DOI: 10.1111/pedi.12589

WILEY ISPAD

ePOSTER SESSIONS

ePoster Session 01 - Technology

eP001
Wearable technology (MI Band and Yu Band) a boon for type 1 diabetic adolescent in west Delhi school children

V. Sharma[1], S. Sinha[1]

[1]*Guru Gobind Singh Indraprastha University, School of Biotechnology, New Delhi, India*

Objective: To develop methods for control and monitor of blood sugar levels in type 1 adolescent diabetic via wearable technology (MI Band and Yu Band). To study effects of daily life routine activities on type 1 diabetic adolescent school children by a wearable devices on blood sugar levels.
Method: Total of 48 type 1 diabetic adolescent school children were taken as subject with an equal ratio of male and female and age group between 10 to 16 years in west Delhi school area, India. Wearable monitoring devices like MI band and Yu Band were put on the wrist of type 1 diabetes patient for 30 days. In all subjects, blood glucose was measured on daily basis with day to day data of their monitoring of step count, calorie burnt, insulin dose, motion time i.e. every time when your body was in motion, sleep monitoring (deep sleep, light sleep, wake up time), calorie consumption, monitoring heart rate to know daily routines and recording them for health purpose.
Result: Present results shown that both wearable device (MI band and Yu Band) reading showed there was a normal heart rate, more calorie burnt with better control of sugar control and average good sleep count in more physically workout, include walking in school children of type 1 diabetic adolescent compared to less physically workout diabetic patients. Both device reading showed that after changing lifestyle routine among less physically active type 1 diabetic adolescent, their blood sugar levels normalize with less requirement of insulin injection dose
Conclusion: Both MI Band and Yu Band showed equal result and there was no change in data from both the devices on the type 1 adolescent diabetic patient. By using, these wearable devices ensured their health awareness with more concerned towards exercising and burning of calories for better control of blood glucose levels.

eP002
Flash monitoring system and adverse reactions

L. Mentesidou[1], M. Xatzipsalti (Chatzipsalti)[1], A. Kourti[1], K. Kouloufakou-Gratsia[1], K. Patouni[1], D. Delis[1], A. Vazeou[1]

[1]*"P. & A. Kyriakou" Children's Hospital, Diabetes Center, A' Department of Pediatrics, Athens, Greece*

Objectives: FreeStyle Libre,(FSL) is a new flash glucose monitoring system which is currently in use in every day clinical practice. Limited data exist regarding the adverse events of FSL. Aim of the study is to evaluate the existence of adverse events and troubleshooting in everyday clinical practice in children and adolescents with type1 diabetes (T1D).
Methods: Fifty-one T1D patients (30 males), with mean (SD) age 10.7 (5.5) years and median disease duration 3.4 (range 0.18-20.3 years) used FSL for a median duration of 98 days (range 14-406). The median number of sensors used was 7 (range 1-29).The subjects were asked for the presence of local skin reactions or troubleshooting by a health care professional during their regular visit at the diabetes center based on a questionnaire designed for this purpose.
Results: Local reactions reported by 28/51 (54.9%) patients, 16 (31.3%) had redness/allergic reactions, 6 (11.7%) red spots, 4 (7,8%) bruises, 9 (17.6%) bleeding when inserting the sensor, 3 (5.8%) inflammation requiring local and 2 (3.9%) oral antibiotics, 4 (7,8%) itching sensation, 3 (5.8%) pain, 37 (72.5%) specks of glue and 19 of them (51.3%) had difficulties in removing it. Troubleshooting had 19/51 (37.2%) of the subjects, 5 (9.8%) had problems with starting the sensor, 12 (23.5%) signal loss, 9 (17.6%) error signal. In the majority of patients signal loss was intermittent, however in 10/51 (19.6%) sensor had to be replaced occasionally more than once. Thirty-five (68.6%) used cover to prevent sensor's detachment, 44.6% complained that the sensor was coming out easily (33.6% during the shower, 60.7% during swimming,) Double protection during swimming was used by 14/27 (58.6%). The majority of patients (88.3%) reported overall satisfaction with the device.
Conclusions: Adverse reactions and troubleshooting are common in subjects wearing FSL. The majority of patients chose to wear protective cover to prevent detachment and prolong the life of the sensor.

eP003
A clinic based study of the impact of flash glucose sensing technology on glycaemic control and self-monitoring of blood glucose in children and young people with type 1 diabetes

S. Walton-Betancourth[1], R. Amin[1]

[1]*University College London Hospitals, Paediatric Diabetes and Endocrinology, London, United Kingdom*

Objectives: The FreeStyle® Libre Flash continuous glucose monitoring system (FSL-CGM, Abbott Diabetes Care) is safe and accurate when used by children and young people with diabetes (Edge J et all. 2017). Limited data are available on its long-term benefits in the paediatric population. Our aim was to assess the impact of FSL-CGM on HbA1c concentrations and self-monitoring of blood glucose (SMBG) in children and young people with type 1 diabetes (T1D).
Methods: Data (HbA1c, SMBG) were collected prospectively from people with T1D younger than 19 years old, who chose to start a FSL-CGM. Families were asked to complete a questionnaire on the usability of FSL-CGM. Data were compared using paired t-tests.
Results: 52 patients with T1D were included. 48% were female and 86.5% used insulin pump therapy. Mean age was 12.2 years [Range 3.4 - 18.2] and duration of follow up was 11.7 months [Range 1.9 - 28.3]. Participants used the sensor 3.3 (±1.0) weeks every month. HbA1c reduced from 7.9 ± 1.0% at baseline to 7.6 ± 1.3%. at 6 months (n: 39. p: 0.03), 7.4 ± 0.8%. at 12 months (n: 26. p: 0.27) and 7.0 ± 0.1% at 18 months (n: 4. p: 0.80). Mean daily SMBG by fingerprick reduced from 9.0 (±4.6) pre-FSL-CGM to 2.5 (±2.3) post-FSL-CGM (p: < 0.001). Patients scanned FSL-CGM an average of 13 (±10.2) times a day. 42 families answered the questionnaire: 90.5% liked FSL-CGM, 80.9% found it accurate and 52.4% used both

the glucose trend arrows to guide daily insulin treatment and the ambulatory glucose profile analysis to improve long-term glycaemic control. 6 patients reported mild device related adverse events (50% bleeding and 50% skin irritation).
Conclusions: In our clinic cohort of patients, FSL-CGM was associated with improvement in HbA1c at six months but not thereafter and an important reduction of conventional fingerprick testing. Patient satisfaction was high.

ePOO4
FreeStyle Libre Flash glucose monitoring (Flash GM) system improves glycaemic control and patient quality of life measures in children with type 1 diabetes with appropriate provision of Flash GM education and support by healthcare professionals

D. Pintus[1], S.M. Ng[2]

[1]*Southport and Ormskirk NHS Trust, Paediatrics (diabetes), Ormskirk, United Kingdom,* [2]*Southport and Ormskirk NHS Trust, Paediatrics (Diabetes), Ormskirk, United Kingdom*

Background: The Flash GM system was recently established in diabetes care and its accuracy, safety and user acceptability were demonstrated for the paediatric population in a recent study. In 2017, the UK's Association of Children's Diabetes Clinicians (ACDC) launched a national educational package for training healthcare professionals in delivering Flash GM to children with Type 1 diabetes (T1DM).
Objective: To evaluate patient metabolic outcomes and quality of life scores 3 months following the use of Flash GM system with provision of key education and support by the healthcare professional team using the ACDC Flash GM educational training package.
Methods: 52 children with T1DM were started on Flash GM for a minimum of 3 months. All patients and parents were provided with key education and support on the use of Flash GM using the ACDC guidelines prior to starting the Flash GM system and on fortnightly bases. The Peds QL 3.2 diabetes questionnaire was used to assess the quality of life scores of patients with T1DM and their parents before and after the use of the Flash GM.
Results: 52 children (33 boys and 19 girls) with a mean age of 11.7 years and mean diabetes duration of 4.4 years were evaluated. The mean HbA1c 3 months after starting the Flash GM showed a significant improvement when compared with HbA1c values at 12, 6 and 3 months before starting the Flash GM (HbA1c 58.23 vs 61.36 mmol/mol; p value 0.020; HbA1c 58.79 vs 62.26; p value 0.006; HbA1c 58.51 vs 66.48; p value 0.009 respectively). The PedsQL3.2 diabetes scores showed an improvement in patient quality of life measures following use of the Flash GM (p value 0.011).
Conclusion: Our findings provide promising support for the use of Flash GM system in children with T1DM. Flash GM technology associated with appropriate Flash GM education at the initiation of the technology and regular support by healthcare professionals improves glycaemic control and patient quality of life measures in children with T1DM.

ePOO5
Effectiveness of the MiniMed® 640G insulin pump on pediatric patients

B. Jiang[1], S. Arunachalam[1], A. Zhong[1], P. Agrawal[1], T. Cordero[1], F. Kaufman[1]

[1]*Medtronic, Inc., Northridge, United States*

Objectives: The MiniMed 640G sensor-integrated pump system features automated insulin delivery suspension for predicted low sensor glucose (SG) values ("suspend before low") and automatic restart of insulin delivery, upon SG recovery. Recently, the system has been shown to significantly reduce hypoglycemia risk in pediatric T1D patients without increasing HbA1c (Biester et al., *Diabetes Technol Ther*, 2017). The real-world effectiveness of this low glucose management system on pediatric patients was evaluated, herein.
Methods: Voluntarily uploaded anonymized data of 4576 pediatric users (aged 0-15 years, self-reported) of the MiniMed 640G system were retrospectively analyzed. Glycemic levels on days when the "suspend below low" function was enabled (ON) were compared to those when the function was not enabled (~513k days vs. 35k days). The analyzed metric was the percentage of SG packets, ≤50 mg/dL (≤2.8 mmol/L) (severe biochemical hypoglycemia), ≤70 mg/dL (≤3.9 mmol/L) (biochemical hypoglycemia) and ≥300 mg/dL (≥16.6 mmol/L) (severe biochemical hyperglycemia).
Results: On days with the "suspend before low" function ON versus OFF, the percentage of SG readings ≤50 mg/dL (0.3% vs. 0.7%, P< 0.01) and ≤70 mg/dL (2.4% vs. 4.1%, P< 0.01) was lower. The percentage of SG readings ≥300 mg/dL on days with and without the "suspend before low" function enabled was 4.7% and 4.6%, respectively (P< 0.01).
Conclusions: Automated, predictive insulin delivery functions of the MiniMed 640G system can reduce hypoglycemia without clinically increasing severe hyperglycemia in children.

ePOO6
Performance of a fourth-generation glucose sensor in a cohort of youth aged 2-18 years with type 1 diabetes (T1D)

J. Sherr[1], L. DiMeglio[2], K. Kaiserman[3], L. Fox[4], R. Brazg[5], R. Slover[6], T. Bailey[7], J. Tryggestad[8], E. Tsalikian[9], B. Bode[10], M. Christiansen[11], A. Sullivan[12], B. Kannard[12], T. Cordero[12], J. Shin[12], S. Lee[12], F. Kaufman[12]

[1]*Yale University School of Medicine, New Haven, United States,* [2]*Indiana University School of Medicine, Indianapolis, United States,* [3]*Socal Diabetes, Torrance, United States,* [4]*Nemours Children's Health System - Jacksonville, Jacksonville, United States,* [5]*Rainier Clinical Research Center, Renton, United States,* [6]*Barbara Davis Center for Childhood Diabetes, Aurora, United States,* [7]*AMCR Institute, Escondido, United States,* [8]*Oklahoma University Health Sciences Center, Oklahoma City, United States,* [9]*University of Iowa, Iowa City, United States,* [10]*Atlanta Diabetes Associates, Atlanta, United States,* [11]*Diablo Clinical Research, Walnut Creek, United States,* [12]*Medtronic, Northridge, United States*

Objectives: This study investigated performance of a fourth-generation subcutaneous glucose sensor, intended for 7-day use, in youth with T1D.
Methods: Participants aged 2-18 yrs (n=158) with T1D for ≥1yr were enrolled at 11 U.S. sites to wear two Guardian™ Sensor 3 sensors in the abdomen or buttock. Sensors were connected to a transmitter paired with a Guardian™ Connect system application on a mobile device (standalone system) or a glucose sensor recorder (GSR, transmitter/recorder for sensor-integrated pump systems). A sub-group of participants (n=145) had a 6-hour in-clinic frequent sample test on day 1, 3 or 7 post insertion, where sensor glucose values were compared to YSI plasma reference values every 5-15 minutes (7-18 yrs [n=124], 2-6 yrs [n=2]) or to fingerstick blood glucose values every 5-30 minutes (2-6 yrs [n=19]). Sensor accuracy, as determined by the absolute relative difference (ARD) between sensor and reference values, based on minimum system-required calibrations; within ±20% sensor-reference agreement rate (%20/20); and sensor functional life, for combined abdomen and buttock sites, were determined.
Results: Overall median ARD for the sensor was ~8% and median sensor life was ~150 hours, approximately 90% of the intended use duration (Table).
Conclusions: The excellent performance of the Guardian™ Sensor 3 supports its use in the pediatric population in both standalone and pump/CGM systems, including those that automate insulin delivery.

	Guardian™ Connect System Sensors	GSR Sensors
ARD, overall		
N[a]	3102	2624
N[a] (% YSI), %	93.4	93.2
Mean ± SD, %	10.9 ± 10.7	11.1 ± 10.6
Median, %	8.2	8.3
Agreement Rate, overall		
%20/20†	87.8	86.7
Functional Sensor Life		
N[b]	161	130
Mean ± SD, hours	129 ± 49	129 ± 44
Median, hours	153	149

N[a] = Number of paired sensor-YSI and sensor-SMBG points, for glucose range 40-400mg/dL
N[b] = Number of sensors
† = For reference glucose ≤80 mg/dL, agreement was based on ±20mg/dL.
[Absolute relative difference, agreement rate, and functional sensor life.]

ePOO7
Efficacy of the predictive low glucose suspension algorithm in children and adolescents with type 1 diabetes using an insulin pump: a pilot study

D. Tinti[1], M.C. Castiglione[2], M.G. Ignaccolo[1], R. Roppolo[3], F. Cardella[3], I. Rabbone[1]

[1]University Hospital, Città della Salute e della Scienza, Pediatric Department - Pediatric Endocrinology Unit, Torino, Italy, [2]University of Palermo, Children Hospital 'G. Di Cristina', Palermo, Italy, [3]Children Hospital 'G. Di Cristina', Palermo, Italy

Objectives: Predictive low glucose suspension (PLGS) is an algorithm integrated into a pump distributed in Europe under the name of Medtronic MiniMed™ 640G. We sought to determine efficacy of PLGS in time spent below 70 mg/dL (=3.9 mmol/mol) in a population of children and adolescents with type 1 diabetes (T1D) using an insulin pump with continuous glucose monitoring (CGM) at home. Secondary aim was to find a correlation between the use of PLGS and metabolic control as HbA1c value.
Methods: An observational analysis was conducted on 18 patients (Group A) with T1D aged between 6 and 18 years using a 640G pump attending two clinics (Turin and Palermo, Italy). Matched data of 21 patients (Group B) using pump and CGM without PLGS were collected. Data concerning CGM (mean, standard deviation, percentage of time spent below 70 mg/dL, 70-180 mg/dL and above 180 mg/dL) in the last 4 weeks before enrollment were also evaluated.
Results: Clinical and metabolic data of the two groups are reported as median [IQR] in Table 1. No differences were observed between the two groups regarding clinical and metabolic data and time spent in hypoglycemia, euglycemia and hyperglycemia. Despite the similarity in the mean of glycemic values, standard deviation was different (57.83 mg/dL vs. 157.86 mg/dL, p-value < 0.001) between Group A and B.

Variable	Group A (n=18)	Group B (n=21)
Age (years)	11.1 [7.8-15.5]	11 [8.8-13]
Weight	37.1 [27.6-56.8]	40.5 [26.8-53.9]
Height	145.5 [123.2-159.1]	147 [129.8-156.5]
Duration of T1D (years)	5.1 [3.6-6.8]	7.2 [5.6-9.5]
HbA1c (%)	7.5 [7.1-8.1]	7.5 [6.9-8]
Total daily dose (U/Kg)	0.75 [0.67-0.92]	0.76 [0.63-0.88]

[Table 1]

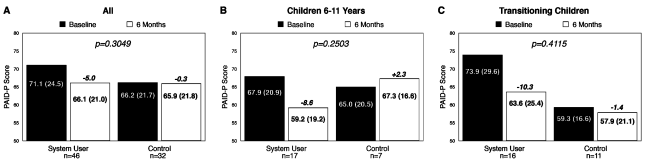
Conclusions: PLGS did not reduce time spent in hypoglycemia nor HbA1c.
However, a lower standard deviation indicates that PLGS may help to reduce glycemic variability.

ePOO8
Use of the accu-chek connect system may reduce diabetes distress in parents of type 1 diabetes children/adolescents

G. Prakasam[1], C. Rees[2], M. Lyden[3], C. Parkin[4], L. Borsa[2]

[1]Sutter Health, Sacramento, United States, [2]Roche Diabetes Care, Indianapolis, United States, [3]Biostat International, Tampa, United States, [4]CGParkin Communications, Inc., Boulder City, United States

Objectives: We hypothesized that use of a blood glucose monitoring system that provides near real-time glucose data and other diabetes information to parents and/or caregivers may reduce parental diabetes-related distress.
Methods: The Accu-Chek Connect system (system) consists of a blood glucose meter, Smartphone app and online data management web portal. The meter connects wirelessly to a user's app which automatically transfers glucose test results to a secure clinician web portals and to parents via text messages and personal web portals. This prospective, cluster-randomized interventional, multi-center, exploratory study included 78 parents of T1D children/adolescents: 46 system use; 32 control. The Problems Areas in Diabetes (PAID-P) scale assessed the impact of system use on diabetes-related distress in parents at 3 and 6 months.
Results: A strong overall trend toward improvement in PAID-P scores was seen at 6 months among all system users but not control parents. (Figure 1A) Notable reductions in diabetes-related distress were seen among parents of children age 6-11 years and parents of children transitioning to self-management. (Figures 1B and 1C). A significant positive correlation between parents and children/adolescents was seen in 6-month PAID scores, r=0.4864, p< 0.0001.
Conclusions: The availability of near real-time glucose data and related information may reduce diabetes-related distress among parents of T1D children/adolescents.



[Figure 1. Change in Diabetes-Related Distress at 6 Months (PAID-P)]

ePoster Session 02 - Psychosocial Issues

ePO09
Benefit-finding among parents of very young children with type 1 diabetes

J. Pierce[1], K. Aroian[2], C. Caldwell[3], J. Lee[4], A. Tamayo[5], R. Farless[6], T. Wysocki[3]

[1]Nemours Children's Health System, Center for Healthcare Delivery Science, Orlando, United States, [2]University of Central Florida, College of Nursing, Orlando, United States, [3]Nemours Children's Health System, Center for Healthcare Delivery Science, Jacksonville, United States, [4]University of Michigan, Ann Arbor, United States, [5]Family Advisor, Miami, United States, [6]Family Advisor, Vero Beach, United States

Objectives: Benefit-finding (BF), positive effects that may result from adversity, has been associated with better psychological well-being in a number of chronic illnesses. BF also predicted increases in self-care for adolescents with type 1 diabetes (T1D). Although not an a-priori focus, we became interested in BF when several parents of young children (YC) with T1D in our qualitative crowdsourcing study spontaneously reported this phenomenon. In the present study, we analyzed responses from subsequent open-ended questions focused on BF.
Methods: 153 parents of children with T1D diagnosed at < 6 years old consented to join our "Parent Crowd." After distributing 13 open-ended questions about raising YC-T1D to participants , the researchers (guided by six Family Advisors) prepared two additional questions focused on BF: "In what ways, if any, has raising a YC-T1D been a positive experience for you?" (Question 14) and "…for your child?" (Question 15). Trained coders used qualitative content analysis to code the data.
Results: Of the 153 participants, 118 (77%) responded to the two questions about BF. The majority of parents identified positive effects of T1D in their responses to Questions 14 (94%) and 15 (92%). A small percentage of parents reported no BF experiences. Analyses revealed that parents reported instances of BF in multiple domains at the levels of the individual child, individual parent, family unit, martial dyad, siblings, social environment, and the healthcare community.
Discussion: This is the first study to identify examples of BF among parents of YC-T1D, which may be a common coping mechanism in this population. Qualitative findings suggest that further research on identifying the mechanisms that lead to BF and its relationship with T1D outcomes may be valuable. A randomized trial to follow this work will examine BF trajectories over time and evaluate whether parental BF mediates or moderates changes in other outcomes among YC-T1D or their parents.

ePO10
Helplessness and fear of negative social evaluations differentially predict parental distress and depression risk in recently diagnosed youth with type 1 diabetes (T1D)

A. Marker[1,2], A. Noser[2,3], S. Majidi[4], M. Clements[5], E. Youngkin[4], S. Patton[2,6]

[1]University of Kansas, Clinical Child Psychology Program, Lawrence, United States, [2]Center for Children's Healthy Lifestyles and Nutrition, Kansas City, United States, [3]University of Kansas, Lawrence, United States, [4]University of Colorado School of Medicine, Barbara Davis Center for Diabetes, Denver, United States, [5]Children's Mercy Hospital, Kansas City, United States, [6]University of Kansas Medical Center, Kansas City, United States

Objectives: To examine associations between fear of hypoglycemia (FH), distress, and depression risk for parents of recently diagnosed youth with T1D.
Methods: In the longitudinal TACKLE T1D study of children with recently diagnosed T1D, 94 parents (Parent age=36.4±6.4 years; 88.3% Mothers; 23.4% Depressed; Child age=7.5±1.4 years; Time since diagnosis=0.6±0.7 years; 89.4% White) completed self-report measures at baseline and 6 months. Measures included the Hypoglycemia Fear Survey (HFS), Problem Areas in Diabetes Survey - Parent Revised (parent distress), and Center for Epidemiological Studies Depression Scale. We used multiple linear regressions to examine if HFS predicted parenting distress and depression risk.
Results: After controlling for baseline distress, baseline HFS Worry significantly predicted increased parenting distress at 6 months (t=2.28, p=.025). HFS Worry at 6 months was also related to concurrent distress (t=5.23, p< .001) and parent depression risk (t=2.87, p=.005). The association between concurrent FH and parenting distress was driven by feelings of helplessness (t=2.25, p=.028; e.g. not recognizing a low; having a low when alone), while the association between FH and parent depression risk was driven by worries about negative social consequences (t=2.65, p=.010; e.g. embarrassment due to a low; looking stupid/clumsy in front of others).
Conclusions: FH was significantly associated with increased parenting distress and depression risk, two factors known to impair T1D management. Importantly, helplessness and worry about negative social consequences of lows were found to differentially predict distress and depression. Future studies should investigate whether targeted treatments for specific fears could improve psychosocial functioning for parents of youth with newly diagnosed T1D.

ePO11
Examining a four-factor structure of the fear of hypoglycemia survey for parents of young children (HFS-PYC)

A. Noser[1], K. Driscoll[2], M. Clements[3], S. Patton[4]

[1]University of Kansas, Clinical Child Psychology, Lawrence, United States, [2]University of Colorado Denver, Pediatrics, Denver, United States, [3]Children's Mercy Hospital, Endocrinology, Kansas City, United States, [4]University of Kansas Medical Center, Pediatrics, Kansas City, United States

Objective: Shepard et al. (2014) recently proposed a four-factor structure for the Hypoglycemia Fear Survey for Parents in 6-18 year-olds. Here, we examine if this four-factor structure also holds for parents of young children (<7 years old) with type 1 diabetes (T1D).
Methods: Parents completed the HFS-PYC and a demographic survey. We used confirmatory factor analysis (CFA) to confirm the four-factor structure previously shown in parents of older youth.
Results: 116 parents participated. Children had a mean age of 5.2±1.35, 50% were male, and 90.5% White. Children's mean HbA1c (M = 8.17±1.09; 66 mmol/mol). CFA identified a 19-item three-factor structure ($\chi^2_{(142)}$= 279.38, $p \leq .001$, RMSEA = 0.08, CFI = 0.94, TLI = 0.93), with factors corresponding to the subscales: Maintain High Blood Glucose; Concerns about Helplessness; Negative Social Consequences Associated with Lows. Items loading on to the Actions to Avoid Lows subscale demonstrated poor fit, so this subscale was dropped. The 3 subscales demonstrated good internal consistency (α's from 0.72-0.90). Correlations between subscales ranged from 0.81 to 0.24.
Conclusions: Our results provide preliminary evidence for the use of a 19-item three-factor model of the HFS-PYC, which can now provide more specific treatment targets to reduce hypoglycemia fear in parents of young children.

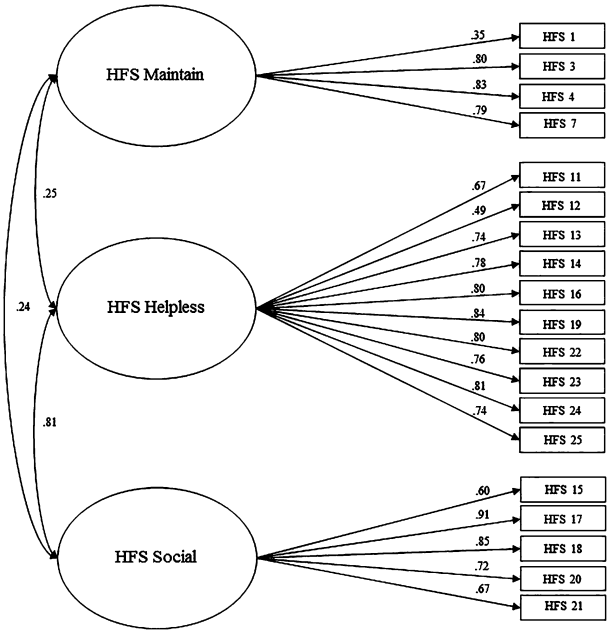


Figure 1. *Confirmatory factor analysis for the Hypoglycemia Fear Survey-Parents of Young Children in parents of young children with T1D. All standardized path coefficients are significant at p ≤ 0.001. [HFS-PYC CFA]*

eP012
Fear of hypoglycemia screening in mothers of children with type 1 diabetes

K.A. Driscoll[1], K. Benson[1], S. Majidi[1]

[1]*University of Colorado School of Medicine, Barbara Davis Center, Aurora, United States*

Objective: To identify mothers of children with type 1 diabetes (T1D) who have clinically elevated fear of hypoglycemia (FOH) as part of a T1D clinic screening initiative.
Methods: 110 mothers of children (ages 10-24 years) with T1D (44% female; 56% pump users; 72% Caucasian; M_{age}= 14.53 ± 2.83 years; $M_{diabetes\ duration}$= 5.5 ± 4.54 years; M_{A1C} = 9.2 ± 2.14) completed the parent version of the Hypoglycemia Fear Survey. Clinical cutoffs of 7 = Maintaining High Blood Glucoses, 24 = Worry/Helplessness About Low Blood Glucoses, and 9 = Worry About Social Consequences were used.
Results: A total of 33 (30%) mothers exceed >1 clinical cutoff with 23% exceeding the cutoff on 1 subscale, 5% on 2 subscales, and 4% on all 3 subscales. Descriptive statistics are in the Table. For those mothers who exceeded the clinical cutoff on >1 subscale and whose children used multiple daily injections (n=17), letters were sent describing screening results and included referrals for outpatient treatment. Mothers who exceeded the clinical cutoff on >1 subscale and whose children used insulin pumps (n=16) were invited to participate in a randomized clinical trial aimed at reducing fear of hypoglycemia (R03DK110459).
Conclusions: This is the first study to implement FOH screening to mothers of children with T1D as part of routine T1D clinic visits. These results highlight the urgent need to assess FOH in mothers of children with T1D and provide intervention for those with elevated fear/worry.

	Maintaining High Blood Glucoses	Worry/ Helplessness About Low Blood Glucoses	Worry About Social Consequences
Subscale Score Minimum/ Maximum*	0-12	0-34	0-20
Mean Score ± SD	3.93 ± 2.86	12.18 ± 8.46	3.65 ± 3.80
Range of Mothers' Scores	0-11	0-32	0-20
% Exceed Clinical Cutoff	19.1%	13.6%	10%

*Higher scores = greater fear/worry

[Fear of Hypoglycemia Descriptive Statistics]

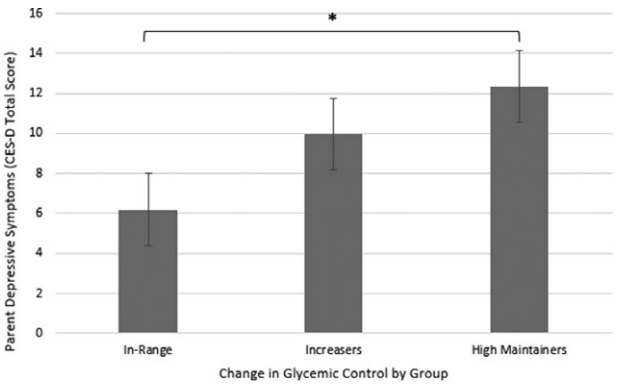
eP013
Parent depression and hemoglobin A1c (A1c) in youth new to type 1 diabetes (T1D)

A. Marker[1,2], A. Noser[2,3], J. Finch[2], S. Majidi[4], M. Clements[5], S. Patton[2,6]

[1]*University of Kansas, Clinical Child Psychology Program, Lawrence, United States,* [2]*Center for Children's Healthy Lifestyles and Nutrition, Kansas City, United States,* [3]*University of Kansas, Lawrence, United States,* [4]*University of Colorado School of Medicine, Barbara Davis Center for Diabetes, Denver, United States,* [5]*Children's Mercy Hospital, Kansas City, United States,* [6]*University of Kansas Medical Center, Kansas City, United States*

Objectives: We examined parental depression and A1c across 6 months in youth new to T1D.
Methods: At baseline and 6 months, 71 parent-child dyads (Child age=7.6±1.4 yrs; T1D duration=0.6±0.7 yrs; 46.5% Male) participated. Parents completed the Center for Epidemiological Studies Depression Scale and we collected child A1c. We categorized families by youth A1c across 6 months: in-range (A1c maintained or decreased to ≤58mmol/mol [7.5%]), increasers (A1c increased from in-range to >7.5%), or high maintainers (A1c >7.5% at both time points). We calculated a linear regression and a one-way ANOVA with post-hoc comparisons.
Results: At baseline and 6 months, 22% and 19% of parents met the clinical cut-off for depression risk, respectively.

22% of youth had in-range A1c, while 36% were increasers, and 42% were high maintainers. Controlling for baseline depression and T1D duration, youth change in A1c predicted parental depression at 6 months (t=2.20, p=.03). Post-hoc, we found parents of high maintainers had more depressive symptoms than those in the in-range group (p=.02). Increasers did not differ from the other groups (p>.25).
Conclusions: Chronically poor A1c was associated with parental depression across 6 months. Results show a potential dose-response relationship between A1c and parental depression. In targeting optimal youth A1c, the impact of parental depression should be considered.



[Average parent depressive symptoms by change in glycemic control over 6 months]

ePO14
Reproductive and sexual health beliefs and behaviors in adolescent and young women with type 1 diabetes in Chile

F. Giraudo[1,2], R. Aedo[2], D. Charron-Prochownik[3], E. Codner[1]

[1]University of Chile, Institute of Maternal and Child Research (I.D.I.M.I.), School of Medicine, Santiago, Chile, [2]Juvenile Diabetes Foundation of Chile, Education Department, Santiago, Chile, [3]University of Pittsburgh, Department of Health Promotion and Development, School of Nursing, Pittsburgh, United States

Objectives: To describe beliefs and behaviors in sexual and reproductive-health of adolescent and young women with T1D in Chile.
Methods: Adolescents and young women with T1D are at risk for reproductive-health problems. 46 young T1D women (age 14-26 years) were recruited at a free educational camp in Chile (January 2017). Reproductive beliefs and behaviors were evaluated with a written standardized questionnaire: perceived susceptibility and severity about unwanted pregnancy and health risks; intentionality of professional help and contraception; perceived benefits, barriers, and self-efficacy regarding sexuality, contraception, preconception control and pregnancy.

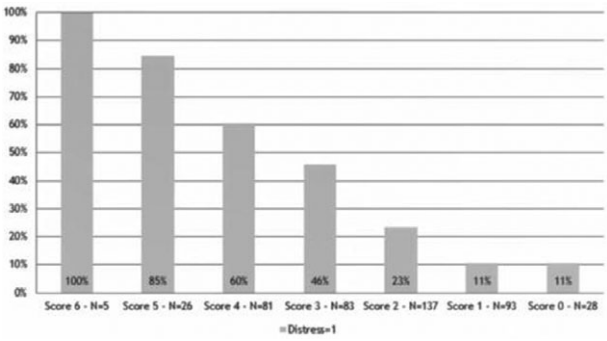
The questionnaire was translated into Spanish and validated by experts in Chile. Each health-belief scale contained 3-23 questions (scores: 1 - 7; higher score being more likely). Results are shown as median. Likewise, perceptions of risk of unwanted pregnancy and risk of mother and child health were evaluated as percentages. All participants/parents signed an assent and consent.
Results: Subjects felt highly susceptible (score:7) with high severity (score:6.1) toward unwanted pregnancy and health risks. High benefits (score:6.8), self-efficacy (score:6.5), and low barriers (score:1.6) to accessing reproductive support were reported. Intentionality of aid was low (score: 2.8), and moderate for contraception (4.1). A moderate perception of risk of pregnancy (%±SD: 66±26) and health risk of mother (62±22) and child (62±27) were observed.
Conclusions: Young women with T1D in this study appeared to know the risks associated with sexual behavior and benefits of preconception counseling (PC), but do not plan to seek help, despite reporting low barriers. These data confirm that PC should begin at puberty to prevent unplanned pregnancies.

ePO15
Clinical detection of diabetes distress (DD) among adolescents with diabetes

D. Novak[1], M. Bøgelund[2], G. Forsander[1]

[1]Inst of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg and the Queen Silvias Children's Hospital, Gothenburg, Sweden, [2]Incentive, Holte, Denmark

Objective: Adolescence is a psychological vulnerable period that is particularly challenging in combination with type 1 diabetes (T1D). Adolescents who develop diabetes distress (DD) risk a decline in self-management behaviors and suboptimal plasma glucose levels. The aim of this study was to find a clinical tool that detects DD among adolescents with T1D.
Method: In the national TODS (Teenagers on Diabetes Sweden) study, all adolescents with type 1 diabetes in Sweden aged 15-18 years (N=2112) were sent an invitation to complete an online survey. The survey included questions regarding: (1) current medical condition and insulin treatment, (2) treatment preferences, (3) DD, (4) self-care behavior, and (5) socio-demographic information. A mean score of ≥3 (moderate distress) on the DDS-2 scale indicates problems with DD.
Results: A total of 453 adolescents participated (males =155, females= 298). The mean ages of respondents were 17 years (SD 0.8) and the mean duration of diabetes was 6.6 years (SD 3.6). The average HbA1c among respondents was 7.7% (SD 3.5) (60.2, SD 14.9 mmol/mol) compared to 8.2% (SD 3.6) (65.6, SD 16.1 mmol/mol) in non-respondents. 44% of the females and 19% of the males reported symptoms of DD ($P < 0.0001$). A multivariate regression identified 6 parameters significantly associated with DD: HbA1c over 6.9% (52mmol/mol), being female, self-assessment of not having a good family economy, not speaking about diabetes with a friend, expressing a wish for more parental involvement, and reporting high blood sugar level. 100% of adolescent with 6 parameters had DD and 60% of adolescents with 4 parameters had DD.
Conclusion: DD is common among Swedish adolescents especially among females. Clinicians should routinely monitor for DD particularly when treatment targets are not met. Using key questions (do you speak to a friend about diabetes? do you wish for more parental involvement?) can help to identify adolescents with risk of having DD.



[Diabete distress score]

ePO16
Prevalence of attention-deficit/hyperactivity disorder in children and adolescents with early onset type 1 diabetes compared to general population peers

K. Castillo[1,2], A. Stahl-Pehe[1,2], C. Bächle[1,2], K. Lange[3], T. Tönnies[1,2], L.M.E. Lindner[1,2], R. Holl[2,4], J. Rosenbauer[1,2]

[1]German Diabetes Centre, Leibniz Institute for Diabetes Research at Heinrich Heine University Duesseldorf, Institute for Biometrics and Epidemiology, Duesseldorf, Germany, [2]German Center for Diabetes Research., Neuherberg, Germany, [3]Hanover Medical School, Medical Psychology Unit, Hanover, Germany, [4]University of Ulm, Institute of Epidemiology and Medical Biometry, Ulm, Germany

Objective: To analyze the prevalence of diagnosed attention-deficit/hyperactivity disorder (ADHD) in 11- to 17-year-olds with type 1 diabetes (T1D) and peers from the general population in Germany and characterize differences between groups.
Methods: Data from T1D patients participating in population-based, nationwide questionnaire surveys (conducted 2009-2010 and 2012-2013) were compared with data from the representative German KiGGS Follow-Up telephone-based survey (KiGGS wave 1, 2009-2012). Patients were classified as having ADHD if they had previously been diagnosed by a doctor or psychologist. Multiple log-binomial regression analyses were conducted adjusting for socio-economic and demographic covariates.
Results: T1D patients (N=1037) comprised 51.3% boys, 27.3% were children (11-13 years) and the mean diabetes duration was 12.2 (SD 1.4) years. Among KiGGS participants (N=5188) 51% were boys and 43.2% were children. The overall prevalence of ADHD diagnosis was estimated to be 6.6% in the T1D group and 6.1% in peers (adjusted relative risk (RR)=1.14 [95%-CI 0.88-1.47; p=0.313]). But the risk for ADHD in T1D patients compared to peers was only

higher in girls (adjusted RR_{girls}=1.90 [95%-CI 1.17-3.07; p=0.009]) and not in boys (adjusted RR_{boys}=0.97 [95%-CI 0.72-1.31; p=0.849]). Among ADHD cases, the frequency of boys was similar in both samples (68.6% in T1D study vs. 80.6% in (KiGGS), adjusted RR=0.84 [95%-CI 0.71-1.01; p=0.065]). In addition, the proportion of adolescents in the age group 14-17 years was higher in the T1D study than in the KiGGS group (72.5% vs. 56.7%), adjusted RR=1.25 [95%-CI 1.04-1.50; p=0.015]). No differences were found between T1D patients and peers with ADHD regarding the possible associations with socio-economic status and family structure.

Conclusion: Prevalence of diagnosed ADHD was similar between children and adolescents with T1D and their peers. However, differences were observed regarding age and sex distributions.

ePoster Session 03 - Diabetes Care

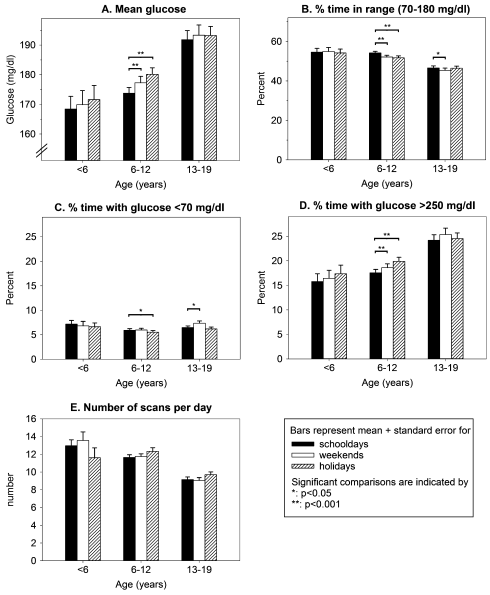
eP017

Glucose control during days at school, weekends, and school holidays in youths with type 1 diabetes: multicentre analysis based on 62,500 days with continuous glucose monitoring

J.M. Hermann[1,2], T. Biester[3], D. Meraner[4], C. Freiberg[5], J. Mirza[6], H. Müller[7], R.W. Holl[1,2], for the DPV initiative

[1]*University of Ulm, ZIBMT, Institute of Epidemiology and Medical Biometry, Ulm, Germany,* [2]*German Center for Diabetes Research (DZD), München-Neuherberg, Germany,* [3]*Diabetes-Centre for Children and Adolescents, Auf der Bult, Hannover, Germany,* [4]*Medical University of Innsbruck, Department of Pediatrics, Innsbruck, Austria,* [5]*University Medical Center Göttingen, Georg August University Göttingen, Department of Pediatrics and Adolescent Medicine, Göttingen, Germany,* [6]*Children´s Hospital, Amsterdamer Str., City of Cologne, Cologne, Germany,* [7]*DKD Helios Hospital Wiesbaden, Department of Pediatrics and Adolescents, Wiesbaden, Germany*

Objectives: School holidays have been assumed to be associated with worse glycaemic control. Real-time (CGM) or intermittent scanning continuous glucose monitoring (FGM) allows assessment of glucose on a daily basis. We examined differences in glucose profiles between days at and off school in paediatric patients with type 1 diabetes (T1D).
Methods: 62,500 days with glucose profiles from n=458 patients (T1D duration ≥1 year, 53% male, 75% pump use, median HbA1c: 54 [48, 61] mmol/mol) from the German/Austrian DPV registry were analysed by preschool children (<6 yrs, n=40), school children (6-12 yrs, n=220), and adolescents (13-19 yrs, n=198). Mean glucose, time in range (TIR, 70-180 mg/dl), and time < 70/>250 mg/dl were compared between school days and weekends or holidays using Wilcoxon signed rank tests for paired data.
Results: School children had less favourable glucose profiles on days off compared with days at school (Figure, all p< 0.002). Adolescents showed differences in TIR and time < 70 mg/dl between school days and weekends (both p< 0.03), but not holidays. No significant differences in glucose profiles were found in preschool children. The number of scans/day in FGM users (n=374) did not differ between days at or off school in neither age group (p>0.05).
Conclusions: Real-world CGM/FGM data indicated slightly less favourable glucose profiles on days off school in school-aged youths with T1D. However, differences were lower than expected.



[Measures of continuous glucose monitoring data for days at and off school by age group]

eP018

Factors influencing diabetes control in children using insulin pump from diabetes type 1 diagnosis

K. Piechowiak[1], K. Dżygało[1], K. Indulska[1], A. Szypowska[1]

[1]*Medical University of Warsaw, Warsaw, Poland*

Objectives: Continuous subcutaneous insulin infusion (CSII) is a first choice treatment of type 1 diabetes (T1D), especially in young children, in many places. Early pump initiation in children has many benefits. There are no guidelines when this treatment should be started. The aim of this study was to find factors influencing diabetes control in children with T1D using insulin pump from diabetes diagnosis.
Methods: There were included 163 children (81 boys) with newly diagnosed T1D, with mean age at diagnosis 7.7 years (1.2-15.2 years), treated from diabetes diagnosis with insulin pump. Following parameters were analysed: fasting C-peptide, GADA, ICA, IA2A antibodies, BMI z-score, total daily dose (TDD), basal percentage of the total daily insulin dose at the time of diabetes diagnosis and during 3-year-follow up. At the end of follow up patients were divided into two groups according to their metabolic control: HbA1c< 7.5% and HbA1c≥7.5%.
Results: Patients with HbA1c< 7.5% at the end of follow up had lower HbA1c at diagnosis (11.7% vs 12.6%; p=0.018), lower GADA level (p=0.001), lower HbA1c at 1st year (6.7% vs 7.3%; p=0.000) and at 2nd year (6.8% vs.7.7%; p=0.000). We found a positive correlation between HbA1c at the end of follow up and: age at onset (p=0.033), HbA1c at onset (p=0.007), HbA1c at 1st year (p=0.000), HbA1c in 2nd year of observation (p=0.000), GADA presence (p=0.000), insulin requirement at 2nd year (p=0.014) and at 3rd year (p=0.003). Logistic regression analysis showed that HbA1c at diagnosis (p=0.012), age at diagnosis (p=0.047), GADA presence (p=0.031), basal percentage at 3rd year (p=0.032), HbA1c at 1st year (p=0.000), HbA1c at 2nd year (p=0.000) influenced HbA1c< 7.5% after the 3rd year of follow-up.
Conclusions: Initiation of insulin pump from onset of diabetes provides benefits in patients with lower HbA1c and younger age at diabetes diagnosis and less intense autoimmune process. Further studies are needed.

eP019

Comparing the characteristics of children and adolescents with type 1 diabetes on insulin pump and other insulin regimes in our centre

Y.Y. Lim[1,2], M.M. Nakhla[3], L. Legault[3,4]

[1]*National University Hospital, Paediatrics, Singapore, Singapore,* [2]*National University of Singapore, Paediatrics, Singapore, Singapore,* [3]*Montreal Children's Hospital, McGill University Health Centre, Division of Endocrinology, Montreal, Canada,* [4]*McGill University, Department of Pediatrics, Division of Endocrinology, Montreal, Canada*

Background: Continuous subcutaneous insulin infusion (CSII) via the insulin pump is a physiologic method of insulin delivery, with a "basal" delivery of insulin with prandial "boluses." There is no consistent evidence that glycemic control is better with CSII compared to Multiple Daily Injections (MDI).
Objectives: To compare the characteristics of patients with Type 1 Diabetes (T1D) on insulin pump and other insulin regimes in our centre. We hypothesized that the BMI of patients on insulin pumps would be higher due to greater dietary flexibility, or fear of hypoglycaemia causing them to eat food higher in carbohydrates and adopting a more sedentary lifestyle.
Methods: 555 children and adolescent subjects with T1D aged less than 18 years old at the time of analysis, who attended the pediatric diabetes clinic at the Montreal Children's Hospital between the years

2015-2016, were included in this study. The data was obtained from the hospital's database.
Results: Out of the 555 patients, 50.6% of them are boys. The average age of these patients is 13.8 years old. The average HbA1C is 8.8%. 30.3% patients are on the insulin pump (IP), 41.4% on the basal-bolus regime (BB), 17.1% on a modified basal-bolus regime (MBB) using intermediate-acting insulin in the morning and basal insulin at night, and ultra-short acting insulin for breakfast and supper, 0.08% on an insulin regime using intermediate-acting insulin and ultra-short acting insulin (NPH regime),and 0.03% on premix insulin regime. The best HbA1c is in the IP group at 8.3% and the worst is in the premix group at 11.4% (p< 0.001). The highest body mass index (BMI) z-score is in the MBB group at 1.08 which is significantly more than the BMI in the IP group at 0.47 (p< 0.001).
Conclusions: In our centre, the patients using insulin pumps have better diabetes control compared to patients on other insulin regime. The BMI is also not higher in patients on insulin pumps, which is contrary to our hypothesis.

ePO20
Total remission in type 1 diabetes is rare and occurs primarily in older adolescents

T.M. Kapellen[1], S. Lanzinger[2,3], K. Nagl[4], B. Karges[5], K. Konrad[6], H. Haberland[7], D. Dunstheimer[8], R.W. Holl[2,3]

[1]*University of Leipzig, Hospital for children and adolescents, Leipzig, Germany,* [2]*University of Ulm, Institute of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany,* [3]*German Center for Diabetes Research (DZD), Munich-Neuherberg, Germany,* [4]*Medical University Vienna, Department of Pediatrics and Adolescent Medicine, Vienna, Germany,* [5]*RWTH Aachen University, Division of Endocrinology and Diabetes, Aachen, Germany,* [6]*Elisabeth-Krankenhaus Essen, Department of Pediatrics, Essen, Germany,* [7]*Sana Klinikum Lichtenberg, Department of Pediatrics, Berlin, Germany,* [8]*Klinikum Augsburg, Department of Pediatrics, Augsburg, Germany*

Objective: Total remission in type 1 diabetes (T1DM), defined as no need of insulin for a certain time, is rare. Moreover, our knowledge on this condition is based on case reports or small cohorts. We analyzed patients < 21 years with total remission documented in the German/Austrian/Luxemburg/Swiss DPV database.
Methods: We investigated 59374 patients with T1DM < 21 years and diabetes duration ≤2 years (March 2017). Definition for total remission was no insulin treatment for at least 2 visits with a diabetes duration between 10 days and 2 years. Patients without documentation of insulin requirement were excluded. Age of the patients, height, weight, diabetes duration, duration of total remission, DKA at onset and betacell antibody (AB) positivity were analyzed. We compared patients with total remission (TR), partial remission defined as IDAA1c ≤9 (PR) and no remission (NR).
Results: 237 patients with TR, 33126 patients with PR and 26011 with NR were identified. TR persisted for 124 days (median), lower quartile 63 days, upper quartile 265 days. Median age at onset differed significantly with the highest age in TR (10.4 years) compared to PR (9.5 years) and NR (9.7 years) (p< 0.005). Patients with TR were less likely to present with DKA at diabetes onset (2.1% vs 7.9% vs. 8.4%, p< 0.005). There was no difference in AB positivity between TR (85.8%), PR (85.3%) or NR (86.4%). Insulin requirement at the last documented visit and frequency of blood glucose measurement were significantly lower in the TR group. HbA1c at the last documented visit was significantly lower in TR and PR compared to NR (6.56% vs. 6.90% vs. 8.05%, p< 0.001).
Conclusion: Total remission occurs rarely in T1D. In the DPV registry, TR was reported in 0.3% of the children, adolescents and young adults analyzed. These patients were older, had a milder onset with less frequent DKA, and a lower HbA1c with lower insulin requirement even after the end of remission.

ePO21
Changing together: adolescents attitudes towards a new adolescent diabetes service that incorporates group psychoeducation and peer interaction opportunities

C. Crowe[1], H. Fitzgerald[2], G. Mellon[2], H. O'Byrne[2], M. Comerford[2], E. Roche[2], A. O'Neill[2], C. Mc Donnell[2]

[1]*The National Children's Hospital, Tallaght, Diabetes, Dublin, Ireland,* [2]*National Children's Hospital Tallaght, Dublin, Ireland*

Objectives: Allen (2009) argued that in preparing adolescents for transition, services must be creative in determining how the needs of young people might best be met in paediatric settings. This study assessed and compared the attitudes of adolescents on different aspects of a creative new adolescent diabetes service that used group rather than individual psychoeducation methods and promoted interaction and peer connectedness.
Methods: 42 adolescents aged 16-18 years completed an anonymous questionnaire examining attitudes towards the adolescent diabetes clinic in comparison to the traditional general clinic.
Results: 79% of adolescents preferred the Adolescent Clinic, 14% preferred the general clinic, while 7% were undecided. Of those that preferred the Adolescent clinic model, reasons included a) Getting to meet peers with diabetes (94%); b) Gaining comfort from others experiencing similar thoughts and emotions about diabetes (66%); c) Learning things about diabetes I did not know before from my peers (51%). Of the 14% who preferred the general clinic, the most frequently cited reason for this (4 of the 6 individuals) was feeling uncomfortable talking in front of others. Regardless of clinic preference, 81% of the adolescents reported that they learned something new at the Adolescent Clinic, while the average rating for the Adolescent clinic experience was 9/10. The most important characteristic of good clinic practice endorsed by 38 of the 42 adolescents was the opportunity to meet health care professionals without parents present.
Conclusions: When making decisions about adolescents' diabetes care it is important that adolescents, are an integral part of the process of informing and developing service delivery. Moving from individual diabetes management to recognizing the psychosocial benefits of group management may offer unique opportunities to promote learning through role modelling and connectedness between young people with diabetes.

ePO22
Providing an integrated model of care to young people with diabetes: a New Zealand perspective

S. Fraser[1], V. Lowe-Reid[1], V. Corbett[1], R. Paul[1], J. McClintock[1]

[1]*Waikato Regional Diabetes Service, Hamilton, New Zealand*

Background: Care from a specialised multidisciplinary team is recommended for teenagers and emerging adults with diabetes due to the high prevalence of psychosocial stressors and difficulty in achieving glycaemic targets in these age groups. Despite advances in technology and treatment options, the optimal model for delivery of specialised multidisciplinary care for youth and young adults with diabetes is not clear.
Objective: Our objective was to determine whether restructuring our Youth and Young Adult Diabetes Clinic to a 'one-stop multidisciplinary shop' improved access of patients to each member of the team, reduced the “did not attend” rate, and improved satisfaction with service provision.
Method: With no change in resource provision, a 'wrap-around' service was developed that allows patients to see all team members in one appointment. Patients complete psychosocial screening questionnaires to identify barriers to glycaemic control. The results of these screening tools help to individualise the approach and provide for a more directed focus on diabetes management skills for the teenager/emerging adult. Patients also receive standard care such as having their HbA1c and screening for microvascular complications performed, and their treatment regimen optimised.

Results: The new model of care has allowed a greater number of patients to see the clinical psychologist, diabetes dietitian and endocrinologist on a more regular basis. Additionally, those who did not attend their first appointment were "captured" within the next six months, resulting in a reduced "did not attend rate" over a 12 month period of 17%.
Conclusion: The new integrated model of practice has improved access of youth and young adults with diabetes to multidisciplinary team input. Feedback from patients and staff on the new clinic model has also been positive highlighting the ability to provide both comprehensive and patient-centred diabetes care.

ePO23
Home telemedicine clinic model significantly improves confidence, self-efficacy and communication in young adults with type 1 diabetes

J. Raymond[1], C. Cain[2], C. Berget[2], K. Ketchum[2], M. Reid[1], J.'. Thomas[3], G. Klingensmith[2]

[1]Children's Hospital Los Angeles, Los Angeles, United States, [2]University of Colorado, Barbara Davis Center, Aurora, United States, [3]University of Colorado, Aurora, United States

Objectives: To determine if participation in a home telemedicine clinic model (CoYoT1 Clinic) by young adults (YA) with type 1 diabetes (T1D) improves self-efficacy and disease management.
Methods: CoYoT1 Clinic was designed to meet the diabetes care needs of YA with T1D through home telemedicine. Strengths, self-efficacy, and disease management were assessed using three measures - Diabetes Strengths and Resilience for Adolescents (DSTAR-Teen), Self-Efficacy for Diabetes (SED), and Self-Management of Type 1 Diabetes in Adolescence (SMOD-A). Outcomes were compared to YA receiving treatment as usual in the clinic (control).
Results: Measured by DSTAR-Teen, YA with T1D participating in CoYoT1 reported increased confidence in their abilities to manage symptoms over the study year, while control patients reported reductions in confidence (p=0.007). CoYoT1 patients also reported increased diabetes self-efficacy, compared to controls, who reported no change (p=0.03). Finally, CoYoT1 patients reported improved ability to communicate with others about their diabetes over the study year compared to control patients, who reported reduced abilities (p=0.02), as measured by SMOD-A.
Conclusions: Delivering diabetes care by home telemedicine increases YA confidence in diabetes management, self-efficacy, and diabetes-specific communication. These steps may be critical to improving long-term diabetes management and decreasing diabetes-related complications.

Variable - Mean (SD)	CoYoT1 Intervention - Baseline (n=45)	CoYoT1 Intervention - One-Year (n=33)	Control - Baseline (n=43)	Control - One-Year (n=30)	Group x Time Interaction p-value
DSTAR-Teen - Total	46.5 (7.5)	47.8 (7.8)	47.5 (6.4)	44.7 (7.7)	0.01*
DSTAR-Teen - Confidence	23.8 (4.1)	25.2 (3.8)	24.7 (3.5)	23.7 (4.1)	0.007*
DSTAR-Teen - Management	22.7 (4.4)	22.6 (4.9)	22.8 (4.0)	21.0 (4.8)	0.16
SED	133.3 (32.2)	143.5 (20.9)	129.6 (36.2)	129.3 (23.8)	0.03*
SMOD-A - Collaboration with Parent	6.7 (5.0)	6.8 (5.8)	8.0 (6.3)	5.2 (4.2)	0.32
SMOD-A - Care Activities	28.3 (7.5)	29.5 (7.5)	28.6 (6.8)	28.7 (4.6)	0.53
SMOD-A - Problem Solving	16.9 (3.8)	17.8 (3.2)	16.9 (4.2)	17.0 (3.4)	0.15
SMOD-A - Communication	17.7 (6.5)	19.9 (5.5)	18.0 (5.2)	16.9 (4.7)	0.02*
SMOD-A - Goals	16.6 (4.3)	16.1 (4.8)	16.7 (4.8)	17.0 (4.2)	0.87

[Self-Efficacy and Disease Management]

ePO24
Home telemedicine significantly improves diabetes distress in young adults with type 1 diabetes

M. Bakhach[1], C. Cain[2], C. Berget[2], K. Ketchum[2], M. Reid[1], J.F. Thomas[3], G. Klingensmith[3], J. Raymond[1]

[1]Children's Hospital of Los Angeles, Los Angeles, United States, [2]University of Colorado, Barbara Davis Center, Aurora, United States, [3]University of Colorado, Aurora, United States

Objective: To assess whether a home telemedicine clinic model (CoYoT1 Clinic) designed to meet the care needs of young adults (YA) with type 1 diabetes (T1D) impacts diabetes distress and psychological functioning.
Methods: YA participating in CoYoT1 Clinic completed 4 visits (3 online, 1 in-person) over 12 months using web-based videoconferencing from any location. CoYoT1 Clinic consisted of an individual appointment with a provider and a group appointment with other YA with T1D. Changes in distress and psychological functioning were assessed by three measures - Euro-Qol 5 Dimensions of Health (EQ-5D), Center for Epidemiologic Studies Depression Scale (CES-D), and Diabetes Distress Scale.
Results: 45 patients participated in CoYoT1 Clinic and 43 patients served as controls. For EQ-5D, both groups reported higher levels of depression and anxiety over study period (p=0.01), but controls reported larger increases than CoYoT1 patients (p=0.07). On CES-D, controls reported higher levels of depression when compared to CoYoT1 patients (p=0.03), and both groups had increased scores during the study period. In regard to diabetes distress, CoYoT1 participants reported decreased diabetes distress over the study period, but controls experienced higher levels (p=0.03).

Variable - Mean (SD)	CoYoT1 Intervention-Baseline (n=45)	CoYoT1 Intervention-One-Year (n=33)	Control-Baseline (n=43)	Control-One-Year (n=30)	Group x Time p-value
EQ-5D-Anxiety & Depression	1.5 (0.7)	1.6 (0.7)	1.3 (0.7)	1.8 (0.9)	0.08
CES-D	10.7 (9.8)	12.4 (9.7)	14.7 (11.9)	20.6 (13.0)	0.26
Diabetes Distress Scale - Total	2.1 (0.9)	1.8 (0.7)	2.0 (0.8)	2.2 (0.7)	0.03*
Emotional Burden	2.3 (1.2)	2.2 (1.2)	2.2 (1.2)	2.7 (1.2)	0.12
Physician-Related Distress	1.4 (0.7)	1.1 (0.3)	1.2 (0.4)	1.3 (0.5)	0.13
Regimen-Related Distress	2.6 (1.3)	2.2 (1.0)	2.4 (1.1)	2.5 (1.0)	0.12
Interpersonal Distress	1.8 (1.0)	1.6 (0.9)	1.8 (1.0)	2.1 (1.2)	0.07

[Diabetes Distress]
Conclusion: Home telemedicine for YA with T1D positively impacted diabetes distress. This positive psychological outcome may result in improved diabetes management and glycemic control in the future.

ePoster Session 04 - Exercise

ePO25
Feasibility of a physical activity intervention for children with type 1 diabetes: steps to Active Kids with Diabetes (STAK-D)

H. Quirk[1], C. Glazebrook[2], H. Blake[3]

[1]*Sheffield Hallam University, A124, Collegiate Hall, Sheffield, United Kingdom,* [2]*University of Nottingham, Division of Psychiatry and Applied Psychology, Faculty of Medicine & Health Sciences, Nottingham, United Kingdom,* [3]*University of Nottingham, School of Health Sciences, Faculty of Medicine & Health Sciences, Nottingham, United Kingdom*

Objectives: This study describes the development and feasibility evaluation of a physical activity intervention for children with type 1 diabetes called 'Steps to Active Kids with Diabetes' (STAK-D). It aims to explore the feasibility and acceptability of the intervention and study design.
Methods: Thirteen children aged 9-11 years and their parents were recruited from a paediatric diabetes clinic in the UK. A process evaluation was conducted alongside a two-arm randomised feasibility trial, including assessment of rate of recruitment, adherence, retention, data completion and burden, fidelity of intervention delivery and adverse events. Secondary outcome measures included; physical activity, self-efficacy and parental fear of hypoglycaemia. Qualitative interviews with children (n=9), parents (n=8), healthcare professionals (n=3) and STAK-D volunteers (n=8) explored intervention acceptability. Interviews were analysed thematically.
Results: Rate of recruitment was 25%, with 77% retention at 3-month follow-up. Study burden was low, data completion was high and the intervention was delivered as per protocol. No serious adverse event was reported. Engagement with intervention materials was generally good but attendance at group activity sessions was low. Interview analysis identified:

1. barriers to recruitment, including lack of clinic endorsement;
2. motivation for participation, including the desire to learn about activity level;
3. facilitators of engagement, including enjoyment and family involvement;
4. experience of data collection, including the acceptability of wrist-worn accelerometers, and;
5. perceived benefits of STAK-D, including increased understanding, parental engagement and family-oriented physical activity.

Conclusions: STAK-D was feasible and acceptable to children, their parents and healthcare professionals, but group sessions may be logistically difficult. Recruitment and retention may be improved with a clinic-wide approach to recruitment.

ePO26
Barriers to exercise in youth with T1D: clinical lessons learnt from a qualitative analysis

T. Chetty[1], L. Fried[2], H. Roby[2], J. Nicholas[2], T. Jones[2,3,4], D. Cross[2,4], E. Davis[2,3,4]

[1]*Princess Margaret Hospital, Department of Paediatric Endocrinology, Perth, Australia,* [2]*Telethon Kids Institute, Perth, Australia,* [3]*Princess Margaret Hospital, Perth, Australia,* [4]*University of Western Australia, Perth, Australia*

Background: Physical activity remains challenging for young people with T1D despite may recognised physical and psychological benefits.
Objectives: To explore the challenges experienced by young people with T1D when they are physically active. To identify gaps in information available to enable young people to exercise safely.
Methods: A purposefully selected sample of adolescents and young adults (AYA) aged 13-25 yrs (n=22) and their parents (n= 15) participated in a total of 10 nominal focus groups; two for each age group (13 to 15; 16 to 18; and 19 to 25 years) and four parent groups. Data were transcribed and analysed inductively using NVivo software.
Results: Study results confirmed that exercise is a major challenge for AYA with T1D. Thematic analysis characterized the challenges to exercise into physical and emotional/social factors. AYA and parents both identified their main challenge as maintaining a stable BGL during exercise. Swimming and hypoglycemia, especially in cold water, were highlighted as specific physical challenges. Other themes identified include 'what works', 'what's needed' and 'where to get information' to improve exercise management. Young people and their parents described a need for individualised strategies to help them problem solve the complexities of exercise management. They described current learning based on “trial and error” and highlighted a need for specific guidance on how to effectively refine strategies. Participants identified a range of ways they would like to receive information or support for managing T1D when active, including from mentors, same-age support groups, informal networks, camps, workshops, mobile in-the-moment apps and at clinic.
Conclusions: Themes identified from this study will inform the direction of future research in this area, provide direction for clinicians navigating the exercise consultation, and contribute to the development of physical activity guidelines that meet the needs of AYA with T1D.

ePO27
Psychosocial barriers to exercise in youth with type 1 diabetes

L. Fried[1], T. Chetty[2], H. Roby[3], J. Nicholas[2], T. Jones[2], D. Cross[3], E. Davis[2]

[1]*Telethon Kids Institute, Health Promotion and Education Research, Perth, Australia,* [2]*Princess Margaret Hospital, Perth, Australia,* [3]*Telethon Kids Institute, Perth, Australia*

This study used a qualitative methodology, specifically nominal focus groups, to explore the challenges experienced by young people with type 1 diabetes when they are physically active. A purposefully selected sample of adolescents and young adults (AYA) with T1D aged 13 to 25 years (n = 50) and their parents participated. A total of ten focus groups were conducted with two for each age group (13 to 15; 16 to 18; and 19 to 25 years) and four parent groups.

Study results showed that physical activity presents a number of psychosocial challenges for AYA including other people's reactions, stopping physical activity to carry out management tasks, lack of community knowledge, and dealing with the physiological effects of anxiety. Parents identified their main challenge as how to transfer responsibility for management to their adolescent children and to develop trust in them. Although the older AYA age groups found it easier to discuss the challenges associated with physical activity, they generally agreed with the younger adolescents about the main challenges experienced.

Themes developed when discussions were analysed using NViVo software have direct implications for the development of better guidelines to enable adolescents to manage T1D while being physically active. An improvement in teacher, coach and peer knowledge of T1D, specifically in relation to physical activity and based on generic and individualised information, is needed. AYA want to be trusted more and not over-ridden, except when experiencing lows or highs. AYA also identified the need to have good self-knowledge and develop strong problem solving skills. Parents need specific guidance about transfer of autonomy and deaing with their own anxiety. Future guidelines will need to provide individualised recommendations and to address the perception that what works when managing T1D and physical activity involves some science but also a lot of luck.

ePO28
A healthy mind in a healthy body - physical activity in children with DT1

G. Deja[1], E. Wozny[2], S. Szupienko[2], B. Tarsa[2]

[1]Medical University of Silesia, Dept. of Children's Diabetology, Katowice, Poland, [2]Medical University of Silesia, Dept. of Children's Diabetology - Student's Scientific Society, Katowice, Poland

Aim: To estimate the impact of physical activity (PA) on clinical parameters and glycemic control in children with DT1 and assessment of children knowledge about undertaking PA.
Methods: The study included 105 patients of our diabetes center in age of 8-20 years with DT1 (57% boys) suffering from at least 1 year (mean 5,7 years), with a mean HbA1c of 7,4%. Data of weight, height, blood pressure (BP) and lipid panel were collected. The Survey about knowledge concerning PA was conducted with every patient (19 questions). Regularity, duration and intensity of the PA were defined according to METs scale.
Results: 69,2% of patients have BMI in norm (centile scale), lipid disorder appears in 29,5% children and BP in 81,2% cases are in standard range. All children attended P.E. classes (2-4 times/week). 57,1% of children run the medium-intense PA in the METs scale (about 6h/week). Children performing extra sport get lower HbA1c (7,3% vs 7,8%) and have shorter T1D duration (<5 years). We didn't observed correlations between PA and other clinical parameters (BMI, lipid profile and BP). The blood glucose level is measured before exercise in 92% of cases, the most children know the range of recommended values. 63,8% of questioned are using a pump, moreover 53,7% of them detach it for the exercise. 88% of respondents eat snack with a low/medium GI dependent on glycemic level before PA, 12,9% do it routinely. After-exercise hypoglycemia occasionally occurs in 64,6% comparatively less children had hyperglycemia 44,8%.
Conclusions: Our study shows that children with DT1 develop a high awareness in the way of undertaking the exercises. More frequent PA is associated with lower HbA1c, shorter T1D duration and male sex.

ePO29
Acute effects on glycemia of different types of exercise in youths with type 1 diabetes

S. Särnblad[1,2], E. Ponsot[3], L. Holmgren[1], F. Kadi[3]

[1]Örebro University Hospital, Department of Pediatrics, Örebro, Sweden, [2]School of Medicine, Faculty of Medical Sciences, Örebro University, Örebro, Sweden, [3]School of Health Sciences, Faculty of Medical Sciences, Örebro University, Örebro, Sweden

Objectives: Regular exercise is often associated with a reduced Hba1c in subjects with type 1 diabetes (T1D). However, the effect seems to differ between different types of exercise. The aim of this study was to investigate the acute effects on glycemia of three types of exercise bouts.
Methods: Male subjects with T1D aged 15-18 years old were invited. Four exercise bouts (control, resistance, intermittent and aerobic) with a duration of 45 minutes were performed in a randomized order. The sessions were standardized using maximal oxygen uptake and maximal strength determined prior to the bouts. Basal insulin dosages were reduced and an extra carbohydrate load (0,5 g carbohydrate /kg) was given before the session. Venous glucose samples were drawn at 0, 5, 10, 15, 30, 45 minutes. Plasma glucose values were compared using two-way repeated-measures ANOVA including all sessions.
Results: Eight subjects with mean HbA1c of 54.9±5.3 mmol/mol, mean age 17.5±0.8 years were included. Four subjects used continuous subcutaneous insulin pump. A significant effect of time (P = 0.001), exercise (P=0.001) and an interaction of experimental session and time (P = 0.004) were found in examining change in plasma glucose during exercise. We found a significant effect of time (P=0.001) but no significant effect of session or interaction between sessions and time when comparing continuous and intermittent exercise. There was no significant effect of time, session or interaction between those factors comparing control session and strength exercise. There was a significant difference in change in p-glucose between time point 0 to 45 minutes between resistance and intermittent/aerobic bouts (minus 1.0±1.4, minus 5.1±1.6 and minus 5.4±1.8 mmol/l; P< 0.001).
Conclusion: Plasma glucose during a resistance exercise bout is stable and differ from that of intermittent and aerobic exercise bouts. More concern has to be taken to the type of exercise when advice is given to subjects with T1D.

ePO30
A comparison of daily lifestyle activities across Polish and Italian children with autoimmune diabetes: preliminary results from the DIAPEPSIN study

E. Niechcial[1], A. Krasinska[1], A. Mongiardo[2], L. Bonetti[3], C. Cavalli[3], B. Skowronska[1], P. Fichna[1], A. Scaramuzza[3]

[1]Poznan University of Medical Sciences, Department of Paediatric Diabetes and Obesity, Poznan, Poland, [2]Luigi Sacco Hospital, University of Milano, Department of Paediatrics, Milan, Italy, [3]ASST Cremona, Maggiore Hospital, Paediatric Diabetology Unit, Division of Paediatrics, Cremona, Italy

Objectives: Physical exercise is important for maintaining optimal glycaemic control in children with type 1 diabetes. In the present study (Dietary habits and physical exercise in Polish and Italian children with type 1 diabetes), we aimed to identify ethnic differences in lifestyle activities.
Methods: The study involved 90 patients aged 8-18 years, including 44 Polish and 46 Italian children. All patients have been recruited during regular follow-up clinic visits in Poznan (Poland) and Milan/Cremona (Italy). Exercise choices were assessed using a self-administrated Sport Preferences Survey.
Results: Italian children were most likely to participate in physical education class (97% vs82%, p< 0.01), but at a lower frequency (1.4 vs 3.3 times/week, p< 0,001) and lesser time (100 vs142 min, p< 0.001). Italian youth go to school from home using bus/car more often than Polish children (71% vs50%, p< 0.05), who used to walk (62.4% vs43%, p=NS). Team games were mostly preferred, even if with some differences. Polish children played: basketball (36.4% vs 15.2%, p< 0.05), soccer (36.4% vs 17.4%, p< 0.05), netball (40.9% vs 6.5%, p< 0.0001). Italian youths preferred gymnastics (50% vs 31.8%, p=NS). Polish children rode bike (70.4% vs 17.4%, p< 0,0001) and jogged (50% vs17.4%, p< 0.001). Italian children spent more time doing homework (91.3% vs 77.3%, p< 0.01), while Polish children on household (65.9% vs 15.2%, p< 0.0001) or walking the dog (45.5% vs 21.7%, p< 0.01). Polish kids used computer/internet more often (91% vs71%, p< 0.01), and for a longer time (530 vs296 min, p< 0.001).
Conclusion: Most of the Italian children participated at physical education class, but less times and for lesser than Polish children. These differences might be related to different patients/diabetes team/school teacher education and different approach to fear of hypoglycaemia. Types of exercises and house activities differed between the two countries, probably because cultural differences.

ePO31
Physical activity, adiposity, diet composition and cardiovascular risk factors in children and adolescents with type 1 diabetes

M. Marigliano[1], C. Piona[1], F. Olivieri[1], E. Fornari[1], V. Chini[1], A. Morandi[1], A. Sabbion[1], C. Maffeis[1]

[1]Pediatric Diabetes and Metabolic Disorders Unit, Regional Center for Pediatric Diabetes, University City Hospital of Verona, Verona, Italy

Objectives: This study aimed to investigate the impact of physical activity, body adiposity and diet composition on cardiovascular risk in children and adolescents with type 1 diabetes (T1D).
Methods: Sixty-five adolescents with T1D (age range: 10-18 years; M/F: 33/32) were enrolled. Physical (height, weight, waist circumference, bioelectrical impedance analysis) and biochemical (HbA1c, lipid profile) parameters were recorded. Subjects were instructed to wear an activity monitor (SenseWear Pro Armband) for 3 consecutive days, including a weekend day and to fill out a weighed dietary record for the same days. Regression models, using Triglyceride-to-HDL cholesterol ratio [(a gross index of cardiovascular risk (CVR)] as the dependent variable and fat mass (FM) %, lipid-to-carbohydrate intake ratio and physical activity (h/day) as independent ones, were calculated.
Results: Triglyceride-to-HDL cholesterol ratio was significantly associated with adiposity (FM%; r = 0.273; P = 0.028), lipid-to-carbohydrate intake ratio (r = 0.258; P = 0.038), the amount (h/day; r = -0.285; P = 0.022) and intensity [expressed as metabolic equivalent (METs), kcal/kg/h; r = -0.283; P = 0.022] of physical activity. Triglyceride-to-HDL cholesterol ratio was not associated with HbA1c (mmol/mol) (r=0.030, P=0.81). Multiple regression analysis showed that diet composition (lipid-to-carbohydrate intake ratio) and physical activity duration contributed to explaining the inter-individual variability of Triglyceride-to-HDL cholesterol ratio (R^2 = 0.152; P < 0.05), independently from gender and the level of adiposity.
Conclusions: Intervention to reduce cardiovascular risk in children and adolescents with T1D could take advantage from regular physical activity and adequate diet composition.

eP032
Joint mobility and sports activities in young subjects with type 1 diabetes mellitus: which is the relationship?

P. Francia[1], S. Toni[2], B. Piccini[2], E. Casalini[2], A. Vittori[2], M. Gulisano[1]

[1]University of Florence, Florence, Italy, [2]Diabetes Unit - Meyer Children's Hospital, Florence, Italy

Objectives: It is well known that diabetes mellitus can negatively affect joint mobility also in young patients. The aim of this study was to evaluate the ankle joint mobility (AJM) and flexibility in a large sample size of young subjects with type 1 diabetes mellitus (T1DM) and healthy controls in addition to their correlation with the sport activities practiced.
Methods: In 66 T1DM patients (M/F:40/26), mean age 12,4±3,7 yrs, body mass index (BMI) 19,4±3,7 kg/m^2, duration of diabetes 5,8±3,6 yrs, mean HbA1c 7,45±0,8% and in 193 healthy controls (M/F:122/71), mean age: 12,1±2,4 yrs; BMI: 19,0±3,5 kg/m^2 practicing different sports (soccer; volleyball, basketball; swimming, tennis and dance) ankle joint mobility (AJM) and lower back/hamstring flexibility were evaluated by inclinometer and Sit and Reach Test.
Results: The patients' ankle ROM was significantly lower than that in controls (136,6±19,7° vs 127.3±16,1°; p< 0.001). Both ankle plantar (32,7°±7,1° vs 26,5°±5,9°; p< 0.001) and dorsal flexion (103,5±15,6° vs 93,1±14,8°; p< 0.001) were higher in control group. Some groups of sport players have showed different AJM values. In comparison to the soccer players the AJM of the volleyball and basketball subjects was higher in both patients (N=13: 133,1±16,9°; N=16: 119,6±19,7°) and control groups (N=126: 141,7±18,1°; N=57: 126,1±20,3°; p< 0,001). Moreover, only the soccer group (patients and controls) have shown a negative correlation between AJM and age (N=73: r=-59; p< 0,001), even more evident in dorsiflexion (N=73: r= -0,58; p< 0,001) and in the soccer control group (N=57: r=-0,68; p< 0,001).
Conclusions: The results of this study can help to clarify the negative effect of diabetes on AJM. In the management of young T1DM patients, the sport-related effect should be considered because it can induce significant changes of AJM and, meanwhile they could negatively affect posture and gait. In particular, playing soccer seems to significantly reduce AJM.

ePoster Session 05 - Nutrition

eP033

Acute impaired glucoregulation and altered gastrointestinal hormone secretion in adolescents in response to caffeine-containing and nutritionally-fortified "energy shots"

H. Virtanen[1], J. Ho[1], V. Johnsen[2], C. Elliott[2], J. Shearer[2]

[1]University of Calgary, Pediatrics, Calgary, Canada, [2]University of Calgary, Kinesiology, Calgary, Canada

Background: Caffeine containing energy drinks (CCED) are increasingly consumed by adolescents, although little is known about the metabolic impact.
Objectives: To investigate the metabolic impact of sugar-free, caffeinated (CAFF) and decaffeinated (DECAF) energy shot consumption on glucoregulation and gastrointestinal hormone response in adolescents.
Methods: 20 healthy subjects: 18(0.6)yrs, range 13.4-19.9; 10M;10F underwent 3 double-blind randomized trials: CAFF (5mg caffeine/kg body wt), DECAF (vitamins and minerals only) or PLACEBO followed 40 mins later by a standard 2h OGTT. Blood was collected and area under the curve (AUC) calculated. Repeated Measures ANOVA or Friedman's Test, as applicable, identified treatment effects with post-hoc tests for pairwise comparisons.
Results:
CAFF consumption elevated glucose and insulin AUC following an OGTT when compared with PLACEBO by 15.8% and 73.0%, respectively. Insulin AUC also increased significantly from DECAF. GLP-1 AUC increased significantly from both CAFF and DECAF when compared with PLACEBO.
Conclusions: CCED consumption impaired glucoregulation as indicated by concurrent elevation of glucose and insulin AUC in response to an OGTT. Both DECAF and CAFF resulted in significantly elevated GLP-1 and insulin AUC, likely due to non-nutritive sweeteners. Further exploration into the mechanisms involved in CCED-induced insulin resistance and the role of non-nutritive sweeteners in GI hormone response is needed.

eP034

Insulin requirement for pure protein meal in children with type 1 diabetes

K. Indulska[1], K. Dżygało[1], A. Szypowska[2]

[1]Medical University of Warsaw, Department of Pediatrics, Warsaw, Poland, [2]Medical University of Warsaw, Department of Pediatrics, Warsaw, Poland

Background: Fat and protein mixed meals need square-wave boluses of insulin because of higher late postprandial glycemia. Recent studies in adults showed that delivery of insulin for protein meals may not be obligatory. The objective of our study was to compare the postprandial glycaemic variability after pure protein meal with or without insulin bolus in type 1 diabetic children.
Materials and Methods: We performed a randomized, double-blind, cross-over study, including 48 children with type 1 diabetes with mean: age 14.2±1.8years, HbA1c 8.7±1.5%, insulin requirement 0.88units/kg, basal percentage 37% , diabetes duration 6.2±3.9years. Participants were randomly assigned into two treatment orders: NO_BOLUS-SQUARE or SQUARE-NO_BOLUS. The tested meal consisted of 200kcal from protein shake. The primary outcome was postprandial glycemia (PPG) based on capillary measurements taken every 30 minutes during 5 hours of follow up. The secondary outcome was the frequency of hypoglycemia(<70mg/dl)
Results: PPG since 150 min of the test were significantly lower when square-wave bolus was delivered (NO_BOLUS vs SQUARE at 150, 180, 210, 240, 270, 300 min: 146 vs 124.5 mg/dl (p=0,034), 143 vs 124.5 mg/dl (p=0,014), 138.5 vs 113 mg/dl (p=0,01), 133 vs 108.5 mg/dl(p=0.013), 121.5 vs 98 mg/dl (p=0.002), 115 vs 93.5 mg/dl (p=0.007). We observed statistically significant difference in overall number of hypoglycemic episodes between groups: 6.04% SQUARE vs. 2,29% NO_BOLUS (p=0.005). There were not statistical differences in the number of hypoglycemia in each time frame between both groups.
Conclusion: Applying a dose of insulin in square-wave bolus for pure protein meals improve PPG, but with higher risk of hypoglycemia. For pure protein meals coverage a smaller insulin-to-protein ratio than for fat-protein mixed meals should be considered.

eP035

Carbohydrate intake can be reliably estimated in photographed meals: a pilot study in adolescents with type 1 diabetes

L. Heikkilä[1], M. Vanhala[2], R. Korpelainen[2,3,4], P. Tossavainen[1]

[1]Oulu University Hospital and University of Oulu, Medical Research Center, PEDEGO Research Unit, Department of Pediatrics, Oulu, Finland, [2]Oulu Deaconess Institute, Department of Sports and Exercise Medicine, Oulu, Finland, [3]University of Oulu, Faculty of Medicine, Center of Life Course Heath Research, Oulu, Finland, [4]University of Oulu, Medical Research Center, Oulu, Finland

Objectives: To estimate the validity of the image-assisted method compared with the food diary in adolescents with type 1 diabetes, and to determine adolescents´ experiences of the image-assisted method.
Methods: The study population was adolescents aged 13 to 18 with type 1 diabetes. The participants (*n*=13) photographed their meals with a mobile phone camera and kept food diary for the same four days. Average energy and nutrient intakes estimated in photographs and in food diaries were compared by the Wilcoxon signed rank test and the Spearman rank correlation coefficients. After the study experiences of the image-assisted method were asked by an electronic questionnaire.

	Treatment	AUC Mean (SEM)	p-value	Pairwise Comparison	Post Hoc p-value
Glucose mmol/l/120min (n=20)	DECAF PLACEBO CAFF	556.9(26.8) 603.7(25.5) 683.8(31.4)	p<.001*	placebo, decaf placebo, caff decaf, caff	p=0.332 p=0.063 p<0.001*
Insulin pmol/l/120min (n=20)	DECAF PLACEBO CAFF	42,437.2(4,711.1) 31,094.6(2,621.7) 52,324.5(7,371.2)	p<.001*	placebo, decaf placebo, caff decaf, caff	p=0.006* p=0.003* p=0.084
GLP-1 pmol/l/120min (n=19)	DECAF PLACEBO CAFF	407.0(47.8) 272.4(32.6) 383.2(40.4)	p<.001*	placebo, decaf placebo, caff decaf, caff	p<0.001* p=0.007* p=1.000

[Glucose and Hormone Response]

Results: There was a significant correlation between the two methods in the energy and carbohydrate intake estimates (r=0.907-0.967; p< 0.05). The image-assisted method underestimated the energy intake 5,5 % compared with the food diary (1501 ± 381 kcal vs. 1589 ± 329 kcal; p=0.040). There was no statistically significant difference in the carbohydrate intake estimates between the image-assisted method and the food diary (184 ± 64 g vs. 192 ± 56 g; -4,2 %; p=0.146). Lapses of memory in photographing were the most remarkable source of misreporting. According to the questionnaire seven participants preferred the image-assisted method, five accepted both methods and one preferred a food diary.
Conclusions: The image-assisted method used by adolescents with type 1 diabetes is comparable to the food diary in the means to estimate food carbohydrate content. Adolescents are more willing to use the image-assisted method in dietary assessment compared with the food diary, and the method may be used as a nutrition advice tool in teenagers with type 1 diabetes.

ePO36
Cardiometabolic effects of sugar-sweetened beverages reduction and physical activity increase in obese children

J. Galhardo[1], F. Marujo[2], A. Alonso[1], C. Diamantino[1]

[1]CHLC - Hospital de Dona Estefânia, Paediatric Endocrinology and Diabetes Unit, Lisboa, Portugal, [2]CHLC - Hospital de Dona Estefânia, Women, Children and Adolescents Department, Lisboa, Portugal

Objective: To assess the effect of sugary beverages reduction and aerobic exercise increase on markers of metabolic syndrome, inflammation in obese children.
Methods: Prospective analysis of the first 200 pre-pubertal patients admitted to our obesity clinic during 2015 (mean BMI-SDS 3.41±0.54). During the first 4 wks, patients had their usual diet and daily activity. From 5th-28th wk they were asked to restrict sugar-added beverages to one serving a week. From the 29th-52nd wk they were also asked to daily exercise for at least 60 min.
Results: At baseline, average daily time spent on moderate-intense physical activity was 30±15min, while on screen was 180±30min; mean sucrose intake was 219±62g/day, of which 66% from sugary beverages; mean WC-SDS was 3.82±0.58; mean systolic and diastolic BP-SDS were 1.8±0.6 and 1.7±0.4 respectively; median HOMA-IR was 3.57 (1.34 to 6.43); mean uric acid was 4.1±1.9mg/dL; median triglycerides was 132 (72 to 201) mg/dL. At 28th week there was a decrease of: 1.7mg/dL (95%CI, 1.0-2.2) in uric acid; 3.51µmol/L (95%CI, 1.52-5.50) in homocysteine; 44mg/dL (95%CI, 21-55) in triglycerides; 19mg/dL in apolipoprotein B (95%CI,13-25); 41.9µUI/mL (95%CI, 27.3-56.5) in insulin at 30min OGTT; 2.2ng/mL (95%CI, 1.3-3.1) in leptin. At the end of the study there was a reduction of: 0.87 (95%CI, 0.38-1.36) in BMI-SDS, 0.91 (95%CI, 0.43-1.39) in WC-SDS, and 1.07 (95%CI, 0.86-1.28) in HOMA-IR. There was a 6.28µg/mL (95%CI, 4.4-9.2) increase in adiponectin, and a decrease of: 7.0ng/mL (95%CI, 5.1-8.9) in resistin; 2.18pg/mL (95%CI, 0.75-3.61) in TNF-α; 2.16pg/mL (95%CI, 0.63-3.69) in INF-γ; 17.2pg/mL (95%CI, 9.0-25.4) in IL-1ß; 25.7pg/mL (95%CI, 8.3-43.1) in IL-6; 16.5ng/mL (95%CI, 10.2-22.8) in PAI-1.
Conclusion: Our results provide additional evidence supporting a positive relationship between both sugar-sweetened beverages reduction and physical activity increase, and the improvement of important markers of inflammation and metabolic syndrome.

ePO37
Introduction of nutritional intervention in type1 diabetes management at T1Diams, Mauritius

L. Poran Stralkou[1], D.A. Jutton[2], A. Dustagheer[1], L. Danharry[1], A. Audit[1]

[1]T1 Diams, Quatre Bornes, Mauritius, [2]T1 Diams, Medical, Quatre Bornes, Mauritius

Objective: Nutritional interventions; carbohydrate counting and label reading have gained clinical importance in Western Countries in the management of Type 1 Diabetes (T1D).
The aim of this study was to launch the concept of nutritional education in T1Diams, a Non-Profit Organisation in Mauritius.
Method: A target group of 35 patients aged 12-30 years was selected during our yearly camp activity. Carbohydrate counting, label reading and healthy eating were introduced to the group via face to face coaching, cooking sessions & competition. Recall and knowledge were assessed at least three months post intervention via a survey.
Results: 23 patients, of which were 10 males (43.5%) and 13 females (56.5%), responded to the survey. The mean age was 17.5 from a range of 12-28 years. 95.6% were from low income families. 69.6% were students. 56.5% of patients felt confident using carbohydrate counting more than 3 months post-intervention while only 8.7% used it routinely to manage their diabetes. 91.3% agreed that carbohydrate counting is useful for glycaemic control in T1D.

Daily use of label reading was found helpful to 78.3% of patients. 87% reported good understanding of a healthy diet and described it as the three main food groups: carbohydrate, protein & vegetables/fruits. 73.9% had applied healthy eating after 3 months but only 8 out of 23 patients were eating a healthy diet regularly. All believed that healthy diet is important. The carbohydrate quiz was fair in 27% of patients. The common hindering themes were lack of parental support, mathematics aspect and laziness.
Conclusion: The importance of nutritional education in T1D is widely accepted. Peer with family support and follow up should be encouraged for consistent application.
Keywords: Type 1 diabetes, T1Diams, carbohydrate counting, label reading and nutrition.

ePO38
A user-survey: what do parents want from a children's and young people's diabetes dietitian?

L. Bull[1]

[1]University College London Hospitals, Paediatrics, London, United Kingdom

Objectives: In England, a best practice tariff (BPT) was introduced for paediatric diabetes in 2011/12 to incentivise the delivery of high quality paediatric care to all children and young people (CYP) with diabetes. BPT requires annual dietetic review alongside regular multidisciplinary (MDT) clinics. It does not address how the dietetic service is delivered, the quality of the service provided, outcome measures or what a dietetic review should entail. The aim of the survey was to find out what parents and CYP would like from and how they would like to interact with the Dietitian.
Methods: An electronic survey was sent to all (at the time of the survey) 403 families attending the diabetes clinics at University College Hospital, a large tertiary paediatric diabetes centre with 75% of the population using CSII. 100 completed surveys were returned. Thematic analysis was used to group topics.
Results: A number of key themes emerged; support with managing exercise, tricky meals (understanding glycaemic index, using pump bolus options and managing pizzas and takeaways) and support with carbohydrate counting (eating out and using apps/websites). The Dietitian's role in promoting healthy eating and supporting CYP to gain independence was also highlighted as important. Parents' preference was for contact with the Dietitian at MDT clinics and via email, websites and telephone, rather than a separate annual dietetic review appointment.
Conclusions: The BPT has improved access to Dietetic time for CYP with Diabetes. The results of this survey highlight areas for resource allocation, key education topics and future development of the delivery of patient centred care. The results have prompted service developments, including, the introduction of specific exercise management clinics and virtual clinics and improvements to patient information resources. The respondents may not be representative of all parents and CYP with diabetes; future surveys should target non-responders.

ePO39

Why don't young people with type 1 diabetes (T1D) attend dietitian review and how would they like to receive nutrition information?

S. Savio[1], M. Freeman[2], W. Nicola[2], S. Toome[1], N. Vanderhaak[1], J. Miller[2], J. Fairchild[3]

[1]Women's and Children's Hospital, Clinical Nutrition, Adelaide, Australia, [2]Flinders University, Adelaide, Australia, [3]Women's and Children's Hospital, Endocrine and Diabetes, Adelaide, Australia

In a 2013 audit of 99% (n=410) of T1D patients attending a children's hospital diabetes clinic, 6% met ISPAD recommendations for annual dietetic review.

Objective and Method: To examine barriers to engagement with dietetic review, assess nutrition knowledge & determine preferred education delivery method in patients ≤18yrs with T1D >1year using 2 surveys (2014, 2015) and a validated knowledge questionnaire.

Results:

	Survey 1 2014 (Md(IQR))	Survey 2 2015 (Md(IQR))
Respondents(n)	102	148
Response rate(%)	30	25
Male(n)	48	73
Age(yrs)	14(10-116)	11.4±4.1mean±SD
Diabetes duration(yrs)	5.0(3.0-9.0)	4.0(1.0-8.0)
HbA1c%	8.5(7.9-9.3)	-
Nutrition knowledge score%	87(78-91)	-

[Characteristics of Survey Respondents]

Survey 1 (2014).

The most common reason for dietitian non-attendance was no perceived need (70%, n=26).

Nutrition knowledge score did not significantly differ between non-attenders reporting no need (Md=89% (81.5-95.7)) and those giving other non-attendance reasons (Md=87%(73.9-91.3), n=11) (U=118, z=-0.841, p=0.40).

There was significant difference in diabetes duration between attenders (Md:4yrs, n=65) and non-attenders (Md:8yrs, n=37), U=678, z=-3.7, p< 0.001. Knowledge score did not significantly differ between the groups (attenders Md=87%(78.2-91.3), non-attenders Md=87% (78.2-95.7)) (U=1042.5, z=-1.126, p=0.26, r=0.11). 49% of respondents sought nutrition advice from the internet but only 44% from dietitian.

Survey 2 (2015).

Preferred technology is accessible (79%, n=86), immediate (48%, n=44), trustworthy and additional to clinic visit.

Conclusion: High HbA1c despite good nutrition knowledge suggests a focus on knowledge application is required. Patients were less likely to attend with longer diabetes duration but seek nutrition advice from technologies. Despite small samples, these data support adding education via technology to improve immediacy, nutrition knowledge application and meet demand.

ePO40

KISS Advanced Bolus system is effective in managing the postprandial effect of high fat and protein meals in twenty five children and young people with type 1 diabetes at Birmingham Womeńs and Childreńs Hospital

J. Pemberton[1], H. McCoubrey[1], C. Leal[1], L. Drummond[1]

[1]Birmingham Women's and Children's Hospital, Diabetes, Birmingham, United Kingdom

Objectives: The impact of fat and protein on postprandial hyperglycaemia is proven for people with type 1 diabetes (Bell, 2015). The Diabetes Team modified the algorithm of Bell (2015), to develop KISS (Keep it Simple & Safe). KISS adds 25% extra insulin to Dietitian defined high fat & protein meals, splitting 50% now: 50% over 2.5 hrs. KISS has an empowering tool that enables patients to safely add extra insulin & adjust the split from monitoring.

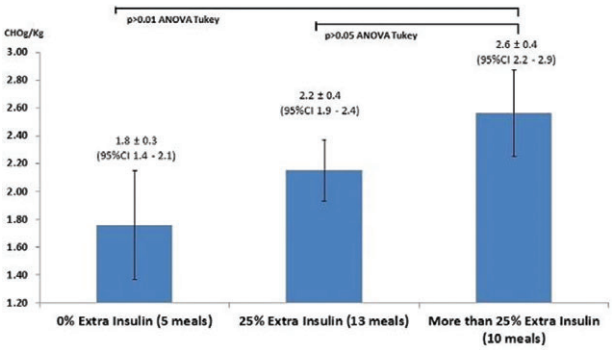
One year audit of KISS hypothesised:

1. Over half of the patients would use KISS
2. Carbohydrate grams per kilogram (CHOg/Kg) would be the main determinant of extra insulin needed.

Methods: From April 2016 to April 2017, 25 children aged 10.8yrs (SD 3.7) were initiated onto insulin pump therapy. On the 3rd education session, KISS was taught. All 25 patients pump downloads were analysed two weeks after the session.

Results: Of the 25 patients educated 17 tried KISS. KISS users were older than non-users (11.9yrs vs. 8.5yrs, T-Test **p< 0.01**) and no children aged less than 7yrs used KISS.

Figure 1 shows CHOg/Kg was strongly associated with extra amount of insulin. Meals requiring more than 25% extra had higher CHOg/Kg compared to 0% and 25% extra.



[Figure 1: Carbohydrate (CHOg/Kg) for the 28 meals requiring 0%, 25%, or more than 25% extra insulin]

Conclusions:

1. KISS is simple to use and gets used, but not by children under 7yrs.
2. When using KISS; start with no extra if meal carbohydrate < 2.0 CHOg/Kg, 25% extra if 2.0 - 2.5 CHOg/Kg, and >25% extra for >2.5 CHOg/Kg.

References: Bell et al. (2015) ***Diabetes Care***, 38: 1008-1015.

ePoster Session 06 - Epidemiology

eP041

Effect of early exposures on early vs. late onset islet autoimmunity: the Diabetes Autoimmunity Study in the Young (DAISY)

B. Frohnert[1], F. Dong[1], A. Barón[2], A. Steck[1], J. Norris[3], M. Rewers[1]

[1]*University of Colorado, Barbara Davis Center, Aurora, United States,* [2]*University of Colorado, Biostatistics & Informatics, School of Public Health, Aurora, United States,* [3]*University of Colorado, Epidemiology, School of Public Health, Aurora, United States*

Objectives: Previous study has shown that individuals with early vs. late islet autoimmunity (IA) differ in race/ethnicity and frequency of sibling status, but not in overall first-degree relative status, suggesting a potential role of early environmental exposures in the timing of development of IA. We sought to assess the association of prenatal and early infancy exposures on the development of early vs. late islet autoimmunity.

Methods: The Diabetes Autoimmunity Study in the Young (DAISY) cohort (n=2,547) has been followed for up to 22 years. Persistent presence of ≥1 islet autoantibodies developed in 212 individuals, categorized as early-onset (<8 years, n=143, median 3.3 years) or late-onset (≥8 years, n=69, median 11.1 years) and followed for a median of 7.9 and 5.1 years, respectively. Early- vs late-onset groups were compared using chi-square analysis for all frequency results. Wilcoxon rank sum test was used to compare breastfeeding duration. Time of introduction of gluten and maternal age were compared using Student's t-test.

Results: Children with early- vs. late-onset islet autoimmunity did not differ significantly in daycare attendance during early childhood (34% vs 23%, p=0.18), median breastfeeding duration (4.2 [IQR: 1.4, 10.8] vs. 7.0 [IQR: 2.0, 12.0] months, p=0.20), mean age at introduction of gluten (7.2 ± 2.1 vs. 7.2 ± 1.8 months, p=0.87), or exposure to diabetes in utero (16% vs. 19%, p=0.56). Mean maternal age at birth was significantly higher in children who developed early-onset IA (31.3 ± 5.3 vs. 28.9 ± 5.4, p=0.0034).

Conclusions: Late-onset of islet autoimmunity is not significantly associated with exposure to breastfeeding or timing of gluten introduction; however, it is associated with younger maternal age.

eP042

Atypical forms of "type 1" diabetes are common in non-Caucasian countries: results from the IDF Life for Child six-country epidemiology study

G.D. Ogle[1,2], D. Govender[1], G. Ahmadov[3], B. Zabeen[4], P. Larco[5], S. Besancon[6], A. Fawwad[7], M. Abdullah[8,9], M. Silink[1], J. Noble[10], C. Wasserfall[11], M. Atkinson[11]

[1]*International Diabetes Federation Life for a Child Program, Glebe, Australia,* [2]*Diabetes NSW & ACT, Glebe, Australia,* [3]*Endocrine Center Baku, Baku, Azerbaijan,* [4]*BIRDEM Institute, Dhaka, Bangladesh,* [5]*FHADIMAC, Port-au-Prince, Haiti,* [6]*Sante Diabete, Bamako, Mali,* [7]*Baqai Medical University, Baqai Institute of Diabetology and Endocrinology, Karachi, Pakistan,* [8]*Sudan Childhood Diabetes Center, Khartoum, Sudan,* [9]*University of Khartoum, Faculty of Medicine, Division of Paediatric Endocrinology, Khartoum, Sudan,* [10]*Children's Hospital Oakland Research Institute, Oakland, United States,* [11]*University of Florida, College of Medicine, Gainesville, United States*

Objectives: Atypical forms of diabetes in children and adolescents are widely considered more common in non-Caucasian populations, but knowledge regarding the contributions of autoimmunity and genetics to diversity in disease phenotypes is quite limited. To address this void, we evaluated pediatric and adolescent diabetes cases in six countries: Azerbaijan, Bangladesh, Haiti, Mali, Pakistan, and Sudan.

Methods: Consecutive ascertainment of new- or recent-onset cases of diabetes in subjects < 21 years, with a target *n* of 100 per country. In four countries all were new-onset. Clinical features, GAD-65 and IA2 autoantibodies, C-peptide levels, and *HLA-DRB1* were determined. DNA was also collected on 200 control subjects in each country.

Results: The number of individuals diagnosed with type 1 diabetes, as well as their clinical features, C-peptide levels and autoantibody frequencies are shown in the table. Atypical type 1 patterns occurred in all countries and were most common in Bangladesh, Haiti, Mali and Sudan. *HLA-DRB*1 population frequencies varied significantly among countries. Locus-level *DRB*1-type 1 associations showed various patterns of predisposing, neutral, and protective alleles. Levels of GAD-65 autoantibodies were particularly lower in Bangladesh and Haiti while IA2 frequencies were reduced in all populations.

Conclusions: Atypical forms of diabetes clinically diagnosed as type 1 appear common in non-Caucasian populations. Further investigations and longitudinal studies are needed to understand this diversity in diabetes and to determine whether the addition of non-insulin therapies may benefit some subjects.

	n diagnosed as "type 1" / all diagnoses	Male %, diagnosis age peak (years (y))	DKA at diagnosis (%)	C-peptide <0.7 ng/ml (<0.2 nmol/l) (%)	GAD-65 ≥ 30 IU/ml (%)	IA2 ≥ 30 IU/ml (%)
Azerbaijan	104/106	54%, 10-11 y	58%	58%	62%	39%
Bangladesh	84/100	44%, 12-13 y	10%	10%	25%	11%
Haiti	91/91	52%, 13 y	20%	60%	29%	9%
Mali	130/132	51%, 15-16 y	45%	12%	58%	22%
Pakistan	100/100	58%, 14-15 y	21%	21%	53%	16%
Sudan	99/99	42%, 9-12 y	55%	55%	53%	27%

[Results]

eP043

Association between the bone metabolism marker osteocalcin and stimulated C-peptide in 32 newly diagnosed type-1-diabetic children and adolescents within the first year post diagnosis

J.O.B. Madsen[1], N.R. Jørgensen[2,3], J. Svensson[4,5], H.B. Mortensen[4,5], F. Pociot[4,5], J. Johannesen[4,5]

[1]*Copenhagen University Hospital Herlev, Department of Children and Adolescents, Herlev, Denmark,* [2]*Rigshospitalet, Department of Clinical Biochemistry, Copenhagen, Denmark,* [3]*Odense University Hospital/ Institute of Clinical Research, University of Southern Denmark, OPEN, Odense Patient data Explorative Network, Odense, Denmark,* [4]*Herlev Hospital and University of Copenhagen, Pediatrics Department, Herlev, Denmark,* [5]*University of Copenhagen, Department of Clinical Medicine, Faculty of Health and Medical Sciences, Copenhagen, Denmark*

Objectives: Osteocalcin (OCN) released from the turnover of bones have been shown to affect the glucose metabolism. OCN knock-out mice have fewer beta-cells and produce less insulin. Type-1-diabetic patients have lower levels of OCN compared to non-diabetics and an

inverse relationship between OCN and HbA1c have been found. This is the first study of the relationship between OCN and the residual insulin production (estimated by stimulated C-peptide) in newly diagnosed type-1-diabetic children and adolescents.
Methods: OCN (μg/L) were analyzed on samples from 32 (16 boys and 16 girls) newly diagnosed patients (mean age 13.12 (SD=1.92) years). Stimulated C-peptide was evaluated by mixed meal stimulation tests 1, 3, 6 and 12 months after diagnosis. Since OCN Z-scores are currently not available analyses were done in boys and girls separately. T-tests was used to compare means between groups with OCN above the mean (HIGH) and below the mean (LOW).
Results: Despite similar ages in boys and girls, girls had significantly lower OCN after 1 (86.96 vs 119.56; P=0.044) and 6 months (82.79 vs 130.27; P=0.008). Boys in the HIGH OCN group had higher stimulated C-peptide compared to the LOW OCN group, but only significantly after 1 month (1023.29 vs 537.03; P=0.008). There were no age-differences between the HIGH and LOW OCN groups among boys. Girls had opposite results with significantly lower stimulated C-peptide in the HIGH OCN group after 3 months (758.58 vs 1174.9; P=0.031), but the HIGH OCN group were also significantly younger (11.74 vs 13.70; P=0.030).
Conclusions: There is a positive association between C-peptide and OCN in boys whereas the association is opposite in girls. Because there are significant age-differences between the HIGH and LOW OCN groups amongst girls, but not boys, the opposite results may partly be explained by differences in age. OCN Z-scores are needed to further elucidate the role of OCN in newly diagnosed type-1-diabetic children and adolescents.

eP044
The association of type 1 diabetes mellitus and concentrations of drinking water components in Newfoundland and Labrador, Canada

L.A. Allwood-Newhook[1], R. Chafe[1], R. Aslanov[1], J. Clarke[2], P. Gregory[2], N. Gill[3], A. Sarkar[2]

[1]Memorial University, Janeway Pediatric Research Unit, St. John's, Canada, [2]Memorial University, St. John's, Canada, [3]NLCHI, St. John's, Canada

Objectives: Previous research has identified drinking water quality as a potential environmental risk factor for the development of T1DM. Newfoundland and Labrador (NL) has one of the highest incidences of T1DM reported worldwide. We studied associations between drinking water quality data and T1DM incidence rates in this population.
Methods: This was a community-based, case-control design study that used data from the NL Pediatric Diabetes Database, which includes all cases of T1DM aged 0-14 years, diagnosed from 1987 to 2012, and publicly available community-based water quality data. We calculated incidence rates of T1DM at the provincial and community levels and performed regression analyses to determine associations between water quality indicators and incidence of T1DM in 240 communities. We also conducted regional-based analysis that included 378 communities.
Results: Based on an average population of 80,403 children aged 0-14, the provincial incidence of T1DM was 51.2/100,000. The individual incidence rates of T1DM in communities reporting at least one case of T1DM during the study period averaged 154.1/100,000 (±175.2 SD; range 16.2 to 1282.1). There were significant associations between higher concentrations of arsenic (ß = 0.268, p = 0.013) and fluoride (ß = 0.202, p = 0.005) in drinking water and higher incidence of T1DM; barium (ß = -0.478, p = 0.009) and nickel (ß = -0.354, p = 0.050) concentrations were negatively associated with T1DM incidence.
Conclusions: In this community-based, case-control design study, we found that concentrations of some mineral and metal components in drinking water were associated with community incidence of T1DM. We confirmed the very high incidence of T1DM in NL. The impact of water quality on the incidence of T1DM requires further investigation.

eP045
Geographical glance at the role of antipyretics in the aetiology of type 1 diabetes mellitus

D. Veteikis[1], L. Zabulienė[2]

[1]Vilnius University, Institute of Geosciences, Vilnius, Lithuania, [2]Vilnius University, Clinics of Rheumatology, Traumatology - Orthopaedics and Reconstructive Surgery, Faculty of Medicine, Vilnius, Lithuania

Objective: Neither the new biological explanations of the progress to autoimmunity, nor the growing evidence of the role of viruses can explain the epidemiology of type 1 diabetes mellitus (T1DM). Geographical differences in the incidence of T1DM and its etiological link to virus infections imply certain cultural factors in play, suggesting antipyretics have a role. Studies show that fever-phobia and limited understanding of fever pathophysiology by parents and paediatricians may remarkably influence the way the children fever is treated. To question antipyretics usage association with the incidence of T1DM in Lithuania, indirect ecological study was performed to forehead biological and clinical investigations.
Methods: Data collection was based on the National Health Insurance Fund database (period of 2007-2013) that helped to detect the new cases of T1DM among children (0-14 years old) as well as the regional sales data of the paediatric doses of acetaminophen (ACP) during the respective period provided by IMS Health Lithuania. The data was clustered into 6 large regions of the country in order to have significant values of the incidence of T1DM.
Results: During the 7 years' period, 661 new onset T1DM case among 0-14 year old children was determined, the average sale of 0.697 (regional range 0.604-0.799) of daily defined dose (DDD) per 1000 children calculated. The significance (p=0.95) of the differences in ACP sales was confirmed between 6 out of 9 neighbouring pairs of regions. Statistical comparison of sales of the paediatric doses of ACP and the incidence of childhood T1DM in different Lithuanian regions showed a strong and significant correlation (r=0.81, p< 0.05).
Conclusions: Geographical relations of antipyretic misuse and the incidence of T1DM in Lithuania indirectly indicates the role of both infections and antipyretics in differences, and could serve as a good support for the following detailed biological and clinical research studies.

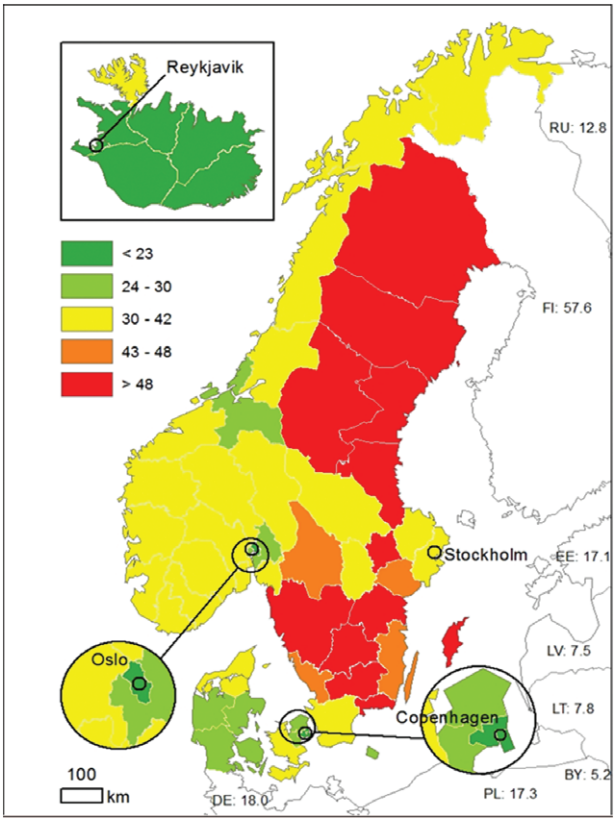
eP046
Geographical variation in the incidence of type 1 diabetes in the Nordic countries

U. Samuelsson[1], L. Westerberg[2], K. Aakesson[3], N. Birkebæk[4], R. Bjarnason[5], A.K. Drivvoll[6], L. Hanberger[7], T. Skrivarhaug[6], J. Svensson[8], A. Thorsson[5]

[1]Department of Clinical and Experimental Medicine, Division of Paediatrics and Diabetes, Research Centre, Linköping University, Linköping, Sweden, [2]IFM-Biology, Linköping University, Linköping, Sweden, [3]Department of Pediatrics, County Hospital Ryhov, Jönköping, Sweden and Jönköping Academy for Improvement of Health and Welfare, Jönköping University, Jönköping, Sweden, [4]Department of Pediatrics, Aarhus University Hospital, Aarhus, Denmark, [5]Landspitali University Hospital and Faculty of Medicine, University of Iceland, Reykjavik, Iceland, [6]Norwegian Childhood Diabetes Registry, Division of Paediatric and Adolescent Medicine, Oslo University Hospital, Oslo, Norway, [7]Department of Medicine and Health Sciences, Div. of Nursing, Linköping University, Linköping, Sweden, [8]Herlev University Hospital, CPH-Direct, Pediatric Department, Herlev, Denmark

Objective: To compare and describe the geographical distribution of incidence of T1D among children in the Nordic countries, an area where the population is genetically similar, during a six years period; 2006 - 2011.

Method: Area of residence at diagnosis for the children, 0-14 years of age, diagnosed with Type 1 diabetes was collected from the Nordic national childhood databases (7 560 diagnosed). Number of children at risk (21 191 716 in total) was collected from official statistics in the four countries. Incidence for geographical visualisation was calculated after aggregating data at regional administrative level, since population at risk often was too low at municipality level.
Results: The overall incidence (+/- SD of the national mean of regional incidences) during these 6 years was in Sweden 44.1 (7.4), Norway 32.5 (5.4), Denmark 26.7 (3.5) and Iceland 18.2 (7.8). Total incidence for all four countries was 35.7 (Figure 1). It seems as if the variation in incidence within these countries was less than the difference between the countries (one-way ANOVA: F (3, 55) = 56.8, $p< 10^{-6}$, R^2=0.76) (Figure 1). High population density areas, i.e. major cities, had the lowest incidence in the four countries, respectively.
Conclusions: There were obvious differences in incidence between these neighbouring countries. Considering that the populations may be genetically similar the most probable explanations are environmental factors.



[Inc. of T1D /100 000 children 0-14 yr andincidence in the area around the Nordic area in year 2011.]

eP047
Incidence of type 1 and other forms of diabetes in children and youth in Dhaka, Bangladesh

B. Zabeen[1,2], A.M. Balsa[1,2,3], G.D. Ogle[2], J. Nahar[1], K. Azad[1,4]

[1]*Bangladesh Institute of Research and Rehabilitation of Diabetes, Endocrine and Metabolic Disorders, CDiC and Paediatrics, Dhaka, Bangladesh,* [2]*International Diabetes Federation Life for a Child Program, Sydney, Australia,* [3]*Centro Hospitalar do Baixo Vouga, Serviço de Endocrinologia, Diabetes e Nutrição, Aveiro, Portugal,* [4]*Diabetic Association of Bangladesh, Perinatal Care Project, Dhaka, Bangladesh*

Aims: To assess the types of diabetes in children and young adults in Dhaka, Bangladesh, and estimate the minimum incidence of type 1 diabetes (T1D).

Methods: Retrospective study, using clinical records from Diabetic Association of Bangladesh (BADAS) clinics in Dhaka and affiliated satellite centers in other districts, of all < 25 years (y) cases diagnosed July 2011-June 2016. Diabetes type was classified according to clinical evaluation. Demographic information was obtained from the 2011 census and extrapolated using estimated growth rate. Incidence was calculated for the area surrounding the main clinics (Dhaka District) to minimize any ascertainment bias.
Results: 2,347 subjects were identified. Type of diabetes was more fully characterized for those < 18 years (1634 cases). 1437 (87.9%) were T1D, 151 (9.2%) type 2 (T2D), 23 (1.4%) fibrocalculous pancreatic diabetes, 5 (0.3%) neonatal, and 18 (1.1%) other types. T1D incidence was estimated from the 526 subjects diagnosed in Dhaka District, with mean annual incidence per 100,000 population 1.24 for < 15y and 0.96/100.000 for < 15y. There was a female preponderance. By age group, incidence/100,000 was 0.27 (0-4y), 0.60 (5-9y), 2.46 (10-14y), 1.86 (15-19y), 1.44 (20-24y). Rates for < 15y rose from 0.73 to 1.18 between 2011-12 and 2015-16 (p< 0.01): a 12.8% annualized increase. No secondary ascertainment was available, but ascertainment in Dhaka District was estimated to be at least 95%. Incidence of type 2 diabetes also increased.
Conclusions: The support to BADAS by the Changing Diabetes in Children and IDF Life for a Child Programs has centralized care and permitted tracking of diabetes cases in young people in Bangladesh. T1D is commonest, but other forms occur which could benefit from different management: further typology studies are warranted. T1D had a female preponderance. Peak T1D onset is at 10-14y, and incidence 0-15y is increasing rapidly.

eP048
Type 1 diabetes mellitus national registry of Sri Lanka

P. Shanmugam[1], C. Warnapura[1], M. Wijesuriya[1]

[1]*Diabetes Association of Sri Lanka, Rajagiriya, Sri Lanka*

Background: As there was no formal register of Type 1 diabetes (T1DM) in Sri Lanka there was a vital need to start a register. Diabetes Association of Sri Lanka (DASL) has initiated to compile a National Registry of T1DM in Sri Lanka and it's maintained at DASL. Ethical clearance was obtained in 2014 from Sri Lanka Medical Association (ERC/13-040) to develop a Register of persons with T1DM.
Aim: To understand the aetiology, incidence and prevalence of T1DM in Sri Lanka.
Method: We wrote to all physicians practicing in this area of study to send us details of any patient who was under their care with T1DM. The following parameters were entered into the register: Age, gender, date of onset, current therapy, address, family history, BMI, complications. These patients are followed up with HbA1c's and lifestyle counseling especially stress. This is offered to them free of charge. It is a supportive system to the Government free health scheme. Any newly diagnosed patients are referred to us by Consultants, GPs and other medical professionals.
Results: Total number of T1DM persons registered is 686. Mean age of the registrants is 17 years where the age ranges from 3 - 64 years. Out of which, 379 are females (55.2%) and 292 (42.7%) are males. Area distribution of persons diagnosed with T1DM shows the majority are from Western province (48.5%) and secondly North Western province (11.1%). Incidentally, 574 persons (83.7%) belong to the Singhalese race which is a reflection of the country's ethnic proportions. However, there is 7% of Muslims registered which is a slight discrepancy in the ethnic proportions of the country as it has surpassed the Tamil race of which there is only 6.5%. The mean age of onset is age 11.
Conclusion: A cause for T1DM is not yet known although a few theories may explain the onset of the condition. We hope someday the details of this registry will help to discover the aetiology of this condition.

ePoster Session 07 - Immunology

eP049

Rare protein-altering variants of known disease-associated genes in children with type 1A diabetes

M. Okuno[1,2], T. Ayabe[1,3], M. Fukami[1], T. Ogata[1,4], T. Urakami[2], T. Kawamura[5], N. Kikuchi[6], T. Kikuchi[7], I. Yokota[8], S. Amemiya[7], S. Sugihara[9], the Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT)

[1]National Research Institute for Child Health and Development, Molecular Endocrinology, Tokyo, Japan, [2]Nihon University Hospital, Pediatrics, Tokyo, Japan, [3]Sanaikai General Hospital, Pediatrics, Saitama, Japan, [4]Hamamatsu University School of Medicine, Pediatrics, Hamamatsu, Japan, [5]Osaka City University Hospital, Pediatrics, Osaka, Japan, [6]Yokohama Minato Red Cross Hospital, Pediatrics, Yokohama, Japan, [7]Saitama Medical University Hospital, Pediatrics, Saitama, Japan, [8]Shikoku Medical Center for Children and Adults, Pediatrics, Division of Pediatric Endocrinology and Metabolism, Zentsuji, Japan, [9]Tokyo Women's Medical University Medical Center East, Pediatrics, Tokyo, Japan

Objectives: Genome-wide association studies (GWAS) have identified a number of single nucleotide polymorphisms (SNPs) associated with the risk of type 1 diabetes (T1D). These SNPs include two non-coding variants flanking *PTPN2*, a gene involved in the T-cell regulation. Yet, the roles of coding mutations in *PTPN2* as well as other genes in the development of T1D remains uncertain. The aim of this study was to clarify the clinical significance of rare protein-altering variants in known T1D-associated genes as susceptibility factors of the disorder.
Methods: We studied 169 unrelated Japanese children with T1D. The participants included 80 children diagnosed at the age of 1-5 years and 89 children diagnosed at the age of 10-15 years. Coding variants in 21 T1D risk genes were screened through next-generation sequencing. We searched for rare protein-altering variants that were assessed as damaging by multiple *in silico* programs. We examined the possible interaction between detected variants and previously reported risk SNPs, and clinical information of the participants.
Results: twenty-one variants of 10 genes were identified in 22 T1D individuals. These variants included a frameshift indel and two probably damaging missense variants in *PTPN2*, as well as possibly/probably damaging variants in *CD226*, *CLEC16A*, *IFIH1*, and *PTPN22*. Each variant was detected only in one or two individuals. All variants were not physically associated with previously reported risk SNPs. Most variant-positive individuals carried risk HLA alleles. There was no correlation between the type of variants and the onset age
Conclusions: The results indicate that rare protein-altering variants in *PTPN2* and other risk genes augment the genetic predisposition of T1D particularly in individuals with HLA-mediated disease susceptibility. These rare variants can compose specific risk alleles different from those determined by GWAS, and therefore likely contribute to the missing heritability of T1D.

eP050

Partial immunoglobulin A deficiency in children with type 1 diabetes - a grey zone of immune deficiency coexisting with autoimmunity?

A. Hogendorf[1], M. Szymanska[1], J. Pietrzyk[1], A. Charubczyk[1], I. Drozdz[1], M. Sokolowska[2], J. Zarebska[2], K. Wyka[1], A. Szadkowska[1], P. Jarosz-Chobot[2], W. Mlynarski[1]

[1]Medical University in Lodz, Lodz, Poland, [2]Medical University of Silesia, Katowice, Poland

The prevalence of selective immunoglobulin A deficiency is 10-fold higher in children with T1D than in general population. However, little is known about the frequency of partial IgAD (pIgAD) in children with diabetes defined as IgA level greater than 0.07 g/l but less than 2 standard deviations of the mean IgA level for age older than 4 yrs, and normal levels of IgG and IgM. **Aim** To determine the prevalence and clinical picture of pIgAD in children with type 1 diabetes.
Methods: 411 patients older than 4 years, aged 8.9+/-3.8 yrs and positive for at least one anti-islet antibody and depended on insulin were included into the study. Serum samples and detailed questionnaires regarding autoimmune and non-autoimmune comorbidities and family history were obtained during follow-up visits at least one year after the onset of diabetes. IgA, IgG, IgM serum levels were measured using nephelometry and ELISA methods. Additional 40 patients with AT1D and IgA deficiency recruited from other four Diabetes Centers served as a replication cohort.
Results: Partial IgAD was found in 24 (5.83%) individuals from the first cohort. Patients with T1D and pIgAD had higher frequency of comorbidities (59% vs 39.5 %, p=0.01), including other autoimmune disorders (54.2% vs 27.2%, p=0.005) and skin symptoms e.g. warts and eczema (p=0.006) as compared with other T1D patients. Non-immune related disorders coexisted more frequently in pIgAD group (20.4% vs. 8.6%, p=0.005). Moreover, in the pIgAD group first degree relatives more frequently had autoimmune diabetes (24% vs 5.8%, $p=10^{-5}$). Similarly, in the replication cohort comorbidities and positive family history of T1D were more common among pIgAD subjects.
Conclusion: Partial IgA deficiency is relatively frequent among pediatric patients with T1D and is often associated with a positive family history of T1D and with several autoimmune comorbidities, suggesting a shared immunogenetic background of these disorders.

eP051

Is the origin of the proband linked to development of autoimmunity in children genetically at risk of type 1 diabetes?

D. Pacaud[1,2,3], A.M. Nucci[4], S.M. Virtanen[5], D. Cuthbertson[6], D.J. Becker[7,8], TRIGR Study Group

[1]University of Calgary, Calgary, Canada, [2]Alberta Children's Hospital, Paediatrics, Calgary, Canada, [3]Alberta Children's Hospital Research Institute, Calgary, Canada, [4]Georgia State University, Department of Nutrition, Atlanta, United States, [5]National Institute for Health and Welfare, Nutrition Unit, Helsinki, Finland, [6]University of South Florida, Pediatrics Epidemiology Center, Tempa, United States, [7]Children's Hospital of Pittsburgh, Pittsburgh, United States, [8]University of Pittsburgh, Pittsburgh, United States

Aim: In children genetically at risk of type 1 diabetes (T1D), to assess if children born to a father with T1D have increased risk of developing multiple autoimmunity than children born to mothers or sibling with T1D.
Methods: Using a Cox Proportional Hazard univariate model and the cohort of children from the TRIGR study who were born to families with only one proband (mother, father or sibling), we analysed the relationship between time to multiple autoimmunity (glutamic acid decarboxylase (GAD), insulinoma antigen 2 (AI-2A) and insulin (IAA) antibodies) and the origin of the proband.
Results: From the TRIGR original group, 2072 subjects met our inclusion criteria: 723 born to fathers with T1D, 1049 born to mother with T1D and 300 born to a sibling with T1D. 225 (11%) children developed multiple autoantibodies (2 or more of GAD, IA-2A and IAA): 86 (8%), 90 (12%), 49 (16%) of children born with a mother, father or sibling as the proband respectively (log-rank test, p =< 0.001). In our regression model for time to multiple autoimmunity, the hazard ratio (HR) was lowest when the proband was the mother (HR 0.49 [95%CI: (0.34,0.69)], p< 0.0001) and lower when the proband was a father (HR 0.71 [95%CI: (0.50,0.99)], p=0.049) then when it was a sibling. Time to IAA as the first antibody present was later in the father (HR 0.58 [95%CI: (0.35,0.96)], p=0.03), but similar between mothers (HR 0.74 [95%CI: (0.47,1.18)], p=0.21) and sibling as

proband (log-rank test between all 3 groups p=0.097). Time to GAD as the first antibody present was not significantly different between the 3 groups.

Conclusions: In the TRIGR cohort, the risk of developing multiple autoantibodies was higher when the proband of origin was the father compared to when it was the mother. Time to developing IAA was different between children born to fathers and mother with T1D, whereas time to developing GAD antibodies was similar, suggesting that origin of the proband plays a role in insulin autoimmunity.

eP052
MAIT cells have increased IL-17 production in children with type 1 diabetes

D. Kinlen[1,2,3], E. Farnan[1], D. O'Shea[3], A.E. Hogan[2,3,4], D. Cody[1,2]

[1]Our Lady's Children's Hospital Crumlin, Department of Diabetes and Endocrinology, Dublin, Ireland, [2]National Children's Research Centre, Dublin, Ireland, [3]University College Dublin, Obesity Immunology Research Group, Dublin, Ireland, [4]Maynooth University, Institute of Immunology, Department of Biology, Co Kildare, Ireland

Objectives: Mucosal associated invariant T (MAIT) cells are a T cell population with innate and adaptive characteristics. They are found in the blood, liver, lungs and GI tract, and have antimicrobial specificity. They have been implicated in autoimmune conditions such as Multiple Sclerosis and Inflammatory Bowel Disease. IL-17 is a pro-inflammatory cytokine produced by MAIT cells that has been independently linked to autoimmunity as well as to insulin resistance.

MAIT cell numbers have previously been shown to be similar in adolescents with T1D and healthy controls. T cell production of IL-17 has been found to be greater in T1D. However, MAIT cell production of IL-17 in this population hasn't been elucidated. The goal of our study was to examine potential differences in MAIT cell frequency and function in children with T1D versus healthy controls.

Methods: Volunteers were recruited from the Our Lady's Children's Hospital, Dublin. Blood samples were collected from 20 children (aged 6-18 years) with T1D and 20 healthy controls. PBMCs were isolated and cultured overnight in the presence or absence of stimulus. Cells were stained with monoclonal antibodies for specific cell surface markers and cytokines, and analysed by flow cytometry.

Results: The proportion of MAIT cells was similar between the T1D and control groups. Production of IL-17 by stimulated MAIT cells was significantly higher in the T1D group ($p< 0.05$). There was no difference in production of IFNγ, TNFα or the proliferation marker Ki67. The immune checkpoint CTLA-4 was higher among T1D subjects but didn't reach statistical significance (p=0.07). There were no significant correlations between the results and age, BMI, HbA1c or length of time with T1D.

Conclusions: This research highlights important differences in MAIT cell function between children with T1D and healthy controls and gives more credence for a role for MAIT cells in the pathogenesis of the disease.

eP053
Type 1 diabetes onset in children: the younger the worse?

M. Alcafache[1], A.L. Fitas[2], S. Ferreira[3], J. Simões Pereira[4], Í. Caramalho[5], L. Lopes[6], C. Limbert[6]

[1]Hospital Dona Estefânia - CHLC, Pediatrics Department, Lisbon, Portugal, [2]Hospital Dona Estefânia - CHLC, Unit for Pediatric Endocrinology and Diabetes, Lisboa, Portugal, [3]Hospital São Francisco Xavier, Pediatrics Department, Lisbon, Portugal, [4]Instituto Portugês de Oncologia, Endocrinology Department, Lisbon, Portugal, [5]Instituto Gulbenkian de Ciência, Lisbon, Portugal, [6]Hospital Dona Estefânia - CHLC, Unit for Pediatric Endocrinology and Diabetes, Lisbon, Portugal

Objectives: Recent evidence suggests a trend towards type 1 diabetes (T1D) diagnosis at younger ages (<6yrs-old) but few studies characterize early onset T1D. We aimed to compare children with T1D onset < 6 and ≥6yrs for autoimmune background, disease severity at onset and metabolic control 1yr after diagnosis.

Methods: Retrospective study in children with T1D diagnosis from 2008-2017, divided by age at disease onset (<6 and ≥6yrs). History of autoimmune diseases, T1D presentation, WBC and fasting C-peptide levels at onset, total daily insulin/kg (TDI) and HbA1c 1yr after diagnosis were compared. Statistical significance was set for $p< 0.05$ (GraphPad Prism®).

Results: 131 children, < 6yrs (n=52, mean age 3,6±1,5yrs) and ≥6yrs (n=79, mean age 10,5±2,9yrs), with similar gender distribution. Earlier age at onset (EAO) was associated with more autoimmune diseases ($p< 0,0001$). In terms of T1D severity there were no differences in disease presentation although EAO group showed lower C-peptide levels ($p=0,0063$). At onset, EAO group had significantly less neutrophils percentage ($p< 0,0001$) and more lymphocytes percentage and absolute count ($p< 0,0001$). Assessing metabolic control 1yr after diagnosis, EAO group had higher TDI ($p=0,003$) despite similar HbA1c. Also, we found a link between lower C-peptide levels (≤0,4 ng/mL) and higher mean percentages/absolute lymphocytes at T1D onset.

Conclusions: Our data show association of EAO with more autoimmune diseases, lower initial insulin reservoir (C-peptide) (although no different presentation) and higher insulin requirements 1yr after diagnosis for the same metabolic control (HbA1c). Innate immunity involvement in pancreatic β-cells lesion, suggested by changes in initial WBC count, might be a disease severity indicator. In the future, family autoimmune history and WBC count value as a T1D severity indicator should be assessed. These results may open novel research lines in the field of genetics and immune tolerance in T1D.

eP054
Ascertained estimation of clinical value of ICA, GADA, and IA-2A assays in children and adolescents

E. Evsyukova[1], I. Kolomina[1], S. Bukin[1], A. Timofeev[2], L. Samsonova[3]

[1]Z.A. Bashlyaeva Children's Hospital, Moscow, Russian Federation, [2]I.M. Sechenov First Moscow State Medical University, Moscow, Russian Federation, [3]Russian Medical Academy of Continuous Professional Education, Moscow, Russian Federation

Objectives: Clinical value of β-cell antibody (AB) tests is estimated by comparison of positive and negative test result frequencies in groups of subjects with and without type 1 diabetes (T1D). Criteria for subject inclusion into T1D group are usually limited to the young age, clinical signs, and insulin dependence. This may increase a proportion of negative test results due to contamination of T1D group by subjects with other diabetes subtypes. We examined performance characteristics of AB assays using more strict selection criteria.

Methods: The T1D group included 62 subjects (33/29:M/F, mean age 7.7±4.5 yr) who met the following criteria: T1D symptoms, duration of T1D by the time of AB testing ≤ 1 mo, BMI ≤ 17, fasting plasma glucose ≥ 10 mmol/l, HbA_{1c} ≥ 7%, ketoacidosis, serum C-peptide below a lower limit of detection. The control group included 85 healthy subjects (41/44:M/F, mean age 10.8±4.8 yr). ICA, GADA, and IA-2A were tested by indirect IFL on human pancreas cryosections, with the Immunotech Anti-GAD RIA, and Medizym Anti-IA2 ELISA, respectively. Operational parameters and diagnostic accuracy of the tests were estimated from receiver operating curves.

Results: are shown in the table.

AB	Sensitivity, %	Specificity, %	Positive Predictive Value, %	Negative Predictive Value, %	AUC
ICA	93.6	98.8	98.3	95.5	0.96
GADA	62.9	89.4	81.3	76.8	0.76
IA-2A	66.1	96.5	93.2	79.6	0.81
Significances of AUC differences: ICA—GADA, ICA—IA-2A: p< 0.001; GADA—IA-2A: p = 0.3					

[Table 1]

Conclusions: Performance characteristics of the ICA test were much better than those reported earlier (Verge C. et al., 1997). IA-2A test parameters were very close to, while GADA test parameters were much worse than those reported earlier (Torn C. et al., 2008). Thus, the strict T1D group selection criteria enabled us to re-evaluate clinical utility of AB tests available in Russia.

eP055

Comparison of natural killer (NK) cells and natural killer T-like cells in siblings of patients with type 1 diabetes mellitus to healthy children

J. Sieniawska[1], A. Krzewska[1], R. Piekarski[1], I. Ben-Skowronek[1]

[1]*Medycal University of Lublin, Department of Pediatric Endocrinology and Diabetology, Lublin, Poland*

Objectives: Natural killer cells are a type of cytotoxic lymphocytes critical to the innate immune system. CD3(+) CD56(+) natural killer T (NKT)-like cells are a subset of T cells characterized by co-expression of the T-cell receptor and NK receptors, including CD56+, and potent antitumour activity. It has been suggested that they have a role in autoimmune disease, including type 1 diabetes mellitus (DM1).
The aim of the study is to compare the number of NK cells and NKT-like cells in healthy siblings of children with DM1 to healthy children from non-diabetic families and to children with DM1.
Method: Peripheral blood mononuclear blood cells were obtained from 78 children with DM1, their siblings - 102, and 30 healthy children. NK cells were characterized by flow cytometry FACSCalibur (Becton Dickinson, USA). The results were shown as a NK percentage and NKT-like percentage of lymphocytes and were analyzed with STATISTICA 10 PL.
Results: The number of NK from the siblings was lower (mean 11,93±5,62) than that in healthy children (mean 14,89±7,78) (p=0,02). There was no significant difference in the number of NK cells between children with DM1 and their siblings.

There was no significant difference in the number of NKT-like cells between children with DM1 and their siblings as well as between the siblings and the control group of healthy children. There was a positive correlation between the age of the sibling group (p< 0,05) and NKT-like (p< 0,05).
Conclusion: The reduced number of NK cells in siblings and DM1 patients in comparison to healthy children has suggested that they could be involved in one or multiple steps at the beginning of the immune-mediated attack that leads to DM1. The results suggest that the dysfunction of NK cells contributes to the autoimmune pathogenesis of type 1 diabetes and is connected with genetic predisposition to DM1. NKT-like cells were probably not involved in the pathogenic process of DM.

eP056

A low frequency variant in the SH2B3 gene is associated with the risk of Japanese early adolescent onset type 1 diabetes

T. Ayabe[1,2], M. Okuno[1,3], M. Fukami[1], T. Ogata[1,4], T. Urakami[3], T. Kawamura[5], N. Kikuchi[6], T. Kikuchi[7], I. Yokota[8], S. Amemiya[7], S. Sugihara[9], The Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT)

[1]*National Research Institute for Child Health and Development, Department of Molecular Endocrinology, Tokyo, Japan,* [2]*Sanaikai General Hospital, Department of pediatrics, MIsato, Japan,* [3]*Nihon University Hospital, Department of Pediatrics, Tokyo, Japan,* [4]*Hamamatsu University School of Medicine, Department of Pediatrics, Hamamatsu, Japan,* [5]*Osaka City University Hospital, Department of Pediatrics, Osaka, Japan,* [6]*Yokohama Minato Red Cross Hospital, Department of Pediatrics, Yokohama, Japan,* [7]*Saitama Medical University Hospital, Department of Pediatrics, Saitama, Japan,* [8]*Shikoku Medical Center for Children and Adults, Department of Pediatrics, Division of Pediatric Endocrinology and Metabolism, Zentsuji, Japan,* [9]*Tokyo Women's Medical University Medical Center East, Department of Pediatrics, Tokyo, Japan*

Objectives: We reported the existence of an onset age-specific type 1 diabetes (T1D) susceptible variant (Ayabe et al. DME 2016). There is a limitation that genome-wide association study cannot identify low frequency variants in the general population. Our objective was to identify T1D susceptible low frequency variant(s), especially related to an onset age.
Methods: Our participants were 89 early adolescent onset (10-15 years of age) T1D individuals and 80 childhood onset (≤5 years of age) T1D individuals. They were unrelated Japanese and were registered with the JSGIT. We performed targeted resequencing analysis of coding regions in 21 known T1D susceptible genes. First, nonsynonymous variants in targeted regions were extracted. Out of those variants, T1D susceptible low frequency variant(s) were obtained by the following criteria:
i. minor allele frequency (MAF) in participants was ≥ 0.05;
ii. MAF in the Japanese general population (1000 Genomes Project Phase 3) was ≥0.005 and ≤0.025.

Results: Only *SH2B3* rs78894077 (p.P242S) T allele was significantly more frequent in the early adolescent group (13/178) than in the Japanese general population (3/208). We obtained particularly high odds ratio (OR) (5.36; *p*-value = 0.0044). However, we were not able to confirm a statistical significance between in the early adolescent group and in the childhood group (6/160) (OR 2.02; *p*-value = 0.24). Although *SH2B3* rs3184504 (p.R262W)is known as a T1D susceptible variant in the Caucasian population, there is no linkage disequilibrium between rs78894077 and rs3184504. Furthermore, the MAF of rs3184504 is registered as zero in the Japanese population, conversely, the MAF of rs78894077 is registered as zero in the Caucasian population (Same Project).
Conclusions: These results suggest that *SH2B3* rs78894077 is an ethnic-specific variant and is associated with the risk of Japanese early adolescent onset T1D. However, it remains unclear whether rs78894077 relates to an onset age of T1D.

ePoster Session 08 - Insulin Resistance/Varia

eP057
Evolution of HbA1c and fasting plasma glucose concentrations in children under human recombinant growth hormone replacement therapy (GHRT)

S. Leka-Emiri[1], E. Zisimopoulou[1], E. Vlachopapadopoulou[1], S. Stergiotis[1], M. Kafetzi[2], V. Petrou[1], S. Michalacos[1]

[1]'P&A Kyriakou' Children's Hospital, Division of Pediatric Endocrinology, Athens, Greece, [2]'P&A Kyriakou' Children's Hospital, Division of Hormonology, Athens, Greece

Objectives: Growth hormone (GH) plays an important role in glucose and lipid oxidation and metabolism as well as in protein synthesis. Both GH deficiency and excess are associated with disturbances of carbohydrate metabolism. Therefore special attention has been paid to changes in glucose and HbA1c concentrations in GH-deficient patients during GH replacement therapy (GHRT). The aim of the current study was to determine the incidence of diabetes during GHRT and the effect of GHRT on fasting plasma glucose concentrations and HbA1c in children with GH deficiency.
Methods: A total of 120 GH-deficient children (male 66.6%; mean age (SD) 8,5 years (3,3), BMI 17.9 kg/m2) were analyzed. Fasting plasma glucose concentrations and HbA1c are reported after GHRT in 1, 2, 3, 4 and 5yr follow up. Statistical analysis was performed with SPSS and Wilcoxon non-parametric test was used (*p< 0.05).
Results: None of the children became diabetic and stopped GHRT. Median values of fasting plasma glucose concentrations and HbA1c are shown in the table

GHRT	At start	1st yr	2nd yr	3rd year	4th yr	5th yr
Glucose Median (mg/dl)	85	87	88	87	90	90
Glucose [25th - 75th] (mg/dl)	[80-90]	[82-92]	[83-93]	[83-93]	[82-96,5]	[83-94]
Glucose max value (mg/dl)	107	103	107	103	108	105
Glucose difference from start (p)		0,145	0,021 *	0,038 *	0,001 *	0,004 *
HbA1c Median (%)		5,2	5,2	5,2	5,2	5,3
HBA1c [25th - 75th] (%)		[5,1-5,4]	[5,0-5,4]	[5,1-5,4]	[5,0-5,5]	[5,0-5,5]
HbA1c max value (%)		5,9	5,8	5,8	6,0	5,9
HbA1c difference from 1st yr (p)			0,085	0,477	0,716	0,798

[Fasting glucose concentrations and HbA1c levels]

Although fasting glucose median concentrations values differed significantly at 5 yrs (p= 0,004), this finding did not have any pathophysiological effect since at 5yrs 75% of children had glucose < 94mg/dl and 95% had glucose < 98mg/dl. HbA1c median values did not differ significantly at 5yrs (p= 0,798) and 75% of children had HbA1c < 5,5%, whereas 95% had HbA1c < 5,7%.
Conclusions: At 5 yrs follow-up of GH-deficient children GHRT does not seem to aggravate glucose metabolism profile.

eP058
Insulin resistance in children with obesity

A. Chylińska-Frątczak[1], A. Baranowska-Jaźwiecka[1], A. Szadkowska[1]

[1]Medical University of Lodz, Department of Pediatrics, Oncology, Hematology and Diabetology, Łódź, Poland

The prevalence of insulin resistance(IR) is increasing in highly developed countries. Obesity and unhealthy lifestyle participate in pathogenesis of IR. IR predisposes to glucose intolerance, hyperlipidemia and hypertension.
The aim of the study was to compare the various indirect IR indicators in children with obesity and their association with components of metabolic syndrome (MS) and non-alcoholic fatty liver disease (NAFLD).
Study group and Methods: 151 patients with obesity aged 9-18 years,BMI≥95pc, without any additional diseases and drugs affecting metabolic state. Height, body weight, waist circumference and blood pressure were measured. 2-hours OGTT was performed. Lipids, HbA1, hepatic enzymes were determined. NAFLD was evaluated on base of USG. Body composition was determined by bioimpedance. MS was diagnosed according to IDF definition. IR was determined by HOMA-IR (>2.5 and adjusted to sex and puberty),QUICKI Index (QI< 0.34), Insulinemia/glycaemia Index (I/GI>0.3), Matsuda Index (MI< 2.5).
Results: Among 151 patients (85 boys, age13.5 ± 2.5 years), IR was found in 100 (54.3%) children based on HOMA-IR (IR>2,5), and adjusted to sex and puberty in 53 (28.8%) children, 104 (56.5%) based on QI and 102 (55.4%) according to MI. Only in 25 (13.6%) children IR were diagnosed with I/GI. The positive correlation was observed between all IR indexes and TG, AlAT, BMI z-score and daytime systolic BP (24 ABPM) and between I/GI Index and MI with HDL. NAFLD was diagnosed in 26 (17,2%) and MS -in 39 patients (25.8%). Among patients with IR more often occurs NAFLD but not MS. There was no association between IR and fat tissue, but I/GI and MI correlated with the amount of visceral fat tissue.
Conclusions: IR was reported in half of the children with obesity. The incidence of IR is not associated with a higher prevalence of metabolic syndrome but with a higher prevalence of hyperTG, higher AlAT levels and NAFLD. In children with IR screening to NAFLD should be performed.

eP059
Association between dyslipidemia and non alcoholic fatty liver disease (NAFLD) with insulin resistance and anthropometric indices in overweight and obese children and adolescents

E. Dikaiakou[1], E. Vlachopapadopoulou[1], I. Panagiotopoulos[1], M. Kafetzi[2], E. Kaloumenou[1], A. Fotinou[2], S. Michalacos[1]

[1]Children's Hospital P. & A. Kyriakou, Dept. of Endocrinology-Growth and Development, Athens, Greece, [2]Children's Hospital P. & A. Kyriakou, Biochemistry Dept.-Hormones Laboratory, Athens, Greece

Objectives: To investigate the association between dyslipidemia and non alcoholic fatty liver disease (NAFLD) with BMI, waist-to-height ratio (WHtR), waist circumference (WC) and with insulin resistance index HOMA-IR in overweight and obese children and adolescents.
Methods: Data from 299 overweight and obese children (48% boys) with mean age 9.23±2.5 years were analyzed. ALT >25.8 U/L (boys) and >22.1 U/L (girls), was defined as abnormal in this study, as there is no single standard cut off point for abnormal serum aminotransferase in children[1]. Student's t-tests were computed for the comparison of mean values. Chi-square tests were used for the comparison of proportions.

Parameter	Subjects without NAFLD (a) (n=78)	Subjects with Mild NAFLD (b) (n=84)	Subjects with Moderate or severe NAFLD (c) (n=46)	P-Value, overall	P-Value, a vs. b	P-Value, a vs. c	P-Value, b vs. c
BMI (Kg/m2)	25.7 ± 3.2	28.6 ± 4.5	30.1 ± 4.3	<0.0001	0.002	<0.0001	0.009
BMI SDS	1.9 ± 0.8	2.4 ± 1.1	2.9 ±1.2	<0.0001	0.004	<0.0001	0.014
Waist circumference (cm)	82.9 ± 9.2	88.7 ± 9.9	95.7 ± 9.9	<0.0001	0.001	<0.0001	<0.0001
WC SDS	1.1± 0.9	1.8 ± 1.4	2.3 ± 1.2	<0.0001	0.001	<0.0001	0.042
Insulin (μU/ml)	14.2 ± 7.8	19.4 ± 10.4	22.7 ± 12.3	0.0001	0.001	<0.0001	0.23
HOMA-IR	3.0 ± 1.7	19.4 ± 10.4	22.7 ± 12.3	0.0002	0.002	0.0003	0.4

Results: Proportions of children with dyslipidemia and NAFLD were 23.4% and 31.4% respectively. The percentage of children with NAFLD was 28.3% in those without dyslipidemia and 45% in those with dyslipidemia (p 0.015). BMI, WC and WHtR were not different between children with and without dyslipidemia (p 0.832, 0.747, 0.851 respectively). BMI was significantly higher in those with NAFLD (p 0.019). A stratified by gender analysis, showed that BMI, WC and WHtR were significantly higher in boys with NAFLD (p 0.009, 0.037, 0.049 respectively). WHtR>0.5 and HOMA-IR>3 were not significantly associated with the presence of dyslipidemia (p>0.999, 0.549 respectively), however HOMA-IR >3 was more frequent in children with NAFLD (p 0.011). A stratified by gender analysis, showed that the aforementioned association was evident only in boys (p 0.027).

Conclusions: The severity of obesity as evidenced mainly by BMI and insulin resistance and male gender is clinical indicators of increased risk of dyslipidemia and NAFLD among obese children and adolescents. Children at increased risk should be followed closely and have a more intense program of healthy diet and physical activity, so as to avoid comorbidities of obesity in adulthood.

1. Gastroenterology. 2010 Apr;138(4):1357-64, 1364.e1-2. Epub 2010 Jan 11.

eP060

Strong association of central obesity and insulin resistance with non-alcoholic fatty liver disease in overweight Asian Indian adolescents

V. Jain[1], M. Jana[2]

[1]All India Institute of Medical Sciences, Pediatrics, New Delhi, India, [2]All India Institute of Medical Sciences, Radiology, New Delhi, India

Objectives: We aimed to assess the prevalence of and association between central obesity, insulin resistance and non-alcoholic fatty liver disease (NAFLD) in overweight Asian Indian adolescents.

Methods: 208 overweight subjects (BMI > 85th centile) aged 10 to 16 were included. BMI and waist circumference (WC) was measured and converted to standard deviation score (SDS) using Indian reference data. NAFLD was diagnosed and graded as mild, moderate or severe by ultrasonography by a single radiologist (MJ). Fasting plasma glucose and insulin (by electrochemiluminiscence assay) were measured and homeostatic model assessment of insulin resistance (HOMA-IR) calculated as fasting insulin (μU/ml) × fasting glucose (mmol/L)/ 22.5. Central obesity was defined as WC > 90th centile for age and sex, or > 90 cm in boys and > 80 cm in girls) and insulin resistance as HOMA-IR> 2.5.

Results: Mean (SD) age, BMI SDS and WC SDS were 11.9 (1.6) y, 2.3 (1.1) and 1.6 (1.3). Central obesity was present in 66%, insulin resistance in 65.5%, and NAFLD in 62.5% (mild, moderate and severe in 40.3, 18.8 and 3.4%, respectively). Mean BMI, WC, fasting insulin and HOMA-IR were highest in the adolescents with moderate or severe NAFLD and minimum in those without NAFLD.

[Adiposity and insulin according to NAFLD grade]

On multiple logistic regression, WC and HOMA-IR were independently associated with NAFLD with odds ratios (95% C.I.) of 2.8 (1.4-5.5) and 2.2 (1.6-4.2), respectively.

Conclusions: The prevalence of central adiposity, insulin resistance and NAFLD closely paralleled each other in overweight Asian Indian adolescents, and waist circumference and HOMA-IR were independently associated with NAFLD.

eP061

Circulating fibroblast growth factor-21 (FGF-21): a biomarker of endothelial dysfunction in obese Hispanic youth (OHY) with nonalcoholic fatty liver disease (NAFLD)?

F. Bacha[1], A. Tomsa[2], S. Klinepeter-Bartz[2], C.Z. David[3], S. Barlow[4]

[1]Baylor College of Medicine & Texas Children's Hospital, Children's Nutrition Research Center, Houston, United States, [2]Baylor College of Medicine & Texas Children's Hospital, Pediatric Endocrinology and Diabetes, Houston, United States, [3]Texas Children's University, Department of Radiology, Houston, United States, [4]Baylor College of Medicine & Texas Children's Hospital, Department of Gastroenterology, Houston, United States

Objective: To investigate the relationship of FGF-21 to endothelial function in OHY with NAFLD (MRS hepatic fat fraction >5.5%) vs. without NAFLD across the spectrum of glucose regulation.

Methods: OHY (age: 15.4±0.3 years), 13 with normal glucose tolerance (NGT), 19 with prediabetes (PreD) and 16 with type 2 diabetes (T2D) had evaluation of reactive hyperemia index (RHI) and augmentation index (AIx) by peripheral arterial tonometry, blood pressure (BP), lipids, peripheral (IS) and hepatic insulin sensitivity (HIS) by hyperinsulinemic-euglycemic clamp with [6,6,$^2H_2$] glucose, DXA, visceral (VAT) and hepatic fat (HF) by MRI/MRS.

Results: The 2 groups were similar in age, sex, HbA1c (5.6±0.1 vs. 5.8±0.1%), BP, % body fat and VAT. The NAFLD group had higher FGF-21, LDL-cholesterol (98.0±4.5 vs. 79.0±4.9 mg/dl), lower IS, lower RHI and higher AIx (Table). FGF-21 related to VAT, HF(r=0.45, p=0.002), HIS (r=-0.39, p=0.009), RHI (r=-0.33,p=0.03), and AIx (r=0.45, p=0.02). In a multiple regression analysis, FGF-21 (β=-0.31) and HF (β=-0.44) contributed to the variance in RHI independent of %BF, VAT, and age (R^2=0.35, p=0.01). With AIx as the dependent variable, FGF-21(β=0.4) was the significant determinant of AIx (R^2=0.44, p=0.004), independent of HIS.

Conclusion: Circulating FGF-21 levels are elevated in OHY with NAFLD and are associated with measures of insulin sensitivity and endothelial dysfunction. FGF-21 may constitute a biomarker of vascular dysfunction in these youth.

	No-NAFLD 11M/14F 10 NGT/8 PreD/ 7 T2D	NAFLD 11M/12F 3 NGT/11 PreD/ 9 T2D	P-value
% Body Fat	37.2 ± 1.3	40.5 ± 1.4	0.1
Visceral adipose tissue (VAT) (cm^2)	88.6 ± 6.6	99.7 ± 6.5	0.2
Intrahepatic Fat (%)	3.2 ± 0.3	11.1 ± 1.1	<0.001

ALT (IU/L)	31.4 ± 5.0	74.0 ± 11.03	0.001
FGF-21 (pg/ml)	203.8 ± 31.3	343.2 ± 34.9	0.005
Insulin Sensitivity (mg/kg$_{FFM}$.min per μU/ml)	4.0 ± 0.4	2.8 ± 0.3	0.01
HIS (mg/kg.min. μU/ml)-1	24.6 ± 3.6	14.1± 1.3	0.01
RHI (vascular reactivity)	1.7 ± 0.08	1.4 ± 0.05	0.004
Augmentation Index (%) (vascular stiffness)	-11.1± 1.3	-5.7 ± 1.6	0.013

[Characteristics of the NAFLD vs. non NAFLD groups]

eP062
Complement, obesity and cardiometabolic risk in adolescents

M. Copenhaver[1], R. Hoffman[1], C.-Y. Yu[1]

[1]*Nationwide Children's Hospital / The Ohio State University, Pediatric Endocrinology, Columbus, United States*

Objectives: Complement components C3 and C4 play an important role in regulating inflammation which plays a role in the development of cardiometabolic disease. Obesity is associated with increased cardiometabolic risk as well as increased levels of complement.
Methods: We obtained a blood sample for evaluation of complement levels in 20 healthy adolescents (age 15.7 +/-1.9, BMI 22.8 +/-5.6). Protein levels for complement C3 and C4 from EDTA-plasma were determined by single radial immunodiffusion. Body fat percentage was measured in the BodPod. An oral glucose tolerance test was performed (OGTT) and insulin sensitivity was calculated using the Matsuda index. Lipids, IL-6 and C-reactive protein (CRP) were also measured. Disposition index was calculated using the Matsuda index and insulin secretion.
Results: The Matsuda index was negatively correlated to C3 concentration (r=-0.534, p=0.019). Insulin secretion was positively correlated to C3 concentration (r = 0.703, p = 0.001). BMI (r = 0.68, p = 0.002), body fat percentage (r = 0.762, p = 0.000), waist circumference (r = 0.599, p = 0.009), total cholesterol (r = 0.469, p = 0.037), and triglycerides (r = 0.676, p = 0.001) were all positively correlated to C3 concentration. CRP was positively correlated to C4 concentration (r = 0.486, p = 0.03). Since C3 was correlated with measures of body fat, multi linear regression analysis was performed to assess how this affected the relationship to insulin secretion, lipids and inflammatory markers and showed that only total cholesterol remained significant. The Matsuda index relationship was found to be due to percent body fat and not due to a direct relationship with C3 concentration.
Conclusions: These results demonstrate potential pathophysiological interactions between complement and adiposity that increase cardiovascular risk in adolescents.

eP064
Increasing trend of fasting plasma glucose in Korean youth: a nationally representative population-based study

J. Lee[1], J.H. Kim[2], Y.-J. Rhie[3]

[1]*Inje University Ilsan Paik Hospital, Department of Pediatrics, Goyang, Korea, Republic of,* [2]*Seoul National University Bundang Hospital, Department of Pediatrics, Seongnam, Korea, Republic of,* [3]*Korea University Ansan Hospital, Department of Pediatrics, Ansan, Korea, Republic of*

Objectives: Diabetes in children is increasing worldwide. However, the study of change in fasting glucose among general pediatric population was lacking. The aim of this study was to investigate the secular trend of fasting plasma glucose levels in Korean youth and to evaluate change in the proportion of impaired fasting glucose (IFG) and diabetes mellitus (DM).
Methods: Study subjects were Korean youth who participated in the Korea National Health and Nutrition Examination Survey (KNHANES). KNAHNES was a nationally representative cross-sectional survey. KNHANES wave 3 (K3) was performed in 2005, KNHANES 4 (K4) in 2007-09, KNHANES 5 (K5) in 2010-12 and KNHANES 6 (K6) in 2013-15. Study participants were classified according to fasting plasma glucose: normal plasma glucose (<100 mg/dL); IFG (100-125 mg/dL); and DM (≥126 mg/dL).
Results: A total of 8,196 youth (boys 4,317, 52.7%) aged 10-19 years with available fasting plasma glucose were enrolled. Mean fasting glucose (mg/dL) was 87.6 ± 0.3 in K3, 88.7 ± 0.2 in K4, 88.5 ± 0.2 in K5, and 91.1 ± 0.3 in K6, respectively (P < 0.001). There was no difference in fasting glucose according to sex. In multiple linear regression analysis, fasting glucose showed significant linear correlation with year of KNANHES after adjusting sex, age and body mass index z-score [coefficient (95% CI) 0.45 (0.35, 0.56), P< 0.001].

The proportion of IFG and DM was 3.1% in K3, 5.2% in K4, 4.7% in K5, 9.4% in K6 (P < 0.001). In obese population, proportion of IFG and DM was 3.5% in K3, 8.7% in K4, 10.6% in K5 and 11.3% in K6, respectively (P = 0.419). In non-obese population proportion of IFG and DM was 3.1% in K3, 4.7% in K4, 3.8% in K5 and 9.1% in K6, respectively (P < 0.001).
Conclusions: In Korean youth, mean glucose showed increasing tendency over the last 10 years. The proportion of IFG and DM was also increasing, especially in non-obese population. Further research is needed to investigate associated factors with this trend.

ePoster Session 09 - Transition

eP065

A national survey of transition care for youth and young adults with type 1 diabetes mellitus: perspectives of pediatric endocrinologists in Korea

J.H. Kim[1], J.-H. Yoo[2]

[1]*Seoul National University Bundang Hospital, Department of Pediatrics, Seongnam, Korea, Republic of,* [2]*Dong-A University College of Medicine, Department of Pediatrics, Busan, Korea, Republic of*

Objectives: Transition from pediatric to adult care for youth and young adults with type 1 diabetes mellitus (T1DM) increased the risk for adverse outcomes. In Korea, transition care of patients with T1DM has not been reported. The aim of the study was to describe experiences, barriers and clinical practice patterns of pediatric endocrinologists associated with transition care using nationwide survey.
Methods: An electronic survey was performed to pediatric endocrinologists registered in the Korean Society of Pediatric Endocrinology.
Results: Response rate was 50.2% (72/143). Among them, female was 58.3%. Duration of clinical practice was 13.0±8.9 years. A 70.8% of responders were worked in an academic medical center. Main reasons for transfer to adult care were request from a patient or family (69.6%), age over 18 years (42.0%) and development of complication (34.8%). Barriers to transition were long-lasting doctor-patient relationship (72.9%), lack of adult endocrinologists in T1DM care (62.9%) and no established transition protocol (55.7%). The communication for transition care between pediatric and adult endocrinologists was non-structured patient summary (68.6%), telephone or e-mail (27.1%), and adult and pediatric practice for the transition period (12.9%). Responders reported that followings were needed for the successful transition: Development of transition protocol (79.2%); multidisciplinary team approach for transition period (52.8%); education for transition care to adult endocrinologists (52.8%); and education for transition care to pediatric endocrinologists (45.8%).
Conclusions: Our findings revealed that transition care of T1DM patients was a challenge to pediatric endocrinologists in Korea. Development of common protocol for transition care and communication between pediatric and adult providers are needed.

eP067

Improving outcomes for youth with type 1 diabetes in transition to adult care through strengthening integration with primary care: an exploratory, cross-provincial study

R. Chafe[1]

[1]*Memorial University, Paediatrics, St. John's, Canada*

Objectives:
1. To examine the processes used to transition patients with type 1 diabetes (T1D) into adult care in two Canadian provinces;
2. To determine and compare the impact of transition on patient outcomes in both provinces;
3. To explore how primary care physicians could play a larger role in providing care to emerging adults with T1D.

Methods: Surveys of 36 pediatric diabetes centres in Ontario and nine pediatric diabetes clinics in Newfoundland; Four focus groups with patients and interviews with primary care physicians; and analysis of health system usage data in two Canadian provinces.
Results: Having a visit with your new adult diabetes provider before you transition is associated with adequate follow-up care in early adulthood. Having a visit with a family doctor during the transition age is associated with adequate diabetes care and a lower risk of DKA or death in early adulthood. Primary care providers are sympathetic to managing diabetes patients, but often do not see enough young adult patients with type 1 diabetes to feel comfortable completely taking over their care. Rural areas do not have same access to specialists, but may face fewer issues related to transition as the same providers often see patients as adolescents and adults.
Conclusions: Providers should encourage youth with T1D to maintain a connection and regularly visit their family physician throughout the transition period and encourage new adult diabetes providers to meet as early as possible with their new patients.

eP068

Adolescents with type 1 diabetes perceptions and preparation for transition care

D. Bekkat Berkani[1], L. Oukrif[1], F.Z. Zemiri[1], K.S. Bouk'hil[1], W. Messadi[1], M. Ouchiha[1], L. Haddad[1], A. Rezki[1], N. Chérif[1]

[1]*CHU Benimessous, Algers, Algeria*

Objectives: The purpose of this study is to ask diabetics adolescents about their perceptions for the transition care, trying to know their expectations and guide the preparation for transition from pediatrics to adult care.
Patients and Methods: Adolescents aged 16 to 25 years with diabetes for at least one year were involving. They were interviewed with their parents about their feelings and perceptions for their transfer to adult counseling, ideal age of transition, autonomy, fears and preference for the place where to be transferred.
Results: Forty patients were included (57.5% were female). The median age was 21 years; 35% of patients were in high school (n = 14), 25% in university (n = 10) and 32% were working (n = 13). The median age of diabetes at diagnostic was 10 years (SD = 4.4 years) and the median follow-up time since diagnosis was 5 years (all SD were 4.5 years). All patients are treated with intensive insulin therapy. They continued to see their pediatric providers with their parents in 77, 5% of cases. Younger patients and their parents reported that transition to adult medical care should occur at the age of twenty years for most of them. Ninety per cent of these adolescents discussed the need to transition to an adult provider of diabetes care. Their greatest fear is to lose their privileged relationship with their pediatrician after many years. All patients would like to transfer to an adult clinic located in the same hospital. Among the parents, only 33.3% judged their child ready. They wanted (77.7%) to be present at the first consultation at adult clinic. During the interview, the teenagers were impatient to meet the adult doctor and curious to see him.
Conclusion: In our study, youth with diabetes and their parents are not prepared for transition to adult care. Transition discussions should begin at an earlier age. It is time to do intensives efforts for integrate transition preparation counseling into our pediatric type 1 diabetes care.

eP069

Transition process from pediatric to adult care of adolescents with diabetes in Latin America

M. Mira[1], C. Hamilton[2], E. Codner[1]

[1]*University of Chile, Pediatric Endocrinology, Santiago, Chile,* [2]*Centro de Investigaciones Endocrinológicas Dr. Cesar Bergadá, Buenos Aires, Argentina*

Objective: Transitioning from pediatric to adult care is known to be a critical time in the care of patients with chronic diseases. Changing the health care providers of adolescents with diabetes may have an adverse impact. Lack of information exists regarding the transition programs of diabetes care of adolescents in Latin America. The aim of this study was to evaluate the methodology used for transferring adolescents from pediatric to adult care in Latin America.
Methods: A survey evaluating the transition experience in different countries (n=13) of South and Central America was sent by email or

given personally to attendees (n=457) of the 2015 and 2016 Annual Meetings of the *Sociedad Latinoamericana de Endocrinología Pediátrica* (SLEP). The total number of questionnaires that were answered was 194 (42%). The responders that took care of subjects with diabetes was 124 (64%); data from these surveys are shown.

Results: Most physicians were pediatric endocrinologists (87%) and pediatricians (8%). The mean age of transfer to adult care was 17.5 ± 1.8 years. The methodology for transferring the patients to adult care was done by: a referral note with a summary of the clinical history (71%), a transfer program (6%) and a meeting with adult team (23%)

The transition process was perceived as having regular, poor and good quality by 44%, 46% and 10% of the physicians, respectively. Only 6% of the physicians reported that having a multidisciplinary team increased the satisfaction with the transfer process.

Conclusions: This is the first study that has evaluated transition of adolescents with diabetes to adult care in Latin America. Very few centers have a transition program. The program of the transition process was frequently perceived as having poor quality. These data should motivate health care providers to develop an organized approach to the transition process in diabetes in Latin-America.

ePO70
Preparing adolescents with type 1 diabetes (T1D) to transition to adult care and adulthood

M.E. Hilliard[1], K.P. Lee[1], J.A. Kushner[1], S.K. Lyons[1]

[1]*Baylor College of Medicine & Texas Children's Hospital, Pediatrics, Houston, United States*

Objectives: International guidelines recommend a gradual transition process that starts early to prepare adolescents with T1D for adulthood, yet many clinical programs focus on the point of transfer to adult care shortly before leaving pediatric care. We describe the implementation of a new transition preparation program.

Methods: Adolescents (age 12-18) and parents complete transition readiness measures via secure web survey, and scores are transformed into 10 transition-related competencies. Annually, families meet with a Transition Navigator (TN) who introduces transition concepts, guides the adolescent in selecting 2 transition competency goals based on their scores and age, provides resources, and informs the care team of the goals.

Results: In the first 5 months, 65 teens participated in the TN program (48% male, 57% non-Hispanic White). The most frequent transition competency goals are listed in the table. Discussion of transition goals during the medical appointment following the TN visit was documented by at least 1 medical team member 56% of the time.

Conclusions: Preliminary process data suggest the TN program is feasible to implement in a busy clinic setting, and feedback will guide efforts to increase follow-up on transition competency goals at medical visits throughout the year following TN meetings. Ongoing research will evaluate the impact on self-management behavior and transition outcomes.

Smart Choices for My Health and Safety	37%
My Health Information	34%
Navigating the Medical System	29%
Communicating with My Healthcare Team	28%
Making Diabetes Management Decisions	17%
Planning for Emergencies	15%
Self-Advocacy & Seeking Support	12%
Managing Diabetes During Physical Activities	11%
Foundational Diabetes Knowledge	9%
Taking Charge of My Diabetes	3%

[% selecting transition-related competency goals]

ePO71
Illustration of innovative, integrated diabetes training curricula for children and adolescents with type 1 diabetes mellitus (T1DM)

D. Sethe[1], D. Hilgard[2], A. Büssing[1], B. Berger[1]

[1]*University Witten/Herdecke, Chair of Medical Theory, Integrative and Anthroposophic Medicine, Herdecke, Germany,* [2]*Community Hospital Herdecke, Paediatric Endocrinology and Paediatric Diabetology, Herdecke, Germany*

Objectives: Children and adolescents with T1DM are treated with complementary, alternative medicine (CAM). The effectiveness of integrated diabetes training programmes can be evaluated when the intervention is regarded as complex interventions. The mutually dependent intervention variables need to be described in detail before an evaluation is carried out. The objective of this study was to summarise the particular intervention variables and their interactions in an intersubjective and transparent manner.

Methods: A reconstructive survey with nine, semi-structured interviews were carried out with experts in integrative diabetes education at the academic teaching hospital (Herdecke Community Hospital). The interview transcripts were coded and evaluated using content analysis.

Results: Primary objectives were derived which are intended to be used in an age-specific way to assist with the promotion of the child´s individual, biographical development tasks. In order to attain these objectives, the children need to develop individual specialist skills, methodological skills, social skills and personal skills. In addition to conventional education programmes, advanced programmes with additional, integrative medical, methods, and objectives were developed. To this end, five module groups have been designed for the integrated diabetes training: knowledge transfer, experimental personal diabetes management, experiential training, creative and individualised support and the promotion of self-effectiveness and social skills.

Conclusions: The curriculum enables the mechanisms of action of the intervention components of integrated diabetes training to be understood intersubjectively. The coherence between the skills profile and the design of the modules in the curricula can thus be reproduced.

ePO72
An observational study of family communication about adolescents' type 1 diabetes management at outpatient clinic appointments

C. Rawdon[1], V. Lambert[1], P. Gallagher[1], N. Murphy[2,3], M. Glacken[4]

[1]*Dublin City University, School of Nursing and Human Sciences, Dublin, Ireland,* [2]*Temple Street Children's University Hospital, Dublin, Ireland,* [3]*Mater Misericordiae University Hospital, Dublin, Ireland,* [4]*St Angela's College, Sligo, Ireland*

Objectives: Adolescence is a key time in which young people take on responsibility for type 1 diabetes (T1D) management. Continued support from and communication with parents and healthcare professionals (HCPs) is crucial for optimal self-management. This study aimed to identify factors which impede and/or facilitate parent-adolescent transition of T1D self-management responsibilities, with particular consideration to the roles of parents and adolescents in communicating T1D management information in a clinical setting.

Methods: Data were drawn from non-participant observations at adolescents' routine outpatient clinic appointments. Twenty-nine 11-17 year olds and their parents were observed during a single appointment. Adolescents were diagnosed with T1D for a minimum of six months. Families were purposively recruited through two national child and adolescent diabetes and endocrine outpatient clinics. Data from audio-recorded consultations with HCPs and informal conversations with families were thematically analysed.

Results: Themes relating to treatment challenges and communication roles were identified. Diet, growth, physical activities, and emotional well-being all had an impact on T1D management. These treatment challenges were frequently discussed in consultations. Adolescents' level of input into T1D management conversations with HCPs varied according to age. Parents of younger adolescents often led the conversation with HCPs, indicating a more active role in their child's T1D management.

Conclusions: This fieldwork provided baseline data on current practices around parent-adolescent communication of management responsibilities for adolescents' T1D at the time of outpatient clinic consultations, with particular emphasis on parent and adolescent roles. These findings have informed a further phase of research exploring the direct experiences of parents and adolescents in negotiating T1D self-management responsibilities.

ePoster Session 10 - Latebreakers - Varia I

eP073

An analysis of a local paediatric diabetes network in the UK using data from the National Paediatric Diabetes Audit (NPDA) 2015/2016

N. Ip[1,2], J. Rangasami[1,2]

[1]*West Middlesex University Hospital, Paediatrics, Isleworth, United Kingdom,* [2]*Chelsea & Westminster Hospital NHS Trust, Paediatrics, London, United Kingdom*

Objectives: The NPDA has been introduced since 2010 to help improve care provided to patients with diabetes. Data from 173 Paediatric Diabetic Units (PDU) across England and Wales is collected yearly to monitor incidence, prevalence, demography, diabetes-related complications. 7 Care processes can be benchmarked against national standards specified by the National Institute for Health & Care Excellence (NICE) guidance. The data is used to monitor each PDUs own activity and identify areas in need of improvement. Data can be compared at a local network meeting enabling sharing of ideas for good medical practice and improving the care provided.
Methods: 6 hospitals, 916 diabetes patients, form part of the local (North West London) network. Data gathered using the NPDA 2015/16 results online. Various relevant data sets were looked at in detail, compared & presented at the July 2017 Network Meeting. Graphs illustrating the results from the 6 hospitals were produced and discussed. Good practice & outcomes were celebrated & areas for improvement highlighted.
Results: 6 hospitals captured >90% of the 3 care processes (HbA1c, BP, BMI). Rest 4 Care processes (Thyroid & eye screen, Albuminuria & foot exam) capture was 60-90%, improved since 2014/15. 1 hospital achieved 100% in completing 6 care processes. Median HbA1c was ≤67.2 mmol/mol, National being 64.5 mmol/mol. HbA1c improved since 2014/15. Microvascular & macrovascular complications were present in about 20% & 15-45% of cases respectively. Insulin pump therapy ranging between 6.1-35.5%, National 28.1%. Thyroid & coeliac disease were between 5.5-6.3% in 4 PDUs, increased compared to national data.
Conclusions: Many missing data, easily improved by a dedicated administrator. HbA1c improved by early intervention starting at diagnosis, goal setting, keeping strict control & Increasing Insulin Pump therapy. Setting individual goals & targets for each PDU & sharing data in the network periodically will improve diabetes care.

eP074

Pilot evaluation of a brief well-being survey for teens with type 1 diabetes (T1D): a clinical tool to enhance diabetes clinic visits

L. Laffel[1], D. Butler[1], W. Levy[2], T. Danne[3], B. Anderson[2]

[1]*Joslin Diabetes Center, Pediatric, Adolescent and Young Adult Section, Boston, United States,* [2]*Baylor College of Medicine, Department of Pediatrics, Section of Psychology, Houston, United States,* [3]*Kinder und Jugendkrankenhaus "Auf der Bult", Hannover, Germany*

Objective: Internationally, teens with T1D frequently struggle with self-care adherence and experience poor biomedical/psychosocial outcomes. There is need for a brief, self-report survey that teens can share with providers during diabetes clinic visits.
Methods: A 12-item survey, assessing 6 domains (diabetes distress/worry, communication, peer integration, weight/body image, family, self-worth) was administered to 24 teens (33% females; 71% pump-treated) with T1D ages 13-18y at 2 pediatric diabetes centers in the USA. Teens endorsed each query using a 5-point Likert scale (agree to disagree). A diabetes provider (2 per site) reviewed responses during clinic visits and identified areas for intervention and support. Providers used a color-coded user-guide (red indicating need for help) when interpreting responses.
Results: Teen mean age was 15.9±1.7y and mean T1D duration was 6.8±3.7y. Mean A1c was 8.7±2.3% with 29% achieving target A1c < 7.5% (<59 mmol/mol). Teens completed the survey within a few minutes and all were comfortable discussing responses with their providers. All providers could identify at least 1-2 areas upon which to focus recommendations for each teen during the visit. The most common areas of concerns by teens involved acknowledging need for family support, accepting that diabetes is a challenge, need for motivation and confidence in self-care, and confessing that diabetes disrupts peer/family time. All teens with their providers created plans to address areas of concern, and both teens and providers reported that they would use the survey again.
Conclusions: Given the multitude of competing needs during T1D clinical encounters for teens related to diabetes management, this 12-item self-administered well-being survey can provide an actionable way for teens and their providers to address teen perceptions of self-care strengths and challenges, aiming to improve outcomes. Survey and provider guide will be shared at ISPAD.

Study supported by Sanofi

eP075

Impact of clinical and social factors on non-physician healthcare practitioner time in pediatric diabetes

A. Clarke[1], H. Ahsan[1], J. Harrington[1,2], F. Mahmud[1,2]

[1]*The Hospital for Sick Children, Department of Pediatrics, Division of Endocrinology, Toronto, Canada,* [2]*University of Toronto, Department of Paediatrics, Toronto, Canada*

Background: The factors associated with health care professional (HCP) time and interactions have not been well described in pediatric type 1 diabetes (T1D) given the adoption of resource-intensive technologies and gaps in socioeconomic status.
Aims: To evaluate the clinical and social factors associated with HCP interactions in a pediatric T1D practice.
Methods: Cross-sectional data from 723 pediatric subjects with TID were linked to non-physician HCP workload data, including time spent in direct clinical care over a 1-year period. Associations between HCP Time and demographic, social and diabetes treatment predictors were tested using regression analysis.
Results: Overall, HCPs spent 145.7 minutes per patient on median over 3 clinic visits, with Certified Diabetes Educators (CDEs) being responsible for most clinic interactions compared to psychosocial staff. CDE Time varied considerably according to T1D duration, with new onsets (duration ≤1 year) taking a median 392.0 minutes compared to 114.5 minutes for their established counterparts (P< 0.0001). Among the established group (n=629), CDE Time was strongly associated with insulin pump initiation, psychosocial service use, degree of marginalization and HbA1c (P< 0.0001). Overall, CDE Time increased by an average of 8.6 minutes for each 1%-increase in HbA1c (P=0.022), and by 16.3 minutes for each 1-unit increase in marginalization (P=0.01), a trend which was opposite in new onsets.
Conclusions: The most consistent predictor of HCP time was metabolic control. Significant investments in education and pump training appear to result in less time spent on subsequent clinical interactions, largely driven by lower HbA1c. With respects to social determinants in our clinic, we observed the least marginalized patients utilized more time at diagnosis, a trend that reversed among established patients, whereby the most marginalized patients and those followed by psychosocial services required more CDE Time.

eP076
Increasing incidence of type 1 diabetes in Sweden but decreasing awareness

J. Ludvigsson[1]

[1]*Linköping University, Div of Pediatrics, Dept of Clin Exp Medicine, Linköping, Sweden*

Background: In Finland, with the highest incidence of Type 1 diabetes (T1D) among children the incidence may level off. Sweden with second highest incidence is said to have an incidence levelling off at ca 40-44 /100 000 children/year. The environmental factors explaining the T1D increase, should have reached its maximum.
Material and Methods: To elucidate the situation data from the official Annual Reports from SWEDIABKIDS, the national register of newly-diagnosed diabetic children in Sweden, have been analyzed regarding HbA1c and ketoacidosis at onset and to get the incidence of T1D in children < 15 years of age. These have been added to published data (1).
Results: Incidence of T1D has continued to increase in Sweden until 2015, the last complete year of registration. The incidence < 15 years 2014-2015 was 48.8! In last 6 years the incidence has decreased in children 0-4 years, but increased mainly in the age group 10-14 years. Incidence decreases after 15 years of age. The proportion of patients with ketoacidosis (pH < 7.30) has increased from 17.9% 2009 , 19.3% in 2012, 21.0% in 2014 to 24.5% in 2016 !
Discussion: The incidence of Type 1 diabetes in Sweden in children < 15 years of age is not leveling off but continuously increasing. The official Swedish incidence figures in recent years are based on < 18 years of age , which becomes lower as the incidence decreases after the age of 15.There is also a delay in national registration, which also may be incomplete certain years. Delay in diagnosis can be illustrated by several cases where the diagnosis of diabetes in children has been inadequate
Conclusions: Sweden has the world`s highest incidence of T1D among children and adolescents next to Finland. The incidence continues to increase, without any sign of plateau. Evidently the environment and/or life style is still getting worse. Furthermore, the diagnosis seems to getting more delayed.

1. Berhan Y et al. Diabetes. 2011; 60:577-81.

eP077
Adjunctive therapy with dapagliflozin improves full closed loop post prandial glycaemic control in type 1 diabetic young adults - The DAPADream

T. Biester[1], A. Nieswandt[1], S. Biester[1], K. Remus[1], R. Nimri[2], I. Muller[3], E. Atlas[3], T. Battelino[4], N. Bratina[4], K. Dovc[4], O. Kordonouri[1], M. Phillip[2], T. Danne[1]

[1]*Auf der Bult, Diabetes Center for Children and Adolescents, Hannover, Germany,* [2]*Schneider Children's Medical Center, Petah Tikvah, Israel,* [3]*DreaMed Diabetes Ltd., Petah Tikvah, Israel,* [4]*University Children's Hospital, University Medical Centre Ljubljana, Ljubljana, Slovenia*

Introduction: Dapagliflozin (DAPA) as an SGLT2-Inhibitor is currently discussed as adjunct therapy in type1 diabetes.

The DreaMed Substance Administration System with fuzzy logic closed loop algorithm is proven to be safe and effective in hybrid closed loop settings, in full closed loop (FCL) settings postprandial time is always a phase of high glucose excursions. The aim of the present trial is to investigate the effect of DAPA on glucose levels after an unannounced meal under FCL conditions.
Method: Eligible patients (T1DM,CSII,non-severe obese) were admitted for 24 hours of FCL in this monocentric, double-blind, randomized, placebo-controlled cross-over trial on two occasions. They received 10 mg DAPA or placebo twice. Two mixed meal tests were performed. Glucose control was achieved by DreaMed FCL. Primary outcome was "Time in Range 70-180 mg/dl" (TIR).
Results: Participants were 15 young adults (9 female) with mean [IQRange] of age 19 [18-20], HbA1c 8.3 % [7.1-10.4]. TIR with DAPA increased significantly overall and during postprandial phase, urinary glucose excretion raised threefold (Table). Time above 180 mg/dl was significantly decreased no increase below 70 mg/dl and no serious ketosis was observed.
Conclusion: Young adults with T1D took effort from DAPA combined with FCL. Average TIR was increased by 2.8 hours compared to placebo despite two unannounced meals. Bolus and basal insulin was reduced in FCL. SGTL2 inhibition appears to be a safe and effective adjunction in FCL.

Time within 70-180 mg/dl [%]	DAPA	Placebo	p-Value
24 h	**68.40 (60.68, 70.66)**	**50.35 (45.56, 56.16)**	<0.001
7 am-7 pm	41.67 (33.23, 47.22)	18.75 (14.04, 29.83)	<0.001
11 pm-7 am	100.00 (93.17, 100.00)	90.63 (77.27, 100.00)	0.123
Time below 70 mg/dl [%]	1.39 (0, 4.11)	0 (0, 2.53)	0.064
Time above 180 mg/dl [%]	29.17 (26.39, 36.84)	45.49 (42.45, 54.21)	<0.001
Mean Glucose Levels [mg/dl]	**154.20 (144.74, 174.55)**	**186.61 (172.53, 201.03)**	0.001
Bolus Insulin [U]	9.65 (8.13, 12.46)	16.00 (13.41, 19.16)	<0.001
Basal Insulin [U]	17.33 (14.50, 21.78)	22.51 (15.38, 27.14)	0.008
Urinary glucose excretion [mg/24h]	149331±42057	48520 ± 22618	<0.001

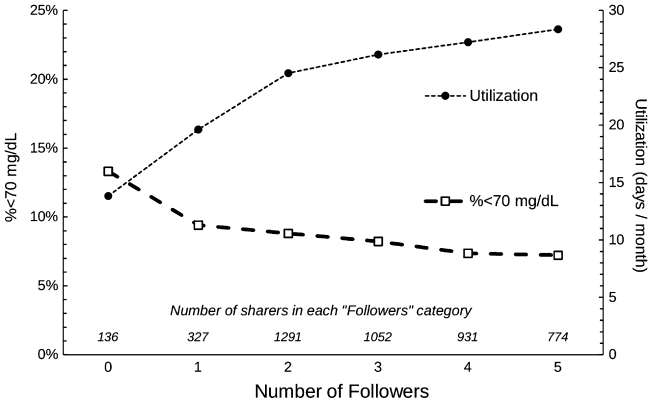
[Results from Full Closed Loop]

eP078
Effects of sharing continuous glucose monitoring (CGM) data from young children with diabetes on CGM usage and hypoglycemic exposure

A. Parker[1], J. Welsh[1], A. Jimenez[1], C. Graham[1]

[1]*Dexcom, Inc., San Diego, United States*

Objectives: Real-time sharing of continuous glucose monitoring (CGM) data allows parents and caregivers to participate in the management of diabetes in young children. We examined whether data sharing was correlated with CGM usage and/or hypoglycemia.
Methods: Share/Follow is part of the Dexcom G5 Mobile CGM system which allows for monitoring of data from one patient (the "sharer") by up to 5 "followers." We identified 4511 sharers ages 2-10 who had uploaded data in May 2017 and categorized them according to the number of associated followers on June 2, 2017. CGM utilization for each patient was calculated as the number of days with valid sensor glucose (SG) values during the month, with each patient-day equivalent to 288 SG values. Hypoglycemic exposure was expressed as the percentage of SG values < 70 mg/dL ("% < 70").
Results: About 97% of children had at least one follower; most had either 2 or 3 followers. As shown in the Figure, the 136 children with no followers had the lowest sensor utilization (13.8 days/month) and the highest percentage of low SG values (16%). Children with more followers had progressively more CGM utilization and progressively lower percentages of SG values < 70 mg/dL.
Conclusions: In this population of young children who are unlikely to entirely self-manage their diabetes, data sharing with Share/Follow may help their parents and caregivers provide appropriate and timely interventions that lead to higher CGM utilization and improved glycemic outcomes.



[Hypoglycemia and CGM utilization as according to number of followers]

eP079
Accuracy of the flash glucose monitoring system during physical activity in youth with type 1 diabetes

E. Giani[1], M. Macedoni[1], A. Barilli[1], A. Petitti[1], C. Mameli[1], G.V. Zuccotti[1]

[1]*University of Milan, Milan, Italy*

Objective: Exercise is often associated with glycemic oscillation and challenges in insulin management. Flash Glucose Monitoring (FGM) system may help to improve glycemic control during exercise. The purpose of this study was to assess the accuracy of FGM during an interval exercise intervention and over a 14-days period.
Methods: Sixteen youth (50% male), aged 13.7±3.8 yrs, with T1D for 5.4±3.8 yrs, A1c 7.4±1.0%, 81% pump users, BG monitoring 5.1±2.6 X/d, were enrolled. Paired FGM, plasma glucose (PG) and capillary (CG) values (total of 113) were collected during interval exercise and paired FGM and CGV (total of 832) were collected during up to 14 days (rest). FGM accuracy was evaluated with different measures, including sensor bias (SB), absolute relative difference (ARD), percentage of readings meeting the Consensus Error Grid (CEG) criteria and the International Organization for Standardization (ISO) criteria.
Results: During exercise, FGM bias means/medians were 14.1/12.0 mg/dl versus PG and 16.1/13.0 mg/dl versus CG. FGM ARDs means/medians were 12.5/9.4% versus PG and 15.4/10.8% versus CG. During rest FGM bias means/median were 10.5/8.0 versus CG and ARDs means/medians were 16.6/12.0%. The percentage of FGM readings within Consensus Error Grid Zone A and zones A+B for was 72.8% and 98.4% respectively during exercise and 71.03% and 97.24% respectively during rest. No serious adverse events were reported. Percentage of reading meeting the ISO criteria for CG levels < 100 mg/dL was 62.5% during exercise and 53.4% during rest; for CG levels≥100 mg/dL was 64.0% during exercise and 60.4% during rest.
Conclusions: FGM demonstrated similar clinical safety during exercise and rest, meeting the CEG criteria. The performance of FGM according to different levels of accuracy (ARD, ISO) resulted lower compared to glucometer but similar to that of other sensors during both exercise and rest. Specific parameters should be developed to test the performance of sensors.

eP080
640G Insulin pump therapy new hope or just a fancy gadget?

W.B. Gawel[1], A. Tabor[1], G. Deja[2], P. Jarosz-Chobot[2]

[1]*Silesian University of Medicine in Katowice, Students Association at Pediatrics & Children's Diabetology, Katowice, Poland,* [2]*Silesian University of Medicine in Katowice, Pediatrics & Children's Diabetology, Katowice, Poland*

Objective: The aim of a study was to assess the glycemic control of the patients with type 1 diabetes (DM1) after introducing personal insulin pump 640G with SmartGuard technology in real life.
Material and Methods: We included 26 girls and 18 boys with DM1 (median HbA1C7.05%; SD=1.8), mean age 9.32 years old (SD=3.93), with diabetes duration minimum 12 months (median 48,SD=37).After several months (median 10, SD=6.48) of using 640G pump we collected data regarding patients' history and glycemic control based on pump parameters from past 30 days of pumps' memory. Glycemic thresholds were set to be within 70-140 mg/dl. Patients were divided into 3 age groups: I(3-6y/o),II(7-10),III(10-19).
Results: Median HbA1C after introducing 640G therapy was lower 6 .85% SD=1.20. In all age groups the higher variability AVGSD (systemic deviation of average blood glucose) was negatively correlated with time patients stay within target thresholds (-0.69) and positively with HbA1C (0.47)Suspension before low(SusBL) was lower in older patients(-0.32). In the youngest group of patients negative correlations were found between AVGSD and SusBL with positive correlation between AVGSD and daily dose of insulin. The variability of glucose levels measured by the SD of average was in reverse correlation with time of suspension before low (SusBL) only in I group (-0.68)also in age group I patients who more frequently measured their BG manually(ManBG) used sensor less (-0.62) and had higher daily dose of insulin(0.64). In II age group higher number of ManBG translated to longer SusBL (0.52) as well as higher AUC< 55 (0.52). In III group higher HbA1C before 640G translates to lower number of ManBG (-0.56) In all groups less basal insulin ratio means higher AUC in target range(-0.39),especially noted in I group.
Conclusions: 640G therapy protects from hypoglycemia based on almost none time spent in< 55mg/dl and low time in< 70mg/dl based on AUC and improves metabolic control in all age groups.

ePoster Session 11 - Technology

eP081

Comparison of estimated HbA1c assessed through Abbott Freestyle Libre Software® and Siemens DCA Vintage® HbA1c in a sample of children and adolescents with type 1 diabetes

R. Cardona-Hernandez[1], L. Suárez-Ortega[1]

[1]*Hospital Sant Joan de Déu, Division of Endocrinology. Diabetes Unit, Barcelona, Spain*

Background: In the last few years, the increasing use of continuous glucose monitoring systems (CGMS) and flash glucose monitoring (FGM) as well as the development of different download platforms which are able to estimate HbA1c from continuous glucose readings, gives both clinicians and patients an opportunity to assess diabetes control in addition to the classic measurement of HbA1c. The Abbot Freestyle Libre Software® allows to estimate HbA1c based on data transmitted in a period of up to 90 days. The aim of this study was to assess the accuracy of estimated HbA1c calculated through this software in comparison with the HbA1c value measured during a routine visit in the diabetes clinic.
Methods: 64 downloads belonging to children and adolescents (2.1-18 years) with type 1 diabetes obtained from this software were collected during routine visits at diabetes clinic. For each download, data were saved for periods of 21, 28 and 90 days respectively. Collected data included estimated HbA1c, percentage of readings in range (70-140 mg/dl), time below range and percentage of capture sensor. Association between software-estimated HbA1c and HbA1c measured through the routine lab method (Siemens DCA Vintage -mean reference 5.0%; SD reference 0.350; range ±2: 4.3-5.7-) was studied by using Pearson correlation analysis.
Results: Software estimated HbA1c with FGM data of 21, 28 and 90 days showed a good correlation with standard HbA1c: at 21 days r= 0.699, p< 0.001; at 28 days r=0.719, p=0.001; at 90 days r=0.781, p=0.001); For a DCA HbA1c 6.87±0.95%, estimated percentage in range (70-140 mg/dl) was 33.09±10.92% (21 days), 34.30±13.15% (28 days) and 33.17±10.30 (90 days); p=ns.
Conclusions: Estimated HbA1c calculated through the Abbot Freestyle Libre Software® gives a good estimation of HbA1c. These estimations may help patients to have accurate feedback of their glycemic control and clinicians take decisions without performing traditional HbA1c measurements.

eP082

Flash glucose monitoring versus conventional glucose measurements for diabetes control in pediatric population

K. Dzygalo[1], K. Kunecka[2], K. Ignasiak[2], B. Nowak[2], A. Ramotowska[1]

[1]*Medical University of Warsaw, Warsaw, Poland,* [2]*Medical University of Warsaw, Student Scientific Association of Pediatric Diabetology, Warsaw, Poland*

In order to achieve good diabetes control, at least 6 measurements of glycemia per day are recommended. Blood glucose tests using conventional glucose meter and lancet is unpleasant, painful, stressful and patients are reluctant to perform them. The FreeStyle Libre flash glucose monitoring (FGM) system is modern device measuring interstitial fluid glucose levels.

The aim of our study was to compare FGM with conventional glucose meter and evaluate their impact on diabetes control in the pediatric population.

The study group consisted of 75 children (42 girls) with the mean age 11.67±4.21 years and mean diabetes duration 4.23±3.96 years. We compared the computer readings from the traditional glucose meter and FGM, from the period of 2 weeks. We counted the amount of episodes of hypoglycemia (<70 mg/dl), especially nocturnal hypoglycemia and severe hypoglycemia (<50 mg/dl) and hyperglycemia (<140 mg/dl). We analyzed also amount of self monitoring of blood glucose (SMBG), mean glycemia (mg/dl), HbA1c (%), total daily insulin dose (TDD; units/kg/day), basal/TDD proportion (basal%) in both periods of time.

We noted significantly more SMBG during the use of FGM (6.1 vs 19.3; p< 0.0001). We found more episodes of hypoglycemia (4.5 vs 15; p< 0.0001), also nocturnal (0 vs 2; p< 0.0007) and severe hypoglycemia (0 vs 2; p< 0.002) when FGM was in use. There was no significant difference in frequency of hyperglycemia (33.5 vs 32.4; p= 0.77), HbA1c (7 vs 6.65; p=0.449), mean glycemia (144.5 vs 150; p=0.472), TDD (0.71 vs 0.7; p=0.437) and basal% (30.5 vs 27; p=0.688).

Both methods of measuring blood glucose level provide good diabetes control in T1D children. FGM system encourage patients to make blood glucose tests more frequently. It increases also the detection of hypoglycemia, especially nocturnal ones which are particularly dangerous to patients. In the case of a chronic diseases such as T1D patient's comfort and compliance are important elements of therapy.

eP083

Flash glucose monitoring system improves glycemic control

M. Xatzipsalti (Chatzipsalti)[1], L. Mentesidou[1], A. Kourti[1], K. Kouloufakou-Gratsia[1], K. Patouni[1], D. Delis[1], A. Vazeou[1]

[1]*"P. & A. Kyriakou" Children's Hospital, Diabetes Center, A' Department of Pediatrics, Athens, Greece*

Objectives: FreeStyle Libre,(FSL), a flash glucose monitoring system, came onto the market recently. Aim of the study is to evaluate the impact of FSL use on glycemic control.
Methods: Fifty-one T1D children (30 males), with mean (SD) age 10.7 (5.5) years and median disease duration 3.4 (range 0.18-20.3) years used FSL for a median duration of 98 days (range 14- 406). The median number of sensors used was 7 (range 1-29). Forty subjects (78.4%) were using the sensor continuously. HbA1c, the number of self- reported mild and severe hypoglycemic episodes were recorded every 3 months, for a matched period, one year before and after FSL use. The subjects were questioned for their opinion on the overall accuracy of FSL, the accuracy in low and high blood glucose values by a health care professional during their regular visit at the diabetes center.
Results: There was a significant reduction of HbA1c, between the time of examination, 3 and 6 months after FSL initiation and the mean HbA1c of the corresponding period, the year before (p< 0.0005, p< 0.0005, p=0.001 respectively). There was a significant increase in the number of self- reported hypoglycemic episodes after FSL compared to the period before [3.7 (2.5) vs 5.0 (3.4) p=0.003]. No difference could be found regarding the number of severe hypoglycemic episodes. There was a reduction in capillary blood glucose measurements. Forty patients were performing >6 measurements/day before FSL and only 4 during FSL use. Overall 32/49 (65.3%) subjects considered FSL accurate and 8/49(16.3%) partially accurate. Wrong decisions due to false readings < 70mg/dl took 10/51 (19.6%) of the patients and >180mg/dl 8/51(15.6%).
Conclusions: The use of FSL facilitates improvement of glycemic control and helps in detection of more hypoglycemic episodes with less capillary blood glucose measurements. The majority of patients considered FSL accurate.

ePO84

The use of insulin pumps with predictive low glucose management (PLGM) facilitates achieving NICE HbA1c target of 6.5% (48 mmol/mol) in prepubertal children

R. Hanas[1,2], K. Lundqvist[1], A. Sjöstrand[1], M. Ekström[1], J. Shin[3], F. Kaufman[3]

[1]NU Hospital Group, Dept. of Pediatrics, Uddevalla, Sweden, [2]University of Gothenburg, The Sahlgrenska Academy, Uddevalla, Swaziland, [3]Medtronic, Northridge, United States

Objectives: NICE has lowered the HbA1c target to 6.5% (48 mmol/mol). We evaluated whether pumps with a predictive low glucose management (PLGM) algorithm that can suspend insulin delivery were feasible in achieving this target.

Methods: This single-clinic study was conducted in 19 prepubertal children using the MiniMed® 640G system with PLGM. All subjects used pumps from within a few weeks of diabetes onset.

Results: The MiniMed 640G system was used for a mean of 0.9±0.4 (range 0.4-1.5) yrs. 2 weeks of CareLink® Personal data from 16 subjects were analyzed at a clinic visit June-October 2016. Mean(±SD) age was 6.5±2.3 (range 3-11) yrs, HbA_{1c} 6.5±0.5 (5.9-7.2)%, 48±5 (37-55) mmol/mol, diabetes duration 2.3±1.8 (0.6-5.9) yrs, BMI-SDS 0.58±0.77 (-1.0-+2.0). 8/19 had HbA1c ≤6.5%. Insulin use: 0.7±0.2 (0.4-1.0) units/kg/24 hrs, % basal/24 hrs 39.6±10.1 (25-57). Suspend Before Low was set at 2.8-3.6 mmol/L (50-65 mg/dL) 07am-10pm and 2.8-3.8 mmol/L (50-68 mg/dL) 10pm-07am. High alarm was set at 9.0-14.0 mmol/L (162-252 mg/dL) in daytime, 8.0-14.0 mmol/L (144-252 mg/dL) in nighttime. No. of boluses, food boluses, mean and SD sensor glucose (SG), %SG >8 mmol/l and %SG 4-8 mmol/L (72-144 mg/dL) correlated significantly with HbA1c (all p< 0.01). Since diagnosis, no subject had severe hypoglycemia or DKA.

Conclusions: PLGM was activated often and appeared to be a safe and effective feature that facilitated achieving the NICE HbA1c target without severe hypoglycemia.

Parameter	Mean ± SD (range)
Sensor wear, days/week	6.5 ± 0.4 (5.3-6.8)
Suspension, % of time	16.2% (4.5-27.8)
Daytime (07am-10pm) suspension, h/day:	-
Before low	2hrs 23 min
- On low	14 min
Nighttime (10pm-07am) suspension, h/day:	-
- Before low	1hr 11 min
- On low	2.5 min
Sensor Glucose (SG)	7.8 ± 0.9 (6.8-9.0) mmol/L; 140 ± 16 (122-162) mg/dL
SD of SG	3.1 ± 0.6 (1.6-4.1) mmol/L; 56 ± 11 (29-74) mg/dL
%SG <3 mmol/L (54mg/dL)	1.0 ± 0.8 (0.03-2.74)
%SG <4 mmol/L (72 mg/dL)	6.6 ± 3.6 (0.5-11.9)
%SG >8 mmol/L (144 mg/dL)	39.4 ± 11.7 (12.4–57.7)
Number of Boluses/day	10.6 ± 2.9 (5.4-16.7)
Number of Manual vs. Bolus Wizard Boluses/day	0.2 vs. 10.3 (0-0.9 vs. 5.0-16.6)
Number of Correction vs. Carb Boluses/day	5.4 vs. 7.2 (1.6-10.1 vs. 4.8-13.4)
Number of Override + vs. -/day	+1.6 (0-5.5) vs, −0.6 (0.1-1.8)

[Data analyzed from Carelink]

ePO85

Insulin infusion pump failure: suggestions to minimize clinical impact. Evidence from a paediatric prospective 1-year study

I. Rabbone[1], N. Minuto[2], V. Cherubini[3], D. Iafusco[4], M. Marigliano[5], F. Lombardo[6], A.E. Scaramuzza[7], R. Schiaffini[8], S. Toni[9], M. Scardapane[10], A. Nicolucci[11], R. Bonfanti[12], Italian Paediatric Pump Failure Study Group

[1]SSD Endocrinologia Pediatrica, Department of Pediatrics, Turin, Italy, [2]IRCCS Istituto Giannina Gaslini, Genova, Italy, [3]AOU Salesi Hospital, Ancona, Italy, [4]Second University of Naples, Naples, Italy, [5]University of Verona, Verona, Italy, [6]University of Messina, Messina, Italy, [7]Ospedale di Cremona, Cremona, Italy, [8]Bambino Gesù Children's Hospital, Rome, Italy, [9]Meyer Children's Hospital, Florence, Italy, [10]CORESEARCH, Pescara, Italy, [11]CORESEARCH, Pescara, Italy, [12]Scientific Institute Hospital San Raffaele, Milan, Italy

Objective: To evaluate the incidence of insulin pump failure in a cohort of children and adolescents with type 1 diabetes (T1DM) followed prospectively for one year.

Methods: Insulin pump failures and related factors (pump model, infusion set and cannula type, number of days of set changing and insulin type) were registered in a cohort of 1046 T1DM children and adolescents (50% males, mean age 12.2±4.1 yrs, disease duration 6.7±3.6 yrs, insulin pump use 3.3±2.2 yrs) from 25 paediatric diabetes centres of Italian Society of Paediatric Endocrinology and Diabetology (ISPED).

Results: During the calendar year 2014 an average rate of 4.5 failure/person/year (hyperglycemia episodes solved with infusion set change 8,4 person/year; bubbles 7; kinking 2,8; bleeding 2,4; set dislodgment 2; pump blockage 2: tunneling 1,9; lipohypertrophy 1,8; infection 0,3) was registered. No relationships between failure and pump model, type of insulin and cannula used, frequency of set changing have been reported. The multivariate analysis showed a significance association between HbA1C and lipohypertrophy (p < 0,0028). Subdividing study population by age-groups (<6, 6-11, >11 years), a higher frequency of bubbles, hyperglycemia episodes and lipohypertrophy have been found in the younger age-group; tunneling and pump blockage were more frequent in oldest group. Aspart insulin was associated to a lower risk of bubbles and hyperglycemia episodes whereas glulisin to a higher risk of lipohypertrophy and pump blockage. The oblique cannula usage was associated to a low risk of all failures except infection.

Conclusion: this prospective study on a large cohort of T1DM children and adolescents in insulin pump therapy showed a low total failure rate/person/year. Lipohypertrophy was the only failure associated to a worsening of metabolic control. More efforts on the education of insulin pump use in children and their families could be useful to reduce failures.

ePO86

Using insulin pump with a remote control system in patients with diabetes improves glyemic control and enhances patient satisfaction

A. Deeb[1], H. Al Suwaidi[1], L. Abdulrahman[1], S. Awad[2], M. Akle[1], T. Hussain[1], S. Al Remeithi[2]

[1]Mafraq Hospital, Paediatric Endocrinology, Abu Dhabi, United Arab Emirates, [2]Shaikh Khalifa Medical City, Paediatric Endocrinology, Abu Dhabi, United Arab Emirates

Objectives: Studies confirmed the efficacy of insulin pump therapy in management of type 1 diabetes mellitus (T1DM). The Accu-Check Combo system (ACCS) has advanced features to improve insulin delivery. A key function for young patients is the use of a remote control, which may ease adherence, improves diabetes control and enhances satisfaction. The aim of the study is to assess the effect of ACCS use on glycemic control and patient satisfaction in young

people with T1DM. We also aim to explore the suitability of the system for younger school children.

Methods: The study is prospective in 2 centers. The primary study group included adolescent patients (age 12-17) and young adults (age 18-30). The secondary study group comprises school children aged 6-11 and was analyzed in parallel. Relevant treatment and patient satisfaction parameters were recorded at baseline and in 2 follow-up visits at 12 and 24 weeks. The intended size of the study group (n=40) provides sufficient power (85%) to detect a mean individual decrease in HbA1c of 0.5%.

Results: 43 patients with T1DM were enrolled. Primary group n=28 (mean age 16, 12-28) and secondary n=15 (mean age 9, 6-11). 23 completed the study in the primary group. The mean decrease of HbA1c was 1.1% (p< 0.0006) and 1.05% (p< 0.0002) from baseline to visit 1 and to visit 2. The secondary group (n=14) showed a similar mean decrease in HbA1c of 0.96% (p< 0.038) and 0.79% (p< 0.09 trend from baseline to visit 1 and to visit 2. Patient satisfaction on change rating was favorable in both groups (mean >4 with max 5). An analog scale of satisfaction (0-100) averaged at baseline 57 (primary) and 61(secondary) advanced towards the end of the study to 76 (primary) and 81(secondary).

Conclusions: Our study demonstrates improvement in glycemic control and patient satisfaction in young T1DM patients when using a pump system with remote handling.

eP087
Characteristics of the patients regularly uploading blood glucose meters, sensors and insulin pumps using Diasend®

E. Arturi[1], A. Trettene[1], R. Biasoli[2], R. Cardani[2], A. Salvatoni[3]

[1]University of Insubria, Department of Medicine and Surgery, Varese, Italy, [2]Ospedale Filippo del Ponte, Pediatric Unit, Varese, Italy, [3]University of Insubria, Ospedale Filippo del Ponte, Pediatric Unit, Varese, Italy

Objectives: To identify the characteristics of patients uploading regularly the memory of their blood glucose meters through an application available on the Web (Diasend®).

Methods: We invited 67 T1DM patients [36 male and 31 female, aged 13(5.5)] with a disease duration of 69(83) months treated with subcutaneous insulin through MDI or CSII] to upload their glucose meter once a week on a specific web site (Diasend®). The patients were previously registered on the site by a proper user name and password and trained on the uploading procedure performing a simulation and providing a sheet reporting in detail the uploading steps. Data were shared with the health care provider team who provided them proper advices to improve the metabolic control. We compared the following parameters of the patients regularly uploading the meters and/or sensor and/or pump with those not uploading: gender, age, disease duration, HbA1c, mean and SD of blood glucose in the last month, HBGI, LBGI, type of treatment (MDI or CSII), use of sensor, ethnic origin. Data are reported as median and IQR. Chi-square and Mann-Whitney tests were use for statistical analysis.

Results: Only 20 patients over 67 (30%) uploaded regularly the meter and they were similar to the other patients for all parameters taken into account except for type of treatment (CSII more used by the uploading group: 40% *vs* 15%; p< 0.05) and for the use of the glucose sensor (Glucose sensor more used by the uploading group: 40% *vs* 14%; p< 0.02).

Conclusions: Patients on insulin pump and/or glucose sensor are more prone to use web technology.

eP088
Professional continuous glucose monitoring before start of insulin pump therapy

J. Ferris[1], J. Wood[2], R. Monzavi[1]

[1]Children's Hospital Los Angeles, Endocrinology, Diabetes, and Metabolism, Los Angeles, United States, [2]University Hospitals Rainbow Babies & Children's Hospital, Pediatric Endocrinology, Diabetes, and Metabolism, Cleveland, United States

The transition from multiple daily injections to an insulin pump can be a challenge for youth with type 1 diabetes (T1D), as glycemic control may worsen, at first, until the insulin pump regimen is optimized.

A personalized starting insulin pump regimen can be created from data collected via CGM (continuous glucose monitoring), which may improve glycemic control during the transition process.

We conducted a randomized controlled pilot study using Medtronic iPro2 CGM to inform insulin pump settings at the start of pump therapy in T1D youth to assess whether its use would improve time within target BG (70-180 mg/dL).

Eleven subjects aged 4-16 years with T1D for ≥3 months, naïve to CGM, and starting on insulin pump were recruited. All subjects wore the CGM for 5 days at ~2 weeks before, first 5 days on pump, and 6 weeks after pump start. In the intervention group (INT), CGM data was used to determine initial insulin pump settings.

Subjects were 10.6±3.6 years old and had T1D for 2.3±3.3 years. No differences were noted between groups at baseline. At 6 weeks, when compared to baseline, there was significant improvement in % time in target BG (63.2±26 to 81.7±13 %, p=0.02), mean BG (173±46 to 137±6.6 mg/dL, p=0.05), and MAGE (108±24 to 61.5±7.0 mg/dL, p=0.005) for INT, whereas changes were not seen for the control group. Changes between baseline and 6 weeks were compared between groups. When compared to the control group, INT had a significant increase in % time in target BG (+9.7±2.5 vs. -9.3±11%, p=0.04) and decrease in mean BG (-17.3±7.1 vs. +31.7±30 mg/dL, p=0.05).

Using professional CGM to optimize insulin pump settings prior to pump start appears to improve glycemic control and decrease glycemic variability during transition to pump therapy.

ePoster Session 12 - Psychosocial Issues

ePO89

Food choice and a child eating behaviours associated with metabolic control and weight of children with diabetes type 1 in perception of their parents

B. Zduńczyk[1], K. Piechowiak[1], A. Szypowska[2]

[1]*The Public Paediatric Teaching Hospital, Warsaw, Poland,* [2]*Warsaw Medical University, Warsaw, Poland*

Objectives: Parents of children with diabetes type 1 play a crucial role in the maintenance of good metabolic control. In process, they are responsible for feeding children and their weight control. The aim of this study was to compare perception of a child eating behaviours and factors affecting choice of food in parents of children with diabetes type 1 considering their weight and metabolic control.
Methods: Parents of children with diabetes duration > 1 year filled in the Child Eating Behaviour Questionnaire and the Food Choice Questionnaire. We analysed 394 questionnaires (parents of 205 girls/189 boys, mean age - 12.2 years; mean diabetes duration - 5 years; mean HbA1c - 7.6%; mean BMI z-score - 0.28.
Results: 203 (51.5%) children achieved good metabolic control (HbA1c ≤ 7.5%). 77 (19.5%) children were overweight (z-score > 1). While we found significant difference between parents of children with HbA1c ≤ 7.5% and HbA1c >7.5% in perception of emotional overeating (p=0.03), satiety responsiveness (p=0.002), desire to drink (p=0.002) and emotional under-eating (p=0.02), parents of children with (BMI z-score > 1) and children with (BMI z-score ≤ 1) perceived differently food responsiveness (p=0,03), and food choice regarding weight control (p=0.03) and price (p=0.01). HbA1c positively correlated with emotional overeating (p=0.006), satiety responsiveness (p=0.0002) and desire to drink (p=0.0002) and BMI z-scores with emotional overeating (p=0.002), food responsiveness (p= 0.001) and food choice regarding weight control (p=0.007) and price (p=0.0002).
Conclusions: 19.5% children had problems with weight. Both parents of children with poor metabolic control and parents of overweight children had problems with emotional eating. Interventions targeted weight control and metabolic control should include both children and parents.

ePO90

Improved emotional and behavioural status in morbidly obese adolescents with prediabetes following reversible endoscopic bariatric procedure: duodenal-jejunal bypass liner (DJBL)

S. Klemenčič[1], A. Bujišić[1], T. Battelino[1,2], P. Kotnik[1,2]

[1]*University Medical Centre - University Children's Hospital, Department of Pediatric Endocrinology, Diabetes, Ljubljana, Slovenia,* [2]*Medical Faculty, University of Ljubljana, Chair of Pediatrics, Ljubljana, Slovenia*

Background: Psychological comorbidities are an important factor in management of morbidly obese adolescents. Study's aim was to determine psychosocial functioning before and at 12 months following reversible endoscopic bariatric procedure - DJBL.
Methods: Subject's characteristics are presented in Table 1. Emotional and behavioural problems were assessed by Youth Self-Report (YSR) and body image by Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ-AS). Wilcoxon's signed-rank test and Mann-Whitney U test were used for statistical analysis.
Results: DJBL group didn't differ to controls in physical or psychological characteristics at baseline. BMI and WC decreased in DJBL group and insulin sensitivity improved at 12 months. Emotional and behavioural problems improved. Changes in body image were trending. *Table 1.*

	Controls (N=19) 0m	DJBL (N=19) 0m	DJBL (N=16) 6m	DJBL (N=16) 12m
Age	16.3±1.5	17.1±1.3	17.7±1.3	18.3±1.3
Gender (m:f)	9:10	7:12	4:12	4:12
BMI SDS	3.6±0.4	3.7±0.3	3.3±0.3*	3.3±0.4*
HOMA	n/a	5.4±2.1	3.6±1.5*	3.4±1.6*
Attention problems	4.0±3.0	6.0±4.1	6.0±3.4	5.3±3.9*
Internalizing problems	11±11.2	13.0±9.9	12.3±8.9*	10.25±8.8*
Total emotional and behaviour problems	37.0±21.3	51.6±23.6	42.3±21.1*	37.4±23.2*
Appearance orientation	3.2±0.7	3.2±0.6	n/a	3.4±0.6

[Metabolic and Psychological Outcome (Mean/Mdn±SD)]
*Sig. change at 0.05 level.

Conclusions: In addition to reduction in body weight and improvement of insulin sensitivity in morbidly obese adolescents that underwent DJBL procedure, decreased emotional and behavioural problems were reported. Especially symptoms of internalizing problems and perceived attention problems were reduced. These changes are considered favourable for continued conservative management following DJBL removal.

ePO91

Disturbed eating behaviours in adolescents with type 1 diabetes: a cross-sectional population-based study in Italy

L. Ferrito[1], E. Skrami[2], F. Carle[2], A. Iannilli[1], R. Gesuita[2], V. Cherubini[1]

[1]*Ospedale Salesi - Ospedali Riuniti Ancona, Ancona, Italy,* [2]*Polytechnic University of Marche, Ancona, Italy*

Objective: To evaluate the role of clinical, metabolic and socio-economic factors on disturbed eating behaviour (DEB) among adolescents with type 1 diabetes screened using the Diabetes Eating Problem Survey-Revised (DEPS-R).
Research design and Methods: A total of 163 adolescents with type 1 diabetes, aged 11-20 years, recruited from the registry for type 1 diabetes of Marche Region, Italy, completed the DEPS-R (response rate 74.4%). Clinical characteristics, lipid profile, HbA1c, parental level of education and occupation were evaluated. The Italian version of DEPS-R was validated and the prevalence of DEB estimated. The association of demographic, socioeconomic and clinical factors with DEB was evaluated by the Multiple Correspondence Analysis and the multiple logistic regression.
Results: The prevalence of DEPS-R-positive (score≥20) was 27% (95%CI: 17-38) in males and 42% (95%CI: 31-53) in females. A clinical profile of DEPS-R-positive was identified, as being overweight, poor attitude towards physical activity, low socio-economic status, poor metabolic control, attitude to skipping insulin injections. Furthermore, the probability of DEPS-R-positive increased 63% for every added unit of HbA1c, 36% for every added number of insulin injections skipped in a week and decreased about 20% for every added hour per week spent in physical activity; overweight youth were six times more likely to be DEPS-R-positive.
Conclusions: Specific clinical features of DEPS-R-positive should be detected in clinical practice. A multidisciplinary clinical approach aimed to normalize eating behaviour and enhance self-esteem should be used to prevent the onset of these disorders and continuous

educational programs are needed to promote healthy behaviours and lifestyles.

ePO92
The impact of T1DM on perceptions of body image: a comparison between adolescents with T1DM and their peers

N. Doody[1], V. Mc Darby[2], E. Somers[3], D. Cody[2,3]

[1]National University of Ireland, Maynooth, Ireland, [2]Our Lady's Children's Hospital, Crumlin, Dublin, Ireland, [3]National Children's Research Centre, Dublin, Ireland

Objectives: Research shows chronic illness to be associated with poorer self-reported body image, particularly among adolescents. However, this has not been examined in T1DM adolescents. The present research compared standardised self-report measures of body image, and the related concepts of self-esteem and self-concept, in T1DM adolescents with age-matched peers and whether these concepts were associated with glycaemic control.
Methods: 119 T1DM adolescents (M=14.9 years; 51% male) and 112 age-matched peers (M=14.8 years; 46% male) completed the Body-Esteem Scale, Piers-Harris Self-Concept Scale and Rosenberg Self-Esteem Scale. HbA1c was measured at standard clinic visits.
Results

	Diabetes Group (n=119)	Comparison Group (n=112)		
	M (SD)	M (SD)	t-value	p-value
Body-Image Score	51.85 (18.39)	50.68 (17.48)	.45	.66
Self-Esteem Score	19.47 (5.42)	19.67 (5.85)	-.23	.82
Self-Concept Score	43.47 (10.66)	42.59 (11.18)	.45	.59

[Comparison of Scores Between Groups]

Perceptions of body image, self-esteem and self-concept did not differ between T1DM adolescents and their peers. Glycaemic control was not found to be associated with perceptions of body image ($p=.3$), self-esteem ($p=.1$) or self-concept ($p=.22$). Consistent with previous research, T1DM males scored significantly higher than T1DM females on perceptions of body image ($p< .01$), self-esteem ($p=.04$) and self-concept ($p=.05$).
Conclusions: Contrary to research in other chronic illnesses, T1DM adolescents do not perceive themselves as different to their non-T1DM peers with regard to body image, self-esteem or self-concept. Potential theoretical explanations for these findings include the role of the self-protection hypothesis and the protective role of social support from the diabetes healthcare team.

ePO93
Assessing the utility of the diabetes eating problem survey - revised (DEPs-R) screening in clinical practice in identifying predictors for disordered eating behaviour in adolescents with type 1 diabetes

B. Ryman[1], J. MacIssac[1], L. Stare[1], R. Stein[1], P. Gallego[1]

[1]Western University, Paediatrics, London, Canada

Objectives: To examine the utility of the Disordered Eating Problem Survey Revised (DEPs-R), a validated self-report questionnaire developed for type 1 diabetes (T1D), in assessing the prevalence and clinical characteristics of T1D adolescents with disordered eating (DE) behaviours
Methods: Eighty (37 F, 43 M) T1D adolescents (mean ± SD age 14.6yr ± 1.4; duration 6.3yr ± 3.8; A1C% 8.4 ± 1.2) were recruited. Participants completed the DEPS-R screening. Both participants and parents answered an additional questionnaire addressing psychosocial characteristics and specific conflict with diabetes management (arguments on insulin, glucose testing, glucose readings and meals which were scored as never, sometimes, always). Clinical variables were obtained from participant's files. Student's t-test, Mann-Whitney and Chi-square tests compared differences between positive and negative DEPs-R groups; multivariate analysis examined the effect of variables (gender, age, A1C, child and parent conflict score) as predictors for abnormal DEPs-R screening.
Results: Eighteen subjects scored positive for DEPS-R (22.5%). More females had abnormal DEPS-R (78% x 22%, p=0.002); positive DEPs-R had higher A1C% (9.2 ± 1.0 x 8.2 ± 1.2, p=0.002). Increased conflict in diabetes management was seen in the positive DEPS-R group (Mann-Whitney test p = 0.007 and p< 0.001, for parents and children's score, respectively). In multivariate model, gender (gender-male OR 0.06, 95% CI 0.007 - 0.462, p=0.007) and older age (OR 1.96, 95% CI 1.03 - 3.72, p=0.04) were predictors for abnormal DEPs-R score.
Conclusion: The DEPs-R score is a useful clinical tool for identifying T1D adolescents at risk for disordered eating behaviour. Females, suboptimal diabetes control and increased conflict in diabetes management are associated with abnormal DEPs-R score.

ePO94
Quality of life and family burden in type 1 diabetes children and adolescents on continuous subcutaneous insulin infusion versus multiple daily injections: a multicenter randomized controlled trial

E. Mueller-Godeffroy[1], R. Vonthein[2], C. Ludwig-Seibold[3], B. Heidtmann[4], C. Boettcher[5], D. Hilgard[6], E. Lilienthal[7], A. Ziegler[8], V.M. Wagner[9], German Working Group for Pediatric Pump Therapy (agip)

[1]University of Luebeck, Department of Pediatrics, Luebeck, Germany, [2]University of Luebeck, Institute of Medical Biometry and Statistics, Luebeck, Germany, [3]Oberschwabenklinik GmbH, Department of Pediatrics, Ravensburg, Germany, [4]Children's Hospital Wilhelmstift gGmbH, Hamburg, Germany, [5]Justus-Liebig University, Department of Pediatrics, Giessen, Germany, [6]Gemeinschaftskrankenhaus Herdecke, Department of Pediatrics, Herdecke, Germany, [7]Ruhr-University Bochum, St. Josef-Hospital; Department of Pediatrics, Bochum, Germany, [8]StatSol, Luebeck, Germany, [9]University of Luebeck, University Clinic of Schleswig-Holstein, Luebeck, Department of Pediatrics, Luebeck, Germany

Objectives: Despite conflicting results regarding metabolic outcomes, continuous subcutaneous insulin infusion (CSII) has gained increasing popularity in the pediatric age group. The main benefit of CSII may be found in subjective psychosocial health. We hypothesized that CSII has substantial psychosocial benefits compared to multiple daily injections (MDI).
Methods: In a multicenter open parallel controlled trial, children and adolescents aged 7-16 years were randomized 1:1 to either CSII or MDI, stratified by center. The MDI group had the option to change to CSII at the end of the study period. The primary outcomes were child-reported diabetes-related quality of life (DQoL), and diabetes burden of the main caregiver. We also examined additional patient reported outcomes, and HbA1c.
Results: A total of 211 patients were randomized between February 2011 and October 2014, and 186 main caregivers and 170 children and adolescents were analyzed using the intention-to-treat principle for primary outcomes. Children 8-11 y in the CSII group reported higher DQoL at 6 months than the MDI group (median difference 9.5, 95% CI 3.6-16.7, adjusted p=0.008), while the difference in the adolescents 12-16 y was not significant (median difference 2.7; 95% CI -3.2-9.5; nominal p=0.353). The main caretakers of the CSII group

reported a significantly lower overall diabetes burden compared to MDI (median difference 0; 95% CI -1-0; adjusted p=0.029).
Conclusions: CSII has substantial psychosocial benefits as it increases children's diabetes-related quality of life and decreases caregiver burden.
Registration: NCT01338922 at clinicaltrials.gov
Acknowledgements: Pediatric diabetes centers of university clinics Berlin, Kiel, Rostock, Tübingen; children's hospitals Darmstadt, Hamburg-Altona, Köln, Osnabrück; Ev. Hospital Oberhausen, Olga-hospital Stuttgart, HELIOS Clinic Wiesbaden, Bethlehem Center Stolberg, Germany
Funding: German Research Foundation; Roche Diagnostics GmbH, Germany

eP095
Evaluation of the diabetes stress questionnaire for youths-short form in ethnic minority youth with type 1 diabetes

A. Delamater[1], E. Pulgaron[1], K. Niel[1]

[1]*University of Miami Miller School of Medicine, Pediatrics, Miami, United States*

Objectives: Ethnic minority youth with type 1 diabetes (T1D) are at increased risk for poor metabolic control. High stress and maladaptive coping (MAC) have also been associated with poor metabolic control. This study evaluated a short form of the Diabetes Stress Questionnaire for Youth, and how stress and MAC contribute to metabolic control disparity.
Methods: 93 youth (mean age = 13.7 years) with T1D (mean duration = 5.2 years) participated; the sample was ethnically diverse (29% Black, 46% Hispanic, 25% White). A 10-item short form, the DSQ-SF, used the highest loading items from the factors in the DSQ. Internal consistency of the DSQY-SF and relationships with demographic and metabolic variables, regimen adherence (RA; youth and parent Self-Care Inventory ratings), and MAC (Ways of Coping Checklist) were examined.
Results: The DSQY-SF showed good internal consistency (α=.79) and correlated strongly with the original DSQY (r=.91, p< .001). DSQY-SF was associated with older age (r=.23, p< .02), lower SES (r=-.28, p< .004), and lower youth-rated RA (r=-.24, p< .01), but not with sex, T1D duration, or A1c. Multiple regression analyses controlling for age and SES revealed that higher DSQ-SF was associated with lower youth-rated RA (p< .04), but was unrelated to parent-rated RA, A1c, and DKA. Results also indicated that MAC was associated with more DKA (p< .05). Black and Hispanic youth reported lower RA than White and had poorer glycemic control and more DKA (p's< .05). Black youth also reported higher stress, while both Black and Hispanic youth reported more MAC than White youths (p's< .05).
Conclusions: These results indicate the DSQY-SF is a reliable and valid measure of diabetes-specific stress. Greater diabetes stress is associated with lower levels of youth-rated RA. Poor metabolic control in ethnic minority youth is associated with more diabetes stress and MAC, and lower RA.

eP096
Integrating the PHQ-2 depression screening tool into the pediatric diabetes clinic

C. Hawkes[1], J. Gettings[2], S. Willi[1,3]

[1]*Children's Hospital of Philadelphia, Endocrinology/Diabetes, Philadelphia, United States,* [2]*Children's Hospital of Philadelphia, Child & Adolescent Psychiatry & Behavioral Sciences, Philadelphia, United States,* [3]*Perelman School of Medicine at the University of Pennsylvania, Pediatrics, Philadelphia, United States*

Objectives: Depression is under-recognized in children with type 1 diabetes. We administer the Patient Health Questionnaire-2 (PHQ-2), a validated, two-question depression screening tool, in our routine diabetes clinic visits for all children over 12 years of age. The aim of this study was to determine if PHQ-2 screening identifies patients who may benefit from behavioral health intervention. We also studied the demographics and resource utilization of children who screened positive using this test.
Methods: We assessed children aged ≥ 12 years attending the diabetes clinic at the Children's Hospital of Philadelphia (CHOP) from July 1, 2016 to May 1, 2017 in a retrospective chart review. Results of those who screened positive on this test (Score ≥3) were compared to those screened negative using chi-squared and student's t-test for categorical and continuous variables, respectively.
Results: All of the 1539 eligible children at CHOP were screened, with 236 (15%) scoring > 0 and 62 (3.9%) screening positive. Of these, 19 (31%) were referred to behavioral health for initial assessment, while 11 (18%) had previously been evaluated. Females were more likely to screen positive (5.3% vs 2.7%, p< 0.001) as were black versus white patients (8% vs 2.8%, p< 0.001). Those screening positive had higher mean HbA1c (10 vs 8.5%, p< 0.001), number of emergency department visits (0.27 vs 0.08, p=0.03), hospital admissions (0.45 vs 0.1, p=0.01), and missed outpatient appointments (1 vs 0.6, p< 0.001) over the previous year. Mean age (16.9 vs 16.5 years, p=0.13) and duration of diabetes (6.5 vs 7.3 years, p=0.17) were similar in both groups.
Conclusions: Depression screening using the PHQ-2 can be conducted in the context of routine outpatient diabetes visits. This tool identified children with previously unrecognized depressive symptoms who demonstrated disparities from the overall clinic population with regard to gender, race, glycemic control, hospital resource utilization.

ePoster Session 13 - New Insulins

eP097

Anti-insulin antibody (AIA) profiles of insulin glargine 300 U/mL (Gla-300) and insulin glargine 100 U/mL (Gla-100) in people with type 1 diabetes (T1DM): review of EDITION 4 data at 12 months

G. Bolli[1], M. Ziemen[2], E. Boëlle-Le Corfec[2], P. Home[3]

[1]Department of Medicine, Perugia University Medical School, Perugia, Italy, [2]Sanofi, Paris, France, [3]Newcastle University, Newcastle upon Tyne, United Kingdom

Objectives: To evaluate the effect of AIAs on the efficacy and safety of Gla-300 and Gla-100 in people with T1DM in the EDITION 4 trial.
Methods: Analyses were performed per visit and for the 12-month treatment period for effect of AIA status/titer on hypoglycemia, adverse events, and change in HbA_{1c} and insulin dose.
Results: Similar proportions of Gla-300- and Gla-100-treated participants were AIA-positive at baseline (61.7 vs 53.6%) and at any time over 12 months (84.6 vs 82.3%). Of participants who were AIA-negative at baseline, 74.2 and 73.8% were AIA-positive at ≥1 later visit for Gla-300 and Gla-100. Mean change in HbA_{1c} or insulin dose from baseline to month 12 was independent of AIA status/titer for Gla-300 and Gla-100. A higher proportion of participants experienced hypoglycemia in the anytime AIA-positive vs AIA-negative groups (Table). There were no differences in the incidence of common treatment emergent adverse events (TEAEs) by treatment or AIA titer (low vs high; Table). TEAE incidence was higher in AIA-positive than AIA-negative people for Gla-300 and Gla-100 (Table), including a higher incidence of upper respiratory tract infections (AIA-negative: 10.3 and 11.4%; AIA-positive: 37.1 and 28.5% [Gla-300 and Gla-100, respectively]).

Number of participants (%) experiencing ≥1 hypoglycemia event (safety population)	AIA-negative[a] Gla-300 (N = 29)	AIA-negative[a] Gla-100 (N = 35)	AIA-positive[a] Gla-300 (N = 237)	AIA-positive[a] Gla-100 (N = 235)	Low-titer[b] Gla-300 (N = 208)	Low-titer[b] Gla-100 (N = 200)	High titer[b] Gla-300 (N = 29)	High titer[b] Gla-100 (N = 35)
Any (24 h)	24 (82.8)	32 (91.4)	230 (97.0)	226 (96.2)	201 (96.6)	192 (96.0)	29 (100)	34 (97.1)
Any nocturnal (00:00–05:59 h)	17 (58.6)	24 (68.6)	183 (77.2)	182 (77.4)	160 (76.9)	154 (77.0)	23 (79.3)	28 (80.0)
Confirmed or severe (any time of day [24 h])								
≤3.9 mmol/L (≤70 mg/dL)	24 (82.8)[c]	32 (91.4)	229 (96.6)[c]	225 (95.7)	200 (96.2)	191 (95.5)	29 (100)	34 (97.1)
<3.0 mmol/L(<54 mg/dL)	17 (58.6)	26 (74.3)	205 (86.5)	202 (86.0)	178 (85.6)	171 (85.5)	27 (93.1)	31 (88.6)
Confirmed or severe (nocturnal [00-00–05:59 h])								
≤3.9 mmol/L (≤70 mg/dL)	17 (58.6)[c]	24 (68.6)	181 (76.4)[c]	181 (77..0)	158 (76.0)	153 (76.5)	23 (79.3)	28 (80.0)
<3.0 mmol/L(<54 mg/dL)	11 (37.9)	15 (42.9)	139 (58.6)	147 (62.6)	121 (58.2)	124 (62.0)	18 (62.1)	23 (65.7)
Severe	4 (13.8)	2 (5.7)	21 (8.9)	29 (12.3)	17 (8.2)	25 (12.5)	4(13.8)	4 (11.4)
Participants with common TEAEs, n (%)	18 (62.1)	19 (54.3)	179 (75.5)	166 (70.6)	160 (76.9)	140 (70.0)	19 (65.5)	26 (74.3)
HbA_{1c} (mITT population)	(N = 21)	(N = 24)	(N = 226)	(N = 228)	(N = 198)	(N = 193)	(N = 28)	(N = 35)
Mean change from baseline to month 12, % (SD)	0.13 (0.20)	−0.20 (0.19)	−0.22 (0.06)	−0.21 (0.06)	−0.25 (0.06)	−0.18 (0.06)	−0.02 (0.16)	−0.38 (0.14)
Difference (95% CI)	0.335 (−0.209, 0.879)		−0.008 (−0.167, 0.150)		−0.070 (−0.234, 0.095)		0.364 (−0.051, 0.779)	
Bacal insulin dose (mITT population)	(N = 16)	(N = 18)	(N = 198)	(N = 196)	(N = 174)	(N = 165)	(N = 24)	(N = 31)
Mean change from baseline to month 12, U/kg (SD)	0.16 (0.12)	0.11 (0.19)	0.17 (0.17)	0.09 (0.13)	0.17 (0.16)	0.09 (0.13)	0.17 (0.24)	0.10 (0.12)

[a]Considered as AIA-positive if positive atany time during the whole on-treatment period; [b]Based on the maximum titer measured during the whole on-treatment period; low: ≥2–064; high: ≥64; [c]Difference between hypoglycemiaincidencefor AIA-positive and AIA-negative populations was significant ($p < 0.05$).

AIA, anti-Insulin antibody; mITT, modified intention-to-treat; SD, standard deviation; TEAE, treatment-emergent adverse events.

[Hypoglycemia incidence and mean change in HbA1c and insulin dose by AIA-status and titer level]

Conclusions: The immunogenicity of Gla-300 and Gla-100 appeared to be similar in T1DM, and no impact of AIAs on efficacy was observed; however, a higher incidence of hypoglycemia was seen in AIA-positive vs AIA-negative participants.

eP098

The design and rationale for an ongoing study evaluating the efficacy and safety of insulin glargine 300 U/mL (Gla-300) compared with insulin glargine 100 U/mL (Gla-100) in patients with T1D using continuous glucose monitoring (CGM)

J. Pettus[1], J. Gill[2], S. Paranjape[2], J. Stewart[3], S. Edelman[1], B. Bode[4]

[1]University of California, San Diego, United States, [2]Sanofi US, Inc., New Jersey, United States, [3]Sanofi Canada, Laval, Canada, [4]Atlanta Diabetes Associates, Atlanta, United States

Objectives: To demonstrate that morning injection of Gla-300 versus Gla-100 provides better glycemic control as evaluated by CGM in adult patients with T1D.

Methods: In this ongoing, 16-week, multicenter, randomized, open-label, active-controlled, parallel-group phase 4 trial, 638 subjects with T1D were randomized 1:1 to receive a morning injection of either Gla-300 or Gla-100 (NCT02688933). Blinded CGM data will be collected at baseline and during Week 16 from subjects satisfying inclusion criteria. The primary efficacy endpoint will evaluate the percentage of time that glucose concentrations obtained by CGM are within the target range of 70-180 mg/dL during Week 16. Secondary efficacy endpoints include: incidence and rate of nocturnal symptomatic hypoglycemia (defined as an event with typical symptoms of hypoglycemia accompanied by self-monitored plasma glucose ≤ 70 mg/dL that occurs between 0:00 am and 5:59 am); glycemic control during last 4 hours of CGM data collection before the next basal-insulin injection; and variability in CGM profile. Safety parameters, including adverse events, will be assessed. Analysis of covariance, with class variables for the strata and baseline variables as covariates will be used for the primary outcome variable. Logistic and overdispersed Poisson regressions will be used for analyzing nocturnal hypoglycemia.
Results: Of the 638 subjects randomized, 56% were male. Baseline patient characteristics (mean ± standard deviation [SD]) included: diabetes duration (23 ± 13 years), BMI (28 ± 5 kg/m^2), age (46 ± 14 years), glycated hemoglobin A1c (8.0 ± 0.8%), and dose of basal insulin (31 ± 15 U/mL). At baseline, the time (mean ± SD) in target range of 70-180 mg/dL was 53 ± 14%.
Conclusions: The outcomes of this study may provide important insights into real-world, clinically relevant differences in glycemic control (time in target range) and duration of effect with Gla-300 versus Gla-100 in adults with T1D.

eP099
Experience of insulin Deglutec in everyday clinical practice in children and adolescents with type1 diabetes (T1D)

M. Xatzipsalti (Chatzipsalti)[1], L. Mentesidou[1], K. Kouloufakou-Gratsia[1], L. Stamoyannou[1], D. Delis[1], A. Vazeou[1]

[1]*"P. & A. Kyriakou" Children's Hospital, Diabetes Center, A' Department of Pediatrics, Athens, Greece*

Objective: Insulin Deglutec (IDeg) is a long-acting analog currently in use for children and adolescents with T1D. However, limited data exist regarding the performance of IDeg in pediatric everyday care. The aim of the study is to evaluate the effectiveness of IDeg after switching from basal insulin in children and adolescents with T1D in everyday clinical practice.
Methods: Sixty three subjects, 30 females, with mean (SD) age 14.3 (5.0) years and disease duration 7.0 (4.70) years, who were on multiple injection regimen with insulin glargine (IGlar) U100 as basal insulin, switched to IDeg with the same bolus regimen. IDeg was initially given at the same dose as IGlar. HbA1c, total daily insulin requirements, basal and bolus insulin dose, number of reported hypoglycemic episodes, nocturnal and severe events, weight, height and BMI were recorded every 3 months one year before and one year after switching to IDeg.
Results: HbA1c was similar for the total period before and after switching to IDeg [mean SD 7.6 (1.1) vs 7.5% respectively p=ns) and among the 3 month periods before and after. Total number of hypoglycemic episodes was significantly lower after switching to IDeg (p=0.036). No difference could be found regarding the number of nocturnal and severe hypoglycemic episodes. There was a significant reduction of total and the bolus daily insulin requirements after switching to IDeg [mean (SD) 0.92(0.26) vs 0.87(0.26) p=0.042) and 0, 52(2.7) vs 0.47 (1.8) U/Kg/day (p=0.036) respectively.
Conclusion: These results suggest that IDeg, injected once at bedtime, may provide similar glycemic control as IGlar, with less hypoglycemic episodes and less total and bolus daily insulin requirements.

eP100
Efficacy of degludec in control of HbA1c in children with type 1 diabetes

A. Jeyaraman[1], A. Phua[1], S. Shekhar[1], N. Burson-Thomas[1], A. Foster[1]

[1]*Scunthorpe District General Hospital, Paediatrics, Scunthorpe, United Kingdom*

Introduction: Use of degludec [tresiba] in children and adolescents with type 1 diabetes was approved by FDA in December 2016. Degludec is a new ultra-long acting basal insulin with terminal half-life of approximately 25 hours and duration of action of more than 42 hrs. Constant release of insulin throughout the day leads to better control of blood glucose for more than 24 hours with significant reduction in HbA1c.
Aim: To compare and assess HbA1C control before and after starting degludec.
Methods: We did retrospective case notes review of 24 children over a period of 4 months from October 2016 to January 2017. We have assessed the quality of glycemic control before and after starting degludec in our unit.

We also looked at the hospital admission with hypoglycemia or DKA and changes in the insulin dose, basal insulin requirement after starting degludec.
Results: Sex distribution in our study was 54% boys and 46% girls.

Majority age group between 11- 18 yrs. 58% were used Glargine and 42% used insulin pump before starting degludec.

HbA1c was improved in 62%, static in 13% and worsened in 25% of our patients.

4 patients had DKA before starting degludec. In these 4 patients, 3 were using pump with missing boluses causing poor control requiring admission with DKA which was improved after starting degludec. 2 patients needed hospital admission with hypoglycaemia after starting degludec.67% patients needed less basal insulin after starting degludec.

We have also noted documentation about reason and patient perception after starting degludec. Main reason for starting degludec as documented in case notes was for better glycemic control. Few patients (4) reported that injecting degludec was less painful and provided more flexibility.
Conclusion: Our study showed better glycemic control after starting degludec in our unit and also less admission with DKA.

eP101
Cost analysis of insulin degludec (IDeg) in comparison with insulin detemir (IDet) in treatment of children and adolescents with type 1 diabetes (T1D) in the UK

N. Thalange[1], J. Håkan-Bloch[2], W. Parekh[3]

[1]*Norfolk & Norwich University Hospital, Norwich, United Kingdom,* [2]*Novo Nordisk A/S, Søborg, Denmark,* [3]*Novo Nordisk Ltd, Gatwick, United Kingdom*

Objectives: This analysis evaluated the mean annual cost of IDeg *vs* IDet as basal insulin in children and adolescents with T1D in the UK, using evidence from BEGIN YOUNG (NCT01513473) - a 26-week randomised, treat-to-target, non-inferiority trial with a 26-week extension.
Methods: During the whole 52-week period, the main basal (IDeg: IDet) dose ratio (U/kg) was 0.70, and there was a lower risk of hyperglycaemia with ketosis with IDeg *vs* IDet (rate ratio 0.41, *p*=0.0066). Mean annual costs of treatment with IDeg or IDet in children and adolescents aged 1 to 17 years with T1D, and in age subgroups, were calculated as the cost of basal insulin and ketosis based on the main basal dose ratio, rate ratio of hyperglycaemia with ketosis, mean weight for each group, and a mean cost per ketosis event of £142.97 (as calculated in Thalange *et al. Diabet Med* 2017;34[Suppl. 1]:184 [Abstract P498]).
Results: The mean annual cost per patient was estimated at £230.05 for IDeg *vs* £370.45 for IDet. This annual saving of £140.40 per

patient in favour of IDeg included a 22% reduction in basal insulin cost and a 59% reduction in the cost of ketosis events. In the age subgroups, annual cost savings per patient were also in favour of IDeg (Table). Further sensitivity analyses demonstrated the robustness of the results.

Conclusions: This analysis shows that an annual saving ranging from £115.27 to £165.15 per patient can be achieved for children and adolescents with T1D on IDeg instead of IDet.

Table. Cost analysis of IDeg compared with IDet in children and adolescents with T1D.

Cost calculations (1 year)	IDeg (£)	IDet (£)	Incremental cost (IDeg—IDet)(£)
All patients			
Basal insulin cost	165.57	213.18	−47.61
Ketosis cost	64.48	157.27	−92.79
Total annual cost	230.05	370.45	−140.40
1–5 years of age			
Basal insulin cost	78.20	100.69	−22.49
Ketosis cost	64.48	157.27	−92.79
Total Annual cost	142.68	257.96	−115.28
6–11 years of age			
Basal insulin cost	140.67	181.12	−40.45
Ketosis cost	64.48	157.27	−92.79
Total annual cost	205.15	338.39	−133.24
12–17 years of age			
Basal insulin cost	251.63	323.99	−72.36
Ketosis cost	64.48	157.27	−92.79
Total annual cost	316.11	481.26	−165.15

Cost/unit: IDeg £0.031, IDet £0.028; both 100 U/mL Penfill®

IDeg, insulin degludec; IDet, insulin detemir; T1D, type 1 diabetes

eP102

Efficacy of insulin degludec after switching from insulin detemir or glargine in children with type 1 diabetes

I. Kosteria[1], M. Arkoumani[1], S.A. Paschou[1], G.P. Chrousos[1], C. Kanaka-Gantenbein[1]

[1]*Diabetes Center, Division of Endocrinology, Metabolism and Diabetes, First Department of Pediatrics, "Aghia Sophia" Children's Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece*

Objectives: Degludec is a long-acting insulin analogue presenting more reproducible pharmacodynamic profile compared to detemir or glargine. However, the effect of switching patients from detemir or glargine to degludec is still barely studied, especially in children. The aim of this study was to investigate the efficacy of insulin degludec after switching from insulin detemir or glargine in children with type 1 diabetes (T1D).

Patients and Methods: Thirty-three consecutive patients with T1D (22M/11F), 11.7±3.8 (5-18) years old, with 5.5±2.2 (1-10) years of T1D duration were included. They were on multiple daily injections (MDI) with detemir (1 or 2 injections) or glargine (1 injection) along with short acting analogues and were switched to degludec without changes in the type of short-acting analogues used, at least during the last six months [duration on degludec 1.6±0.5 (0.5-2) years]. The glycemic control and the units of daily long-acting insulin per kg body weight needed before and after switching were assessed.

Results: From the 33 patients, 45.5% (15) were previously on detemir and 54.5% (18) on glargine. No statistically significant difference was found regarding glycemic control expressed by last HbA1c before and after switching (7.77±1.3 vs 7.66±1.08, p>0.05), as well as regarding the daily requirement of long-acting insulin units/kg (0.38±0.24 vs 0.33±0.11, p>0.05). Moreover, no statistically significant difference was found when separate sub-group analysis was conducted for patients previously on detemir (HbA1c: 7.5±0.56 vs 7.34±0.75, long-acting insulin units/kg: 0.39±0.25 vs 0.3±0.11) or glargine (HbA1c: 8.01±1.7 vs 7.95±1.27, long-acting insulin units/kg: 0.37±0.23 vs 0.35±0.09), (before vs after, p>0.05 for all comparisons).

Conclusion: Insulin degludec presents equal efficacy after switching from insulin detemir or glargine in children with T1D. Larger studies are needed to confirm these results or to prove possible superiority of degludec.

eP103

Insulin glargine 300 U/mL (Gla-300) provides more even 24-h pharmacokinetic (PK) and pharmacodynamic (PD) profiles vs insulin degludec 100 U/mL (Deg-100) in T1DM

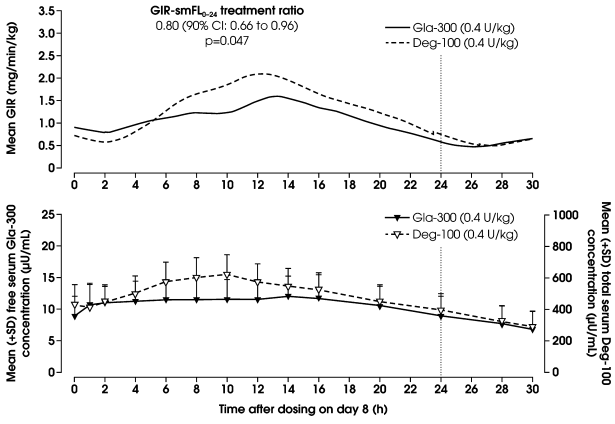
T. Bailey[1], J. Pettus[2], R. Roussel[3], K. Bergmann[4], M. Maroccia[5], N. Nassr[4], O. Klein[6], G. Bolli[7], R. Dahmen[4]

[1]*AMCR Institute, Escondido, United States,* [2]*University of California, San Diego, United States,* [3]*Assistance Publique Hôpitaux de Paris, Bichat Hospital, Paris, France,* [4]*Sanofi, Frankfurt am Main, Germany,* [5]*Umanis, Levallois-Perret, France,* [6]*Profil, Neuss, Germany,* [7]*University of Perugia, Perugia, Italy*

Objective: The aim of this multiple-dosing, crossover, euglycemic glucose clamp study was to compare steady-state PK/PD profiles of Gla-300 vs Deg-100 in two parallel cohorts with fixed once-daily dosing regimens in T1DM.

Methods: For both insulins, participants received 0.4 (n=24) or 0.6 U/kg/day (n=24) at ~8 am for 8 days. Main endpoint: within-day variability (fluctuation) of smoothed glucose infusion rate (GIR) over a 24-h dosing period (GIR-smFL$_{0\text{-}24}$). Other endpoints: relative degree of serum insulin concentration (INS) 24-h fluctuation (F_{rel}), area under the INS time curve (INS-AUC).

Results: Within-day GIR variability (GIR-smFL$_{0\text{-}24}$) was 20% lower with Gla-300 vs Deg-100 at 0.4 U/kg/day (p=0.047; Figure) but comparable at the 0.6 U/kg/day dose. Gla-300 provided more constant PK profiles than Deg-100 at both the 0.4 (Figure) and 0.6 U/kg/day dose levels; the relative degree of INS fluctuation (F_{rel}) of Gla-300 was 13% and 17% lower vs Deg-100 at 0.4 and 0.6 U/kg/day, respectively. Distribution of INS-AUC$_{0\text{-}24}$ (6-h fractions; 0-6, 6-12, 12-18 and 18-24 h) was consistently more even with Gla-300 (25, 26, 26 and 23%) than with Deg-100 (23, 29, 26 and 21%) (data the same at both dose levels).



For GIR data a smoothing factor (LOESS factor 0.15) was applied. Validated radioimmunoassays were used to measure INS - LLOQ was 5.02 µU/mL for Gla-300 and 12 µU/mL for Deg-100 (Gla-300 assay measured free serum parent glargine and active metabolites M1 and M2, Deg-100 assay measured bound and unbound serum insulin). CI, confidence interval; GIR, glucose infusion rate; GIR-smFL$_{0\text{-}24}$, fluctuation of the smoothed GIR curve over 24 hours; INS, serum insulin concentration; LLOQ, lower limit of quantification

[GIR and INS profiles at the 0.4 U/kg/day dose level in steady state]

Conclusions: Morning dosing of Gla-300 provides more even 24-h action profiles in T1DM at 0.4 U/kg/day, and more constant steady-state serum concentrations vs Deg-100 consistently across dose levels.

eP104

A 12-week dose-ranging study of sotagliflozin, a dual SGLT1 and SGLT2 inhibitor, as adjunct therapy to insulin in type 1 diabetes, (inTandem4; NCT02459899)

C. Baker[1], S. Wason[2], P. Banks[2], S. Sawhney[2], P. Strumph[2], on behalf of the Sotagliflozin inTandem4 Writing Group

[1]*Diabetes & Endocrine Associates, P.C., Omaha, NE, United States,*
[2]*Lexicon Pharmaceuticals, Inc., The Woodlands, TX, United States*

Objectives: Sotagliflozin (SOTA) is a dual SGLT1 and SGLT2 inhibitor in Phase 3 development for type 2 diabetes (T2D) and as adjunct to insulin in type 1 diabetes (T1D). Inhibition of SGLT1 delays and reduces glucose absorption in the proximal intestine, improving post-prandial glycemic control. SGLT2 inhibition reduces renal glucose reabsorption.
Methods: In a double-blind Phase 2 dose-ranging trial, 141 adults with T1D treated with MDI or pump and A1C 7.0-10.0% at screening were randomly assigned 1:1:1:1 to once-daily SOTA (75, 200, 400 mg) or placebo, and stable insulin dosing for 12 weeks.
Results: Baseline characteristics (expressed as range of means for the arms) were comparable among groups: age 42-48 years; duration of T1D 22-27 years; BMI 27-32 kg/m^2; total daily insulin: 0.65-0.77 U/kg; A1C at randomization 7.95-8.07%. After 12 weeks, adjunctive SOTA 200 and 400 mg were more effective than placebo in reducing A1C. All dosages of SOTA reduced body weight and increased urinary glucose excretion vs. placebo. SOTA 400 mg was more effective than placebo in decreasing 2-hour post-prandial glucose, and decreasing systolic blood pressure (SBP) in those with SBP ≥130 mm Hg at baseline. The overall incidence of TEAEs was lower in the SOTA arms. Incidences of diabetic ketoacidosis, severe hypoglycemia, nausea, diarrhea and genital mycotic infections were low.
Conclusion: These results support the use of SOTA 200 mg and 400 mg as Phase 3 doses in the T1D development program.

Efficacy and Safety from Randomization to Week 12

Results	Placebo n=36	SOTA 75 mg n=35	SOTA 200 mg n=35	SOTA 400 mg n=35
Efficacy				
Baseline A1C	7.95	8.00	8.07	8.05
A1C LSMD vs. placebo*, % (*p*-value)	N/A	−0.25 (0.07)	−0.48 (<0.001)	−0.38 (0.006)
2-hr PPG LSMD vs. placebo*, mmol/L (*p*-value)	N/A	−1.1 (0.28)	−1.5 (0.15)	−2.7 (0.006)
FPG LSMD vs. placebo*, mmol (*p*-value)	N/A	−0.5 (0.50)	−0.5 (0.48)	−1.2 (0.09)
Body weight LSMD vs placebo*, kg (*p*-value)	N/A	−1.3 (0.038)	−2.4 (<0.001)	−2.6 (<0.001)
24-hr UGE LSMD vs. placebo*, g (*p*-value)	N/A	+42 (0.006)	+58 (<0.001)	+70 (<0.001)
SBP LSMD vs. placebo in those with Baseline SBP ≥ 130 mm Hg** (*p*-value)	N/A	−8.4 (0.26)	−6.8 (0.28)	−14.3 (0.013)
Patients with Safety Events				
Any treatment-emergent adverse event. n (%)	18 (50.0)	17 (48.6)	10 (28.6)	12 (34.3)
AE as primary reason for early discontinuation of core treatment period, n	1	1	0	0
Serious adverse event, n	1	1	1	1
Death, n	0	0	0	1
DKA, n	0	0	0	1
Severe hypoglycemia, n	0	1	1	1
Nausea, n	0	1	0	0
Diarrhea, n	3	0	1	1
Genital mycotic infection, n	0	1	1	1

AE, adverse event; DKA, diabetic ketoacidosis; FPG, fasting plasma glucose; LSMD, least squares mean difference; PPG, postprandial glucose; UGE, urinary glucose excretion; SBP, systolic blood pressure; TEAE, treatment-emergent adverse event.*Statistical comoarisons of each SOTA arm to placebo were preplanned and performed using a generalized linear model with repeated measures statistics. **The LSMD analysis for SBP was post hoc. n for SBP analysis; placebo n=6, SOTA 75 mg n=3, SOTA 200 mg n=8, and SOTA 400 mg n=11.
[Table]

ePoster Session 14 - Diabetes Care

eP105

The impact of regional deprivation on metabolic control and rates of diabetic ketoacidosis in pediatric patients with type 1 diabetes in Germany - results from the DPV registry

S. Lanzinger[1,2], W. Maier[2,3], J. Rosenbauer[2,4], D. Hilgard[5], M. Sindichakis[6], K. Tzamouranis[7], S. Golembowski[8], B. Bohn[1,2]

[1]*University of Ulm, Institute of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany,* [2]*German Center for Diabetes Research (DZD), München-Neuherberg, Germany,* [3]*Helmholtz Zentrum München, Institute of Health Economics and Health Care Management, German Research Center for Environmental Health, Neuherberg, Germany,* [4]*Institute for Biometrics and Epidemiology, German Diabetes Center, Leibniz Center for Diabetes Research at Heinrich Heine University Düsseldorf, Düsseldorf, Germany,* [5]*Department of Pediatrics, Gemeinschaftskrankenhaus Herdecke, Herdecke, Germany,* [6]*Hospital for Pediatrics and Adolescent Medicine, Clinical Center Traunstein, Traunstein, Germany,* [7]*Department of Pediatrics and Adolescent Medicine, DKD HELIOS Clinic Wiesbaden, Wiesbaden, Germany,* [8]*Center of Social Pediatrics/Diabetology, Sana-Clinic Berlin-Lichtenberg, Berlin, Germany*

Objectives: Recently, a German study reported regional differences at federal state level in diabetes care in pediatric patients with type 1 diabetes (T1D). Regional deprivation might be one of the contributing factors explaining the observed differences. We used the German Index of Multiple Deprivation (GIMD) to examine the impact of regional deprivation at district level on HbA1c and rates of diabetic ketoacidosis (DKA) in pediatric patients with T1D.

Methods: We investigated 27,335 patients with T1D < 18 years documented in 2015-2016 in German centers of the diabetes patients follow-up registry (DPV). DKA was defined as arterial, venous, or capillary pH < 7.3 or hospital treatment. GIMD was categorized into quintiles (Q1-Q5) with Q1 representing lowest and Q5 representing highest regional deprivation. Linear and Poisson regression models considering overdispersion were used to investigate the impact of GIMD-quintiles on HbA1c and rates of DKA. Models were adjusted for sex, age, diabetes duration and migration background.

Results: HbA1c and rates of DKA were significantly lower in less deprived compared to higher deprived regions. Strongest differences in HbA1c were observed comparing Q1 (7.76% [95%-confidence interval: 7.71; 7.81]) to Q5 (8.05% [8.00; 8.10], p< 0.001). DKA rates were lower in Q1-Q4 compared to Q5 (p< 0.02), strongest differences were found comparing Q2 (1.3 events/100 PY [1.1; 1.6]) to Q5 (2.2 events/100 PY [1.8; 2.7], p< 0.001).

Conclusions: Less deprived regions revealed lower HbA1c and lower rates of DKA compared to higher deprived regions. Results of the DPV registry indicated that deprivation might be one factor contributing to regional differences in HbA1c and rates of DKA in pediatric patients with T1D. Understanding regional differences is important for initiating targeted interventions and improving diabetes care further in pediatric patients with T1D.

eP106

Clinic non-attendance, glycaemic control and deprivation score in paediatric and young persons' diabetes clinics in Lothian, Scotland

J. Tait[1], K. Noyes[2], L. Bath[2], M. Henderson[2], D. Elleri[2]

[1]*University of Edinburgh, Edinburgh, United Kingdom,* [2]*Royal Hospital for Sick Children, Endocrinology and Diabetes, Edinburgh, United Kingdom*

Objectives: Existing research does not capture the complexity of clinic non-attendance in type 1 diabetes. We measured rates of paediatric and young persons' diabetes clinic non-attendance in Lothian. We defined non-attendance as at least one appointment missed without explanation. The relationship between clinic non-attendance, glycaemic control and social deprivation was explored.

Methods: Paediatric (0-14yrs, n=247) and young persons (14-18yrs, n=118) patient data were extracted from electronic medical records between January 2015 and May 2016. Characteristics of non-attenders (age, sex, number of not-attended appointments, mean HbA1c and insulin regimen) were analysed. The Scottish Index of Multiple Deprivation was used to calculate deprivation (1=most deprived, 10=least deprived areas). Statistical analysis was performed using GraphPad Prism.

Results: The percentage of clinic non-attendance was 21% in paediatric and 69% in the young persons' clinics. Mean HbA1c was greater in non-attenders compared to the clinic mean in paediatrics (74 vs 62mmol/mol; p< *0.001*, unpaired t-test*)*, young people (83 vs 73mmol/mol, p< *0.002*) and in all clinics together (78 vs 68mmol/mol, p< 0.001). Non-attenders lived in more socially deprived areas (57% score 1-5). Sequential clinic non-attendance was identified in 9% of paediatric patients and 36% of young people. Multiple non-attenders had a higher mean HbA1c (76mmol/mol in children and 86mmol/mol in young people).

Conclusions: In Lothian, 69% of young people and 21% of paediatric patients had missed diabetes clinic appointments. This group of patients had poorer glycaemic control and tended to live in more deprived areas. It is crucial to implement innovative methods to engage young patients with outpatient services prior to transition.

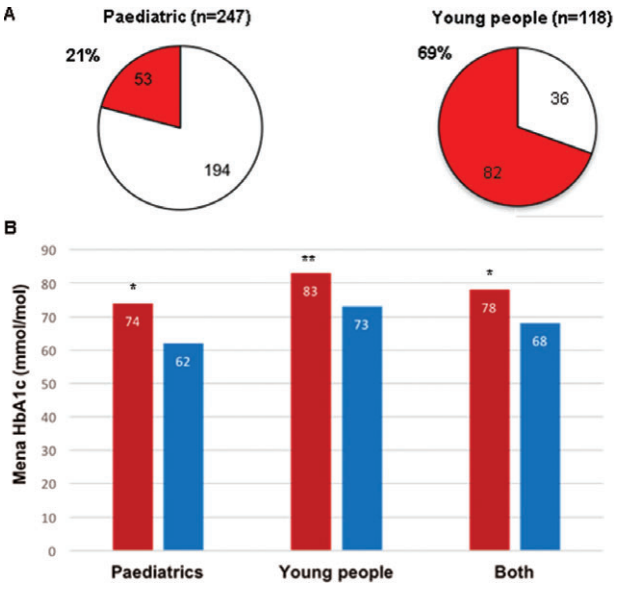


Figure 1. Diabetes clinic non-attendance and mean HbA1c in paediatric patients and young people. (A) Percentage of non-attenders (red sector) of the whole population (white sector) for both paediatric and young persons. (B) Mean HbA1c of non-attenders (red bar) and the whole clinic (blue bar). **P<0.001* and ***P<0.002* versus whole clinic (unpaired t-test).

[Diabetes clinic non-attendance and mean HbA1c in paediatric patients and young people.]

eP107

Diabetes control in children and young people with type 1 diabetes requiring interpreter support: the need for appropriate care packages to improve diabetes care

J. Idkowiak[1,2], S. Elhag[1], V. Saraff[1], R. Dias[1], T. Barrett[1], M. Kershaw[1], R. Krone[1]

[1]*Birmingham Women's & Children's Hospital, Department of Paediatric Endocrinology and Diabetes, Birmingham, United Kingdom,* [2]*University of Birmingham, Institute of Metabolism and Systems Research, Birmingham, United Kingdom*

Introduction: Empowerment through education of patients and families is central for diabetes self-management to achieve good glycaemic control and minimize long-term complications. Language barriers can pose a barrier to successful education and may influence glycaemic control.
Methods: Retrospective analysis from diagnosis to 18 months post diagnosis of glycaemic control in 41 children and young people (CYP) with type 1 diabetes requiring interpreter support (INT) currently under care of our diabetes centre based within a multi-ethnic community. Median HbA1c at 0, 3, 6, 9, 12 and 18 months following diagnosis were compared to 232 age- and sex-matched controls who did not require interpreter service.
Results: The main languages spoken were Somali (27%), Urdu (19.5%), Romanian (17%) and Arabic (12%), but also Polish, Hindi, Tigrinya, Portuguese, Bengali and sign language. As per usual practice, all CYP were started on multiple daily injections and received structured education with an interpreter being present in the INT group. The median HbA1c was higher at diagnosis in the control group (10.1 versus 9.0 %, p=0.14) but was higher in the INT group after diagnosis; the median HbA1c at 18 months post diagnosis was 8.3% (INT) versus 7.9% (controls) (p=0.16). There were no hospital admissions required due to diabetes-related complications within the observational period for both subgroups.
Summary and Conclusions: Glycaemic control seems to be worse in CYP with type 1 diabetes and significant language barrier in our center with a tendency of higher HbA1cs in this subgroup. In order to improve diabetes care for this significant sub-set of CYP, we suggest that health care providers need to develop strategies to provide tailored support, including provision of diabetes-specific training for interpreters. Equally, patients and their families should be encouraged and supported to acquire language skills for ongoing diabetes education.

eP108

The long and short-term concerns about health outcomes of families with children and young people with diabetes - a national survey

K. Fazakerley[1], A. Burton[1], J. Dias[1], U. Parkash[2], A. Gupta[2], P. Hindmarsh[2], M. Ford-Adams[2], F. Campbell[2]

[1]*Families with Diabetes National Network, London, United Kingdom,* [2]*National Children and Young People's Diabetes Network, London, United Kingdom*

Objective: The Families with Diabetes National Network (FWD NN) is a parents' reference group for the National Children/Young People's Diabetes Network with the aim of providing a forum for communication between the network & the parents of children/young people with diabetes & supporting the development of a National Diabetes Service Improvement Delivery Plan for children/young people.
Method: FWD NN carried out a survey to establish what matters to parents & children most in terms of outcomes for children with diabetes.

Families' & children's' views were sought by an anonymised online survey involving wider community by using Facebook groups, local support groups & clinics.

Five questions were asked; age of child, age at diagnosis, clinic attended, what worries you most in long term & in short term with view to provide three most important answers. Responses were received from 535 parents & 78 children from a wide range of ages & age at diagnosis.

Results: The largest category identified for short term worries was 'care at school & access to education'. If "hypos during the day"," hypos at night" had been combined as one category they would have outweighed anxieties about school education. The psychological impact also features high on the list. The complications were by far the largest category in long term worries; the second largest was anxiety about the child taking care of themselves.

The short term worries for children were like those reported by the parents, with severe hypos featuring strongly. Surprisingly the most frequently mentioned long-term worry was about not being able to have children.
Conclusion: There were many varied responses to the essential question: "What worries you most?". There has been a great deal of work already on building multidisciplinary teams with inclusion of psychologist in paediatric diabetes & improving care processes, but there is still much to do to improve health outcomes, including those that are important to families.

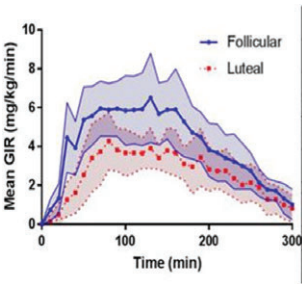
eP109

Revealing the insulin treatment challenge for females with type 1 diabetes: changes in insulin action in relation to menstrual cycle

E. Cengiz[1], W. Tamborlane[1], N. Patel[1], A. Galderisi[1,2], S. Saxena[1], N. Sukumar[3], J. Sherr[1], M. VanName[1], A. Steffen[1], J. Finnegan[1], E. Tichy[1], L. Carria[1], A. Urban[1], S. Weinzimer[1]

[1]*Yale University School of Medicine, Division of Pediatric Endocrinology & Diabetes, New Haven, United States,* [2]*University of Padova, Department of Women's and Children's Health, Padova, Italy,* [3]*Yale University, Yale Center for Analytical Sciences, New Haven, United States*

Objectives: Managing Type 1 Diabetes (T1D) in females presents extra challenges due to unpredictable blood glucose fluctuations during different phases of menstrual cycle (MC). The study aim was to investigate the variability in insulin action during Follicular (FP) and Luteal Phases (LP) of MC as a potential risk factor for glycemic fluctuations in females with T1D.
Methods: Ten female subjects with T1D (mean age 21.8±6.1y, HbA1c7.3±0.9%, T1D duration 13.1±7.4yrs, non-obese) underwent two insulin action studies after a subcutaneously administered, standard 0.2u/kg/dose rapid acting insulin during FP and LP of their MC in random order. Data were analyzed by a linear mixed-effects model, with comparisons made for pharmacodynamic (PD) and pharmacokinetic (PK) measures between FP and LP.
Results: The area under curve (AUC) for glucose infusion rate during five-hour insulin action study ($GIR_{0\text{-}300min}$), representing the overall insulin action, was 39% lower with a 20min delay in early insulin peak action (Time to 50% GIR_{max}) during LP as compared to FP despite similar plasma insulin concentrations (Figure).



Insulin PD and PK Measures	Follicular Phase	Luteal Phase	Follicular vs. Luteal Phase	p-value
	LS mean (95% CI)	LS mean (95% CI)	LS mean diff. (95% CI)	
GIR_{mean} (mg/kg/min)	4.0 (3.1, 4.8)	2.5 (1.6, 3.3)	1.5 (0.7, 2.3)	0.003
GIR_{max} (mg/kg/min)	7.9 (6.1, 9.7)	5.2 (3.4, 7.0)	2.7 (1.3, 4.1)	0.002
Time to 50% GIR_{max} (min)	33.5 (24.6, 42.4)	55.5 (46.6, 64.5)	-22.1 (-32.6, -11.5)	0.001
Time to GIR_{max} (min)	101.2 (66.0, 136.3)	132.8 (97.7, 168.0)	-31.7 (-79.9, 16.5)	0.17
	LS geo. mean (95% CI)	LS geo. Mean (95% CI)	FP/LP Ratio (95% CI)	
$GIR_{AUC\ 0\text{-}300\ min}$ (mg/kg)	1173.2 (898.5, 1532.0)	718.4 (550.1, 934.1)	1.63 (1.29, 2.07)	0.001
Plasma $Insulin_{AUC\ 0\text{-}300\ min}$ (pmol/ml*min/L)	14060.2 (11906.0, 16604.0)	12887.3 (10912.9, 15219.0)	1.09 (0.99, 1.20)	0.07

Figure: The insulin time action profile graphs depicted by mean GIR values during FP and LP. Shades areas represent 95% confidence intervals (CI). The PD and PK comparisons between phases are shown in the embedded table. The mean GIR, GIR max, time to 50% GIR max, and time to GIR max model estimates are presented as least-square mean differences with 95% confidence intervals. AUC at 300 minutes outcomes were transformed by the natural log function; comparisons between phases are presented as ratios of geometric means with 95% CI. All tests were performed at alpha = 0.05.
[Insulin PK and PD during follicular and luteal phases.]

Conclusion: There is significant blunting of the peak insulin action with a delayed early phase and a reduction of the overall insulin glucodynamic action during the LP as compared to FP that can lead to significant hyperglycemia during LP. Our preliminary findings indicate the need for MC adjusted insulin dosing regimens to improve management of females with T1D.

eP110
Attachment, emotional awareness and metabolic control in children with type 1 diabetes

S. Costa Cordella[1,2], F. Mena Salas[3], K. Jaramillo[4], F. Giraudo[4], P. Luyten[1,5]

[1]University College London, London, United Kingdom, [2]Universidad del Desarrollo, Psicología, Santiago de Chile, Chile, [3]Fundación Diabetes Juvenil, Santiago de Chile, Chile, [4]Universidad de Chile, Santiago de Chile, Chile, [5]University of Leuven, Leuven, Belgium

The attachment strategies children adopt towards their caregivers allow them to deal with stress and form the basis for affect regulation.

Stress is a known risk factor for poor metabolic control. Its impact can be direct, through the influence of stress hormones on glucose homeostasis, or indirect, by making the patient less likely to adhere to treatment.

Emotional awareness is the way in which individuals recognize and create representations of their emotions, and how they experience emotions at a bodily and mental level. The capacity to be aware of bodily signals can help the individual to distinguish between different glycemic states. Both attachment and emotional awareness allow the subject to develop proper emotional regulation, which is fundamental to the achievement of mental health, and may also play a role in diabetes management and metabolic control.

Objectives: This study aimed to understand the relationship between attachment strategies of children with type 1 diabetes, their emotional awareness and metabolic control.

Method: 97 children (8-12 years old) answered standardized questionnaires aimed to assess levels of attachment security and emotional awareness. To gauge metabolic control, the results of HbA1c exams were analysed.

Results: A significant association was found between attachment strategies and poor metabolic control among boys in the participant group, with attachment security accounting for 11.1% of metabolic control variability (p=.02). A noticeable link was found between emotional awareness and metabolic control among girls. Overall, emotional awareness had no moderating effect on the relationship between attachment and metabolic control.

Conclusion: The regulation of emotions and stress associated with attachment strategies and emotional awareness may have an important role in several dimensions of the condition management. Considering these psychosocial factors may help to develop more targeted and effective interventions.

eP111
Ultrasensitive C-peptide in diabetes type 1 children with long lasting disease, in correlation to clinical features

M. Jamiołkowska[1], B. Orlińska[1], A. Kalinowska[1], M. Panasiuk[1], A. Zasim[1], B. Florys[1], K. Noiszewska[1], W. Łuczyński[1], B. Głowińska-Olszewska[1], A. Bossowski[1]

[1]Medical University of Bialystok, Bialystok, Poland

Objectives: C-peptide (a well-accepted β-cell function marker) residual secretion can be detected even in adult patients with a long-lasting type 1 diabetes (DM1), and shows correlation with a lower risk of diabetes complications. The data concerning characteristics of paediatric patients with preserved C-peptide secretion is still limited.

Methods: 160 patients (79 boys/81 girls) at the mean age of 12,8 yrs (3-18) and minimum 12 months of DM1 duration were enrolled in the study. Mean diagnosis age was 7 yrs (1-16,5) and mean disease duration was 5,5 yrs (1-15,5). Mean HbA1c (last 12 months) was 7,7±1,18%. The fasting blood C-peptide was measured with "C-peptide ultrasensitive" method, and samples >2,5pmol/L were considered detectable.

Results: Overall detectable C-peptide frequency was 53%. In those patients the frequency of clinically significant C-peptide (according to DCCT study >0.23 ng/ml) was 63,5%, and dividing all the patients by the disease duration was: < 2 yrs -76%, 2-5 yrs -27%, >5 yrs -10%. Clinically significant secretion was more frequent in the patients diagnosed at the age >5 yrs than those diagnosed earlier (46% vs 6%). Mean C-peptide was significantly higher in the patients with mean HbA1c< 7,5% (0,95ng/ml vs 0,18ng/ml, p< 0,05). We observed C-peptide level correlation with: diagnosis age and remission time -positive correlation (p< 0,05); disease duration and mean HbA1c -negative correlation (p< 0,05). There was no correlation with BMI-SDS neither at the DM1 diagnosis, nor at present time.

Conclusions: Detectable C-peptide levels can be observed in about 50% of the paediatric patients with DM1 longer than one year, although clinically significant levels are less frequent and decrease in time. C-peptide secretion depends on the age at the diagnosis and DM1 duration, but interestingly, not on the presence of overweight or obesity. There is a need of further investigation of the factors determining C-peptide preservation in young diabetic patients.

eP112
Intensive management undertaken by a dedicated specialist nurse & dietitian improves HbA1c in children and young people (CYP) with HbA1c greater than 8.5%/70mmol/mol: a specialist clinic using a target-based, family centred approach

W. Azam[1], A. Dawes[1], A. Moodambail[1]

[1]Barts Health NHS Trust, Paediatric Diabetes, London, United Kingdom

Objectives: Newham University Hospital covers the most diverse, deprived populations in East London. As a result, glycaemic control within the paediatric diabetes clinic has been suboptimal for many CYP. Despite various interventions, the median HbA1c remained >9%/75mmol/mol.

Method: Criteria for inclusion was HbA1c>8.5%/70mmol/mol. The Specialist Nurse and Dietitian designed a clinic where CYP were seen monthly; and contacted in between. The clinic provided a non-judgemental environment. CYP and their families were involved in discussions regarding regime changes and areas for improvement. Each patient would have no more than 3 simple targets to achieve. Targets were a collaborative decision by CYP; families; and professionals.

Results: 20 CYP met the criteria. (Baseline mean HbA1c: 10.7%/93mmol/mol). 3 monthly mean HbA1c reduced to 9.7%.82mmol/mol. This was maintained at 6 months. Further analysis showed those with a lower HbA1c at baseline (<10%/85mmol/mol) continued to improve throughout the 6 month period (Baseline: 9.5%/80mmol/mol, 3 month: 9.1%/76mmol/mol, 6 month: 8.7%/71mmol/mol). Patients and their families reported the clinic was a positive experience. DNA rates were lower than anticipated. Interventions most frequently needed were BG testing; carbohydrate counting; and diet adjustments; enabling more accurate insulin regime optimisation.

Conclusions: CYP with poor glycaemic control are often those whom we struggle to actively engage in clinics. By creating a supportive and non-judgemental environment; praising the smallest of achievements; this improved relationships with professionals. This appeared to enhance their response to diabetes education. This audit indicates that intensive support provided by specialist paediatric diabetes nurses and dietitians achieves notable improvements in glycaemic control for this "hard-to-reach" group.

ePoster Session 15 - Complications

eP113

Ketoacidosis and length of hospitalization at diabetes onset related with distance to treatment center and center size in Germany and Austria

K. Nagl[1], A. Neu[2], T.M. Kapellen[3], B. Karges[4], T. Rojacher[5], J. Hermann[6,7], J. Rosenbauer[7,8], B. Rami-Merhar[1], R.W. Holl[6,7], on behalf of the DPV-Initiative

[1]Medical University Vienna, Department of Pediatrics and Adolescent Medicine, Vienna, Austria, [2]University Children's Hospital Tübingen, Tübingen, Germany, [3]University of Leipzig, Women and Children's Center, Leipzig, Germany, [4]RWTH Aachen University, Medical Faculty, Division of Endocrinology and Diabetes, Aachen, Germany, [5]Landeskrankenhaus Villach, Abteilung für Kinder- und Jugendheilkunde, Villach, Austria, [6]University of Ulm, Department of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany, [7]German Center for Diabetes Research (DZD), Munich-Neuherberg, Germany, [8]German Diabetes Center, Leibniz Center for Diabetes Research at Heinrich-Heine University Düsseldorf, Institute for Biometrics and Epidemiology, Düsseldorf, Germany

Objectives: Accessibility of treatment centers might be an important factor in the management and prevention of Diabetic ketoacidosis (DKA) at type 1 diabetes (T1D) onset. We investigated the occurrence of DKA and length of hospitalization at T1D onset, as there might be relevant health-economic implications.
Methods: DPV (Diabetes-patient-documentation) - registry data from 40,245 German and Austrian pediatric patients (mean age±SD 9±4 years, 54% male, 19% with migration background) with T1D onset between 1995 and 2016 were analyzed. Linear distance between residence and treatment center was calculated for each patient based on postal codes. Association of DKA at onset (pH< 7.3) and duration of hospitalization with center size and distance was assessed by logistic and linear regression analysis, respectively. Models were adjusted for gender, age, migration background and year of diagnosis.

A two-sided p-value < 0.05 was considered statistically significant.
Results: Without distinct longitudinal trend, there were significant inter-annual fluctuations of DKA rates at onset, ranging from 11-21%. Onset-DKA was more frequent in facilities located closer to patients' homes, unaffected by center-size, both in Austria and Germany. Duration of hospitalization continuously decreased from 16.1±6.5 to 12.9±4.2 (p< 0.0001) over time. It did not differ with distance from home, but was significantly shorter in larger centers. There was a trend of shorter hospitalization in Austria compared to Germany.
Conclusions: Patients with onset-DKA are taken to the nearest hospitals, independent of center size. While larger centers might be more experienced in long-term diabetes care, smaller centers close to family homes play an important role in the acute management of DKA at onset of T1D. Length of hospitalization decreased over time, but is still long compared to other countries.

eP114

Inequalities in glycaemic control, hypoglycaemia and diabetic ketoacidosis according to socio-economic status and area-level deprivation in young persons with type 1 diabetes mellitus - a systematic review

L.M.E. Lindner[1,2], W. Rathmann[1,2], J. Rosenbauer[1,2]

[1]German Diabetes Centre, Leibniz Centre for Diabetes Research at Heinrich Heine University Duesseldorf, Duesseldorf, Germany, [2]German Centre for Diabetes Research (DZD), Muenchen-Neuherberg, Germany

Objectives: The aim of this systematic review was to examine the association between individual- and area-level socio-economic status (SES) as well as area-level deprivation and glycaemic control, hypoglycaemia and diabetic ketoacidosis in children, adolescents and young adults with Type 1 diabetes mellitus.
Methods: Ovid MEDLINE was searched to identify relevant cohort, case-control and cross-sectional studies published between January 2000 and June 2015. Search results were screened by title, abstract and keywords to identify eligible publications. Decisions on inclusion or exclusion of full-texts were independently made by two reviewers. A data extraction sheet was utilized to select important data. The Newcastle Ottawa Scale (NOS) was used to estimate the methodological quality of included studies. Quality assessment and extracted data of included studies were synthesized narratively and reported according to the PRISMA statement.
Results: Literature search in Ovid MEDLINE identified 1,345 possible studies. Thirteen studies matched our inclusion and exclusion criteria. One article was additionally identified through hand search. According to the NOS, most of the studies were of average quality. Effects of individual-level as well as area-level SES and area-level deprivation on glycaemic control and hypoglycaemia were contradictory between studies. In contrast, lower individual-level SES was a predictor for diabetic ketoacidosis in all except one study.
Conclusions: Lower individual-level SES is associated with a higher risk to experience diabetic ketoacidosis in children, adolescents and young adults with Type 1 diabetes. Access to care for socially deprived persons needs to be improved to overcome impairing effects on the course of the condition and to reduce health care disparities.

eP116

Lactobacillus reuteri oral administration improves periodontal disease in children and adolescents with type 1 diabetes

B. Predieri[1], V. Cenciarelli[1], P. Bruzzi[1], D. Miceli[2], F. Bonvicini[1], F. Leo[1], A. Forabosco[2], L. Iughetti[1]

[1]University of Modena and Reggio Emilia, Department of Medical and Surgical Sciences of the Mother, Children and Adults, Modena, Italy, [2]University of Modena and Reggio Emilia, Department of Integrated Activities of Specialized Head-Neck Surgery, Modena, Italy

Objectives: Understanding the clinical manifestations and management of periodontal disease are important for the optimal care of patients with type 1 diabetes (T1D). Probiotics could protect the oral tissues against the action of periodontal pathogenic bacteria. We aimed to assess the effects of the administration of Lactobacillus reuteri as probiotic upon oral health in children and adolescents T1D.
Methods: Forty-three patients (11.3±2.77 yrs.; T1D duration 58.2±38.0 months) were enrolled and randomly assigned to Group A (probiotic - 5 drops/day, 10^8 CFU/day for 3 months) and Group B (no probiotic). Oral health index [Full Mouth Plaque Score (FMPS), Full Mouth Bleeding Score (FMBS)], insulin dose (IU/kg/day), and HbA1c were measured at baseline (T0) and 3-months after (T1).
Results: FMPS significantly improved in both Group A and B (p< 0.05). In Group B daily insulin dose increased (p=0.01) and HbA1c improved (p< 0.001) at T1, while in Group A the metabolic control was unchanged. We performed a telephone survey to evaluate the probiotic compliance in Group A. 13 out 22 patients reported a regular probiotic intake (A1), while the other ones used it sporadically (A2). Despite FMPS and FMBS values were not different between groups at T0, they were significantly lower (p< 0.05) in Group A1 respect to Group A2 at T1. FMPS and FMBS longitudinally decreased in Group A1 but not in Group A2.

Data are reported as mean±SD (median)	Group A1	Group A2	p (A1 vs. A2)
T0			
FMPS (%)	88.8±11.2 (90)	92.8±12.5 (100)	0.367
FMBS (%)	64.6±28.7 (60)	78.3±24.1 (80)	0.317
T1			
FMPS (%) (p vs. T0)	70.0±27.1 (80) p=0.017	86.1±27.5 (100) p=0.465	0.038
FMBS (%) (p vs. T0)	49.6±23.7 (50) p=0.074	78.9±28.4 (95) p=0.787	0.025

[Changes of Oral health index]

Conclusions: Our preliminary data suggest that 3-months oral administration of probiotic might improve the oral health of children and adolescents with T1D and confirm that glycemic control have also an influence on oral health.

eP117

Serum neopterin level in pediatric patients with type 1 diabetes mellitus: relation to diabetic sensorimotor polyneuropathy and nerve conduction studies

N.S. Elbarbary[1], E.A.R. Ismail[2], R.A. El- Hilaly[3], F.S. Ahmed[1]

[1]Ain Shams University, Pediatric Department, Diabetes Unit, Cairo, Egypt, [2]Ain Shams University, Clinical Pathology Department, Cairo, Egypt, [3]Ain Shams University, Physical Medicine, Rheumatology and Rehabilitation Department, Cairo, Egypt

Background: Electrophysiological techniques allowed the identification of sub-clinical pathological changes and early diagnosis of diabetic peripheral neuropathy (PN). Neopterin is a marker of inflammation that is elevated in conditions of T-cell or macrophages activation.

Objectives: To measure neopterin levels in 60 children and adolescents with type 1 diabetes mellitus (T1DM) compared with 30 age- and sex-matched healthy controls and to assess its possible relation to glycemic control, PN and nerve conduction studies (NCS).

Methods: Neuropathy disability score (NDS) and NCS for median, ulnar, posterior tibial and common peroneal nerves were assessed. Fasting blood glucose, lipid profile, HbA1c, high sensitivity C-reactive protein (hs-CRP) and serum neopterin levels by enzyme linked immunosorbent assay were measured.

Results: The frequency of PN according to NDS was 40 (66.7%) patients out of 60, while NCS confirmed that 30 (50%) patients had this complication. Neopterin levels were significantly higher in patients with and without PN than controls and the highest values were found among those with PN (p< 0.001). High neopterin levels were observed among patients with abnormal NDS (median [IQR], 60 [53.5-80] versus 23 [17-33.5] nmol/L) as well as those with abnormal NCS (median [IQR], 47 [35-60] versus 17 [13-32] nmol/L). Neopterin levels were positively correlated to HbA1c, serum creatinine, total cholesterol and hs-CRP among patients with PN. Neopterin levels were positively correlated to motor latency of tibial and common peroneal nerves as well as motor and sensory latencies of median and ulnar nerves. Neopterin levels were independently related to diabetic neuropathy in logistic regression analysis. Neopterin cutoff level at 32 nmol/L could detect peripheral neuropathy with a high sensitivity and specificity.

Conclusions: The strong relation between neopterin and nerve conduction parameters supports its use as a reliable serum biomarker for PN in T1DM.

eP118

Higher adiponectin levels in children and adolescents with type 1 diabetes might contribute to lower bone mass observed in those patients, through alterations in osteocalcin circuit energy signaling of bone cells

C. Tsentidis[1], D. Gourgiotis[1], L. Kossiva[1], A. Doulgeraki[2], A. Marmarinos[1], K. Karavanaki[1]

[1]University of Athens, Athens, Ampelokipi, Greece, [2]Institute of Child Health, 'Aghia Sophia' Children's Hospital, Department of Bone and Mineral Metabolism, Athens, Greece

Objectives: Recent advances in energy homeostasis revealed a significant interconnection between bone and adipose tissue through osteocalcin. Reduced bone mass documented in type 1 diabetes mellitus (T1D) could be related to disregulation of adipokine signaling on bone. We aimed at studying adipokine distribution in T1D young patients and their correlation with bone metabolism markers.

Methods: We evaluated 40 children and adolescents with T1D (mean±SD age 13.04±3.53 years, T1D duration 5.15±3.33years) and 40 healthy age- and gender-matched controls (age 12.99±3.3years). Adiponectin, leptin and bone metabolism markers were measured, while lumbar spine (LS) and total body (TB) Bone Mineral Density (BMD) were evaluated with dual energy X-ray absorptiometry (DXA).

Results: Lower BMD values have already been documented in patients, as well as lower osteocalcin [log(osteocalcin) 3.44±0.5 vs 3.6±0.51]. Patients had higher levels of adiponectin (18078±8645 vs 13536±6703 ng/ml, p=0.007) while leptin levels were comparable between groups (8.85±8.73 vs 10.03±8.75 pg/ml, p=0.13). Both adipokines were associated with Body Mass Index (BMI) in both groups. Adiponectin was positively associated with osteocalcin only in controls(Rho=0.31, p=0.05) possibly indicating altered energy signaling in bone of T1D patients, whereas in patients it was negatively associated with IGF1(Rho=-0.30, p=0.05) and positively associated with HbA1c(Rho=0.38, p=0.01), indicating higher levels in those with worse glycemic control and metabolic response. A positive correlation with i-phosphorus(Rho=0.39, p=0.01) was also found. No associations of leptin with bone markers were observed.

Conclusions: Increased adiponectin might contribute to lower bone mass observed in young T1D patients with altered interconnection of energy signaling in bone cells, through osteocalcin circuit.

eP119

Asymmetric dimethylarginine levels and diabetes duration: relationship with measures of subclinical atherosclerosis and cardiac function in children and adolescents with type 1 diabetes

B. Ersoy[1], N. Eroğlu[2], M. Çetin[2], E. Onur[2], M. Ozkol[2], S. Coskun[2]

[1]Celal Bayar University, Faculty of Medicine, Pediatric Endocrinology, Manisa, Turkey, [2]Celal Bayar University, Faculty of Medicine, Manisa, Turkey

Objectives: Higher asymmetric dimethylarginine (ADMA) levels are known to be an indicator for cardiovascular risk, especially in adults with Diabetes Mellitus (DM). We aimed to evaluate ADMA levels according to diabetes duration and to determine the relationship between ADMA levels and measures of subclinical atherosclerosis and cardiac muscle function in children and adolescents with Type 1 DM (T1DM).

Subjects and Methods: Eighty-four children and adolescents with T1DM were included in this cross-sectional study. The patients were stratified according to the duration of diabetes as follows: 12 to 60 months (Group 1); >60 to 120 months (Group 2); and >120 months (Group 3). ADMA levels were assessed by ELISA. Carotid intima media thickness (IMT) was measured with ultrasonography. Cardiac muscle function was assessed in all patients by M-mode, conventional Doppler and tissue Doppler echocardiography (TDE).

Results: ADMA levels were significantly higher in Group 1 while carotid IMT was significantly higher in Group 3 than other groups ($p< 0.05$). TDE showed the ratio of peak early to peak late diastolic myocardial annular velocity (Em/Am) decreased significantly in Group 2 and 3 while myocardial performance index (MPI) in all groups and isovolumic relaxation time (IVRT) in Group 3 increased significantly. There were negative correlations between the Em/Am ratio and duration of diabetes (r:-0.310, p=0.004) and HbA1c levels (r=-0.391, $p< 0.001$). ADMA levels were negatively correlated with carotid IMT and IVRT ($p< 0.05$).

Conclusion: ADMA concentrations decrease as diabetes duration increases in Type 1 diabetic children and adolescents without complication. Significant TDE changes that occur after the fifth year of diabetes are associated with the development of diastolic filling defects and may, in turn, be related to poor metabolic control. Lower ADMA levels are associated with worsening measures of cardiovascular risk and poorer diastolic dysfunction.

eP120

Eevaluation of skin advanced glycation end products (sAGE) and of cardiovascular (CV) risk factors in adolescents with type 1 diabetes (T1D) or with severe obesity

S. Zucchini[1], M. Zioutas[1], V. Trevisani[1], G. Maltoni[1], L. Bernardini[1], A. Pession[1]

[1]*University of Bologna/St. Orsola-Malpighi Hospital, Dep. of Woman and Child Health, Bologna, Italy*

Objectives: Both pts with T1D or with severe obesity show high CV risk. We compared CV risk between 2 groups of pts with T1D or obesity by evaluating sAGE and other known variables associated with CV risk. Secondly we analyzed the parameters influencing sAGE levels.

Methods: 106 pts aged 10-18 yrs, 67 with T1D and 39 with severe obesity, had a cross-sectional evaluation of sAGE (AGEreader, DiagnOptics Tech.), lipid profile, auxology and BP. Inclusion criteria were age 10-18 yrs, for T1D pts disease duration >5 yrs or of >3 in puberty, for obese subjects BMI centile>99° and absence of T2D. In T1D pts age was 14.5±2.2 yrs, disease duration 8.1±3 yrs, last HbA1c 8.3±1.7%. In obese pts age was 13.9±1.7 yrs and BMI 33±3.2. A CV risk factor was considered positive (+1) if sAGE>1 SD, HbA1c>7.5%, waist/Ht≥0.5, BMI>95° centile, syst and/or diast BP>95° centile, LDL chol>100 mg/dl, trygl/HDL ratio≥2.2. sAGe was correlated with all parameters collected and in T1D pts with last and 3-5 yrs HbA1c.

Results: sAGEs were significantly higher in T1D pts vs obese (1.3±0.3 vs 1.1±0.2; p=0.0001). Only 1/39 obese pts vs 16/67 pts had sAGE>1 SD (p=0.0001). Obese pts showed a higher mean score of CV risk factors (3.3±.1.2 vs 1.6±1.2; p=0.0001). Among the T1D pts with mean HbA1c>9%, 5/9 showed sAGE>1 SD, among the pts with HbA1c< 7.5% 2/22 had sAGE>1 SD. In both groups sAGE was higher in females vs males (p=0.01 in both groups). In T1D group sAGE was significantly correlated with mean Hba1c and last HbA1c (p=0.0001), but not with age, disease duration or others. In obese pts sAGE only correlated with age (p=0.01).

Conclusions: Severely obese pts showed a higher score of CV risk factors than T1D pts. In pts with T1D sAGE level was strongly associated with metabolic control, although some T1D pts with bad metabolic had normal sAGE values. In our pts with severe obesity without T2D sAGE determination was not helpful in identifying CV risk, with almost all cases showing normal values.

ePoster Session 16 - Type 2 Diabetes

eP121
Weight loss behaviours and weight-related stress in children: do they predict adiposity over 2 years?

S. Harnois-Leblanc[1,2,3], A. Van Hulst[1,4], C. Sabiston[5], K. Maximova[6], M.-P. Sylvestre[2,3], M. Henderson[1,7]

[1]Research Center of CHU Sainte-Justine, Montreal, Canada, [2]Université de Montréal, School of Public Health, Montreal, Canada, [3]Research Center of Centre Hospitalier Universitaire de Montréal, Montreal, Canada, [4]McGill University, Epidemiology, Biostatistics and Occupational Health, Montreal, Canada, [5]University of Toronto, Faculty of Kinesiology & Physical Education, Toronto, Canada, [6]University of Alberta, School of Public Health, Edmonton, Canada, [7]Université de Montréal, Faculty of Medicine, Department of Pediatrics, Montreal, Canada

Objective: Dieting to control weight during adolescence is predictive of later weight gain, but little is known on its association in childhood. We assessed the prevalence of weight loss behaviors and weight-related stress in 8-10y children and whether they predict adiposity 2 years later.
Methods: Data stem from the Quebec Adipose and Lifestyle Investigation in Youth (QUALITY) cohort of children aged 8-10y at baseline and with at least one obese biological parent (n=630). Weight loss behaviors and stress related to weight were reported by children at baseline. Weight, height and puberty were measured at baseline and after a 2y follow-up. Body mass index z-scores (zBMI) were computed and % body fat (%BF) was measured via DEXA. Waist-to-height ratio (WHtR) was computed by dividing waist circumference (cm) by height (cm). We used multivariable linear regressions adjusted for age, sex, puberty, parental BMI, socioeconomic status and baseline adiposity.
Results: Almost 50% of children (27% of normal weight and 80% of overweight/obese) had ever tried to lose weight at 8-10y. Weight-related stress was experienced in 24% of girls and 19% of boys. Prior to adjusting for baseline adiposity, weight loss behaviors (B=0,977; p< 0,001) and weight-related stress (B=0,788; p< 0,001) were associated with higher zBMI 2 years later when accounting for all other covariables. When further adjusting for baseline zBMI, these associations were no longer observed, except for weight-related stress which predicted a lower zBMI (B=-0,096; p=0,045). Findings were similar for %BF and WHtR. Associations did not differ by sex or weight status.
Conclusions: Weight loss behaviors are highly prevalent in children with familial obesity. These predict higher adiposity 2 years later, but not its change. In this sample, weight-related stress predicted lower adiposity over 2 years. Awareness of these behaviors' preponderance and further research regarding their long-term impact on adiposity are required.

eP122
Risk factors for type 2 diabetes among children with familial obesity: what is the role of breastfeeding?

A. Van Hulst[1,2], S. Harnois Leblanc[3], G. Paradis[2], M. Henderson[1]

[1]CHU Sainte-Justine, Montreal, Canada, [2]McGill University, Montreal, Canada, [3]Université de Montréal, Montreal, Canada

Objectives: There is growing evidence for the protective effect of breastfeeding against childhood obesity. We examine the association between breastfeeding and insulin dynamics in children with a family history of obesity, and determine whether the association is mediated by obesity.
Methods: The QUALITY study includes 630 children with at least 1 obese parent recruited at age 8-10 years. Parents reported breastfeeding duration as: never, <3 months, 3-6 months and > 6 months. Insulin sensitivity (IS) was assessed by the Matsuda Index and insulin secretion by the ratio of the AUC of insulin to glucose at 30min and at 120min after a 2-h oral glucose tolerance test. Fat mass was assessed by DXA. Multivariable linear regressions were used while controlling for sex, birth weight, gestational age, parents' perception of child's health at birth, current age in years, puberty, parent education and fat mass.
Results: Following adjustment for covariates but prior to adjusting for fat mass, children who were ever (vs never) breastfed had a 23% higher Matsuda Index at 8-10 years (p< 0.001). Adding fat mass to the model resulted in an 10% higher Matsuda Index in those who were ever breastfed (p=0.02). Fat mass mediated 56% of the beneficial effect of breastfeeding on IS (Sobel's test p< 0.001). After adjusting for fat mass, breastfeeding duration was associated with IS as followed: compared to those never breastfed, Matsuda Index was higher by 13% in those breastfed < 3 months (p=0.01), and not different in those breastfed 3-6 months (p=0.12) or > 6 months (p=0.11). Breastfeeding was not associated with insulin secretion.
Conclusions: This study lends support to the protective effect of breastfeeding on IS in children above and beyond its protective effect on obesity although increased duration of breastfeeding was not associated with higher IS. Promoting and supporting breastfeeding may contribute to mitigate metabolic consequences in at risk children.

eP123
Incidence and prevalence of type 2 diabetes in youths in Germany

J. Rosenbauer[1,2], A. Stahl-Pehe[2], A. Neu[3], U. Rothe[4], S. Wiegand[5], T. Reinehr[6], S. von Sengbusch[7], T. Meissner[2,8], R.W. Holl[2,9]

[1]German Diabetes Centre, Leibniz Institute for Diabetes Research at Heinrich Heine University Duesseldorf, Institute for Biometrics and Epidemiology, Duesseldorf, Germany, [2]German Center for Diabetes Research (DZD), Munich-Neuherberg, Germany, [3]University Hospital Tuebingen, Children's Hospital, Tuebingen, Germany, [4]Technical University Dresden, Medical Faculty Carl Gustav Carus, Health Science/Public Health, Dresden, Germany, [5]Charité Children's Hospital Universitätsmedizin Berlin, Department of Pediatric Endocrinology and Diabetes, Berlin, Germany, [6]University of Witten/Herdecke, Vestische Hospital for Children and Adolescents Datteln, Department of Pediatric Endocrinology, Diabetes and Nutrition Medicine, Datteln, Germany, [7]University Hospital of Schleswig-Holstein, Campus Luebeck, Department of Pediatric and Adolescent Medicine, Division of Pediatric Endocrinology and Diabetology, Luebck, Germany, [8]University Children's Hospital, Heinrich-Heine University Düsseldorf, Department of General Pediatrics, Neonatology and Pediatric Cardiology, Duesseldorf, Germany, [9]University of Ulm, Institute of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany

Objectives: To estimate the national incidence and prevalence of type 2 diabetes (T2D) in youths 11-18 years of age in Germany.
Methods: Data were taken from the nationwide DPV database - used for longitudinal documentation of treatment and outcome in diabetes care in almost all pediatric diabetes centers in Germany - and the North Rhine-Westphalian (NRW) diabetes register. Besides the DPV database, the NRW register ascertains newly diagnosed T2D cases by means of two additional data sources: a prospective hospital-based active surveillance system (ESPED) and annual inquiries among practices. Completeness of the DPV database within the NRW register was estimated by the capture-recapture-method. Applying these regional estimates ascertainment-corrected national estimates were derived from the DPV database. Estimates of incidence and prevalence were based on Poisson distribution.

Results: In 2014-15, 171 newly diagnosed cases with T2D aged 11-18 years were registered in the DPV database giving an incidence of 1.4 (95%CI 1.2;1.6) per 100,000 person-years (py). Ascertainment was 48.2% complete resulting in a corrected incidence of 2.8 (2.5;3.1) per 100,000 py. The incidence in 15- to 18-year-olds was twice as high as in 11- to 14-year-olds (3.7 vs. 1.8 per 100,000 py). In 2014 (2015), 424 (520) T2D patients aged 11-18 years were documented in the DPV database corresponding to a prevalence of 8.3 (6.7) per 100,000 persons. Ascertainment was 58.2% (56.2%) complete giving a corrected prevalence of 13.4 (12.0) per 100,000 persons. The prevalence in 15- to 18-year-olds was 2-3-fold higher than in 11- to 14-year-olds.
Conclusions: These nationwide estimates confirm that T2D remains a very rare disease in youths in Germany. Annually about 180 youths are newly diagnosed with T2D, and there are about 800-900 prevalent cases. These estimates represent only lower bounds of actual figures as there may be a considerable amount of undiagnosed cases.
Funding: The study was supported by the Federal Ministry of Health, Germany (FKZ: GE20160324) as part of the German Diabetes Surveillance Project conducted by the Robert Koch Institute, Berlin, Germany.

eP124
Accepting the diagnosis: what providers need to know to help adolescents improve diabetes self-management in type 2 diabetes

N. Chang[1]

[1]*Children's Hospital Los Angeles, Endocrinology and Metabolism, Los Angeles, United States*

Objectives: Type 2 Diabetes Mellitus(T2DM) is a growing problem among adolescents. An even bigger problem is the lack of adherence to self-management of the disease within this population. The objective of this study was to understand the barriers adolescents face while managing T2DM.
Methods: Grounded theory was utilized to explore and understand the barriers to effective diabetes self-management care from the perspective of Latino adolescents with T2DM. Focus groups were conducted with 12 participants to identify the important topics for the individual interviews. Other 15 adolescents participated in the in depth individual interviews. All focus groups and individual interviews were video-taped and coding was done directly from the videos. All participants were recruited at Children´s Hospital Los Angeles.
Results: Participants were 45%female, with mean age of 16.3 years, and 93% had a BMI>85% for age. They had T2DM for a mean of 3.9 years, and poor metabolic control with a mean HbA1c of 9.1%. Qualitative data revealed that intrapersonal barriers and facilitators were the most important factors that influenced the participants in making decisions about their diabetes self-management. The core category was identified as ***"Acceptance of diabetes"***. This study revealed that when adolescents accepted their diabetes, they were able to embrace it and were able to overcome all the negative influences and perform diabetes self-management tasks. In order to achieve acceptance patients need to have a combination of a positive outlook in life, high self-esteem, be independent and resilient, and need to have some social support.
Conclusions: This study uncovered barriers that have important implications in the treatment of Latino adolescents with T2DM. Providers working with this population need to understand their barriers to treatment and need to implement changes in practice to help these youths acquire the necessary skills to achieve Acceptance of their diabetes.

eP125
Youth with type 2 diabetes have hepatic, adipose and peripheral insulin resistance

L. Pyle[1,2,3], M. Cree-Green[1], J. Thurston[1,2], J. Stuppy[1], B. Bergman[4], A. Baumgartner[1], S. Bacon[4], K. Nadeau[1,3]

[1]*University of Colorado School of Medicine, Pediatrics, Aurora, United States,* [2]*Colorado School of Public Health, Biostatistics and Informatics, Aurora, United States,* [3]*Barbara Davis Center for Childhood Diabetes, Aurora, United States,* [4]*University of Colorado School of Medicine, Medicine, Aurora, United States*

Objectives: Youth with type 2 diabetes (T2D) have difficulty meeting glycemic targets, which may be in part due to untreated insulin resistance (IR) in particular tissues. We tested the hypotheses that youth with T2D have adipose, hepatic, and peripheral insulin resistance compared to similarly obese youth without T2D.
Methods: In 47 youth (25 with T2D), multi-tissue IR was assessed by a four-phase hyperinsulinemic euglycemic clamp (basal, 10, 16, and 80 mU/m^2/min insulin). Fat free mass (FFM) was measured by DXA. Primary outcomes were group differences in glycerol rate of appearance (Ra, measuring adipose IR) at the 10 mU/m^2/min phase, glucose rate of appearance (measuring hepatic IR) at the 16 mU/m^2/min phase and glucose infusion rate (GIR, measuring peripheral IR) at the 80 mU/m^2/min phase, adjusting for the mean insulin concentration at the relevant phase. For analysis of dynamic changes in glycerol and glucose Ra over the entire clamp, we used repeated measures mixed-effects models with group (T2D or control), clamp phase, and insulin as covariates. T-tests were used for comparison of other continuous outcome measures.
Results: The two groups were similar in age (mean±SD: T2D 15.3±2.1 yrs, control 14.4±1.9, p=0.108) and BMI percentile (T2D 96.9±3.2, control 96.9±3.4, p=0.999). Compared to controls, youth with T2D had higher glycerol Ra at the 10 mU/m^2/min phase (group difference 1.50±0.44 μmol/kg/min, p=0.001), higher glucose Ra at the 16 mU/m^2/min phase (difference 0.64±0.11 mg/kg/min, p< 0.0001), and lower GIR (6.6±4.2 vs. 14.2±5.8 mg/kg FFM/min, p< 0.0001) at the 80 mU/m^2/min phase.
Conclusions: Youth with T2D have significant adipose, hepatic, and peripheral IR when compared to control youth of similar age and BMI, and never fully suppress endogenous glucose release despite marked hyperinsulinemia. Tissue-specific strategies to improve IR may be needed to better prevent and/or treat T2D in youth.

eP126
Type 2 diabetes in children and adolescents: experience in a single Belgian center

J. Vanbesien[1], I. Weets[2], K. Van De Maele[1], J. De Schepper[1], I. Gies[1]

[1]*UZ Brussel, Pediatric Endocrinology, Jette, Belgium,* [2]*UZ Brussel, Department of Clinical Chemistry and Radio-Immunology, Jette, Belgium*

Background: The incidence of type 2 diabetes (T2DM) among youths increases over the past decades all over the world, particularly among certain ethnic groups.
Aim: The aim of this study is to describe the clinical experience (clinical presentation, biochemical characteristics, initial treatment and first year metabolic control) of children and teens diagnosed with T2DM in a large multi-ethnic Belgian city.
Methods: Retrospective chart review of all newly diagnosed pediatric patients with diabetes mellitus at the UZ Brussel (Brussels, Belgium) during the last 7 years.
Results: Of the 203 (80 Magreb) newly diagnosed children and adolescents (≤16 years), T2DM was identified in 8. Their median age at diagnosis was 13 years (range 9.3 - 15.8) and median BMI SDS was 3 (range 2 - 4.2). Two patients were prepubertal, only 1 patient was a boy. 7 patients were known with primary obesity, whereas 1 patient had a previously diagnosed Prader-Willi Syndrome. All but one patient were from Magreb origin. Seven had a family history of T2DM. 3 patients had mild typical symptoms (polyuria, polydipsia, weight loss) at diagnosis and 5 patients presented with acanthosis nigricans. HbA1c at diagnosis ranged between 6 - 10.7%. No type 1 diabetes associated auto-antibodies were present. Six patients were started on metformin at diagnosis, whereas 2 patients, presenting with slight acidosis, received instant insulin therapy . These 2 patients achieved a faster optimal metabolic control (HbA1c ≤7.5% - within three months of treatment).
Conclusion: Currently T2DM makes up 3 % of newly diagnosed diabetic children and adolescents and is characterized by an

asymptomatic onset, a female preponderance, occurrence during the second decade and only a slightly elevated HbA1c at diagnosis. Obese female adolescents of Magreb origin appear at highest risk, especially in association with a positive family history, justifying a regular screening for diabetes mellitus in this particular patient group.

eP127
Youth onset type 2 diabetes: clinical outcomes following routine management

L.Z. Simpson[1], J.H. Cox[1], P. Vasista[2], J.C. Agwu[1], N. Pargass[3], S. Karandikar[4], P. Sundaram[2]

[1]Sandwell and West Birmingham Hospitals NHS Trust, Paediatrics, West Bromwich, United Kingdom, [2]University Hospitals of Leicester NHS Trust, Leicester Children's Hospital, Leicester, United Kingdom, [3]The Royal Wolverhampton Hospital NHS Trust, Paediatrics, Wolverhampton, United Kingdom, [4]Birmingham Heartlands Hospital NHS Trust, Paediatrics, Birmingham, United Kingdom

Objectives: Review the clinical outcomes of children and young people (CYP) with type 2 diabetes (T2D) managed in the Midlands UK.
Method: Case notes review of 61 CYP with T2D managed in 4 large hospitals in the Midlands.
Results: Median age at presentation 13 years (range 9-17 years). Female 66%, male 43%. South Asian 61%, Caucasian 23%, African-Caribbean 5%, and Mixed Ethnicity 3%. Family history of T2D in 79%. At presentation, 28/61 were asymptomatic. 24/61 had typical symptoms but only 4 were in DKA.

At diagnosis 13% (8/61) were managed with lifestyle intervention (LI) alone while 51% (31/61) received LI and metformin. 23% (14/61) received basal and prandial insulin (MDI) plus metformin.

At presentation, median HbA1c was 70.8 mmol/mol and median BMI was 31. Of those screened within the first year of diagnosis, 12% (6/50) had microalbuminuria, 55% (29/53) dyslipidaemia, 56% (22/39) abnormal liver function tests and 28% (12/43) hypertension.

In 34 patients with 2-year follow-up data, median HbA1c at diagnosis was 67.2 mmol/mol then 50.9 and 60.9 mmol/mol at 1 year and 2 years respectively. There was no significant change in median BMI (30.9 at diagnosis and 30.5 at 2 years). 50% (17/34) had improved their HbA1c from baseline whilst only 32% had improved their BMI compared to BMI at diagnosis.
Conclusions: Youth onset type 2 diabetes is on the increase but remains relatively uncommon. There is currently no data on clinical outcomes and no national guidelines on management. This case notes review shows that screening rates for complications were variable within the 4 Midlands hospitals and rates of complications within the first year were high. There was an initial improvement in HbA1c within the first year but this was not sustained. Weight loss was difficult to achieve in the majority of patients.

eP128
Change in annual incidence of childhood type 2 diabetes detected by urine glucose screening at schools in the Tokyo Metropolitan area during 1975-2015

T. Urakami[1], M. Yoda[2], K. Yoshida[2], S. Tanabe[2], Y. Mine[2], M. Aoki[2], J. Suzuki[2]

[1]Nihon University School of Medicine, Pediatrics, Tokyo, Japan, [2]Nihon University School of Medicine, Tokyo, Japan

Objective: Change in annual incidence of children with type 2 diabetes detected by urine glucose screening at schools in the Tokyo Metropolitan Area during 1975-2015 were studied.
Methods: Trends of temporal changes in annual incidence rate were analyzed using a joinpoint regression model developed by Kim et al., and the joinpoints where is an essential change in the log-linear trends were detected. Annual percent change (APC) was calculated for each segmented line regression. Average annual percent change (AAPC) was also calculated for the whole period analyzed.
Results: During the study period from 1975 to 2015, a total of 11,652, 205 children, including 7,955,857 primary school children (PSC), aged 7-12 years, and 3,696,348 junior high school children (JHSC), aged 13-15 years, were participated in the screening program. As the result, 301 children, including 64 PSC and 237 JHSC, were diagnosed as having type 2 diabetes. The incidence of type 2 diabetes (per 100,000 children-year) throughout the study period was 2.58 in all children, 0.80 in PSC and 6.41 in JHSC. APPC during the entire study period was estimated as -1.5 (NS), and the incidence significantly increased during 1975-1982 (APC=17.49, $P< 0.05$), but tended to decrease during 1982-2015 (APC=-1.01). In PSC, the incidence significantly increased during 1975-2010 (APCC=3.3, $p< 0.05$), and tended to decrease during 2010-2015 (APC=-29.61). On the other hand, in JHSC, the incidence barely increased during the entire study period (APCC=0.06).
Conclusions: We speculated that significant increase in the incidence of type 2 diabetes in PSC during 1975-2010 might be reflected by increase in the frequency of obesity in PSC during much of the same period, whereas decrease in the incidence during 2010-2015 seems to be influenced by improvement of the frequency of obesity in PSC after 2010 in the Tokyo Metropolitan area.

ePoster Session 17 - Genetics and Associated Diseases

eP129
High prevalence of Pre-symptomatic T1D and celiac disease in the general population: the Autoimmunity Screening for Kids (ASK)

M. Rewers[1], C. Geno-Rasmussen[1], J. Baxter[1], K. Waugh[1], L. Yu[1], B. Frohnert[1], A. Steck[1]

[1]*Univeristy of Colorado, Barbara Davis Center for Diabetes, Aurora, United States*

Objectives: T1D and celiac disease (CD) are among the most common chronic diseases of childhood. The ASK Program strives to provide evidence for a universal screening for pre-symptomatic T1D and CD.
Methods: In January-May 2017, we screened for pre-symptomatic T1D and CD 1623 Denver children aged 2-17 y. The initial screening was carried out during a visit with the child's primary care provider. Venipuncture was preferred to finger poke by 79% of the subjects. Islet autoantibodies to insulin, GAD, and IA-2 as well as transglutaminase autoantibodies (TGA) were measured using radiobinding assays (RBA) and by a novel more sensitive and specific electrochemiluminescence assays (ECL). ZnT8 autoantibodies were measured by RBA only. Children positive for any of the autoantibodies were invited to the Barbara Davis Center for Diabetes for a re-testing using the same RBA and ECL assays.
Results: As of May 26, autoantibody results were available for 1570 study subjects. The prevalence of Stage 1 T1D (multiple islet autoantibodies and normoglycemia) was 0.7% and an additional 0.5% of the children had pre-Stage 1 T1D (single islet autoantibody by RBA and ECL). These results were confirmed in all 10 subjects who have completed re-testing. Single islet autoantibody by RBA, believed not to predict T1D, was present in 2.7% of the participants and was confirmed in 15/22 (68%) of the cases on re-testing. The prevalence of pre-symptomatic CD (TGA by RBA and ECL) was 2.2% and confirmed in 24/25 (96%) of re-tested children. An additional 1.2% of the children tested positive only by ECL TGA. Only 5% of the children screened so far had a first-degree relative with T1D and 7% had a first degree relative with CD. Participation was similar by age, sex, and race/ethnicity.
Conclusions: This general population screening high prevalence of both pre-symptomatic T1D and CD. Follow-up includes monitoring for dysglycemia, education to prevent DKA, and interventions to delay clinical diabetes.

eP130
Polymorphism c1858t in the protein tyrosine phosphatase non-receptor type 22 in co-occurrence of type 1 diabetes and celiac disease

D. Smigoc Schweiger[1], T. Hovnik[2], N. Bratina[1], T. Battelino[1]

[1]*University Children's Hospital, University Medical Centre Ljubljana, Department of Paediatric Endocrinology, Diabetes and Metabolic Diseases, Ljubljana, Slovenia,* [2]*University Children's Hospital, University Medical Centre Ljubljana, Unit of Special Laboratory Diagnostics, Ljubljana, Slovenia*

Objectives: The finding that polymorphism C1858T in the protein tyrosine phosphatase non-receptor type 22 (PTPN22) gene is associated to several autoimmune diseases may reflect its general role in the aetiology of autoimmunity. However, previous studies have shown that susceptibility alleles in PTPN22 has opposite effects in type 1 diabetes (T1D) and celiac disease (CD). The aim of our study was to evaluate the role of PTPN22 for developing both T1D and CD.
Methods: In total 325 individuals were included in our study, 127 controls, 65 T1D patients, 67 CD patients and 66 patients with both T1D and CD. SNP C1858T in PTPN22 gene was determined by TaqMan SNP method. Logistic regression was used for comparison of genotype frequencies, calculating odds ratio (OR) and 95% confidence interval (CI), as well as for the analysis of interaction between polymorphisms. All statistical analyses were performed using IBM SPSS Statistics 19.0 (IBM Corporation, Armonk, NY, USA).
Results: Minor allele frequency was 14.2%. Comparison of genotype frequencies (patients vs. controls) showed that proportion of carriers of at least one polymorphic *PTPN22* allele was significantly higher among T1D patients (P=0.03), but significantly lower in patients with CD (P=0.024). Proportion of carriers of at least one polymorphic *PTPN22* allele (comparison on different patient groups) in patients with coexisting T1D and CD was significantly lower compared to T1D patients (P=0.016) and significantly higher compared to CD patients (P=0.026).
Conclusions: This study showed that SNP C1858T in PTPN22 gene was significantly associated with the risk of developing T1D, but had no association with CD. Interestingly, in patients with coexisting diseases the frequency of C1858T was lower compared to patients suffering only from T1D. A distinct genetic predisposition in coexisting T1D and CD from that of T1D alone suggests different pathways involved in T1D pathophysiology.

eP131
Analysis of the results of genetic testing for celiac disease in children and adolescents with type 1 diabetes

A. Zubkiewicz-Kucharska[1], M. Seifert[1], J. Chrzanowska[1], A. Noczyńska[1]

[1]*Wroclaw Medical University, Dept. of Endocrinology and Diabetology for Children and Adolescents, Wrocław, Poland*

Type 1 diabetes (T1D) and celiac disease (CD) often coexist. Evaluation of haplotype HLA-DQ2/DQ8 can confirm a genetic predisposition to CD. The negative result of this study allows to exclude CD with a high probability. It is suggested that in the group of higher risk of CD, to which patients with T1D belong, the implementation of genetic testing should reduce the number of patients requiring systematic immunological screening.

The aim of the study was to analyze the results of genetic testing for CD in children and adolescents with previously diagnosed T1D.
Material and Methods: The study included 156 patients (83 girls and 73 boys), with T1D, aged from 2 to 18 years (mean 11.4 years), in whom HLA DQ2 (DQ2.2, DQ2.5) and DQ8 alleles were examined. In 12 children CD and in 22 Hashimoto disease were diagnosed together with T1D.
Results: In 147/156 (94.21%) of patients (including 3 of children with previously diagnosed CD, on gluten-free diet), the titer of anti-tissue transglutaminase IgA antibodies (anti-tTG IgA) were within laboratory norms, none of the patient was IgA deficient. In 9 patients anti-tTG IgA was positive. In 19 cases (12.2%) on the basis of genotyping, the risk of celiac disease was found to be minimal (DQ2 and DQ8-negative). In the remainder patients (87.8%) a genetic test result was positive (HLA DQ2 and/or HLA DQ8-positive), including 44 (28.2%) patients, where both haplotypes (HLA DQ2.5 and HLA DQ8) were positive. In all patients with celiac disease the disease predisposing alleles were positive. HLA DQ2.5 was more frequent among patients with T1D and CD than T1D only (p=0.019).
Conclusions: The group of patients negative for HLA DQ2 and DQ8 alleles, in whom immunological testing for CD will not be routinely performed is relatively small. Most of patients, positive for HLA DQ2/DQ8, need further systematic antibodies evaluation. HLA DQ2.5 is more frequent in diabetic patients with CD.

eP132
Antibody positivity after biopsy-proven celiac disease diagnosis in type 1 diabetes

K. Nagl[1], A. Pappa[2], A. Naeke[3], E. Fröhlich-Reiterer[4], P. Salfeld[5], J. Rosenbauer[6,7], S. Koletzko[8], J. Wolf[9], E. Bollow[7,10], N. Prinz[7,10], on behalf of the DPV-initiative

[1]Medical University Vienna, Department of Pediatrics and Adolescent Medicine, Vienna, Austria, [2]University Hospital RWTH Aachen, Department of Pediatrics and Adolescent Medicine, Aachen, Germany, [3]University of Dresden, Department of Pediatrics, Dresden, Germany, [4]Medical University of Graz, Department of Pediatrics, Graz, Germany, [5]Cantonal Hospital Thurgau Münsterlingen, Department of Pediatrics, Center for Diabetes Region Lake of Constance, Münsterlingen, Switzerland, [6]Heinrich Heine University Duesseldorf, Institute for Biometrics and Epidemiology, German Diabetes Center, Leibniz Center for Diabetes Research, Düsseldorf, Germany, [7]German Center for Diabetes Research (DZD), Munich-Neuherberg, Germany, [8]Ludwig-Maximilians-University (LMU) Munich, Division of Pediatric Gastroenterology, Munich, Germany, [9]St. Vincenz Hospital Paderborn, Department of Pediatric and Adolescent Medicine, Paderborn, Germany, [10]University of Ulm, Department of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany

Objectives: Patients with Type 1 Diabetes (T1D) and comorbid celiac disease (CD) are often clinically asymptomatic, but might show growth retardation compared to T1D patients without CD. CD related antibody (Ab) titers are used as surrogate parameters for compliance with diet and disease control. This study examines how many T1D patients stayed Ab-positive after biopsy proven (BP-) CD diagnosis, and whether they differed from patients that reached Ab-negativity.
Methods: DPV registry data from T1D patients were analyzed. Based on propensity score (estimated by age, sex, diabetes duration and migration background) 723 patients with BP-CD were matched with 3615 patients with T1D-only. Patients were compared 0-24 months before biopsy (Bx) and 9-30 months after Bx by t-test, Wilcoxon or X^2-test. Differences between Ab-positive and Ab-negative patients with BP-CD were assessed by linear regression adjusted for age, gender, migration background and diabetes duration.
Results: 54% of BP-CD patients reached Ab-negativity within 9-30 months after Bx. Those remaining Ab-positive were older at Bx compared to patients reaching Ab-negativity (10.7 [7.6;13.7] vs. 9.6 [6.8;12.2] years, p=0.0198). After Bx, Ab-positive and Ab-negative patients had no increase in height-SDS and were significantly smaller than T1D-only patients. Although continuously lower compared to T1D-only patients, BMI-SDS increased significantly in both groups but more pronouncedly in Ab-positive patients (p=0.0296). HbA1c was lowest in Ab-negative-, compared to Ab-positive- and also to T1D-only patients (7.3 [6.7;7.9] vs. 7.7 [7.1;8.7] and 7.6 [7.0;8.3] %, p< .0001). Number of blood sugar measurements per day was higher in Ab-negative patients (p=0.012).
Conclusion: Almost half of patients stayed Ab-positive 9 to 30 months after BP-CD diagnosis. Antibody positivity after biopsy seems to be associated with poor adherence to therapy reflected by higher HbA1c and fewer blood glucose measurements per day.

eP133
Association between HLA-DRB1 gene and type 1 diabetes with and without autoimmune thyroid disease in children, adolescents and young adults in the Croatian population

N. Rojnic Putarek[1], Z. Grubic[2], M. Maskalan[2], R. Zunec[2], N. Krnic[1], J. Ille[1], A. Spehar Uroic[1], M. Dumic[1]

[1]Zagreb University Hospital Centre, School of Medicine, Department of Paediatric Endocrinology and Diabetes, Zagreb, Croatia, [2]Zagreb University Hospital Centre, School of Medicine, Tissue Typing Centre, Zagreb, Croatia

Objective: Co-occurrence of type 1 diabetes (T1D) and autoimmune thyroid disease (AITD) is classified as autoimmune polyglandular syndrome type 3 (APS3v). Association of HLA-DRB1 polymorphisms with T1D is reported for various populations, whether it is not clear if the same genes are associated to APS3v. The aim of the study was to examine the HLA-DRB1 polymorphisms associated to T1D and APS3v in the Croatian population.
Methods: The study included 161 unrelated patients (92 with T1D, 69 with APS3v) aged 1.1 to 25.8 years and 93 healthy unrelated individuals in the control group. All subjects were typed by Polymerase Chain Reaction - Sequence Specific Oligo Probes.
Results: The DRB1*03 and DRB1*04 genes were significantly more frequent in T1D (P=0.006 and P< 0.001, respectively) and APS3v patients (P< 0.001, each) than in controls. The DRB1*11 and DRB1*15 genes were significantly less frequent among T1D patients (P< 0.001 and P=0.001, respectively), while the DRB1*07, DRB1*11, DRB1*12 and DRB1*13 genes were significantly less frequent among APS3v patients (P=0.017, P=0.006, P=0.022 and P=0.05, respectively) compared to controls. High-risk DRB1*03/DRB1*04 genotype (T1D 19.4% and APS3v 20.6%, P< 0.0001) and medium-risk DRB1*04/DRB1*X genotype (T1D 33.3%, P< 0.0001 and APS3v 30.9%, P=0.0004) were present with significantly higher frequency in both groups of patients compared to controls. The frequency of DRB1*15/DRB1*X genotype was significantly lower among T1D patients (P=0.014), than between APS3v patients and controls.
Conclusion: Similarities found in susceptible HLA-DRB1*03 and DRB1*04 genes and protective DRB1*11 gene for T1D and APS3v, support the observation that genetic background is shared between these two diseases and is in concordance with previous reports. However, protective role of HLA-DRB1*07, DRB1*12 and DRB1*13 genes for APS3v found in our study needs to be confirmed in other investigations.

eP134
Polymorphisms rs7093069 and rs7647305 on Graves' disease in comparison with diabetes type 1

A. Bossowski[1], J. Goscik[2], N. Wawrusiewicz-Kurylonek[3], W. Mlynarski[4], A. Kretowski[5]

[1]Medical University in Bialystok, Department of Pediatric, Endocrinology, Diabetes with a Cardiology Units, Białystok, Poland, [2]Medical University of Bialystok, Centre for Experimental Medicine, Białystok, Poland, [3]Medical University of Bialystok, with Cardiology Division, Medical University of Białystok, Centre for Experimental Medicine, Medical University of Bialystok, Department of Endocrinology and Diabetes with Internal Medicine, Białystok, Poland, [4]Medical University in Lodz, Department of Pediatrics, Oncology, Hematology with Diabetology, Lodz, Poland, [5]Medical University in Bialystok, Department of Endocrinology, Diabetology with Internal Medicine, Białystok, Poland

Background: The etiology of autoimmune diseases, including Graves' disease (GD) and diabetes type 1 is multifactorial and involves genetic and environmental factors. Family and population studies confirmed the strong genetic influence and inheritability in the development of these diseases. Most papers evaluating the relationship of rs7093069 and rs7647305 polymorphism with lipid metabolism and obesity. Possible differences in overexpression of the IL2RA, SFRS10, ETV5 and DGKG genes polymorphisms on GD and diabetes type 1 remain unclear.
Objective and hypotheses: To identify the differences between polymorphisms of IL2RA, SFRS10, ETV5 and DGKG genes in patients with Graves' disease and patients with type 1 diabetes.
Method: The study was performed in 142 patients with GD and 94 patients with diabetes type 1. The two single nucleotide polymorphisms (SNPs): rs7093069 - IL2RA and rs7647305 - SFRS10, ETV5 and DGKG were genotyped by TaqMan SNP genotyping assay using the real-time PCR.
Results: Rs7093069 C alleles were more frequent in GD patients in comparison to patients with diabetes type 1 (p< 0,005 with OR=1,9).

Rs7647305 C alleles were more frequent in GD patients in comparison to patients with type 1 (p< 0,005, OR=3).
Conclusion: Rs7093069 C/T and rs7647305 C/T polymorphisms could contribute to development of GD. The main risk factor for 7093069 is C allele. In case of rs7647305 the main risk factor is also allele C.

eP135
The polymorphism z-2/z-2 of the gene akr1b1 and the prevalence of diabetic neuropathy in children and adolescents with type 1 diabetes mellitus

D. Kallinikou[1], C. Tsentidis[1], K. Kekkou[2], M. Louraki[1], C. Kanaka-Gantenbein[3], E. Kanavakis[2], K. Karavanaki[1]

[1]*Diabetes and Metabolism Clinic, 2nd Department of Paediatrics, University of Athens, 'P. & A. Kyriakou' Children's Hospital, Athens, Greece,* [2]*Department of Medical Genetics, Choremeio Research Laboratory, University of Athens, Athens, Greece,* [3]*Diabetes Center, Division of Endocrinology, Metabolism and Diabetes, First Department of Paediatrics, University of Athens, "Aghia Sophia" Children's Hospital, Athens, Greece*

Introduction: Diabetic neuropathy (DN) is a common long-term complication of diabetes with significant impact on the quality of life. Characteristic neuronal alterations may occur subclinically, early during the course of the disease with a prevalence ranging from 9-57%. The homogygocity of Z-2/Z-2 polymorphism increases the transcriptional activity of the *AKR1B1*gene contributing to the development of DN. Our objective was to study the prevalence of subclinical autonomic and peripheral DN in children and adolescents with type 1 Diabetes (T1D) and its association with Z-2 polymorphism of *AKR1B1*.
Methods: We evaluated 102 T1D children and adolescents (mean± SD age:12.9± 2.8 years, T1D duration: 5.14±3.5 years) and 100 controls (age:11.9±2.7 years). Pupillary dilation(PD) in darkness was assessed, as an index of autonomic neuropathy, using a Polaroid pupilometer and vibration sensation threshold(VST), as an index of peripheral neuropathy, using a Biothesiometer. The polymorphisms of *AKR1B1*gene were evaluated using microsatellite sequence Z.
Results: PD impairment and higher VSTs in the upper and lower limbs were more frequent in the T1D group compared to controls. PD was associated with age (r=0.16, p=0.022), HbA1c(r=0.23, p=0.048) and T1D duration (r=0.20, p=0.022). Older age(p< 0.001) and puberty were associated with greater proportion of abnormal VSTs (pubertal vs prepubertal children: 17.7% vs 2.8%, p=0.001). T1D patients, homozygous for Z-2 polymorphism of *AKR1B1*gene had higher prevalence of PD abnormality (63.73% vs 36.27%, p=0.047) compared to controls, while no association with VST abnormality was observed.
Conclusions: Impaired indices of peripheral and autonomic DN were present in a significant proportion of young T1D patients, although asymptomatic. Indices of DN were associated with age, diabetes duration, puberty, and glycaemic control. Homozygocity of Z-2 polymorphism of *AKR1B1*gene was related to t the presence of autonomic, but not peripheral neuropathy.

eP136
Hemoglobin A2 level is associated with thyroid function and interferes with hemoglobin A1c measurements among pediatric patients with type 1 diabetes

A. Baranowska-Jaźwiecka[1], B. Mianowska[1], I. Pietrzak[1], A. Zmysłowska[1], A. Szadkowska[1], W. Mlynarski[1]

[1]*Medical University in Lodz, Lodz, Poland*

Objectives: The purpose was to study a possible link between HbA2 level and HbA1c measurements among pediatric patients with type 1 diabetes (T1DM).
Methods: The study was designed as a prospective cohort observation conducted between August 2012 and January 2015 including all patients with autoimmune T1DM and disease duration longer than one year. We excluded children aged below 2 years and/or with laboratory signs of anemia or hemoglobinopathies. Measurements of HbA1c, HbF and HbA2 were performed three times within one-year period using HPLC technology (Bio-Rad Laboratories, USA).
Results: In total 819 pediatric patients of Caucasian origin with diabetes were treated in the study center. Finally, 499 children were eligible for and included into the study (mean age 12.8±3.9 years, diabetes duration 5.6±3.3 years) and 1497 measurements of HbA1c and HbA2 level were performed in this group. Average yearly measured HbA1c was 7.5±1.3% (59±14.03 mmol/mol) and HbA2 2.6±0.2% and they were negatively correlated R=-0.33 (p< 0.0001). In multivariate analysis, HbA1c level was associated independently with HbA2 (b=-0.19; p< 0.0001), average glucose level (b=0.71; p< 0.0001) and number of glucose measurements per day (b=-0.13; p< 0.0001). Additionally, HbA2 level was associated with patient age (r=0.34; < 10^{-5}), fT4 (R=0.16; p=0.0004) and was significantly lower among patients with Hashimoto disease (n=65, 13%) as comparing others, 2.5 (2.3-2.6)% vs. 2.6 (2.4-2.7)%, p=0.0003.
Conclusions: HbA2 level is associated with thyroid function as previously reported. However, for the first time a link between HbA1c and HbA2 measurements among pediatric patients with T1DM was found.

ePoster Session 18 - Monogenetic/Case Reports

eP137
Obesity and metabolic control in Alstrom syndrome: 5 year follow-up from national multidisciplinary clinic

J. Hill[1], J. Anderson[1], K. Mobberley[2], J. Pemberton[2], M. Kershaw[2], T. Barrett[3]

[1]*University of Alabama, School of Medicine, Birmingham, United States,* [2]*Birmingham Women's & Children's Hospital, Diabetes, Birmingham, United Kingdom,* [3]*University of Birmingham, Institute of Cancer and Genomic Sciences, Birmingham, United Kingdom*

Introduction: Alstrom syndrome is the association of infancy onset obesity, retinal dystrophy, sensorineural deafness, cardiomyopathy and type 2 diabetes. It is a rare ciliopathy disease caused by mutations in the ALMS1 gene. The UK National Health Service for England funds a national highly specialised multi-disciplinary clinic for children with Alstrom syndrome, to coordinate their medical, psychological and social/educational needs in living with this life limiting condition. We aimed to audit the quality performance indicators of glycaemic, obesity and lipid control.
Methods: Retrospective analysis of glycaemic control, BMI and triglyceride measurement in 25 children and young people (CYP) with genetically confirmed Alstrom syndrome under the care of our national centre. Median HbA1c, BMI and triglyceride measurements for the service over 5 years (2011-2015).
Results: There were 11 CYP with Alstrom syndrome seen by the service in 2011, 19 in 2012, 22 in 2013, 25 in 2014, and 24 in 2015. The percentage of CYP with HbA1c (DCCT aligned) less than 7.5% was 36% in 2011, improving to 75% in 2015. 55% of CYP had a BMI below the 99.6 centile in 2011, but only 46% achieved this in 2016. 36% of CYP had fasting triglyceride level below 10mmol/L in 2011, compared to 58% in 2015.
Summary and Conclusions: Monitoring of metabolic parameters improved over the period of the audit. Glycaemic control improved, but there was a deterioration of BMI and fasting triglycerides. This is in line with national obesity trends and may also be a population demographic and cultural shift artefact. Limited opportunities to exercise due to sensory deficits (severe vision impairment, deafness) may also impact. In order to improve long term outcomes in this group of CYP, we suggest that health care providers develop strategies to provide individual diet and exercise advice, perhaps with the support of personal trainers. Families should be encouraged and supported to adopt healthier lifestyles.

eP138
A novel ALMS 1 mutation in a Turkish patient with Alström syndrome

A. Akinci[1], I. Dundar[1], E. Camtosun[1]

[1]*Inonu University Medical Faculty, Pediatric Endocrinology Department, Malatya, Turkey*

Alström syndrome (AS) is a rare monogenic autosomal recessively inherited disorder characterised by cone rod dystrophy, blindness , hearing loss, childhood obesity, type-2 diabetes and multiorgan failure. Mutations in the Alström Syndrome 1(ALMS1) gene have been found to be causative for AS. There are now 239 disease-causing mutations in ALSM1 gene identified in different populations. We report here the clinical and novel molecular finding in a patient with AS.
Case report: The 15-year old patient was referred to the our outpatient clinic for evaluation of hyperglycemia and hypertriglyceridemia. His prior history included poor vision since birth. Sensoryneural hearing loss subsequently developed at the age of 10. His school performance was not good ,he could not completed primary school education. The parents were first cousins. Physical examination findings were as follows. Height: 160 cm(3-10% percentile) , weight: 47kg(weight for height: 25-50% percentile),bone age: 13 years, BMI:18 (kg/M^2), and blood pressure: 120/80mmHg. The eye examination was notable for advanced retinitis pigmentosa in both eyes. He had midfacial hypoplasia, bilateral enofthalmos, marked nystagmus and slight photophobia . Other clinical findings including achantosis nigricans, hypothyroidism, hypogonadism, hyperinsulinemia and hepatomegaly were also observed. His blood glucose was ranged from 190 to 250 mg/dl and he was diagnosed type-2 diabetes mellitus. *ALMS1* gene sequence analysis was performed by using MiSeq next generation sequencing , and we detected a novel frameshift and truncating mutations **(NM_015120.4. ALMS1:c.7905_7906insC (p. N2636Qfs*24) mutation)** in exon 10. This mutation was not identified in the literatüre until now. Although mutation taster software was predicted this variant was pathologenic, functional studies are needed for exact decision.

eP139
Characterization of diabetes following near-total pancreatectomy in patients with diffuse congenital hyperinsulinism

A. Welters[1], T. Meissner[1], J. Grulich-Henn[2], E. Fröhlich-Reiterer[3], K. Warncke[4], K. Mohnike[5], O. Blankenstein[6], U. Menzel[7], N. Datz[8], E. Bollow[9], R.W. Holl[9]

[1]*University Children's Hospital Düsseldorf, Department of General Pediatrics, Neonatology and Pediatric Cardiology, Duesseldorf, Germany,* [2]*University Hospital Heidelberg, Center for Childhood and Adolescent Medicine (General Pediatrics), Heidelberg, Germany,* [3]*Medical University of Graz, Department of Pediatrics, Graz, Austria,* [4]*Technical University of Munich, Department of Pediatrics, München, Germany,* [5]*Otto-von-Guericke University, Department of Pediatric Endocrinology, Magdeburg, Germany,* [6]*Charité Children's Hospital Universitätsmedizin Berlin, Institute for Experimental Paediatric Endocrinology, Berlin, Germany,* [7]*Altona Children's Hospital, Hamburg, Germany,* [8]*Children's Hospital AUF DER BULT, Diabetes Center for Children and Adolescents, Hannover, Germany,* [9]*University of Ulm, Institute of Epidemiology and Medical Biometry, Ulm, Germany*

Until the last decade, management of diffuse congenital hyperinsulinism (DCHI) frequently included near-total pancreatectomy that is associated with high rates of insulin-dependent diabetes mellitus (almost 100% at 11 years post-surgery). Very little is known about the characteristics, management and long-term glycaemic control of DCHI patients with diabetes following near-total pancreatectomy. We searched the German/Austrian DPV (Diabetes Patienten Verlaufsdokumentation) database and compared the course of 42 DCHI patients with diabetes to that of age-matched patients with type 1 diabetes mellitus (T1DM). Data were compared at diabetes onset and after a median follow-up period of 6.1 years (3.3-9.7). At follow-up a considerable large number of patients with DCHI was treated with conventional insulin therapy (21.1% vs. 6.4% of T1DM), and only a small number with insulin pumps (15.8% vs. 36.7%). Daily insulin doses were significantly lower in the DCHI group, both at diabetes onset (0.3 vs. 0.6 IE/kg/d, p=0.003) and follow-up (0.8 vs. 0.9 IE/kg/d, p=0.02), while there was no significant difference in daily carbohydrate intake. Glycaemic control, as measured by HbA1c level, was significantly better in the DCHI group at diabetes onset (6.2% vs. 7.2%, p=0.003), significantly worsened in both groups as diabetes progressed, and reached a similar level of control at follow-up (HbA1c 7.5% vs. 7.9% in T1DM, p=0.12). Importantly, in the DCHI group, the risk of severe hypoglycaemia appears to be higher only at diabetes onset (14.8% vs. 5.8%, p=0.1) as it decreased to a rate comparable to that of T1DM patients at follow up (8.3% vs. 9.5% p=0.8). In conclusion, the severity of diabetes and the risk of severe hypoglycaemia

following near-total pancreatectomy in DCHI patients are comparable to that of T1DM. Therefore, treatment should be intensified to achieve good glycaemic control. Our data furthermore strengthen the need for alternative treatment options for patients with DCHI.

eP140
Neonatal diabetes as a first symptom of IPEX syndrome

A. Brandt[1], M. Drożyńska-Duklas[1], E. Adamkiewicz-Drożyńska[1], A. Żurowska[1], W. Młynarski[2], K. Kałwak[3], M. Myśliwiec[1]

[1]Medical University of Gdansk, Gdansk, Poland, [2]Medical University in Lodz, Lodz, Poland, [3]Wroclaw Medical University, Wroclaw, Poland

Introduction: Immunodysregulation polyendocrinopathy enteropathy x-linked syndrome (IPEX) is characterized by systemic autoimmunity, typically beginning in the first year of life. Presentation is most commonly the clinical trial of diarrhea, dermatitis, and endocrinopathy.
Case report: Boy from 1st pregnancy, born with body weight 3840 g, Apgar 10 points. In 13th day of life vomiting and tachypnoe were noted and in laboratory tests hyperglycemia (653mg/dl) and ketoacidosis were reported. Patient was diagnosed with diabetes and treatment with insulin pump was started. Antibodies typical for diabetes type 1 were negative. In 9th month of life boy was hospitalized in Clinic of Pediatrics, Diabetology and Endocrinology in Gdansk, mutation in KCNJ 11 was excluded and autoimmune thyroiditis was diagnosed and L-tyroxin treatment was started.

In 12th month of life patient was diagnosed with nephrotic syndrome resistant to steroids. Patient had also periodical skin lesions and diarrhea. According to clinical presentation IPEX syndrome was suspected, T regulatory cells level was normal, sample for genetic test for FOXP3 mutations was taken. After 1 month patient started seizures, in MRI scans there were not seen any changes, but antineuronal antibodies (ABA) were highly positive. Also anti-tissue transglutaminase antibodies were positive and gluten free diet was started.

In molecular tests performer in Department of Clicial Genetic in Łódź mutation in FOXP3 was found.

Patient had started immunosuppression and afterwards had bone marrow transplantation performed in Medical University in Wroclaw at the age of 2 years.
Conclusion: Neonatal diabetes in boys can be first symptom of IPEX syndrome, which needs multidisciplinary treatment.

Work supported from 02-0120/07/156

eP142
Effect of coenzyme Q10 treatment in a case of young woman with mitochondrial diabetes mellitus

M. Habu[1], S. Tanabe[1], Y. Mine[1], J. Suzuki[1], T. Urakami[1]

[1]Nihon University School of Medicine, Pediatrics, Tokyo, Japan

Objectives: Clinical characteristics of mitochondrial disease involve maternal inheritance, short stature, neurosensory deafness, and some cases are complicated with glucose intolerance. We experienced a family case of MDM. All 3 patients have mitochondrial DNA (mtDNA) 3243 (A-G) mutations, and elder sister started administration of coenzyme Q10 (CQ10) 10 years after the diagnosis of MDM. We report changes of her clinical features and glycemic control under treatment with CQ10.

Case description: A 25-year-old woman, elder sister, was diagnosed with WPW syndrome at 12 years of age, and with diabetes mellitus with mtDNA 3243 (A-G) mutations at 15 years of age. She had neurosensory deafness and cardiomyopathy after that. She had been treated using oral hypoglycemic agents (OHA) and insulin injections. Her HbA1c level was between 8-9%. Fatigue and dysesthesia, migraine, weakness of muscle strength developed at 25 years of age. HbA1c level was worsen to 10.3% accompanied by decreasing insulin secretion, and she started treatment with CQ10 (30mg/day). Following administration of CQ10, dysesthesia improved, and the JMDRS score of 11 before the treatment improved to 9 and 7, 1 and 2 months after the treatment. Fasting and peak of C-peptide (CPR) on glucagon loading test before the treatment was 0.2ng/ml and 0.53ng/ml, which improved to 0.46ng/ml and 1.03ng/ml 3 months after the treatment.

A 53-year-old woman, mother, was diagnosed with diabetes at 33 years of age and have been treated with OHA, and was detected mtDNA 3243 (A-G) mutations and neurosensory deafness at 43 years of age. A 22-year-old woman, younger sister, was detected mtDNA 3243 (A-G) mutations at 13 years of age and was had impaired glucose tolerance (IGT) at 22 years of age.
Conclusion: We reported a young woman with MDM well responded to treatment with CQ10. Further evaluation of the adequate dose of CQ10, and long-term follow up in the clinical features are needed to elucidate the effect of CQ10.

eP143
Glycaemic control in Wolfram syndrome: 5 year follow-up results from national multidisciplinary clinic

J. Anderson[1], J. Hill[1], S. Gleeson[2], R. Dias[2], T. Barrett[3]

[1]University of Alabama, School of Medicine, Birmingham, United States, [2]Birmingham Women's & Children's Hospital, Diabetes, Birmingham, United Kingdom, [3]University of Birmingham, Institute of Cancer and Genomic Sciences, Birmingham, United Kingdom

Introduction: Wolfram syndrome is the association of childhood onset insulin dependent diabetes, and progressive optic atrophy. It is a rare neurodegenerative disease caused by mutations in the WFS1 gene. The UK National Health Service for England funds a national highly specialised multi-disciplinary clinic for children with Wolfram syndrome, to coordinate their medical, psychological and social/educational needs in living with this life limiting condition. We aimed to describe the progression of glycaemic control over time.
Methods: Retrospective analysis of glycaemic control, in children and young people (CYP) with genetically confirmed Wolfram syndrome under the care of our national centre. Median HbA1c for the service was assessed over 6 years (2011-2016).
Results: There were 36 CYP with genetically confirmed Wolfram syndrome seen by the service between 2011 and 2016, with a median age of diagnosis of 6 years. Median fasting C-peptide was 96pmol/L (less than 90-165). There were 3 CYP on CSII, and the rest on MDI regimes. During the follow-up, 12 children were diagnosed with diabetes insipidus (33%). The median HbA1c (DCCT) for all CYP was 7.9%, with a significant gender difference: females 7.6% vs males 8.4% ($p < 0.001$). There was no evidence of change in glycaemic control over 5 years of follow-up. No CYP had retinopathy on vision screening during the follow-up.
Summary and Conclusions: Wolfram patients are thought to have a less severe form of diabetes and lower risk for long term microvascular complications. Our data show that glycaemic control is suboptimal, and worse in boys than girls, however does not improve over time. This may be due to difficulty in managing diabetes with sensory deficits including vision impairment. There may also be gender differences in severity of the syndrome. We suggest that health care providers refer for provision of vision aids, and develop strategies to deliver diabetes education programs with vision impairment teachers.

ePoster Session 19 - Education

eP145
Group education and intensive insulin dose calculation from diagnosis improves HbA1c at 2 years in children with type 1 diabetes

K. Ross[1], A.M. Frohock[1], V. Kannian[1], R. Besser[1]

[1]*Oxford University Hospital NHS Foundation Trust, Department of Paediatrics, Oxford Children's Hospital, Oxford, United Kingdom*

Aim: To assess the impact group education (GE) at 6 months and intensive insulin dose calculation at diagnosis on mean HbA1c in paediatric patients with newly diagnosed type 1 diabetes (T1D).
Background: Between 2013-2016, two initiatives were introduced to optimise HbA1c outcomes over the first two years in newly diagnosed T1D patients: GE teaching insulin dose adjustment at 6 months; and insulin dose calculation for carbohydrate (CHO) and blood glucose level (BGL) at diagnosis.
Method: HbA1c was recorded 3 monthly for all patients from January 2012 to June 2016. 3 groups of patients are compared (Table 1): Group 1 (standard care); Group 2 (GE at 6 months); Group 3 (insulin dose calculation at diagnosis). Average HbA1c was tracked from baseline (3 months post-diagnosis) for 2 years. Groups 2 and 3 were stratified according to attendance at GE and age.
Results:
168 patients are included; mean age at diagnosis (+/-SD) was 9(+/-3) yrs; 53% male. Age at diagnosis was similar for each group.

Baseline HbA1c was similar between the three groups. HbA1c rose over 2 years in all groups. In Groups 2 & 3, the rise was lower and delayed in those attending GE vs. those not attending. The highest attendance was in patients aged 5-11.9y (75%) vs. 66% < 5y and 56% >12y.
Conclusion: The combination of insulin dose calculation at diagnosis and group education at 6 months is associated with improved HbA1c at 2 years post diagnosis. Intensive insulin dose calculation at diagnosis may improve baseline HbA1c.

eP146
Development of digital video resources for goals of diabetes education: a UK structured education programme

H. Thornton[1], F. Campbell[2], C. Mullier[2], F. Hanson[2]

[1]*St Helens & Knowsley Teaching Hospitals NHS trust, Children & Young People's Unit, Liverpool, United Kingdom,* [2]*Leeds Teaching Hospitals Trust, Paediatric Department, Leeds, United Kingdom*

Objective: Goals of Diabetes Education is a structured education programme that has been designed to enhance the knowledge, confidence and skills of all Children & Young People with Type 1 diabetes and contribute to their physical, social and emotional wellbeing. Introduced in 2016 in the UK this age related competency framework provides a scaffolding for health care professionals to work to. Train the trainer sessions have been provided throughout the UK to facilitate its adoption with over 127 Health Care Professionals (HCP) being trained and copies distributed to every centre in the UK.
Method: Social learning theory asserts that most behaviours are learned by observation and imitation. This can provide the foundation for behavioural modelling and with skilled educators children can cement these behaviours into their minds.

To reinforce the competencies in the Goals of Diabetes Education a series of video bites were developed using real young people with type 1 diabetes taking part in daily activities and scenarios relating to diabetes care. Scenes were developed by a team of health care professionals in collaboration with families and a professional company with personal Type 1 diabetes experience.
Results: Care was taken to accurately reproduce the key age related competencies and also modelling opportunities demonstrated for parents. A separate instructional video for parents was also developed to encourage modelling in daily life. The videos are planned to be released via website and social media in a format that can be viewed on a variety of devices.
Conclusion: The production of digital videos supporting the UK structured education programme Goals of Diabetes will provide a valuable resources to children young people and their families. They can also be used by HCP to deliver this educational experience. The uptake of the structured education will be monitored via a snapshot audit from the National Paediatric Diabetes Audit.

eP147
Special characteristics of the participants in integrated training for children with type 1 diabetes mellitus (T1DM) aged between 12 and 17 years compared to traditional training

D. Sethe[1], D. Hilgard[2], A. Büssing[1], B. Berger[1]

[1]*University Witten/Herdecke, Chair of Medical Theory, Integrative and Anthroposophic Medicine, Herdecke, Germany,* [2]*Community Hospital Herdecke, Paediatric Endocrinology and Paediatric Diabetology, Herdecke, Germany*

Objectives: In the community hospital Herdecke, children and adolescents with T1DM receive an integrated diabetic training integrating traditional modules as well as applications from complementary medicine. The objective of the study was to survey the characteristics of participants in integrated diabetes training and to compare these with participants of the same age from other institutions.
Methods: Descriptive, multicentric cross-sectional study across eight clinics in Germany.
Results: A total of 221 children were included, with 85 children having taken part in an integrated diabetes training programme in Community Hospital Herdecke and 136 children having taken part in a

Group	Date of Diagnosis	N	Insulin Management	Group Education at 6 months (n)	Baseline HbA1c Mean(+/- SD) Mmol/mol %	HbA1c at 2yr Mean(+/-SD) Mmol/mol %
1	01/01/12 - 30/06/13	50	Standard care: MDI, fixed doses at diagnosis Insulin dose calculation for CHO and BGL 10 days after diagnosis	None	48 (9) 6.5%	57 (11) 7.4%
2	01/07/13 - 31/12/14	60	As Group 1	Attended (44)	48 (9) 6.5%	56 (8) 7.3%
				Not attended (16)	52 (13) 6.9%	71 (18) 8.7%
3	01/01/15 - 30/06/16	58	Insulin dose calculation for CHO and BGL introduced at diagnosis	Attended (6)	47 (8) 6.3%	54 (8) 7.1%
				Not attended (22)	44 (8) 6.2%	57 (15) 7.4%

[Table 1: Results]

traditional training programme. There were no significant differences between the groups for the variables of HbA1c, number of hypoglycaemic episodes, language skills, duration of manifestation, well-being, age and gender. Additionally, the groups did not differ in terms of generally stressful events or in terms of the number of additional illnesses. However, participants in integrated diabetes training at the academic teaching hospital Herdecke indicated that they had been admitted to hospital more frequently as a result of hypoglycaemia ($z = -2.09$, $p=.037$), felt as if they had a more significant disability as a result of diabetes ($z = -3.87$, $p < .001$), took more blood glucose measurements ($z = -2.68$, $p =.004$) and they estimated that their knowledge was less ($z = -3.64$ $p < .001$) than the patients in conventional diabetes training programmes. Moreover, it is more common that these children do not live with both parents ($z = -2.94$, $p =.003$).

Conclusions: There are clear differences between both cohorts. The results could be used for preliminary estimates on pattern of use, associated costs, and factors associated with integrative diabetes education use in individuals with diabetes.

eP148
An Irish experience implementing a structured education programme for children and young people with diabetes

G. Mallon[1], H. Fitzgerald[1], A. O Neill[1], C. Crowe[1], H. O Byrne[1], E. Roche[1], C. Mc Donnell[1]

[1]*The National Children's Hospital, Tallaght, Dublin, Ireland*

Objectives: Structured education programmes (SEP's) on carbohydrate counting are designed to help children and young people with T1DM better manage their condition. They provide participants with the knowledge and skills to make sense of blood glucose monitoring and make adjustments with insulin doses as needed. The aim of this audit was to evaluate the impact of such a programme on HbA1c, BMI and insulin regimens in our cohort.

Methods: This audit included 43 patients aged 4 - 16 years who had attended a SEP (CHOICE) between April 2014 and June 2016. All of the patients had T1DM for greater than 1 year. HbA1c, BMI and insulin regimen were recorded pre programme and again after 4 months completion.

Results: There was an even distribution of gender (males=21, females=22). The median duration of T1DM was 1.7 years (range 1.2 - 12.7 years). Median HbA1c level pre programme was 67mmol/mol and post programme was 68mmol/mol. 11 patients (26%) intensified their insulin regimen following the programme. In the group 12 patients (28%) had a BMI > 91st C (males = 3, females = 9). After 4 months 2 of these patients (17%) BMI had returned to within the normal range.

Qualitative data based on participants' feedback showed that 70% of parents reported “sharing information about diabetes” and over 60% of children/young people reported “peer support” and “learning more about diabetes” as what they liked best about the programme. Attendance rates increased from 85% in year 1 to 99% in year 2. There were no drop outs in year 2.

Conclusions: SEP's are well received by children and parents. Improved attendance could be explained by course improvements for example age banding of groups, presentation style, venue used, timing of sessions and inclusion of art therapy. Those who attended were more likely to change to an intensive insulin regimen post intervention. Future audits should include data on QOL, knowledge and glycaemic variation in comparison to the clinic population.

eP149
The highs and lows of diabetes care: assessing knowledge and approach to self-care in youth with type-1 diabetes

C.J. Wheeler[1,2], A. Boucher[3], F.J. Cameron[1,2,3], M.A. O'Connell[1,3]

[1]*Murdoch Childrens Research Institute, Diabetes, Melbourne, Australia,* [2]*University of Melbourne, Melbourne, Australia,* [3]*Royal Children's Hospital, Diabetes and Endocrinology, Melbourne, Australia*

Objectives: A majority of youth with Type-1 Diabetes (T1D) do not achieve the international target HbA1c of < 7.5%. This study aimed to assess diabetes-related knowledge and attitudes to T1D self-care in a cohort of adolescents at our tertiary paediatric diabetes clinic.

Methods: A cross-sectional clinic-based study of youth aged 12-18y, T1D>1y who had standardised diabetes-education at diagnosis at our centre was performed. Participants completed a customised questionnaire designed to assess clinic taught targets (CTT), self-directed targets (SDT) and approaches to T1D self care.

Results: 102(49M:53F) of 113 youth who were approached participated. Mean[SD] age was 16.0[2.0]y, T1D duration 7.7[3.4]y & HbA1c 7.9[1.3]%. 38/102 had HbA1c < 7.5%. Knowledge of insulin action and importance of HbA1c were high (95% & 78% respectively).

CTT HbA1c of < 7.5% was not identified by 33 respondents; but, this was not associated with HbA1c. 63 youth indicated their SDT HbA1c as < 7.5%; mean HbA1c was significantly less in this subgroup than in those with no/higher SDT HbA1c (7.5[1.03]% vs 8.7%[1.4], p< 0.01).

CTT pre-meal BGL range is 4.0-8.0mmol/l; 32 youth did not correctly indicate the lower end of this range, of whom 21 indicated a level >4.0. 77 indicated a maximum pre-meal BGL CTT of 8.0mmol/l, yet separately only n=33 stated a pre-meal BGL of 9.5mmol/l would cause them concern. 46 respondents agreed 'hypoglycaemia should be avoided if at all possible'. 47 youth reported forgetting to give insulin as a cause for their hyperglycaemia.

Conclusions: Despite standardised T1D education, divergence between CTT and SDT was high: < 2/3 of youth had SDT HbA1c of < 7.5%, ~1/3 had pre-meal targets that diverged from CTT and almost ½ reported insulin omission. Desire for, but not knowledge of, HbA1c target < 7.5% positively correlated with HbA1c. Further work to explore the apparent tolerance of hyperglycaemia and improve alignment of SDT with international targets is needed.

eP150
Results of social intervention on glycemic control of underprivileged children with T1D

G. Boudraa[1], A. Zennaki[1], M. Gharnouti[2], A. Aoui[1], M. Bouri[3], M. Touhami[1], K. Bouziane-Nedjadi[1]

[1]*CHU Oran, Pédiatrie, Oran, Algeria,* [2]*HRMU Oran, Pédiatrie, Oran, Algeria,* [3]*Lions Club International, Oran, Algeria*

Objective: All families do not automatically benefit from social insurance in case of chronic illness. Decompensation is then inevitable in the case of diabetes. We opted for a personalized approach of the kind sponsorship to provide support in the most disadvantaged cases. In this assessment we wanted to show if our action could be effective on glycemic control.

Patients and Methods: Children and adolescents with T1D coming from family in difficult living condition and without social insurance have been proposed in sponsorship to society benefactors and members of the Lion´s of Oran. The sponsorship included medical costs (purchase of strips, insulin, lancets, medical check-up), travel and school fees. The average level of sponsorship was about 720 US dollars annually managed by the local association. The effectiveness of the sponsorship was evaluated on glycemic control. Statistical calculations have been made in Wilcoxon test and percentage comparison.

Results: From March 2012 to April 2017, 76 children aged 11±4.5 years have been sponsored. The father was unemployed or in precarious situation in 53 cases, absent or deceased 14 times, separated parents 9 times, and multiplex families 11 times. An associated pathology was found 41 times, including celiac disease 10 times. The average rate of HbA1c decreased from 10.58± 2.56% to 9.91± 2.69% after 15 months and 9.34± 2.16% ($p < 0.02$) after 39 months. HbA1c≤7.5% increased from 13% at the beginning of the sponsorship to 17.9 % after 15 months and 20% after 39 months ($p = 0.09$).

Conclusion: The sponsorship of children with T1D in social difficulty significantly improves Glycemic control in medium and long term. However, improved blood glucose levels do not mean achieving the target of 7.5%. The effort must therefore continue acting on other causes of imbalance (lack in patient education, or frequently associated co-morbidities).

eP151

Exploring health beliefs, barriers and facilitators of diabetes care in Somali Canadian families living in Toronto

M. Gurnani[1,2], M. Wolfe-Wylie[1], A. Regina[1], M. Dave[3], F. Mahmud[1], C. Almeida[1], J. Hamilton[1]

[1]The Hospital for Sick Children, Toronto, Canada, [2]University of Toronto, Toronto, Canada, [3]North York General Hospital, Toronto, Canada

Objectives: Somali-Canadian families attending the SickKids diabetes program demonstrate higher A1c than clinic average. *Recognizing the multiple factors contributing to T1DM control, this study aimed to identify barriers and facilitators to diabetes care in this population, and to explore interpretations of T1DM within the context of Somali culture and health beliefs.*

Methods: 3 focus groups consisted of a sample of 5 Somali-Canadian adolescents with T1DM, 10 Somali-Canadian parents of children with T1DM, and 9 interdisciplinary healthcare professionals (HCP) who care for this population. These semi-structured interviews focused on perceived T1DM control, clinic satisfaction, youth responsibility, social support, and health beliefs. Transcribed data was coded and refined into categories that were analysed for underlying themes. Triangulation and external auditing were employed to ensure the rigor of findings.

Results: Themes arising from the parent and youth focus groups focused on autonomy, diabetes task-responsibility and challenges in parent-child relationships attributed to the influence of "North American" society. Teens expressed frustration with "parental overprotection", and feel that T1DM does not impact them significantly. Parents discussed challenges in controlling food intake in large households, and worry their children are not managing T1DM effectively. Parents described dissonance between children in Somalia being mature and responsible at a younger age than those raised in Canada. Analyses revealed a distinct disconnect between identified challenges and proposed solutions expressed by parents and HCP, with HCP focusing on the impact of social determinants of health on diabetes care.

Conclusions: There is a need for facilitating better perspective-sharing between HCP and parents. As indicated by parents, diabetes education provided directly to the children prior to the teenage years may also improve diabetes self-management during adolescence.

eP152

Diabetes knowledge and glycaemic control in Chilean families of youth with type 1-diabetes: intensive diabetes education and training camp for parents is essential, even more in the context of Chilean regional disparities in diabetes care and education

J. Pelicand[1], J. Caceres[1], H. Alcaino[1], A. Gleisner[2]

[1]Universidad de Valparaiso, San Felipe de Aconcagua, Chile, [2]Universidad de Concepción, Departamento de Pediatría, Concepción, Chile

Family's socio-demographic, low diabetes education and glycaemic risk factors place youth with type 1-diabetes (T1D) at higher risk for immediate and long-term health complications. In the Chilean context of regional disparities in diabetes education and care, 7days-Intensive Diabetes Education and Training Camps for families take place In the south of Chile (8^{th} area) during each summer for families of youth with T1D.

Objective: To evaluate diabetes knowledge and skills (DKS) in parents of youth with T1D before and after a Camp and its association with diabetes education, glycaemic control and characteristics of the families.

Methods: our sample of 72 parents (73.6% women, 26.4% men, 36.6 $\pm$ 10.9 year) was taken from 2 camps from the 8^{th}area of Chile. DSK were assessed by using at the beginning and at the end of the Camp, a 50 true-false questionnaire related to diabetes knowledge and skills, designed on the basis of the AJD DSK questionnaire. The family's socioeconomic and medical characteristics were obtained by parent' self-report. Glycated hemoglobin (HbA1c) was measured by DCA Vantage during the camp. Association between DSK scores (number of correct answers), HbA1c, number of participation in camp and socioeconomic and medical characteristics were assessed.

Results: Initial DKS Score and the increasing of the DSK Score are associated with diabetes duration (p=0.039) and number of participation in camp (p=0.006). The DSK score initial decreased with the HbA1c (p=0.0001) but higher is the HbA1c, more increased the DSK score (p= 0.0001). No significant association with socio-economic characteristics of the family. By multivariate analyses, DSK scores are associated with HbA1c and number of participation in camp (p< 0.05).

Conclusion: Our results confirmed the importance of diabetes education and training to the parents even more if they live far away from diabetes expert team, to be able to manage diabetes and improve glycaemic control in youth.

ePoster Session 20 - Latebreakers Varia II

eP153
School holidays: are they also a holiday from diabetes control?

S. Somani[1], N. Wright[2], E.C. Ferguson[2]

[1]University of Sheffield, School of Medicine, Sheffield, United Kingdom, [2]Sheffield Children's NHS Foundation Trust, Department of Diabetes and Endocrinology, Sheffield, United Kingdom

Introduction: To maintain an average HbA1c of less than 48mmol/mol requires good diabetes control throughout the year. School holidays take on average 25% of the year in the UK. Good control in holidays as well as term-time is therefore paramount. Little work has been done in this area but it has been suggested diabetes control may be worse during holidays.
Objective: To retrospectively compare diabetes control between term-time and the school holidays.
Methodology: All school aged children with type 1 diabetes, being managed by one centre and attending school within the Sheffield catchment area were entered into the study. Demographic data from hospital records was recorded. DIASEND download data routinely obtained at each clinic appointment was reviewed for the duration of the summer and Christmas holidays during the 2015-16 school year. DIASEND data for the same period after each holiday was also collected.
Results: One hundred and twenty children (median age 11years, 43% pump users) had data available for analysis. Daily mean blood glucose was significantly higher for both the Christmas and summer holidays (10.6mmol/l and 11.0mmol/l respectively) compared to the term-time (10.1mmol/l and 10.1mmol/l, p< 0.01). During the Christmas holiday children did fewer blood tests per day (5.4 vs 5.9, p< 0.01), with more readings above target (53% vs 47% p< 0.01). During the summer holidays children did a similar number of tests to the term time (5.3 vs 5.4 p=0.5) but still had significantly more results above the target range (50% vs 46% p< 0.01). Those using insulin pumps had no difference in the average daily insulin used or the number of boluses given between term-time and holidays.
Conclusion: Diabetes control appears to worsen during school holidays. A change of mean glucose of 0.9mmol/l equates to a 6mmol/mol change in HbA1c. This highlights the need for education to equip patients and their families to adjust insulin regimes for changes in routine.

eP154
Current recommended carbohydrate intake prior to intermittent high-intensity exercise does not result in unphysiological glycaemic excursions in type 1 diabetes under basal insulin conditions

W. Soon[1,2,3], K. Guelfi[2], E. Davis[1,3,4], P. Fournier[2,3], T. Jones[1,3,4]

[1]University of Western Australia, Division of Paediatrics within the School of Medicine, Perth, Australia, [2]University of Western Australia, School of Human Sciences, Perth, Australia, [3]University of Western Australia, Telethon Kids Institute, Children's Diabetes Centre, Perth, Australia, [4]Princess Margaret Hospital, Department of Endocrinology and Diabetes, Perth, Australia

Objective: Intermittent high-intensity exercise (IHE) is known to result in a lesser fall in blood glucose level (BGL) compared to continuous moderate intensity exercise (MOD) in individuals with type 1 diabetes mellitus (T1DM) under hyperinsulinaemic conditions. It is unclear, however, whether moderate carbohydrate (CHO) intake prior to exercise performed in a basal insulinaemic state causes excessive hyperglycaemia during and after IHE. For this reason, our aim was to test the hypothesis that CHO intake prior to IHE and MOD causes an unphysiological rise in BGL in response to IHE, but not MOD.
Methods: After a familiarisation session during which $V\dot{O}_2$peak was determined, 8 (5f, 3m) T1DM participants (age 14-35y, HbA1c 7.7±0.9%) in an overnight fasted and basal insulinaemic state completed on separate days the following four 40-min exercise sessions in a randomised counterbalanced order: MOD alone; MOD with prior CHO intake based on the 2016 ADA guidelines but corrected for body mass (10.2±0.9g); IHE (MOD interspersed with a 4-s sprint every two minutes and 10-s final sprint); and IHE with prior CHO intake. At time intervals before, during and two hours after exercise, blood samples were taken to measure glucose and lactate levels.
Results: In response to CHO intake, BGL increased by 1.8±0.6 (±SEM, p< 0.02) and 2.3±0.3 mmol/L (±SEM, p< 0.01) compared to pre-exercise levels during IHE and MOD respectively, and remained above pre-exercise levels during the first half-hour of recovery with no differences between exercise modalities (p>0.05). Without CHO intake, average BGL did not fall below pre-exercise levels during and after either mode of exercise, but decreased below pre-exercise levels in some participants.
Conclusion: Under basal insulin conditions, carbohydrate intake as per ADA-recommendations results in a moderate, but not unphysiological increase in blood glucose level during and early after intermittent high-intensity exercise in individuals with T1DM.

eP155
Food composition of typical meals and snacks available in Haiti and resulting challenges for pediatric diabetes management

A.K. Pruszynska[1], M.-C. Mascary[2], R. Mondesir[2], K. Altenor[2], J. von Oettingen[1]

[1]McGill University, Montreal, Canada, [2]Kay Mackenson, Montrouis, Haiti

Objective: Nutrition is an integral part of pediatric diabetes management. In many resource-limited settings, information about typical food composition is insufficient, limiting the ability to provide setting-appropriate nutritional recommendations. Food labels are infrequently available.
Methods: Observational study to evaluate the composition, food quality and food safety of a typical diet in a low-income population in Haiti. A nutritionist recorded ingredients and preparation techniques of meals and snacks served at a clinic for children with diabetes in Montrouis, Haiti, over 4 weeks in the month of June 2017, and monitored food safety. Food items were weighed and analyzed for macro- and micronutrient content using the online tool eaTracker. Profiles for a typical male and female adolescent were created and average daily intake compared to recommended.
Results: Evaluation of average daily macro- and micronutrients of 21 meals and 14 snacks indicated that caloric intake was lower than recommended. Requirements for fat, carbohydrates, vitamin C, B3, B6 and B12 were met for both males and females, while those for protein, milk and milk alternatives, fiber, calcium, iron, folate and vitamins A, D and E were not. Carbohydrate count deviated as much as two-fold from the recommended amount based on insulin regimen. Overcooking of starchy and leafy vegetables resulted in a high estimated glycemic index and decreased micronutrient content. Periodical lack of sewage and hand washing water, and prolonged exposure of meat to high ambient temperatures, were identified as potential food hazards.
Conclusions: The food composition of a typical low-income Haitian diet is suboptimal for adolescents. High carbohydrate content, high glycemic index, and inaccuracy of carbohydrate count due to lack of food composition information challenge optimal diabetes management, especially in the context of pre-mixed NPH/Regular insulin use.

eP156
Adherence to physical activity recommendations and psychosocial well-being in adolescents with type 1 diabetes

R. McDonough[1], A. Noser[2], S. Patton[3]

[1]Children's Mercy Kansas City, Division of Endocrinology & Diabetes, Kansas City, United States, [2]University of Kansas Medical Center, Lawrence, United States, [3]University of Kansas Medical Center, Kansas City, United States

Objectives: We examined the relations between adolescent depression and anxiety with adherence to moderate-to-vigorous physical activity (MVPA) recommendations in a pilot sample of adolescents with type 1 diabetes (T1D).
Methods: 20 adolescents with T1D participated (M age: 14.6 ±1.57 years, 50% male, HbA1c M= 9.0±1.66%; 74.9mmol/mol). Adolescents completed measures of depression and anxiety. Minutes of MVPA and sedentary behavior (SB) were collected based off of 7 days of science-grade wrist-worn accelerometry (i.e., Actiwatch AW2, Philips Respironics, Bend, OR).
Results: Average minutes per day of MVPA and SB were 72.2±45.1 and 520.5±89, respectively. However, 52% of adolescents achieved the minimum daily MVPA recommendation of 60 minutes, which is slightly higher than expected compared to MVPA in adolescent without T1D. Average depression ratings were low (5.55±9.33), but 10% endorsed clinically significant symptoms. Average anxiety scores were moderate (11.45±2.37). Correlations revealed no association between youth age and minutes of MVPA or SB. But boys were slightly more active than girls (r=0.50, r=0.01). We found negative associations between minutes of MVPA and youth depression (r=-0.51, p=0.01) and anxiety (r= -0.38, p=0.05) and positive associations between SB and depression (r=0.45, p=0.03) and anxiety (r=0.57, p=0.01).
Conclusion: MVPA is a recommended part of daily T1D self-care, but has received limited study. We demonstrate associations that suggest that depression and anxiety could reduce adolescents´ participation in MVPA and encourage SB.

eP157
Promoting high-quality health communication in adolescents and young adults with type 1 diabetes: intervention development and feasibility

M. Monaghan[1], M. Simms[1], M. Rose[1]

[1]Children's National Health System, Center for Translational Science, Washington, United States

Objective: Adolescents and young adults (AYAs) with type 1 diabetes (T1D) are at risk for negative health outcomes. Effective communication between AYAs and health care providers (HCPs) may be a key contributor to T1D self-care and glycemic control. This study describes development, recruitment, and initial feasibility of PREP-DC (Planning, Reflecting, and Engaging with Providers for Diabetes Care), a behavioral intervention targeting health communication in AYAs with T1D.
Methods: AYAs ages 17-21 diagnosed with T1D for >1 year were recruited. Baseline assessment included completion of self- and HCP-report measures on communication skills and T1D self-care; the T1D clinic visit was audio-recorded and coded using the Roter Interaction Analysis System (RIAS). Participants completed two intervention sessions via video conferencing or phone and received text messages for 12 weeks. Follow-up data is collected 4 months post-baseline and includes self- and HCP-report measures, audio-recording of a T1D clinic visit, and medical record data.
Results: Forty-one AYAs were sent letters about PREP-DC; 12 were never reached and 11 declined participation. Of the 18 AYAs who were reached and interested, 16 (M age=18.79 yrs; 50% female; 43.75% Caucasian; M A1c = 9.87%) enrolled and completed baseline procedures. Intervention content was developed using expert and AYA stakeholder review, and consisted of strategies to promote communication competence and behavior change such as guided review of communication, planning for medical visits, and glucose data review. All 16 participants (100%) completed session 1, and 15 participants (94%) completed session 2. Follow-up data collection is ongoing.
Conclusions: Findings indicate enrollment in PREP-DC is feasible and AYAs are interested in strategies to promote effective health communication. Preliminary feasibility and satisfaction with intervention delivery and content will be discussed.

eP158
Factors affecting adherence towards therapeutic regimen among children with type 1 diabetes mellitus

S. Al Rafay[1], R. Matter[2], S. El Sayed Hassan[1], R. Abdel Aziz[1]

[1]Ain Shams University, Faculty of Nursing, Pediatrics, Cairo, Egypt, [2]Ain Shams University, Cairo, Egypt

Objectives: Although medication adherence is important for diabetic child to prevent disease-related complications and improve quality of life, the rate of children adherence to therapeutic regimen is somewhat disturbing. Hence, this study aimed to assess factors affecting adherence towards therapeutic regimens among children with type 1 Diabetes Mellitus.
Methods: A descriptive exploratory design was used.
Subjects: A purposive sample comprised of 175 children and adolescents (mean age 13.01±2.4 years and about half of them were females) with type 1 Diabetes Mellitus and their caregivers. Setting: The study was conducted at Diabetes Clinic, Children´s Hospital, Ain Shams University.
Tools: I- Interviewing questionnaire about factors affecting adherence toward therapeutic regimens **II-** Morisky Scale: it was used to assess children´ adherence to medication.
Results: About half of studied caregivers had unsatisfactory knowledge about type 1 diabetes mellitus and most of the studied children were adherent toward therapeutic regimen and had agreement with beliefs toward therapeutic regimen. In addition, more than half of studied children had positive attitude factors toward adherence to therapeutic regimen, had social support factors to therapeutic regimen but had no sufficient health care system factors.
Conclusions: Caregivers´ knowledge factors, attitude factors, social support factors, therapy factors, health care system factors and disease factors positively affected studied children' adherence towards therapeutic regimens. Meanwhile, beliefs factors and motivation factors did not have a significant effect on studied children adherence towards therapeutic regimen.
Recommendation: Continuous health education to the children and their caregivers to improve their adherence.
Keywords: Adherence -Therapeutic Regimen - T1DM

eP159
A 1-year long-term study on efficacy and safety of degludec in children and adolescents with type 1 diabetes

L. Iughetti[1], T. Suprani[2], P. Bruzzi[1], V. Graziani[3], G. Maltoni[4], S. Zucchini[4], B. Predieri[1]

[1]University of Modena and Reggio Emilia, Modena, Italy, [2]Bufalini Hospital, Cesena, Italy, [3]Santa Maria Delle Croci Hospital, Ravenna, Italy, [4]S. Orsola-Malpighi Hospital, Bologna, Italy

Objectives: Degludec (IDeg) seems to improve glycemic control and to prevent hypoglycemia, respect to glargine (IGlar), in patients with type 1 diabetes (T1D). Few data have been published on IDeg effects in childhood. The aim of our study was to assess 1-year efficacy and safety of IDeg as a part of a basal-bolus (BB) therapy in children and adolescents with T1D.

Methods: Forty patients (12.3±4.55 yrs; 24 males; 19 prepubertal; T1D duration 5.35±3.78 yrs; IGlar treatment by at least 1 year) were switched to once-daily IDeg because of HbA1c >7.5% or pain at IGlar injection. Insulin dose [IGlar or IDeg plus short-acting/regular at mealtime (MT)], HbA1c, FPG, BMI z-score, and severe hypoglycaemia rates were collected at baseline (T0), 3-months (T1), 6-months (T2), and 12-months (T3) after IDeg was started.

Results: The switch from IGlar to IDeg allowed a longitudinal decreased of BB dose (median Δ% -3.28 at T0, -5.02 at T1, -5.36 at T2, and -4.26 at T3; ANOVA Chi Sqr.=10.4, p=0.033) mainly due to the reduction of MT dose (median Δ% -0.00 at T0, -6.06 at T1, -5.90 at T2, and -10.7 at T3; ANOVA Chi Sqr.=18.7, p< 0.001). IDeg did not significantly reduced HbA1c levels. However, in patients with HbA1c >7.5% at T0 (21 subjects) we found a longitudinal decrease in HbA1c values from 8.4% to 7.8 at T1 (p=0.005), 7.9 at T2 (p=0.031), and 8.0 at T3 (p=0.086). Moreover, 8 out 21 had HbA1c < 7.5% at T3. FPG improved by 9.5% at T2 and 3.3% at T3. BMI z-score did not change and no episode of severe hypoglycaemia was reported.

Conclusions: IDeg seems to improve the glycemic control than therapy with IGlar, mainly in patients with poor glycemic control. Our results in children and adolescents suggest that the dose of IDeg should not be reduced and the MT bolus insulin appropriate replacement doses should be lowered by 11% for patients who previously received IGlar. IDeg might be considered a useful and well tolerated basal insulin also in childhood.

eP160
A novel gene for MODY?

S. Johnson[1,2,3], P. Leo[2], J. Harris[2], A. McInerney-Leo[2], M. Brown[2], E. Duncan[2,3,4]

[1]Lady Cilento Children's Hospital, Endocrinology and Diabetes, South Brisbane, Australia, [2]Queensland University of Technology, Translational Genomics Group, Institute of Health and Biomedical Innovation, Woolloongabba, Australia, [3]University of Queensland, Faculty of Medicine, Herston, Australia, [4]Royal Brisbane and Women's Hospital, Endocrinology and Diabetes, Herston, Australia

Maturity-onset diabetes of the young (MODY) arises from autosomal dominant mutations in one of 13 established genes affecting beta cell function. Most MODY cases are missed; even when suspected clinically with comprehensive genetic screening, >10% will not have a genetic diagnosis. This suggests as yet unknown genetic causes. Whole exome sequencing (WES) allows simultaneous screening of known MODY genes and gene discovery.

We identified a family with clinical features of MODY, through a non-obese proband with antibody-negative diabetes whose identical twin sister, mother, maternal aunt and maternal grandmother also had diabetes.

The proband, her maternal aunt, grandmother and unaffected brother underwent WES. After quality control, data were filtered for novel coding variants segregating. Additionally variants were filtered according to conservation (genomic evolutionary rating profile [GERP] score >2) and protein prediction algorithms (predicted to be deleterious/damaging by SIFT, Mutation Taster and/or Polyphen). No variants were identified in known MODY genes. Two variants were identified, in *KCNK16* and *USP42*. *KCNK16* has a known role in insulin secretion; the only known role for *USP42* is in spermatogenesis. The *KCNK16*A variant (c.341T>C, p.Leu114Pro) was novel (not present in ExAC, LOVD, ClinVar, HGMD); affects a highly conserved region (GERP score 5.65); and is predicted to be damaging. *KCNK16* encodes a potassium channel on the pancreatic beta cell which creates an outwardly-rectifying potassium current, regulating calcium influx and insulin secretion. A mouse model with a gain-of-function variant (rs1535500, associated with diabetes in multiple type 2 diabetes GWAS) had a similar phenotype to our family. This channel does not respond to the usual stimuli of K_{ATP} channels of the islet cell.

Thus *KNCK16* appears a very strong candidate for a novel MODY gene. If confirmed, this discovery may lead to new therapeutic approaches for this subtype of diabetes.

ePoster Session 21 - Psychosocial Issues

eP161

Will and Emma Meet the TEDDY Scientists: a book to improve children's understanding of their genetic risk for type 1 diabetes

L. Smith[1], K.A. Driscoll[2], K. Lynch[1], J. Melin[3,4], U. Swartling[3,5], A. Wimar[3,4], C. Crouch[6], M. Gardiner[7], S. Bennett Johnson[8], R. Karban[9], G. Young[10], and the TEDDY Study Group

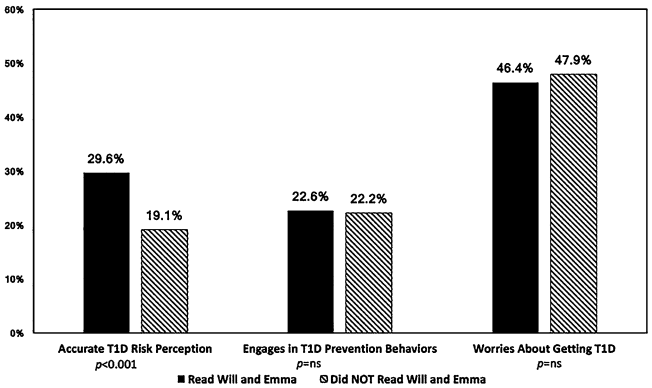
[1]University of South Florida, Tampa, United States, [2]University of Colorado Denver, Barbara Davis Center, Aurora, United States, [3]Skane University Hospital, Malmo, Sweden, [4]University of Lund, Malmo, Sweden, [5]University of Lund, Malmo, United States, [6]Pacific Northwest Research Institute, Seattle, United States, [7]Medical College of Georgia, Augusta, United States, [8]Florida State University College of Medicine, Tallahassee, United States, [9]University of Colorado Denver, Aurora, United States, [10]Augusta University, Augusta, United States

Objective: Describe the *Will and Emma* book and its impact on 1) T1D risk perception; 2) engagement in T1D prevention behaviors (when preventing T1D is not possible); and 3) the unintended consequence of worrying about developing T1D. Children who read the book were hypothesized to have more accurate T1D risk perceptions.

Methods: The Environmental Determinants of Diabetes in the Young (TEDDY), an ongoing prospective study, aims to identify T1D triggers in 8,676 genetically at-risk children identified at birth. *Will and Emma* is provided to 10-year-olds to provide education about TEDDY and their T1D genetic risk.

Results: The *Will and Emma* book was received by 807 children and 64% (n=517) read it; more girls read it than boys ($p< 0.001$). *Will and Emma* was not read by 29% despite receiving it. Of those who read it, *Will and Emma* helped 94% to understand TEDDY. T1D risk perceptions were more accurate for those who read *Will and Emma* (χ^2=11.38; $p< 0.001$). There were no differences in T1D prevention behaviors or worry about developing T1D in those who read *Will and Emma* (Figure).

Conclusions: *Will and Emma* helps children understand TEDDY. Although risk perceptions were more accurate in those who read *Will and Emma*, the majority of them had inaccurate T1D risk perceptions after reading it. Thus, supplemental education is needed given the complex nature of genetic studies. Reading *Will and Emma* did not appear to increase worry or unnecessary prevention behaviors about getting T1D.



[Impact of Will and Emma]

eP162

The association between stressful life events and respiratory infections during the first four years of life: the environmental determinants of diabetes in the young (TEDDY) study

R. Roth[1,2], K. Lynch[3], H. Hyötyi[4], M. Lönnrot[5], K.A. Driscoll[6], S.B. Johnson[7], The TEDDY Study Group

[1]University of Graz, Institute of Psychology, Graz, Austria, [2]Helmholtz Zentrum München, Institute of Diabetes Research, Neuherberg, Germany, [3]University of South Florida Florida, Pediatric Epidemiology Center, Tampa, United States, [4]University of Turku, School of Medicine, Tampere, Finland, [5]University of Tampere, Tampere University Hospital, Tampere, Finland, [6]University of Colorado Denver, Barbara Davis Center for Childhood Diabetes, Denver, United States, [7]Florida State University College of Medicine, Tallahassee, United States

Objectives: Type 1 Diabetes (T1D) is an autoimmune disorder in genetically predisposed individuals. Disease onset is preceded by a pre-clinical period of islet autoimmunity (IA). Both IA and T1D onset have been associated with respiratory infections, certain specific viruses and stressful negative life events (NLEs). The aim of this study was to conduct a prospective analysis of the association between NLEs and the development of respiratory infections during the first four years of a child's life.

Study design: Long and short term temporal associations between NLEs and respiratory infectious episodes (RIEs) in 5618 children participating in The Environmental Determinants of Diabetes in the Young (TEDDY) study were analyzed. Longitudinal models were adjusted for demographic, day care, season of infection and psychosocial factors associated with RIEs.

Results: The number of child RIEs reported by parents was higher in Europe than in the US (+0.27, 95%CI=0.197-0.256, p< 0.001). However, the number of parent-reported child NLEs and parent NLEs was higher in the US than in Europe (child NLEs OR=1.19, 95%CI=1.10-1.30, p< 0.001; parent NLEs OR=1.87, 95%CI=1.75-2.01, p< 0.001). In both continents, both parent and child NLEs were significantly associated with mean number of child RIEs. However, over longer periods, child cumulative NLEs showed a stronger association with mean RIEs than parent cumulative NLEs.

Conclusions: This large-scale prospective study agrees with previous observations suggesting that stress can increase the susceptibility for infections and shows that this phenomenon exists already in very young children. The mechanism by which stress may lead via bacterial or viral infections to autoimmunity or T1D is still unknown.

eP163

"Target is the new low": parental hypoglycemia fear and young child glycemic control in T1D

A. Noser[1], K. Driscoll[2], M. Clements[3], S. Patton[4]

[1]University of Kansas, Clinical Child Psychology, Lawrence, United States, [2]University of Colorado Denver, Pediatrics, Denver, United States, [3]Children's Mercy Hospital, Endocrinology, Kansas City, United States, [4]University of Kansas Medical Center, Pediatrics, Kansas City, United States

Objective: We examined the association between parental hypoglycemia fear (HF) and children's daily glucose levels using the categories proposed by Bergenstal et al. (2013) in families of young children with type 1 diabetes (T1D).

Methods: Parents completed the Hypoglycemia Fear Survey-Parents of Young Children (HFS-PYC) and a demographic form. We calculated the percent glucose values in each category using 14-day downloads from children's glucometers. We used a path analysis to simultaneously examine all possible associations.

Results: Parents (N=90) reported moderate HF (Worry= 46.2±13.7 & Behavior= 22.3±3.9). Child mean age was 5.3±1.3, 48% were male, and 94% were White. Mean HbA1c was 8.22±1.03 (66 mmol/mol). Percent glucose values in each category were: < 50mg/dl= 1%; < 60 mg/dl= 2%; < 70 mg/dl= 3%; ≥70 and < 180 mg/dl= 42%; ≥180 mg/dl= 23%; ≥250 mg/dl= 24%; >400mg/dl= 5%. Since 96% of children spent less than 5% of the time < 50mg/dl, we dropped this category from our model. We found Worry was positively associated with percent Target glucose values (β=.25, *p*=.02) and negatively associated with percent Very High values (β=-.26, *p*=.02).

Conclusion: Parents of young children with a higher percent Target glucose values reported more HF, but HF dissipated when children had a higher percent glucose values >400mg/dl. Parents of young children may perceive Target glucose values as low and benefit from therapy to reduce their fear.

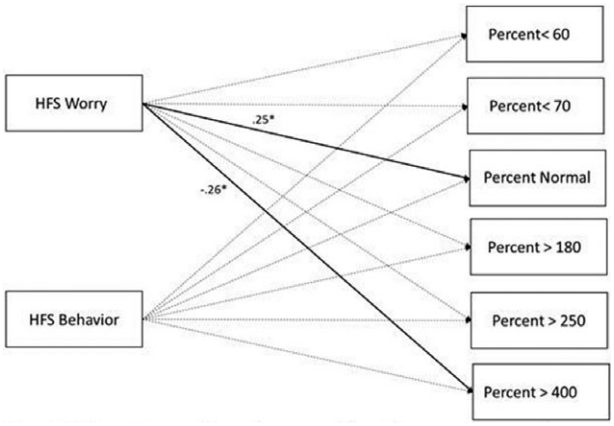


Figure 1. Solid lines indicate significant pathways. Dotted lines indicate non-significant pathways.
Percent < 50 not included in the model.
*p<.05
[HFS-PYC & Percent Glucose]

eP164

The Flexible Lifestyle Empowering Change (FLEX) intervention for self-management in adolescents with type 1 diabetes: trial design and baseline characteristics

J. Kichler, PhD[1], M. Seid[1], J. Crandell[2], D. Maahs[3], F. Bishop[4], K. Driscoll[4], D. Standiford[1], C. Hunter[5], E. Mayer-Davis[2]

[1]*Cincinnati Children's Hospital Medical Center, Department of Pediatrics, Cincinnati, United States,* [2]*University of North Carolina at Chapel Hill, Department of Nutrition, Chapel Hill, United States,* [3]*Stanford University School of Medicine, Department of Pediatrics, Stanford, United States,* [4]*University of Colorado Denver, Barbara Davis Center for Childhood Diabetes, Denver, United States,* [5]*National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, United States*

Objectives: The Flexible Lifestyle Empowering Change (FLEX) Intervention Study is a multi-site randomized controlled trial to test the efficacy of an adaptive behavioral intervention to promote self-management in youth with type 1 diabetes mellitus (T1D). The FLEX sample demographic characteristics and outcome variables at baseline are presented.

Methods: Participants were adolescents with T1D, age 13-16 years, T1D duration >1 year, and Hemoglobin A1c (A1C) between 8% and 13%. Participants were randomized to either an intervention or control arm after their baseline standardized measurement visit. The FLEX intervention uses Motivational Interviewing (MI) and Problem-Solving Skills Training (PSST).

Results: Baseline data (N = 258) for the primary (A1C) and secondary outcomes (motivation and problem-solving, health-related quality of life, risk factors associated with T1D complications) variables as well as the potential mediator variables (self-management behavior, family conflict and responsibility) suggest that the study sample is representative of youth with T1D and their parents. Participants with higher A1C (>9.0%, N=170) were compared to those with lower A1C (≤9.0%, N=88). Participants with higher A1C were older (15.0 vs. 14.7 years, p=.04) and had higher LDL (101 vs. 91, p=.006), total cholesterol (176 vs. 163, p=.002), and triglycerides (114 vs. 73, p=.04). They demonstrated lower overall motivation scores (7.5 vs. 7.9, p=.047), including being less motivated to take insulin (8.14 vs. 8.80, p=.006). They exhibited lower self-management scores from both youth (53.4 v. 58.2, p=.001) and parent (49.9 vs. 55.0, p=.001) reports, and higher family conflict scores based on parent report only (1.46 vs. 1.38, p=.04).

Conclusions: The FLEX intervention is an innovative application of a tailored treatment intervention designed for real-world practice. Future publications will present whether FLEX demonstrates efficacy in the promotion of youth T1D self-management.

eP165

Dissemination of NICH: an innovative program for children with diabetes and psychosocial complexity

R. Bensen[1], B.I. Agustin[1], D.V. Wagner[2], D.M. Maahs[1], M.A. Harris[2], D. Naranjo[1]

[1]*Stanford University School of Medicine, Palo Alto, United States,* [2]*Oregon Health and Science University, Portland, United States*

Objective: A subgroup of children with diabetes and psychosocial complexity experience poor glycemic control, repeat DKAs, and disproportionately high healthcare resource utilization. The Oregon ***Novel Interventions in Children's Healthcare (NICH***) program was developed to address these challenges**.** NICH providers ("interventionists") deliver family- and skills-based interventions, case management, and care coordination in the family's natural environment (home, school, clinic) while being available 24/7 to coach and liaise with youth, parents, and medical teams. Since 2011, 170 participants (40% with type 1 diabetes [T1D]), demonstrated improved health outcomes and decreased costs/utilization. This pilot's objective was to determine the feasibility of implementing NICH in another institution (Stanford).

Methods: Feasibility was assessed with recruitment, retention, and sustainability. Clinical outcomes (DKA, HbA1c, missed appointments) were abstracted from the medical record. Barriers and success factors to implementation are described.

Results: Six participants with diabetes enrolled. Compared to the year prior to NICH, 5 participants evidenced a 75% average reduction in DKA admissions and >75% average reduction in no-shows after 6 months. Since enrollment, 3 participants started insulin pumps. HbA1c's remained high, which may be an effect of sample size, follow-up period, or implementation. After 14 months of Stanford NICH, success factors include a strong advisory committee, ongoing consultation from Oregon NICH, and an interventionist with personal experience with T1D. Barriers include funding challenges due to an uncertain healthcare environment and a steep learning curve for the interventionist.

Conclusions: With consultation from the program developers, strong internal champions at Stanford, and targeted modifications, NICH can be feasibly disseminated to effectively address the needs of the most challenging and vulnerable youth with diabetes.

eP166

Parents' perspectives on negotiating responsibility for type 1 diabetes self-management with their adolescent children

C. Rawdon[1], V. Lambert[1], P. Gallagher[1], M. Glacken[2], N. Murphy[3,4]

[1]*Dublin City University, School of Nursing and Human Sciences, Dublin, Ireland,* [2]*St Angela's College, Sligo, Ireland,* [3]*Temple Street Children's*

University Hospital, Dublin, Ireland, [4]Mater Misericordiae University Hospital, Dublin, Ireland

Objectives: The complexities involved in sharing management responsibilities between parents and adolescents for type 1 diabetes (T1D) can result in ineffective communication strategies which can impact negatively on adolescents' glycaemic control. This study aimed to describe the process of how parents communicate and negotiate self-management responsibilities with adolescents with T1D; including how parents establish adolescents' readiness to assume responsibilities and factors that support or hinder sharing of responsibilities.
Methods: Qualitative interviews were conducted with parents of 25 adolescents (11-17 years) with T1D to explore the process of how they share self-management responsibilities with their child. Parents were recruited through two national child and adolescent diabetes and endocrine clinics and online advertisement through a national diabetes advocacy organisation. Audio-recorded interviews were transcribed verbatim and thematically analysed.
Results: Parents assumed a number of roles in their child's T1D management ranging from taking full responsibility for management to supporting, assisting, teaching, and advocating for their child. This changed with adolescents' age. School and leisure activities often acted as catalysts for adolescents to take on more responsibility for managing their T1D, thereby asserting their independence and well-being for the first time. Parents communicated self-management responsibilities to their adolescents in a number of ways ranging from regular reminders to less frequent in-depth discussions.
Conclusions: These findings provide healthcare professionals (HCPs) with insight into the complexity of parent-adolescent negotiation of self-management responsibilities for T1D. Understanding factors that enable and/or hinder effective parent-adolescent communication about T1D self-management will enable HCPs to provide more effective support to families during this important transition stage.

eP167
Neurocognitive deficits in children and adolescents with type 1 diabetes mellitus - a pilot study

T. Schwerzler[1], D. Seick Barbarini[1], A. Blassnig-Ezeh[1], C. Stark[1], C. Säly[2], B. Simma[1]

[1]Landeskrankenhaus Feldkirch, Department of Pediatrics, Feldkirch, Austria, [2]Landeskrankenhaus Feldkirch, Department of Internal Medicine and Cardiology, Feldkirch, Austria

Objectives: Neurocognitive deficits occur in children and adolescents with type 1 diabetes mellitus (T1DM). The causes and pathophysiological mechanisms are not completely known. The aim of this study was to investigate the occurrence of neurocognitive deficits in a group of 24 children and adolescents with T1DM and their correlation with age at diagnosis, duration of disease and glycemic control.
Methods: Neurocognitive testing were made in 24 children and adolescents with T1DM: 13 male, 11 female; mean age 12.7 years (6.4 - 17.8 y), SD 3.5 y. The test batteries included the Wechsler Intelligence Scale for Children (WISC, german version) and the Test of Attentional Performance (TAP) or a specific TAP setup for the use in children (KiTAP). Collected data were: age at diagnosis of T1DM, duration of disease, number of diabetic ketoacidosis episodes and all hemoglobin A1c (HbA1c) values since the diagnosis. In the analysis, gender-specific differences are considered. Data analysis was performed using the IBM SPSS Statistics 24. Spearman's rho correlation test and Mann-Whitney *U* test were used.
Results: There was no statistically significant correlation ($p < 0.05$) between IQ-value of WISK or results of TAP/KiTAP and age at diagnosis of T1DM, duration of disease, number of diabetic ketoacidosis episodes and HbA1c values since diagnosis.
Conclusions: In this collective there was no cognitive deficits on evaluated parameters in all areas of attention and IQ: divided attention, impulsiveness, language comprehension, perception-based logical thinking, working memory processes and processing speed. Attentional processes are important for daily intellectual performance and essential for the acquisition of competencies, such as reading, spelling, and calculating. The results of this pilot study are the basis for further investigation.

eP168
School performance before and after type 1 diabetes onset in 622 elementary and middle school children from Chile: longitudinal follow up

R. Roman[1,2], V. Garrido[1], E. Pichuante[1], V. Novoa[1], G. Mundaca[1], A. Fuentes[1], A. Rivera[1], A. Torres[1], M. Fuentes[1]

[1]University of Antofagasta, Faculty of Medicine and Odontology, Antofagasta, Chile, [2]Hospital Regional de Antofagasta, Dr. Leonardo Guzman, Antofagasta, Chile

Objective: To study the school performance long term evolution after Type 1 diabetes (T1D) onset (T1DO), in children who developed T1D between 10 and 14 years old.
Patients and Methods: Annual school records were obtained from the government web side, the best grade was 7 and the worse was 1.
Results: We studied 622 children from "Fundación de Diabetes Juvenil de Chile" with T1DO at age 11,8±1,4 years, 54% males, attending public school 33% chartered school 47% and private school 20%; health insurance (HI) was 57% public and 43% private. The table shows school grade averages and approval percentage for children with T1D the year previous to T1DO (-1), the T1DO year (0) and the following years after T1DO (1,2,3,4,5). School grades and year approval exhibited a reduction the T1DO year and the following years compared to the year previous to T1DO (*= p< 0,001).

Year from T1DO	-1	0	1	2	3	4	5
General	5,7	5,6*	5,5	5,4	5,4	5,4	5,4*
Language	5,4	5,3*	5,1	5,1	5,1	5,1	5,2*
Math	5,3	5,1*	4,9	4,9	4,9	4,9	4,8*
Public HI	5,6	5,5*	5,4	5,3	5,3	5,3	5,3*
Private HI	5,9	5,7*	5,6	5,6	5,6	5,6	5,6*
Girls	5,9	5,7*	5,6	5,5	5,5	5,4	5,5*
Boys	5,6	5,5*	5,4	5,4	5,4	5,4	5,4*
Approved(%)	97	94*	92	91	89	89	87*

[School grade averages in children with T1D]

Conclusion: We found a detriment on school grades the T1DO year that was not recovered the following years. T1D seems to have a negative impact on long term school performance.

ePoster Session 22 - Complications DKA

eP169

Changes of lactate levels in children with diabetic ketoacidosis and newly diagnosed type 1 diabetes mellitus

K. Jenei[1], I. Szatmári[1], P. Zsidegh[1], A. Luczay[1], P. Tóth-Heyn[1]

[1]*Semmelweis Egyetem I. sz. Gyermekgyógyászati Klinika, Budapest, Hungary*

Introduction: It is well known that lactate concentration is increased in diabetic ketoacidosis (DKA), however the kinetics and pathophysiology of lactate-changes are still unclear. Lactate exist in the human body as L and D-lactate. Normally L-lactate is the major form, D-lactate accounts only for 1-5% of lactate. According to previous data, also D-and L-lactate might be increased in hyperglycaemic disorders. We aimed to describe the kinetics and mechanisms of lactate concentration changes in DKA and newly diagnosed diabetes.
Methods: We performed a prospective study, including 5-18 years old children with DKA (DKA group, n=13) and with newly diagnosed type 1 diabetes without DKA (T1DM group, n=6). We did blood gas test 0-12-24-48 hours after admission to measure L-lactate (GEM 3000 blood gas analyser). At the same times venous blood samples were also taken (n=9+6) to define total serum lactate level by gas chromatography- mass spectrometry.
Results: Initial plasma lactate concentration was increased in all DKA patients and was higher than in T1DM group (p< 0,05). After 12 hours of rehydration lactate level was greatly reduced in DKA patients but after 24-48 hours it was repeatedly increased compaired to the 12h level (all p< 0,01). In the T1DM group significant elevation was only at 48h (p< 0,05 vs 12h). In the 0-12h phase total serum lactate level was an average of 2 mmol/l higher than L-lactate level, referring to D-lactate production. This difference decreased to 1 mmol/l after 24 hours, and was 0 at 48h.
Discussion: Decrease of the initially high plasma lactate levels in the phase of rehydration refers to the major role of anaerobic glycolysis in lactate production. D-lactate production contributes to the initial hyperlactataemia in both groups. D-lactate production is comparable to L-lactate in the early phase of DKA and was gradually decreasing due to insulin treatment. We assume, that insulin-stimulated aerobic glycolysis leads to the second lactate peak.

eP170

Agreement of capillary βhydroxybutyrate and serum βhydroxybutyrate measurement in the management of pediatric diabetic ketoacidosis: a prospective cohort study

P. Kurup[1], R. Rameshkumar[1], R. Soundravally[2]

[1]*Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Pediatrics, Puducherry, India,* [2]*Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Biochemistry, Puducherry, India*

Objective: To study the strength of agreement between the point-of-care (POC) capillary measurement of βhydroxybutyrate (BHB) and serum βhydroxybutyrate in the management of pediatric diabetic ketoacidosis (DKA).
Methods: *Setting:* Pediatric Critical Care Division of tertiary care academic institute. *Subjects:* Children aged less than or equal to 12-year with DKA as per ISPAD-2014 guideline. *Intervention:* Capillary BHB was measured by POC device (Abbott FreeStyle OptiumH) with simultaneous serum sample for laboratory BHB (Cayman chemical colorimetric assay) along with venous blood gas at admission and two hourly for first six-hour and then four hourly till resolution of DKA. Serum samples were stored at 80°C until analysis. *Statistical Analysis:* The strength of agreement was assessed using Bland-Altman (BA) plot and intraclass correlation (ICC). The correlation between POC-BHB with venous pH, pCO_2, bicarbonate, and anion gap (AG) was analyzed using linear regression.
Results: Two-hundred-thirty-six pairs (capillary and serum BHB) in 26 patients (male-7, female-19) were analyzed. Mean±SD BHB is 2.6±1.9 and 2.6±2.1 mmol/L in POC and serum measurement respectively. The BA analysis showed excellent agreement and proportional bias at values above 5.0 mmol/L (t-value= -3.49,p< 0.001) (serum BHB measurements were consistently higher than POC-BHB). The ICC between POC and serum BHB was 96.1% (95%CI 95% to 97%). POC-BHB had a significant negative correlation with pH (r= -0.594), pCO_2 (r= -0.414) and bicarbonate (r= -0.588) and a positive correlation with AG (r=0.488).
Conclusions: POC-BHB shows excellent agreement with laboratory BHB and is reliable for monitoring of target ketonemia of less than one mmol/L during the management of DKA. It may reduce the frequency of laboratory measurement, thus reducing overall healthcare costs. POC-BHB shows bias for higher value probably due to enzymatic saturation of strips. Newer POC-BHB for higher values needs to be designed in future.

eP172

Successful intravenous insulin infusion therapy in pediatric patients with type 1 diabetes during intercurrent illness and surgery according to protocol of Leipzig

A.G. Thiele[1], M. Heckenmüller[2], H. Bartelt[1], S. Klamt[1], W. Kiess[1], T. M. Kapellen[1]

[1]*University Hospitals Leipzig, Hospital for Children and Adolescents, Leipzig, Germany,* [2]*Hospital Lüneburg, Hospital for Children and Adolescents, Lüneburg, Germany*

Objective: Continuous intravenous (IV) insulin infusion therapy minimizes blood glucose (BG) fluctuations and prevent metabolic crisis in pediatric patients with type 1 diabetes (T1D) during intercurrent illness and surgeries. However, data on the adequate fluid and insulin substitution in these cases is rare. We evaluated the effectiveness and safety of IV insulin therapy according to the local protocol.
Methods: Retrospective study of 124 cases of hospitalization with IV insulin therapy due to intercurrent illness (n=78) or minor surgeries (n=46) in 62 patients with T1D (mean age [SD]: 9.6 [5.4] years). The patients received a glucose-electrolyte infusion and normal insulin. Infusion rate was adapted according to the BG measured hourly. Glycemic control (GC) during infusion therapy was analyzed in the entire cohort and in subgroups subdivided by age, glycated hemoglobin (HbA1c) and reason for hospitalization.
Results: Mean infusion time was 22 h (range 1.5-147 h). In 65% of the infusion time, patients' BG was within the target rage (4-8 mmol/l). In almost all cases (n=118) at least one BG was beyond this range. Critical events, defined as a BG < 3 or >15 mmol/l, were found in 6% of the infusion time. Comparison of GC in subgroups for HbA1c and the reason for hospitalization revealed no significant differences. However, patients < 12 years of age exhibited significant more critical events, primarily hypoglycemia, and needed more adaptions of insulin dosage compared to adolescents (hypoglycemia/case 2.4±2.7 vs. 0.9±2.0; P< 0.001). Additionally, the duration of critical events was significantly longer in the younger patients (82 min±133 vs. 52 min±160).
Conclusion: Our protocol for the IV insulin therapy proved to be appropriate for an adequate GC in pediatric patients with T1D during intercurrent illness and surgery. However, the regime seems to be more suitable in adolescents. An adaption of insulin dosage in younger patients should be considered.

eP173

Contacts with health care services for diabetes-related symptoms before admission for DKA among pediatric patients in Sweden. A two-year national survey

J.H. Wersäll[1], P. Adolfsson[1], G. Forsander[1], A. Janson[2], E. Örtqvist[2], L. Wallensteen[2], R. Hanas[1]

[1]*Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden,* [2]*Karolinska Institutet, Department of Women's and Children's Health, Karolinska University Hospital, Stockholm, Sweden*

Objectives: There were 1708 pediatric patients admitted for new-onset diabetes in Sweden during 2015 and 2016. Of these, 19.2 % and 24.5 %, respectively, presented with pH < 7.30 at onset (SWEDIABKIDS, The Swedish national pediatric diabetes registry). This survey aims to investigate health care contacts due to diabetes-related symptoms within one month prior to admission for DKA and whether early or late contact resulted in different metabolic status in the patients at admission.
Methods: A two-year prospective study from Feb 2015 to Jan 2017 was performed where all newly diagnosed children with DKA 0-17.99 years in Sweden are targeted. So far, 211 have been included. Data on pre-admission events and admission parameters was collected through questionnaires filled out by the primary caregivers and the attending physician.
Results: Of the newly diagnosed patients with DKA registered in this study, 55% had a health care contact within 1 month before admission. The time range from the first health care contact until admission for DKA was 0 - 14 days. One-third (33 %) among those with a prior health care contact for diabetes-related symptoms was not referred to a pediatric emergency ward within the same day. These patients had significantly lower pH values at admission compared to patients who were immediately referred (p< 0.001) and to patients who had not had any health care contacts before hospital admission for DKA (p=0.008).

	n	median pH at admission
Not admitted to hospital same day	38	7,15
Admission to hospital same day	78	7,22
No health care contact within 1 month before admission	95	7,21

[Health Care contacts for diabetes-related symptoms]

Conclusions: In contrast to recommendations in national and ISPAD guidelines, it was common that diabetes-related symptoms did not lead to immediate referral to a pediatric hospital emergency ward. A national information campaign to make professionals in primary health care aware of type 1 diabetes and DKA symptoms in children is essential.

eP174

Biochemical characteristics of diabetic ketoacidosis in Japanese type 1 diabetes treated with insulin analogues

J. Suzuki[1], K. Yoshida[1], S. Tanabe[1], Y. Mine[1], M. Aoki[1], T. Urakami[1]

[1]*Nihon University Hospital, Department of Pediatrics, Tokyo, Japan*

Objectives: Recently, use of insulin analogs and insulin pumps has become quite extensive in Japan. However, there are few reports about the biochemical characteristics of diabetic ketoacidosis (DKA) in type 1 diabetes (T1D) patients treated with insulin analogs. This study aimed to investigate biochemical characteristics of DKA in pediatric patients in Japan with type 1 diabetes treated with insulin analogs.
Method: The subjects were T1D patients younger than 18 years, admitted to Nihon University Hospital, Tokyo, Japan, for DKA treatment. This was a retrospective study and biochemical findings were obtained from their medical charts. DKA criteria complied with ISPAD clinical consensus guidelines. We evaluated biochemical findings at DKA diagnosis, between April 2011 and April 2017. Subjects were divided into three groups based on onset of T1D, pump trouble, and number of sick days. Each of the biochemical findings was compared between the three groups using Mann-Whitney U test. We considered p value less than 0.05 significant.
Results: During the study period, there were 21 episodes (18 cases) of hospitalization. Median patient age was 7.4 years. DKA onset was due to eight instances of T1D onset, five instances of pump trouble, and five instances of sick days. Medians of biochemical findings were as follows: HbA1c, 9.9%; PG, 591 mg/dl; AST, 28 IU/l; ALT, 19 IU/l; LDH, 212 IU/l; BUN, 18.7 mg/dl; Cr, 0.45 mg/dl; Na, 134 mEq/l; K, 4.5 mEq/l; Cl, 94 mEq/l; Ca, 9.8 mg/dl; P, 5.1 mg/dl; total ketone, 9182 μmol/l; venous blood pH 7.195; PCO2, 30.4 mmHg; HCO3, -9.7 mmol/l; BE, -18.5 mmol/l. The three DKA groups showed no significant differences in any studied biochemical parameters.
Conclusion: To our knowledge, this is the first investigation of biochemical characteristics of DKA in Japanese T1D children treated with insulin analogs. Nonetheless, a larger sample size is required to establish the relationship between biochemical parameters and causes of DKA.

eP175

Alterations in platelet morphology in children with new onset type 1 diabetes mellitus (T1DM)

D.K. Varma[1], R. Kumar[2], G.V. Venkatesh[2], P. Bhatia[2], D. Dayal[2]

[1]*PGIMER, Pediatric Endocrine and Diabetes Unit, Chandigarh, India,* [2]*PGIMER, Chandigarh, India*

Platelet reactivity in children with type 1 diabetes mellitus has been documented by few studies[1,]. Morphological changes in platelets have also been studied in TIDM[2]. These changes in platelet reactivity and structure may be linked to chronic vascular complications in T1DM.
Objective: To study alterations in platelet morphology among children with new onset T1DM.
Methods: Prospective case-control study was done among subjects with new onset (within 30 days) T1DM, and healthy controls, aged 6 months to 15 years. Platelet count (PLT), mean platelet volume, platelet distribution width, platelet large cell ratio and Plateletcrit (PCT) was measured in fresh blood. Results of above parameters were compared in cases and controls using independent student t test.
Results: A total of 180 subjects (90 cases and 90 controls) were enrolled over 18 months study period. Fifty children(55.5%) had DKA at the time of diagnosis or before enrollment. Among cases HbA1C value has negative significant correlation with platelet count and PCT at P value of 0.005 and 0.003 respectively. Main result s are summarized in Table 1.

	CASES(n=90)Mean±SD	CONTROLS(n=90) Mean±SD	P-Value
PLT(x105/μL)	3.12±1.26	3.40±1.02	.110
MPV(fL)	11.10±1.58	10.00±1.14	.000
PDW(fL)	14.91±3.39	12.04±2.59	.000
P-LCR(%)	34.42±11.04	26.79±6.93	.000
PCT(%)	0.33±.12	0.34±.07	.458

[Table 1: Comparison of platelet indices of childre]

Conclusion: MPV, PDW and P-LCR were significantly higher in subjects with T1DM when compared to controls.Both PLT and PCT values were inversely proportional with HbA1c in cases.

References:
1. Vignini A, Moroni C, Nanetti L, Raffaelli F, Cester A, Gabrielli O, et al. Alterations of platelet biochemical and functional properties in newly diagnosed type 1 diabetes: a role in cardiovascularnrisk? Diabetes Metab Res Rev 2011; 27: 277-285

eP176
Predictors of type 1 diabetes mellitus (1DM) acute complications on pediatric age

J. Serra-Caetano[1], A. Sousa Pereira[1], M. Ferreira[1], A.R. Capitão[1], L. Aveiro[1], N. Batista[1], L. Simão[1], F. Freitas[1], R. Cardoso[1], I. Dinis[1], A. Mirante[1]

[1]*Coimbra Pediatric Hospital, Universitary Hospital Centre of Coimbra (CHUC), Endocrinology, Diabetes and Growth Unit, Coimbra, Portugal*

Introduction: Diabetic ketoacidosis (DKA) and severe hypoglycemias (SH) are potential life-threatening acute complications of 1DM.
Objectives: The aim of our study was to evaluate the risk factors for DKA and SH on children and adolescents with 1DM.
Methods: Retrospective descriptive study of all 1DM children/adolescents with more than one year of disease duration, followed at our centre along a 5 year-period (2011-2015). Variables analysed included metabolic control, treatment type, and frequency of SH and DKA per 100 patients/year. Statistical analysis: SPSS21®.
Results: We studied 351 children/adolescents with 1DM (50.4% males) with a mean of 229 cases analyzed at each year. Mean age at diagnosis was 7,4±4,1y and mean disease duration was 5,9±3,8y. 29.2% were on continuous subcutaneous insulin infusion. Mean A1c was 7,7±1,2%, with mean glycemias of 168,3±34,7mg/dl and 73,7±21,7mg/dl standard deviation. Mean number of glycemia evaluations/day was 5.1. Mean insulin daily dosis was 0,9±0,3U/Kg. Mean incidence of SH was 4.9/100 patients/year and of DKA 1.7/100 patients/year, without changes along time. There was no statistical difference regarding age and type of treatment. DKA episodes had higher A1c (9,0 vs 7,6%; p< 0,001), lower glycemic evaluations (4,3 vs 5; p=0,015), higher mean glycemias (189,0 vs 165,3mg/dl; p=0,014). The risk of complications increases with disease duration (6,3 vs 5,1y; p=0,013) and occur mainly on adolescents (84%).
Conclusions: Our study shows SH and DKA incidence rates similar to international literature. DKA was associated with lower number of glycemia evaluation and worse metabolic control. Disease duration increases the risk of complications which confirms the importance of reinforcing education at key-ages, including adolescent years.

ePoster Session 23 - Diabetes Care

eP177
Knowledge concerning diabetes among students of the final year of medicine in Poland

Z. Goslawska[1], P. Jarosz-Chobot[1], M. Szczepanska[2], A. Szadkowska[3], P. Piatkiewicz[4], M. Bernas[4], J. Polanska[5], A. Chobot[6]

[1]School of Medicine in Katowice, Medical University of Silesia, Department of Children's Diabetology, Katowice, Poland, [2]School of Medicine with the Division of Dentistry in Zabrze, Medical University of Silesia, Department of Pediatrics, Zabrze, Poland, [3]Medical University in Lodz, Department of Pediatrics, Oncology, Hematology & Diabetology, Lodz, Poland, [4]Medical University of Warsaw, Department of Internal Diseases, Diabetology and Endocrinology, Warsaw, Poland, [5]The Silesian University of Technology, Data Mining Division, Gliwice, Poland, [6]Clinical Hospital No 1, Zabrze, Poland

Objectives: Given the epidemics of diabetes we designed a study to evaluate knowledge concerning diabetes (DM) among polish students of the final year of medicine.
Methods: 473 students from Medical Schools in Katowice(36%) and Zabrze(35%) (Medical University of Silesia), Medical University of Warsaw(13%) and Lodz(16%) answered anonymously a 25-question survey. Questions concerned basic knowledge on DM covered by the curriculum.
Results: Among participants 64% were women. 96% attended diabetology classes, but only 6% plan to specialize in diabetology. 31% described themselves as poorly or not prepared to take care of patients with DM. Surprisingly 3% of students did not know that diabetes type 1 (T1DM) is incurable and 16% that T1DM patients require insulin even when fasting. 72% of students had basic knowledge concerning monogenic DM (best knowledge 98%, p< 0.001 in Lodz; centre involved in monoenic DM genetic testing in Poland). Two questions regarding treatment of type 2 DM were answered correctly by 84% and 90% of students. Hyperglycemia symptoms and causes were familiar to only 72% and 75% students respectively. Insulin as a wrong treatment for hypoglycemia was indicated correctly by 95% students, but just 54% knew at what blood glucose level to diagnose it. Treatment of diabetic ketoacidosis was familiar to 80% students. Basic knowledge regarding insulin pumps and continuous blood glucose monitoring systems (what it is/what for) had respectively 85% and 76% respondents. Only attending diabetes classes influenced knowledge concerning DM (significantly more correct answers in most questions). Factors such as: gender, diabetes in the student's family, willingness to specialize in diabetology or declaration of good/excellent preparation to deal with diabetic patients in general had no impact on students' knowledge.
Conclusions: There is still need to improve basic knowledge concerning diabetes even among medical students - soon-to-be doctors.

BK/204/RAU1/2017

eP178
Carbohydrate recognition and counting ability in pediatric residents

S. Robinson[1,2], C. Boucher-Berry[2], S. Mantis[1], M. Mullen[3], C.Z. Minutti[1]

[1]RUSH University Medical Center, Pediatrics/Pediatric Endocrinology, Chicago, United States, [2]University of Illinois at Chicago, Pediatrics/Pediatric Endocrinology, Chicago, United States, [3]RUSH University Medical Center, Clinical Nutrition, College of Health Sciences, River Forest, United States

Objective: Optimal metabolic control in patients with type 1 diabetes mellitus (T1DM) requires a clear understanding of the concepts of carbohydrate recognition and counting. Pediatric residents (PR) contribute to the education and clinical management of pediatric patients with T1DM by counting carbohydrates and calculating insulin doses. Our objectives were to assess the knowledge of PR in recognizing and counting carbohydrates and to determine if there is a significant correlation between their postgraduate year (PGY) of training and their ability to recognize and count carbohydrates.
Methods: PR of all postgraduate years of training from 2 institutions (University of Illinois at Chicago Hospital and RUSH University Hospital) were asked to voluntarily participate in an IRB-approved quiz. The quiz was a modified Koontz PedCarbQuiz that assessed carbohydrate recognition and counting. PR were scored in the two areas. Data was then analyzed by multiple regression analysis (T test).
Results: 60 PR completed the quiz. Of these 22 were PGY1, 18 were PGY2 and 20 were PGY 3 or above. The maximum possible score for carbohydrate recognition is 36 and for carbohydrate counting is 6. The mean scores for carbohydrate recognition for PGY1, PGY2 and PGY3 and above were 26.36, 30.17 and 31.10, respectively.
Conclusions: Our study showed that the PR at the earlier levels of training (PGY1) had the lowest scores, both in carbohydrate recognition and carbohydrate counting. The difference between the PGY1 group and the PGY2 and PGY3 and above groups was statistically significant (P= 0.00549 and P = 0.00549 respectively) for the carbohydrate recognition part of the quiz, but not for the carbohydrate counting. There was no statistical difference between the PGY2 group and the PGY3 and above group for any part of the quiz. Our study shines light into the fact that many PR in the early years of their postgraduate training have a deficit in knowledge of carbohydrate recognition and counting.

eP179
Estimation of glycemic control in the past month using the ratio of glycated albumin to hemoglobin A1c

I. Musha[1], M. Mochizuki[2], T. Kikuchi[1], J. Akatsuka[1], A. Ohtake[1], K. Kobayashi[2], N. Kikuchi[3], T. Kawamura[4], I. Yokota[5], T. Urakami[6], S. Sugihara[7], S. Amemiya[1], The Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes

[1]Saitama Medical University, Department of Pediatrics, Saitama, Japan, [2]University of Yamanashi, Department of Pediatrics, Yamanashi, Japan, [3]Yokohama City Minato Red Cross Hospital, Department of Pediatrics, Kanagawa, Japan, [4]Osaka City University Graduate School of Medicine, Department of Pediatrics, Osaka, Japan, [5]NHO Shikoku Medical Center for Children and Adults, Division of Pediatric Endocrinology, Kagawa, Japan, [6]Nihon University School of Medicine, Department of Pediatrics and Child Health, Tokyo, Japan, [7]Tokyo Women's Medical University Medical Center East, Department of Pediatrics, Tokyo, Japan

Objectives: While HbA1c (A1C) is the gold standard for glycemic target, it is difficult to estimate the glycemic control within a month. We aimed to clarify whether the glycated albumin (GA) to A1C (GA/A1C) ratio could estimate the recent glycemic control based on the differences between these half-lives.
Methods: Pediatric patients with type 1 diabetes (T1D) were measured GA and A1C simultaneously 10 times or more during observed period. The individual long-term consistency of GA/A1C ratio was analyzed by the quadratic curve between GA/A1C ratio at test and the product of GA/A1C ratios at test and the individual mean value. The correlation and concordance rate were examined between A1C one month apart (ΔA1C) and the fluctuation of GA/A1C ratio using either the percent change from the individual mean (Method A) or the absolute difference from the cohort mean (Method B), A1C expressed by either NGSP units (A1C-N) or IFCC units (A1C-SI).
Results: Highly significant correlations of quadratic curves were observed between GA/A1C ratio at each period and the mean value, indicating individual consistency of GA/A1C ratio. The fluctuations of

GA/A1C ratio were weakly but significantly correlated with ΔA1C (Method A: r=0.26, p< 0.01 by A1C-N; r=0.20, p< 0.01 by A1C-SI. Method B: r=0.19, p< 0.01 by A1C-N; r=0.11, p< 0.01 by A1C-SI.). The concordance rates were however significant only in glycemic deterioration, but not in improvement. Furthermore the concordance rates using Method A were higher than those using Method B. Additionally the concordance rates using A1C-SI were lower than those using A1C-N including non-glycated Hb.

Conclusions: Increased GA/A1C ratio in Method A using the percent change from the individual mean may estimate glycemic deterioration within a month, rather than that in Method B using the absolute difference from the cohort mean in T1D patients. The application of decreased GA/A1C ratio is limited to the estimation of improvement within a month.

eP180
Factors associated with preservation of C-peptide levels at type 1 diabetes recognition

A. Szypowska[1], L. Groele[1], M. Wysocka-Mincewicz[2], A. Mazur[3], L. Lisowicz[3], I. Beń-Skowronek[4], J. Sieniawska[4], B. Klonowska[5], D. Charemska[5], J. Nawrotek[6], I. Jałowiec[6], A. Bossowski[7], M. Jamiołkowska[7], B. Pyrżak[8], I. Rogozińska[8], M. Szalecki[2]

[1]Medical University of Warsaw, Department of Paediatrics, Warsaw, Poland, [2]Children's Memorial Health Institute, Department of Endocrinology and Diabetology, Warsaw, Poland, [3]Medical Faculty University of Rzeszow, II Department of Paediatrics, Paediatric Endocrinology and Diabetes, Rzeszów, Poland, [4]Medical University of Lublin, Department of Paediatric Endocrinology and Diabetology, Lublin, Poland, [5]Faculty of Medical Sciences, University of Warmia and Mazury in Olsztyn, Provincial Specialist Chilldren's Hospital, Department of Clinical Pediatrics, Olsztyn, Poland, [6]Endocrinology and Diabetology Ward, General District Hospital, Kielce, Poland, [7]Medical University in Białystok, Department of Pediatrics, Endocrinology, Diabetology with a Cardiology Division, Białystok, Poland, [8]Medical University of Warsaw, Department of Pediatrics and Endocrinology, Warsaw, Poland

Aims: C-peptide value is one of the biomarkers that can identify individuals most likely to respond to immune interventions carried out to protect pancreatic β-cell damage.

The aim of the study was to evaluate factors associated with C-peptide levels at type 1 diabetes (T1D) recognition.

Methods: The study included 1098 children aged 2-17 with newly recognized T1D. The data was collected from seven Polish hospitals. There were analyzed: data of birth, fasting C-peptide, HbA1c, sex, weight, height, pH at the time of diabetes onset.

Results: There was correlation between fasting C-peptide and BMI-SDS (p=0.0001), age (p=0.0001), and HbA1c (p=0.0001). Logistic regression model revealed that fasting C-peptide ≥ 0.7 ng/ml at diabetes recognition was dependent on weight, HbA1c, pH and sex (p< 0.0001).

Overweight and obese children (n=124) had higher fasting C-peptide (p=0.0001) and lower HbA1c (p=0.0008) than other subjects. Girls had higher fasting C-peptide (p=0.036) and higher HbA1c (p=0.026) than boys.

Conclusion: children with obesity and overweight are diagnosed with diabetes at an early stage with largely preserved C-peptide level. To preserve C-peptide level, increased awareness of the symptoms of type 1 diabetes and improved screening and diagnostic tools are important. Gender differences in the course of diabetes exist at T1D recognition.

eP181
Vitamin D deficiency as a risk factor for development of post transplant diabetes mellitus

M. Patil[1], V. Kute[1], H. Patel[1], D. Gera[1], P. Shah[1]

[1]Institute of Kidney Disease and Research Centre, Nephrology, Ahmedabad, India

Objectives: The study aims to provide preliminary information about the levels of 25-hydroxy Vitamin D (25[OH]D) in renal transplant patients and find any correlation between its deficiency and development of PTDM.

Methods: A retrospective analysis of 468 patients transplanted between 2014 and 2016 was done. Pre and post transplant vitamin D levels, fasting blood sugar (FBS), post prandial blood sugar (PPBS), HbA1c levels were noted down. Vitamin D levels were classified into three groups < 10 ng/ml, 11-30 ng/ml and > 31 ng/ml. PTDM was considered as patients developing diabetes mellitus (FBS > 126 mg/dl, PPBS > 200 mg/dl and HbA1c > 6.5) after transplant. All patients with pre transplant diabetes mellitus were excluded from study.

Results: The study showed that incidence of PTDM was 12.6%. Vitamin D levels < 10 ng/dl were found in 16.2%, 11-30 ng/dl in 59.8% and >31 ng/dl in 24.1% of patients. We found a positive correlation between vitamin D levels < 10 ng/dl and occurrence of PTDM (p< 0.001).

Conclusion: In order to prevent PTDM, identification of modifiable risk factors at the time of transplantation may be useful to develop primary preventive therapeutic strategies for high-risk patients. To conclude, in this single centre observational study, we identified vitamin D deficiency at the time of transplantation as an independent risk factor of PTDM.

eP182
Role of carnosine as an adjuvant therapy for diabetic nephropathy in children and adolescents with type 1 diabetes: relation to oxidative stress, renal functional integrity and glycemic control

N. Samir Elbarbary[1], E. Abdel Rahman Ismail[2], A.R. El-Naggar[3], M. Hany Hamouda[3], M. El-Hamamsy[4]

[1]Ain Shams University, Department of Pediatrics, Diabetes Unit, Cairo, Egypt, [2]Ain Shams University, Department of Clinical Pathology, Cairo, Egypt, [3]Modern Technology and Information University, Department of Clinical Pharmacy, Faculty of Pharmacy, Cairo, Egypt, [4]Ain Shams University, Department of Clinical Pharmacy, Faculty of Pharmacy, Cairo, Egypt

Background and Objectives: Oxidative stress is a significant contributor to the pathogenesis of diabetic nephropathy. Carnosine is a natural radical oxygen species scavenger. We investigated the effect of carnosine as an adjuvant therapy on urinary albumin excretion (UAE), the tubular damage marker alpha 1-microglobulin (A1M), and oxidative stress in pediatric patients with type 1 diabetes and nephropathy.

Methods: This randomized placebo-controlled trial included 90 patients with diabetic nephropathy, despite oral angiotensin-converting enzyme inhibitors (ACE-Is), who were randomly assigned to receive either 12 weeks of carnosine 1g/day (n = 45), or matching placebo (n = 45). Both groups were followed-up with assessment of hemoglobin A1c (HbA1c), UAE, A1M, total antioxidant capacity (TAC) and malondialdhyde (MDA).

Results: Baseline clinical and laboratory parameters were consistent between carnosine and placebo groups (p>0.05). After 12 weeks, carnosine treatment resulted in significant decrease of HbA1c (8.2 ± 2.1% versus 7.4 ± 1.3%), UAE (91.7 versus 38.5 mg/g creatinine,) A1M (16.5 ± 6.8 mg/L versus 9.3 ± 6.6 mg/L), MDA levels (25.5 ± 8.1 versus 18.2 ± 7.7 nmol/mL) while TAC levels were increased compared with baseline levels (p< 0.001) and compared with placebo (p< 0.001). No adverse reactions due to carnosine supplementation were reported. Baseline TAC was inversely correlated to HbA1c (r=-0.58, p=0.04) and A1M (r=-0.682, p=0.015) among carnosine group.

Conclusions: Oral supplementation with L-Carnosine for 12 weeks resulted in a significant improvement of oxidative stress, glycemic control and renal function. Thus, carnosine could be a safe and effective strategy for treatment of pediatric patients with diabetic nephropathy.

This trial was registered at ClinicalTrials.gov (NCT02928250).

eP183
Progressive reduction in corneal nerve fiber length over two years measured by corneal confocal microscopy in children with type 1 diabetes

H. Virtanen[1,2,3], K.G. Romanchuk[1,4], A. Nettel-Aguirre[1,3], R.A. Malik[5,6], J.K. Mah[1,2,3], D. Pacaud[1,2,3]

[1]University of Calgary, Calgary, AB, Canada, [2]Alberta Children's Hospital, Paediatrics, Calgary, Canada, [3]Alberta Children's Hospital Research Institute, Calgary, Canada, [4]Alberta Children's Hospital, Calgary, Canada, [5]University of Manchester, Centre for Endocrinology and Diabetes, Institute of Human Development, Manchester, United Kingdom, [6]Weill Cornell Medicine-Qatar, Department of Medicine, Doha, Qatar

Background: Corneal confocal microscopy (CCM) has emerged as a rapid, non-invasive imaging surrogate marker of diabetic neuropathy (DN) in adults, but its use in children has not been widely studied.
Objectives: Corneal nerve fibre length (CNFL), considered to be the best diagnostic and prognostic marker in adults with DN, was assessed 2yrs apart in children with type 1 diabetes (T1DM) and healthy controls.
Methods: 71 children with T1DM with mean(SD) age 14.7(2.3) yrs, T1DM duration 9.1(2.7) yrs and HbA1c 9.0(1.8)%; and 23 healthy controls aged 12.6(0.6) yrs underwent CCM examination at baseline and 2yrs. CNFL was quantified using automated image analysis and compared via independent t-tests; Repeated Measures ANOVA to explore change over 2 yrs, and McNemar's Test to compare the frequencies of individuals with abnormal CNFL over 2 yrs.
Results: Mean CNFL was significantly lower in participants with T1DM compared to controls at baseline (p=0.02) and at 2 years (p=0.001). Point estimates of mean differences in CNFL indicated lower 2yr measures in T1DM and higher 2yr measures in controls, but this was not statistically significant (p=0.054). The proportion of participants with an abnormal CNFL (cut-off established from healthy controls) increased from 7 to 17 in T1DM (p=0.013) and from 0 to 2 in controls (p=0.500), over 2yrs.

CNFL (mm/mm2) Mean(SD)	T1DM	Controls	p-value
Baseline	15.0(3.0)	16.9(3.8)	.021
2 yr	14.2(3.3)	17.3(4.1)	.001
Δ(95%CI lower, upper) within individuals	-0.8(-1.4,-0.2)	0.4(-0.6,1.4)	

[CNFL at baseline and 2 yr]

Conclusion: Children with T1DM have a lower CNFL compared to control subjects at baseline and CNFL further decreased at 2 years, while remaining stable in controls. Furthermore, after 2 years the proportion of children with an abnormal CNFL increased significantly in T1DM, with no significant change in controls. These findings suggest early and progressive nerve loss over a relatively short period of time in children with T1DM.

eP184
Audit on annual nephropathy screening in children with diabetes

P.K. Lim[1], A.V. Sreedharan[2], Y.C. Hui[1], S.T. Lim[1], N. Lek[2], F. Yap[2], R.F. Vasanwala[2]

[1]KK Women's and Children's Hospital, Division of Nursing, Singapore, Singapore, [2]KK Women's and Children's Hospital, Department of Paediatrics, Singapore, Singapore

Introduction: Long term complications in diabetes include nephropathy which can result in renal failure and hypertension. Screening for microalbuminuria (MA), an early marker for nephropathy may be the first sign of microvascular complication. In children with diabetes, it is essential to identify patients at risk so that treatment strategies such as improvement in glycaemic control and blood pressure can be implemented early.
Aim: To assess the compliance of annual screening and prevalence of MA among the children with diabetes in accordance with International Society of Paediatric and Adolescent Diabetes (ISPAD) standards.
Methods: All patients with Type 1 and Type 2 diabetes, age 10-19 years and diagnosed >1 year, on active follow-up between 1st January 2014 to 31st December 2016 were included. Baseline demographic data and urine sample for MA testing were collected and analysed. If first urine sample is found abnormal, second and/or third sample is collected.
Results: The screening rate for MA improved from 65% (n=170) in 2014, to 85% (n=240) in 2015 and 80% (n=231) in 2016. Percentage of abnormal first urine sample was 18% (n=30) in 2014, 15% (n=37) in 2015 and 13% (n=31) in 2016. Prevalence of MA detected from the screening was 4% (n=7) in 2014, 3% (n=8) in 2015 and 3% (n=6) in 2016. Mean age at MA detection was similar, 14.3y±2.1 (2014), 15.1y±0.0 (2015) and 14.5y±4.9 (2016). Mean duration of diabetes at MA detection was also similar 3.7y±1.4 (2014), 3.9y±1.4 (2015) and 4.0y±1.4 (2016). Mean HbA1c at MA detection was 8.5%±3.5 (2014), 8.5%±1.6 (2015) and 9.6%±3.3 (2016). Only one patient was found hypertensive at MA detection in 2014.
Conclusions: There was an improvement in screening rate for MA with the implementation of Annual Review Clinic in July 2014. Early detection of MA with optimisation of glycaemic control and blood pressure can prevent further deterioration of diabetic kidney disease.

ePoster Session 24 - BMI

eP185
Overweight adolescents: a group at risk for metabolic syndrome (Tehran adolescent obesity study)

H. Moayeri[1]

[1]*Tehran University, Imam Khomeini Hospital, Pediatrics Endocrinology., Tehran, Iran, Islamic Republic of*

Background: Metabolic syndrome not only is a serious problem for adults, but is also afflicting an increasing number of children and adolescents. This syndrome is a risk factor for type 2 diabetes mellitus and cardiovascular diseases. The aim of this study was to estimate the prevalence of metabolic syndrome in a sample of Iranian adolescents.
Methods: A total of 554 overweight adolescents (aged 11 - 17 years) participated in a community-based cross sectional survey. Anthropometric examinations including height, weight, body mass index, and blood pressure were assessed. A fasting blood sample was taken for measurement of glucose and lipid profile. Metabolic syndrome was determined by the definition released by the National Cholesterol Education Program Adult Treatment Panel III, which was modified for age.
Results: The overall prevalence of metabolic syndrome was 26.6%. There was no gender difference in the distribution of metabolic syndrome. When stratified by body mass index, 22.5% were overweight (BMI> or =95th percentile) besides having the criteria for metabolic syndrome, while the remaining 4.1% of the adolescents were at risk for overweight (BMI between 85th and 95th percentile) together with metabolic syndrome. Hypertriglyceridemia was the most common and high-density lipoprotein was the least common constituent of metabolic syndrome.
Conclusion: This study suggests a high prevalence of metabolic syndrome among overweight Iranian adolescents. This poses a serious threat to the current and future health of Iranian youth.

eP186
Indices of carbohydrate exchange in adolescents with obesity

D. Latyshev[1], O. Latyshev[2], Y. Lobanov[1], T. Kar'kova[1]

[1]*Altai State Medical University, Barnaul, Russian Federation,* [2]*Russian Medical Academy Continius Professional Education, Moscow, Russian Federation*

Objectives: To study the carbohydrate metabolism in adolescents with obesity in view of the degree of obesity
Methods: 29 children (boys 11), aged 10 to 15 years with obesity were examined. Three groups were formed: 1- SDS BMI >1 < 2.5 - 10 (girls 8); 2 - SDS BMI >2.6 < 3.0 - 10 (girls 6); 3 - SDS BMI >3,1< 3,9 - 9 (girls 4). Fasting glucose, insulin (6.0-27 microU/ml), C-peptide (1.0-5.0 ng/ml), HOMA-IR (<2.7) were investigated.
Results: The fasting glucose value was 4.44 ± 0.87 mmol/l. The increase is noted in 13.7% (4/28), boys 9.1% (1/11), girls 16.7% (3/18) (p = 1,000). The glucose level was elevated only in patients from group 2 - 30, 3% (3/10) and 3 - 11.1% (1/9) (p = 0.582). The insulin level was increased in 27.5% (8/29), in 8.1% (2/11) of boys and in 30.0% (6/18) of girls (p = 0.671). The level of basal insulin was 18.88 ± 16.44 μU/ml. The insulin level was raised in the 2nd group - 50, 0% (5/10) and 3 group - 30, 0% (3/9) (p = 0, 650). The level of C-peptide was 3.87 ± 3.99 ng/ml. The increase level of C-peptide -17.2% (5/29), boys - 9.1% (1/11), girls - 22.2% (4/18) (p = 0, 622). The increase in the HOMO-IR is observed in 48.3% (14/29), boys - 45.5% (5/11), girls -50.0% (9/18) (p = 1,000). The HOMO-IR was 4.18 ± 4.30. Elevated HOMO-IR values have been observed since the first degree of obesity: 20.0% (2/10) of children of the1st group, 40.0% (4/10) of the 2nd group and 88.8% (8/9) of the 3rd group (between 1 and 3 group differences were significant, p = 0,005).
Conclusions: The increase glucose level was observed in 13.7% of obese children. Signs of hyperinsulinism were detected more often: the level of insulin was increased in 27.5% and HOMO-IR - in 48.3%. There were no gender specific features. There was a tendency to the dependence of the severity of carbohydrate metabolism disorders on the degree of obesity.

eP187
Body composition in girls between 12-15 years of age, with type 1 diabetes

K. Jeppesen[1], H.B. Mortensen[1], B.S. Olsen[1], J. Johannesen[1], J. Tinggaard[2], K. Main[2]

[1]*Herlev Hospital and University of Copenhagen, Childrens Department E, Herlev, Denmark,* [2]*Rigshospitalet, Department of Growth and Reproduction, Copenhagen, Denmark*

Aim: To investigate body composition, mainly focused on fat distribution, in adolescent girls with Type 1 diabetes (T1D).
Research design and Methods: In this cross-sectional study, the body composition of 29 pubertal (Tanner stage ≥2) females between 12 and 15 years of age with a diabetes duration of more than one year, were examined using dual-energy X-ray absorptiometry (DXA). Furthermore height and weight were measured while waist-hip ratio, BMI (kg/m^2) and daily insulin dose (U/kg/24h) were calculated. A total of 96 age and gender matched healthy peers, already examined 1 year in advance in another study, served as controls. 27 out of 29 patients used an insulin infusion-pump, while the remaining 2 were on the traditional pen treatment. SD scores for total body fat, weight, height and BMI were calculated from national references (ref. Wohlfahrt-Veje C, European Journal of Clinical Nutrition 2014 og Tinggaard J, Acta Paediatrica 2014). To compare total body fat percentage, weight and height as well as BMI in diabetic patients and healthy controls we used student's t-test.
Results: Total body fat was increased for the diabetic patient group with a mean value which was 1.15 SDS higher compared to healthy control group (P< 0.0001). Weight and height were 0.99 SDS (P< 0.0001) and 0.42 SDS higher (P=0.04), respectively. Likewise BMI was significantly higher in the diabetic patients with a score of 0.95 SDS (P< 0.0001). BMI SDS was significantly correlated with daily insulin dose (r=0,34; P=0.001) . The fat distribution as assessed by waist to height ratio was borderline but not significantly positively associated with the HbA1c level (r=0.12; P=0.06).
Conclusion: Despite modern insulin management and diabetes care for T1D girls they still have significant differences in body composition, resulting in increased total body fat, height, weight and BMI compared to healthy controls. BMI SDS was correlated to an increased insulin requirement.

eP188
Relevant weight loss and improved metabolic status in morbidly obese adolescents with prediabetes following endoscopic and totally reversible bariatric procedure - duodenal-jejunal bypass liner

P. Kotnik[1,2], M. Homan[2,3], R. Orel[2,4], T. Battelino[1,2]

[1]*University Children's Hospital, University Medical Centre Ljubljana, Department of Endocrinology, Diabetes and Metabolism, Ljubljana, Slovenia,* [2]*Medical Faculty, University of Ljubljana, Ljubljana, Slovenia,* [3]*University Children's Hospital, University Medical Centre Ljubljana, Department of Gastroenterology, Hepatology and Nutrition, Ljubljana, Slovenia,* [4]*University Children's Hospital, University Medical Centre*

Ljubljana, Department of Gastroenterology, Hepatology and Nutrition, Ljubljana, Slovenia

Objectives: Duodenal-jejunal bypass liner (DJBL) is an endoscopically placed and removable bariatric device associated with weight loss and metabolic improvements in adults. Aim of the study was to determined efficacy and safety of DJBL up to 1 year in morbidly obese adolescents.
Methods: 19 obese adolescents with prediabetes (12 females, mean(SD) age 17.2(1.2) years) underwent endoscopic placement of DJBL under general anesthesia. Inclusion and exclusion criteria are described in detail at www.ClinicalTrials.gov (NCT02183935). Subjects were examined at months 1, 3, 6, 9 and 12 following DJBL placement.
Results: Relevant weight loss, increased insulin sensitivity and improvement in metabolic complications were determined as shown in the table (*Difference between means(SD) was determined by ANOVA (*p< 0.05) and Dunnett's postHoc test (**p< 0.05 when compared to baseline)*).

	Baseline (n=19)	6 months (n=17)	12 months (n=16)
BMI SDS*	3.68(.34)	3.33(.09)**	3.25(.42)**
Waist circumference (cm)*	127(7)	118(9)**	116(10)**
Waist-hip-ratio*	.74(.06)	.69(.07)**	.68(.07)**
HOMA-IR*	5.3(2.1)	3.6(1.6)**	3.3(.1.6)**
WBISI*	1.9(.7)	3(1.2)**	2.7(1.)**
A1c(%)	5.3(.4)	5.2(.2)	5.1(.2)
Systolic pressure (mmHG)	126(12)	121(11)	118(11)
Cholesterol (mmol/l)*	4.6(.8)	3.7(.5)**	3.7(.7)**
Triglycerides (mmol/l)*	2.1(1.0)	1.2(.4)**	1.2(.3)**

[Characteristics of the subjects.]

None of the devices needed to be explanted and no serious device related side effects were reported. Decrease in iron levels was determined. Levels of B12, folic acid Se, Zn, vitamins A, D3 and E however didn't change significantly.
Conclusions: Use of endoscopically placed and removable DJBL in obese adolescents with prediabetes, for up to 1 year, was determined to be effective not only in improving weight status, but also increasing insulin sensitivity and several metabolic complications of obesity. No serious device related side effects were determined.

eP190
Optimizing lipid screening for T1DM patients in diabetes clinic

A. Moffett[1], M. Kamboj[1], J. Indyk[1], K. Tommerdahl[2], A. Kramer[3], D. Buckingham[4], H. Larson[5], K. Obrynba[1]

[1]Nationwide Children's Hospital / The Ohio State University, Section of Pediatric Endocrinology and Diabetes, Columbus, United States, [2]Nationwide Children's Hospital / The Ohio State University, Department of Pediatrics, Columbus, United States, [3]Nationwide Children's Hospital, Data Resource Center, Columbus, United States, [4]Nationwide Children's Hospital, Quality Improvement Services, Columbus, United States, [5]Nationwide Children's Hospital, Section of Pediatric Endocrinology and Diabetes, Columbus, United States

Objective: To increase the number of Type 1 Diabetes Mellitus (T1DM) patients (age ≥ 10 yrs, diagnosis for ≥ 1 yr and/or established glycemic control) in our T1DM clinic screened for dyslipidemia from 74% to >90% over a 12 month period.
Methods: A quality improvement (QI) initiative was developed to optimize lipid screening in our T1DM clinic. Members of the multidisciplinary diabetes care team were educated about this QI initiative and were made aware of the guidelines for lipid screening in patients with T1DM. A process flow map was outlined to define a step-wise approach for the process of lipid collection. A "Best Practice Alert" (BPA) was built into the electronic medical record to alert providers at the clinic visit of the need for ordering lipids. Importance of lipid screening was emphasized to patients (and families) who were sent to the lab following the clinic visit. At process year end, patients with incomplete orders received a telephone reminder to go to the lab. Patients who met criteria but had not had lipids ordered were mailed a lab slip and letter discussing the importance of screening. We have successfully utilized and are currently maintaining a similar process with other recommended labs in our patients with T1DM.
Results: At baseline, 74% of our eligible population with T1DM received recommended lipid screening. Implementation of a BPA and measures to enhance awareness of screening guidelines increased lipid screening to 91% in 1 year.
Conclusion: We demonstrate the success of a comprehensive, multidisciplinary approach to optimizing recommended screening for lipids in T1DM patients. Similar strategies may be utilized to optimize other health maintenance screenings, not just for patients with T1DM but with other chronic illnesses as well. Future ideas to maintain and improve this successful established work flow may include collecting labs in the diabetes clinic instead of sending patients to the lab.

eP191
Dyslipidemia in children with type 2 diabetes in Singapore

Y.S. Tan[1], R. Peh[1], Y.C. Hui[2], P.K. Lim[2], S.T. Lim[2], R. Vasanwala[3], F. Yap[3], N. Lek[3,4]

[1]National University of Singapore, Yong Loo Lin School of Medicine, Singapore, Singapore, [2]KK Women's and Children's Hospital, Division of Nursing, Singapore, Singapore, [3]KK Women's and Children's Hospital, Department of Paediatrics, Singapore, Singapore, [4]National University of Singapore, Duke-NUS Medical School, Singapore, Singapore

Aim: To compare lipid profiles at two time-points in paediatric type 2 diabetes (T2D) with type 1 diabetes (T1D) in Singapore.
Methods: We analysed the demographics (age, gender, ethnicity), body mass index (BMI), and lab tests (HbA1c, fasting lipids) in 58 T2D and 141 T1D children aged >10y who had attended ≥2 Annual Reviews (AR) since July 2014. Prevalence of dyslipidemia was calculated.
Results: T2D patients did not differ in gender (45% male vs 44%, p=1.00) and ethnicity (62% Chinese vs 61%, p=0.27), but they had higher mean age at diagnosis (12.7y vs 8.1y) and shorter duration of diabetes than T1D (both p< 0.001). On average, the two AR time-points analysed were 1.6y apart. At both time-points, the T2D group had similar mean HbA1c as T1D (8.3% vs 8.5%, p=0.52; and 8.1% vs 8.6%, p=0.13). However, T2D patients had persistently higher mean BMI-sds (2.06 and 2.06), lower mean HDL-cholesterol (HDL-C, mmol/l) (1.2 and 1.1) and higher mean triglycerides (TG, mmol/l) (1.5 and 1.5) compared to T1D patients (BMI-sds 0.24 and 0.28; HDL-C 1.6 and 1.5; TG 0.8 and 0.9), respectively (all p< 0.001). Prevalence of dyslipidemia was higher in T2D, particularly for HDL-C and TG (Table).
Conclusions: Though the children with T2D were diagnosed later than T1D and had similar glycemic control as T1D, they had worse dyslipidemia that persisted during the study period. In addition to obesity, dyslipidemia may contribute to more severe complications in young-onset T2D patients than T1D patients.

Prevalence of dyslipidemia in children with type 2 diabetes compared to children with type 1 diabetes at each of the two Annual Review time-points.

	Annual Review 1			Annual Review 2		
Prevalence, % (n)	**Type 2 diabetes (n=58)**	**Type 1 diabetes (n = 141)**	**P value**	**Type 2 diabetes (n = 58)**	**Type 1 diabetes (n = 141)**	**P value**
Total cholesterol ≥ 5.2 mmol/2	41% (24)	30% (42)	0.14	36% (21)	31% (44)	0.51
HDL-cholesterol ≤1.0 mmol/l	31% (18)	6% (8)	<0.001	38% (22)	6% (9)	<0.001
Triglycerides ≥ mmol/l	16% (9)	2% (3)	0.001	12% (7)	1% (2)	0.003
LDL-cholesterol ≥ 3.4 mmol/l	43% (25)	22% (31)	0.005	35% (20)	23% (32)	0.11
Dyslipidemia (any one of the above)	66% (38)	36% (51)	<0.001	64% (37)	39% (55)	0.002

[Table accompanying the abstract by YS Tan, et al.]

eP192

Adipokine profiles can distinguish metabolically healthy versus unhealthy obese children: results from the Beijing Child and Adolescent Metabolic Syndrome Study

M. Li[1,2], J. Fu[1,2], G. Li[1,2], I. Esangbedo[3,4], D. Feng[5], S. Gao[5], S. Willi[4,6]

[1]Peking Union Medical College Hospital, Chinese Academy of Medical Science, Department of Endocrinology, Beijing, China, [2]National Health and Family Planning Commission, Key Laboratory of Endocrinology, Bejing, China, [3]Children's Hospital of Philadelphia, Health Weight Program, Philadelphia, United States, [4]Perelman School of Medicine at the University of Pennsylvania, Department of Pediatrics, Philadelphia, United States, [5]Chaoyang Hospital, Capital Medical University, Department of Endocrinology, Beijing, China, [6]Children's Hospital of Philadelphia, Department of Endocrinology/Diabetes, Philadelphia, United States

Objectives: The role of adipose tissue in determining the metabolic fate of those with obesity is not well studied. The current study examined the independent associations between adipokine levels and metabolically healthy obese (MHO) and metabolically unhealthy obese (MUO) phenotypes in childhood.

Design: This cross-sectional study included 1,137 obese, Chinese children (BMI ≥ 95th percentile, aged 6-18 years) and 982 normal weight healthy (NWH) controls. MHO was defined by the absence of any components of metabolic syndrome and/or insulin resistance using homeostasis model assessment. Serum adipokines including leptin, adiponectin, resistin, fibroblast growth factor 21 (FGF21), retinol binding protein 4 (RBP-4) and osteonectin (also known as secreted protein acidic and rich in cysteine or SPARC) were determined by ELISA, and assessed for their relationship to metabolic phenotype.

Results: After adjustment for confounders, MHO had a more favorable adipokine profile than MUO: lower osteonectin, leptin, RBP-4, and higher adiponectin (all $P < 0.05$). Compared to NWH, MHO displayed increased leptin, resistin and RBP-4 levels, and reduced adiponectin concentrations (all $P < 0.05$), but similar osteonectin and FGF21 levels. Among obese subjects, decreased levels of osteonectin (OR=0.82 per SD; 95% CI:0.70, 0.97), RBP-4 (OR=0.77; 95% CI: 0.64, 0.93), and leptin/adiponectin ratio (OR= 0.58; 95% CI: 0.43, 0.77) were independent predictors of MHO phenotype. In addition, compared to children with no adipokine abnormality, those with 3 abnormal adipokines were much less likely to exhibit the MHO phenotype (OR= 0.20; 95% CI: 0.10, 0.42), along with a higher risk of having metabolic syndrome (OR= 2.88; 95% CI: 1.58, 5.24).

Conclusions: These findings suggest that dysregulation of adipokines could govern the metabolic consequences of obesity, even in childhood. Moreover, osteonectin as well as a healthy adipokine profile might be used as the biomarker to identify the MHO phenotype.

ePoster Session 25 - Monogenetic Diabetes

eP193

Application of whole exome sequencing in the search of causative genes for Taiwanese patients with rare monogenic diabetes associated with ciliopathy

M.-C. Tsai[1,2], H.-W. Yu[3,4], P.-C. Chen[3,4]

[1]National Cheng Kung University Hospital, College of Medicine, Tainan, Taiwan, Province of China, [2]National Cheng Kung University, Department of Pediatrics, Tainan, Taiwan, Province of China, [3]Institute of Clinical Medicine, College of Medicine, Tainan, Taiwan, Province of China, [4]National Cheng Kung University, Tainan, Taiwan, Province of China

Objectives: Syndromic ciliopathies are a group of congenital disorders with broad clinical overlapping characteristics, including early onset of obesity and diabetes mellitus. The genetic profile of Taiwanese patients with ciliopathy has been previously described. The aim of this study was to use whole exome sequencing to identify the genetic causes for Taiwanese patients with rare monogenic diabetes associated with ciliopathy.
Methods: Patients receiving diagnosis of syndromic ciliopathies were recruited. We applied the probe hybridization method as the main strategy for exome sequencing enrichment. In a stepwise manner, whole-genome fragment DNA libraries were generated by Nextera DNA library prep kit (illumina). The exome captures from the DNA libraries were sequenced subsequently. Further, we used integrated computing programs to call the genetic variants for syndromic ciliopathies. Sanger direct sequencing was also used on the probands and their parents to verify genetic mutations called out.
Results: A total of 7 patients were included in this study. They all manifested central obesity and bilateral blindness of early onset in early childhood. Exome sequencing applied on these 7 patients identified candidate causative genes in BBS2, BBS7, and ALMS1 genes. These genetic variants were one novel c.534+1C>A and one recurrent c.1814G>C (p.Ser605Ter) mutations in BBS2 gene; one novel c.1688_1689delCT (p.Gly563Pro fsTer4) and one recurrent mutation c.728C>T (p.Cys243Tyr) in BBS7 gene; three novel mutations c.10290_10291delTA (p.Lys3431Ser fsTer10), c.10828_10829delAG (p.Arg3611Ala fsTer6), and c.7972C>T (p.Pro2658Ser) in ALMS1 gene.
Conclusion: Exome sequencing can provide accurate and efficient genetic diagnosis for clinical ciliopathic patients. Genotype-phenotype correlations should be further investigated with a large number of participants. Application of high throughput exome sequencing could be feasible in identifying causes for other rare monogenic diabetes.

eP194

High frequency of monogenic forms in gestational diabetes were demonstrated by targeted next-generation sequencing

N. Zubkova[1], F. Burumkulova[2], V. Petrukhin[2], M. Plechanova[2], A. Panov[2], T. Budyikina[2], V. Ulyatovskaya[2], N. Makretskaya[1], A. Tiulpakov[1]

[1]Endocrinology Research Centre, Moscow, Russian Federation, [2]Moscow Regional Research Institute of Obstetrics and Gynecology, Moscow, Russian Federation

Background: Monogenic forms of diabetes can manifest during pregnancy and misclassified as type 1, type 2 or gestational diabetes (GDM). About 10% of cases of gestational diabetes are shown to be due to the most common forms of monogenic diabetes, such as glucokinase (*GCK*) and hepatocyte nuclear factor 1 alpha (*HNF1A*) defects. We suggest that using a next generation sequencing (NGS) approach may increase the mutation yield in GDM.
Objective and hypotheses: To define molecular basis of GDM using a targeted NGS.
Methods: 178 patients with GDM were studied according to the inclusion criteria. 'Diabetes panel' genes were sequenced using a custom Ion Ampliseq gene panel and PGM semiconductor sequencer (Ion Torrent). Bioinformatic analysis was carried out using Torrent Suite 4.2.1 and ANNOVAR software packages. Assessment of the pathogenicity of sequence variants was performed according to international guidelines.
Results. In 71 patients (39,9%) 65 different sequence variants (all heterozygous) were identified that were classified as pathogenic, likely pathogenic or variants of unknown significance. The majority of variants were detected in *GCK* gene (55%, n=36), including missense mutations (n=32), deletions with frameshifts (n=2), deletions without frameshifts (n=1) and splicing mutations (n=1). Missense variants were also detected in *HNF4A* (n=1), *HNF1A* (n=2), *HNF1B* (n=1), *INSR* (n=5), *GLIS3* (n=2), *KCNJ11* (n=2), *PAX4* (n=1) and *PTF1* (n=2). Digenic or oligogenic variants were detected in 4 patients.
Conclusions: The results demonstrate high frequency of mutations in patients with GDM. The molecular findings were consistent with the phenotype only in the *GCK*/GDM cases. Other mutations/factors may also play a role in development of GDM.

eP195

European Reference Network on Rare Endocrine Conditions (Endo-ERN): mapping children and young people with rare diabetes in Europe

T. Barrett[1], A. Schwandt[2], D. Pacaud[3], M. Witsch[4], A. Hattersley[5], T. Danne[6], on behalf of the EURO-WABB Investigators, the SWEET investigators, and Genetic Disorders of Glucose and Insulin Homeostasis main thematic group co-leads (AH and TD)

[1]University of Birmingham, Institute of Cancer and Genomic Sciences, Birmingham, United Kingdom, [2]University of Ulm, Institute of Epidemiology and Medical Biometry, ZIBMT, Ulm, Germany, [3]University of Calgary, Alberta Children's Hospital Research Institute, Calgary, Canada, [4]Centre hospitalier de Luxembourg, DECCP - Diabetes Endocrinology Care Clinique pédiatrique, Luxembourg City, Luxembourg, [5]University of Exeter, Institute of Biomedical Science, Exeter, United Kingdom, [6]Children´s Hospital AUF DER BULT, Hannover, Germany

Introduction: Rare forms of diabetes (less than 1 in 2,000) are difficult to diagnose, manage and research due to small and widely dispersed populations. This has slowed the development of therapies. European Reference Networks (ERNs) are virtual networks involving healthcare providers, aiming to improve patient care. Endo-ERN (http://endo-ern.eu/) includes the main thematic group: genetic disorders of glucose and insulin homeostasis, that will: a) develop well phenotyped cohorts of patients with rare diabetes; b) facilitate clinical trials of new treatments; c) develop consensus guidelines and health care professional training. We aimed to scope the feasibility for identifying patients with rare diabetes in Europe.
Methods: The ISPAD Rare Diabetes Resource offers molecular genetic testing on most monogenic forms of diabetes. The SWEET consortium comprises pediatric diabetes clinics collecting diabetes-related information from 37 centres in Europe. The EURO-WABB registry comprises patients with monogenic diabetes syndromes from 16 EU states. The SWEET and EURO-WABB registries were accessed to identify numbers of patients with monogenic diabetes under follow-up in these centres.
Results: Across 53 European centres, there were 351 patients with Maturity Onset Diabetes of the Young (MODY); 245 with Cystic Fibrosis Related Diabetes (CFRD), 183 with Wolfram syndrome, 144 with Bardet Biedl, and 74 with Alstrom syndrome. In the SWEET database, 94.72% of patients had type 1 diabetes, 1.75% type 2, and 3.53% other forms of diabetes.

Summary and Conclusions: We show that it is possible to identify patients with rare diabetes and pool information to support phenotyping. However, our prevalence estimates suggest that many patients with rare diabetes may not be correctly identified. EndoERN will share diagnostic tools, clinical outcome data, management advice, and facilitate research to support health professionals in improving care for these difficult to reach groups of patients.

eP196
High frequency of obesity in MODY-HNF1A children

E. Sechko[1], L. Zilberman[1], T. Kuraeva[1], V. Peterkova[1]

[1]*Endocrinology Reserch Centre, Moscow, Russian Federation*

Background: Maturity onset diabetes of the young (MODY) is the most common form of monogenic diabetes characterized by pancreatic B-cell dysfunction, early onset, autosomal dominant mode of inheritance, non-insulin dependence and absence of pancreatic autoimmunity markers. MODY with obesity is often misdiagnosed as type 2 diabetes.
Methods: 199 unrelated children (age of the diagnosis< 18 years) with clinical diagnosis MODY were screened for mutations in *GCK* and *HNF1A*. MODY was confirmed in 110 patients: MODY-HNF1A in 23 patients (11.6%), MODY-GCK in 87 patients (43.7%). We studied clinical and laboratory characteristics of MODY-HNF1A children.
Results: 17.4% of MODY-HNF1A patients (4/23) had clinical features of diabetes (polyuria, polydipsia), age of the diagnosis was 12.0 years [9.8; 15.4]. 95.6% (22/23) of patients had diabetic parents. MODY-HNF1A was confirmed by genetic analysis at 14.3 years [10.5;17.5]. HbA1c was 6.4% [6.1; 7.7]. SDS BMI was 1.6 kg/m2 [-0.17;2.3]. Prevalence of obesity (SDS BMI>2) was 39.1% (9/23). Age of diagnosis of diabetes was inversely correlated with SDS BMI (r=-0.461, p=0.041). Fasting glucose level was 5.0 mmol/l [4.8;6.5], fasting insulin level was 5.9 mU/ml [4.9;10.4], C-peptide was 1.8 ng/ml [1.5;2.1]. Insulin resistance (IR-HOMA>3.2) was diagnosed at 3 patients with MODY-HNF1A (13.0%). IR-HOMA was significantly correlated with SDS BMI (r=0,513,p=0,042). 78,3% of MODY-HNF1A patients were treated with hypoglycemic agents (65,2% (15/23) with sulfonylurea, 8,7% (2/23) with metformin, 4,4% (1/23) with insulin).
Conclusions: We identified high frequency of obesity in MODY-HNF1A children. Obesity was a risk factor for early manifestation MODY-HNF1A. Obesity was associated with insulin resistance and changed pharmaceutical therapy. Children with obesity and mild diabetes, negative for islet autoantibodies, family history of diabetes should be referred for MODY genetic testing.

eP197
Newly described mutation in the *HNF4A*-gene (MODY1) as a cause for diabetes

N. Datz[1], M. Fath[1], T. Biester[1], G. Wildhardt[2], D. Steigenberger[2], T. Danne[1], O. Kordonouri[1]

[1]*Children's Hospital Auf der Bult, Diabetes Centre for Children and Adolescents, Hannover, Germany,* [2]*Centre for Human Genetics, Frankfurt am Main, Germany*

Objective: Maturity Onset diabetes of the young (MODY) is a monogenic diabetes form. It is characterized by an early onset, autosomal dominant inheritance and a primary defect in pancreatic beta-cell function. It accounts for 1-4% of paediatric diabetes cases. The clinical relevance of testing for MODY will be shown with this case report.
Case report: We describe a case of a boy who was diagnosed with type 1 diabetes at the age of 14 years. HbA1c was 9.0%, he had no diabetic ketoacidosis, no ketones in urine and was negative for diabetic associated antibodies. He was treated with a multiple daily injection therapy. His father was diagnosed with type 2 diabetes. After 8 months, the boy had very low doses of insulin (0.28 units/kg/day), and an HbA1c of 6.3%. Due to the family history and the negative diabetic associated antibodies a diagnostic for MODY was performed.
Methods: Molecular genetic analysis of the *HNF4A*-gene showed a novel heterozygous mutation: c298delC(p.Arg100Glyfs*4). The affected father carried the same mutation.
Results: Mutations in the *HNF4A*-gene can cause MODY1. In the beginning of the disease patients show postprandial hyperglycaemia and do not develop ketosis. Furthermore, they develop a fasting hyperglycaemia and have the same risk for chronic complications as patients with type 1 or type 2 diabetes. The patients are extremely sensitive to sulfonylureas which allow better glycemic control than insulin. The boy was put on Repaglinide (Novonorm®) 0.5mg for main meals. Glycaemic control improved (HbA1c between 5.7% and 6.1%) without any hypoglycaemic events.
Conclusion: Diagnosis of MODY is important as it can lead to a reclassification of the primary diagnosis and substantial change of treatment of the patient and other affected family members. The combination of having a positive family history for diabetes, negative diabetic associated antibodies and low insulin requirements should lead to molecular genetic analysis for MODY.

eP198
Monogenic diabetes in Pakistani infants and children: challenges in a resource poor country

M. Ibrahim[1], R. Baloch[1]

[1]*National Institute of Child Health, Endocrinology, Karachi, Pakistan*

Objective: to review the data of infants and children who were diagnosed and confirmed cases of monogenic diabetes on genetic testing.
Background: monogenic diabetes is a type of diabetes resulting from mutations of a single gene. It can be spontaneous denovo or may be autosomal dominant or recessive. Consanguineous marriages are highly prevalent in Pakistan population. So this is the risk of genetic disorders is quite high. Being a resource poor country not only the diagnosis of Type 1 IDDM is often delayed but diagnosis of monogenic diabetes is almost impossible. However from last 5 years we are not only diagnosing monogenic diabetes but confirming their genetic diagnosis from the Exeter Medical School Research Laboratory UK.
Results: Being a referral hospital NICH we have almost 660 registered cases of Type 1 diabetes at our diabetes clinics. We have sent the blood samples of the infants who were diagnosed as having type 1 diabetes in less than one year of age and of the children who were older but having high index of suspicion of mono0genic diabetes.

In infants who were having type 1 diabetes in less than one year 2 cases of Wolcott Rallison (EIF2AK3) mutation and 2 cases of DEND syndrome (KCNJII) were confirmed. Similarly, 1 case of GCK glucokinase mutation was confirmed which later changed their management.

In older children DIDMOAD and thiamine responsive megaloblastic anemia were confirmed in four cases. Two siblings of (HLPH) Histocytosis Lymphadenopathy were also confirmed. Both were having (SLC29A3) homozygous mutation. In two patients no known mutations was identified.
Conclusion: Confirmed diagnosis of monogenic diabetes can be made by molecular genetic testing. This will help in case management and future counselling, so there is great need to address on the diagnosis of monogenic diabetes in largely consanguineously married population of Pakistan.

eP199
Glucose tolerance abnormalities and related factors in pediatric subjects with cystic fibrosis aged 6-9 years

L. Suárez-Ortega[1], M. Cols Roig[2], J. Costa Colomer[2], R. Cardona-Hernandez[1], M. Ramón Krauel[1]

[1]*Hospital Sant Joan de Déu, Division of Endocrinology, Diabetes Unit, Barcelona, Spain,* [2]*Hospital Sant Joan de Déu, Pediatric Pulmonology and Cystic Fibrosis Unit, Pediatrics Department, Barcelona, Spain*

Glucose tolerance abnormalities (GTA) in cystic fibrosis (CF) subjects are associated with increased morbidity. International guidelines recommend annual screening for GTA with an oral glucose tolerance test (OGTT) in all CF subjects starting at age 10. Nevertheless, some studies suggest starting screening at a younger age. The objective of this study was to assess early GTA and associated risk factors.

Methods: Retrospective study of CF subjects aged 6-9.9 years (17 subjects) followed in a tertiary pediatric center. Annual OGTT was routinely performed as part of regular clinical follow-up during the period 2013-2016. The risk to developing GTA was correlated with the following parameters: age, sex, genotype, pancreatic exocrine insufficiency, chronic colonization by Pseudomonas aeruginosa and methicillin-resistant Staphylococcus aureus (MRSA), Allergic Bronchopulmonary Aspergillosis (ABPA) and forced expiratory volume in the first second (FEV1).

Results: Data of 17 subjects (64.7% female) were collected. GTA were found in 10/17 screened subjects. Prevalence of GTA was 28.57% at the age of 6 and increased up to 50% at the age of 8 and 9. Regarding subjects with GTA, 9 were female [RR 4,909 (95% CI, 0,803; 30,019)], 9 carried two severe mutations (classes I, II, III) and 9 presented with pancreatic insufficiency [RR 2,769 (95% CI, 0,488; 15,709)], P. aeruginosa and MRSA chronic colonization were present in 4 and 1 subjects respectively [RR 2,4 (95% CI, 1,229; 4,688)]. Episodes of ABPA were found in 2 subjects [RR 1,875 (95% CI, 1,168; 3,010)] while the presence of FEV1< 90% was noted in 5 subjects [RR 2,4 (95% CI, 1,29; 4,688)].

Conclusions: Prevalence of GTA increase as patients with CF get older when screened at the age of 6-9 years. Most of them were asymptomatic and were diagnosed with OGTT. Bacterial chronic colonization, FEV1< 90% and ABPA were associated with GTA. Further studies are needed to determine if annual OGTT screen should be advised at a younger age.

eP200
Study of glucose intolerance disorders in a cohort of patients with cystic fibrosis in Reunion Island

M. Hoarau[1], O. Maillard[2], C. Tasset[3], A. Dumonceaux[4], M. Lang[4], A. Payet[5], E. Bismuth[6], L. Houdon[3]

[1]CHU de la Réunion, Service de Pédiatrie Générale, Saint-Pierre Cedex, France, [2]CHU de la Réunion, Centre d'Investigation Clinique, Saint-Pierre, France, [3]CHU de la Réunion, Service de Pédiatrie Générale, Saint-Pierre, France, [4]Hopital d'Enfants, Saint-Denis, France, [5]CHU de la Réunion, Service de Pneumologie, Saint-Pierre, France, [6]Hopital Universitaire Robert Debré, Endocrinologie et Diabétologie Pédiatriques, Paris, France

Objective: Reunion Island, a French overseas territory of 852,000 inhabitants, has a higher prevalence of cystic fibrosis than French national prevalence, with specific genetic characteristics. The objective was to describe a cohort of patients with cystic fibrosis, in Reunion Island, in terms of their glucose tolerance disorders.

Methods: An observational, retrospective study included exhaustively patients with cystic fibrosis disease managed in 2 reference centers , in Reunion Island, between September 2016 and March 2017. Their glucose tolerance profile was determined by using their Oral Glucose Tolerance Test (OGTT).

Results: 117 patients were included, including 52 women, aged 0-56 years (mean age 14.59 years). The prevalence of cystic fibrosis is estimated at 13.73 per 100,000 people. 20 patients (17.1%) have cystic fibrosis-related diabetes, 33 (28.2%) have impaired glucose tolerance (IGT), 28 (23.9%) had normal glucose tolerance (NGT).34% of those over 18 years are were patients with diabetes. Y122X is a mutation of class I specific to the island, 43 patients (36.75%) were carriers of that mutation. There was no relationship between the mutation Y122X and glucose tolerance. 36 patients (30.8%) did not had an OGTT because of their young age. The mean age at diagnosis of diabetes was 18.3 years [9.2-34.9], 9 patients with diabetes were on insulin injection and 3 were on hypoglycaemic sulfonamide. None of the 33 patients, with impaired glucose tolerance, were on insulin or hypoglycaemic sulfonamide. Some patients received continuous glucose monitoring for diagnostic and therapeutic purposes.

Conclusion: The prevalence of cystic fibrosis-related diabete ,in Reunion Island, was close to the French national prevalence, despite having a genetic specific population. The use of new technologies in diabetes opens new perspectives.

ePoster Session 26 - School Issues

eP202
Schooling diabetes: a survey of type 1 diabetes (T1D) exchange participants describing the care provided to youth with T1D in the school setting

J. Sherr[1], M. Wu[2], N. Foster[2], K. Miller[2], W. Tamborlane[1]

[1]*Yale University School of Medicine, New Haven, United States,* [2]*Jaeb Center for Health Research, Tampa, United States*

Objectives: Youth with T1D spend 25% of the day in school. Yet the care provided there is not standardized and little is known about the state of school-based management.
Methods: Parents of T1D Exchange participants < 13 y.o. were invited to complete a questionnaire module on diabetes management at school. Data on demographics, school level, presence of formalized management plans, and which staff could assist with T1D management were collected; responses from home-schooled youth were not analyzed.
Results: 728 participants (mean age 8.9yrs, mean A1c 8.2%, median T1D duration 4yrs, 50% female, 82% non-Hispanic white) were analyzed. Insulin pumps were used by 75% and nearly half were using a continuous glucose monitor. Most reported having a formalized plan for accommodations, yet this was less frequent in the youngest group (Table). Access to a school nurse was noted to be sometimes (21%) or not at all (17%); therefore, others were identified to assist students. Yet 25% of students had no one identified other than the school nurse to provide assistance. While 94% of the cohort kept glucagon at school, personnel who could treat a severe hypoglycemic event varied.
Conclusions: Multiple school-based staff support children with T1D. Despite its availability, glucagon use may be limited due to lack of trained individuals. Ensuring that youth with T1D have access to trained personnel who can assist in the school setting is paramount to allow them to safely achieve targeted control.

	Entire Cohort (n=728)	Pre-K to Kindergarten (n=87)	Elementary School (n=420)	Middle School (n=221)
Formalized Accommodations Plan at School (504 Plan)				
Yes	69%	47%	70%	76%
No	27%	48%	26%	21
Don't Know	4%	5%	5%	4%
Is there a school nurse?				
Yes	62%	48%	66%	60%
Sometimes	21%	33%	14%	17%
No	17%	18%	20%	24%
Who can assist, other than a nurse, while the child is at school?	(n=728)	(n=58)	(n-363)	(n-184)
Administrator	24%	19%	20%	21%
Administrative Assistant	27%	21%	27%	23%
Coach	6%	2%	4%	13%
Health Aid	7%	12%	7%	6%
Parent	2%	0%	1%	2%
No One	25%	21%	27%	34%
Is glucagon kept at school?	(n=728)	(n=87)	(n=420)	(n=221)
Yes	94%	93%	96%	91%
Who can administer glucagon in the situation of severe hypoglycemia?	(n=684)	(n=81)	(n=401)	(n=202)
Nurse	49%	38%	51%	50%
Teacher	41%	53%	39%	41%
Administrator	31%	33%	31%	31%
Coach	8%	4%	7%	13%
Health Aid	4%	3%	5%	3%
No One	3%	5%	3%	4%
Parent	1%	4%	1%	0

A seaction 504 is the part of the U.S. federal civil rights law that prohibits discrimination against public school students with disabilities and it outlines how a child's specific needs are met with accommodations, modifications, and services.
[Table]

eP203
Where and how do type 1 diabetes children manage the insulin therapy at their school?

T. Kawamura[1], Y. Hotta[1], N. Nishikawa[1], T. Higashide[2], T. Hashimoto[2], K. Hashimura[1], S. Aono[3], K. Kimura[4], Y. Kashihara[2], M. Aono[3], M. Hirose[5]

[1]*Osaka City University Graduate School, Osaka, Japan,* [2]*HUG HUG Kids Clinic, Osaka, Japan,* [3]*Teradacho Kodomo Clinic, Osaka, Japan,* [4]*Kimura Clinic, Osaka, Japan,* [5]*D Medical Clinic Osaka, Osaka, Japan*

Background: Type 1 diabetes children need the disease management such as insulin injection and self-monitoring of blood glucose (SMBG) at school. Ideally, they had better to perform those procedures in their classroom without any disturbance if they want. However, because of unknowledge of school, some children had experienced to be forced to do that in the other room, such as the healthcare room. We have made the lectures and meetings to school annually more than 15 years.
Objective: To see how the type 1 diabetes patients can perform their disease management at school.
Method: A questionnaire survey was performed to 150 type 1 diabetes patients who were the primary school and junior high school students, visiting to the pediatric clinic of Osaka City University Hospital in 2016.
Results: The data were obtained from 99 patients. Seventy-four children treated with Pump therapy, and 25 children with multiple daily injection (MDI). Seventy-one did SMBG at their classroom. There were seven children who perform that at a health care room or the staff room. Eighty-seven children (87.9%) could to do that at the places where they requested by themselves. On the contrary, 7 children must do that at the place where was requested by school (7.1%). Similarly, 83.8 % of children could to inject insulin at the place where they wished. Seven children (7.1%) did that at the place where school wanted instead of their wish. There was no difference of the results between MID and pump. In response to the question of whether the school is cooperative, 91.9 % was yes. However, some children experienced the misunderstand of school such as, "You should go to the support school" and "You should not join the sport club".

Conclusion: More than 80% of type 1 children could perform their disease management as their wish at school. Our advocacy to school seemed to be effective but not perfect.

eP204
'GlucaGen HypoKit in children with diabetes'- is it accessible to all parents/carers and all schools? A survey

P. Maiden[1], J. Dias[1], A. Burton[1], U. Parkash[2], A. Gupta[2], P. Hindmarsh[2], M. Ford-Adams[2], F. Campbell[2]

[1]*Families with Diabetes National Network, London, United Kingdom,* [2]*National Children and Young People's Diabetes Network, London, United Kingdom*

Objective: The Families with Diabetes National Network is a parents' reference group for the National Children/Young People's Diabetes Network with the aim of providing a forum for communication between the network & the parents of children/young people with diabetes & supporting the development of a National Diabetes Service Improvement Delivery Plan for children/young people.
Aim: To get a national picture of the availability of Glucagon for parents & carers & its presence in schools.
Method: A 3 questions survey was posted in many Facebook groups for families of children with Type 1 diabetes; Have your team prescribed a Glucagon hypo kit?, Do you carry the Glucagon hypo kit with you?, Does your child's school have access to the Glucagon Hypo kit?
Results: 881 responses were received.

A significant number of families were unaware that Glucagon even existed, & of the number who were aware of it, more than a third had not been trained in its use. A quarter of all who responded never carry a Glucagon hypo kit with them, even if away on holiday, again this highlighted a concern regarding the education of severe hypos.

When it came to schools, only 15% of the schools that had a kit on site had been trained on how to administer it & were happy to do so if necessary. The figures doubled when schools carried the Glucagon on site but only for the parents/paramedics to administer. Likewise, the number of schools who refused to have Glucagon on site on the hospital team's recommendation is twice as many as those who have refused of their own accord. 26% of the parents that replied said that they would prefer school not to have Glucagon on site or administer it.
Conclusion: The findings were concerning on use of glucagon in severe hypos. All families & children should have the option to have access to glucagon & should have training for its use. All the schools should have appropriate & regular training on glucagon use in severe hypos.

eP205
Parental perspectives on type 1 diabetes management in Australian schools - illegal and immoral?

P.W. Goss[1], J.L. Goss[1], H.A. Goss[2]

[1]*Team Diabetes, Geelong, Australia,* [2]*University Hospital Geelong, Geelong, Australia*

Objectives: To obtain parental perspective on the delivery of diabetes (T1D) care in Australian schools.
Methods: An on-line anonymous parent survey conducted in late 2016 comprised themes of perceived school support, education, training, consent, and child and family impact. Responses used frequencies and percentages for categorical data then filtered those reporting feeling supported or unsupported. Responses were analysed against Australian medicolegal framework.
Results: 174 respondents reported similar results at all grade levels and at both state and privately funded schools.

Parents (89%), clinicians (56%) and government agencies (22%), currently provide school staff education with 18% school staff adequately trained to supervise or administer insulin. 74% parents did not give legal consent and 51% did not have a written action plan. 29% reported discrimination (21% primary, 42% secondary).

38% parents who felt unsupported at school (31% primary, 50% secondary $p< 0.05$) reported 45% discrimination compared to 11% of those feeling supported ($p< 0.01$) and felt their school did not consider T1D a significant priority (56% vs 11%) ($p< 0.01$). Medical team involvement appeared to be more reactive than proactive.

26% parents ceased employment to support their child's school management, 24% felt themselves nuisances and 12% changed schools. Parents consider 90% of T1D children receive inadequate Government funding.

Despite a generic T1D information initiative, Victoria was reported more negatively than other states.
Conclusions: Most Australian schools neither meet T1D medicolegal requirements nor fulfil duty of care requirements which expose many T1D students to unlawful discrimination.

Current strategies of T1D education and training of Australian school staff are failing badly.

Diabetes teams are medicolegally responsible for health outcomes, are under-resourced and are not providing necessary input.

This grossly unacceptable situation increases burden on families.

eP206
Multidisciplinary collaboration and training on a diabetes and endocrine team with psychology graduate students

K. Newton[1], T. Sharifan[1], L. Edwards-Leeper[1], S. Yigit[2]

[1]*Pacific University, School of Graduate Psychology, Hillsboro, United States,* [2]*Legacy Emmaul Randall Children's Hospital, Pediatric Endocrinology, Portland, United States*

Objective: Recent healthcare reform has emphasized patient-centered care and decreasing health care costs through integrating mental and physical health care. In diabetes care, mental health professionals can assess and treat psychosocial issues common in children and adolescents who have Type 1 diabetes. This poster outlines a novel model for integrating psychology graduate students into a pediatric diabetes team and explores resulting short-term patient outcomes.
Methods: Clinical psychology graduate students were integrated into a pediatric endocrine clinic to provide brief interventions related to adjusting to a new diagnosis, diabetes burnout/distress, and co-morbid mental health concerns. Screening measures were administered to pediatric patients at each medical appointment. Patients were referred to psychology students when concerns were noted on mental health screeners and for elevated HbA1c levels. Outcome measures including screener results of brief measures of depression, anxiety, and eating disorders as well as changes in HbA1c after psychology interventions were obtained with retrospective chart review.
Results: Results indicated 18% (n= 272) of children (ages 4-11) had elevated psychological distress and 8% were referred to psychology. In adolescents, (ages 12-18), 17% (n= 480) reported elevated distress and 16% were referred to psychology. HbA1c results were reviewed before the visit with psychology and 6 months after the visit. Mean HbA1c (%) after psychology intervention (9.63 +/- 2.20) was significantly lower than the mean HbA1c before psychology intervention (10.57 ± 2.38) with $p < 0.001$.
Conclusions: Results demonstrate the utility of incorporating psychology into the diabetes multidisciplinary team. This can also be achieved with a novel training model which includes a collaboration between psychology students, endocrinologists, and diabetes educators for the purpose of addressing biopsychosocial aspects of diabetes.

eP207
Diabetes goes wild at the zoo. High school transition event

C.A. Tulloch[1], K.J. Noyes[1], F. McKenzie[1], R.T. Mitchell[1], L. Owens[1], R.H. Burns[1], L. Duff[1], A.M. Gentil[2], S.C. Ross[2], F. Muller[3], L.E. Bath[1]

[1]NHS Lothian, Department of Endocrinology & Diabetes, Edinburgh, United Kingdom, [2]NHS Lothian, Paediatric & Liaison Service, Edinburgh, United Kingdom, [3]Portobello High School, Edinburgh, United Kingdom

Objectives: Transition to secondary education is daunting for young people with diabetes. We aimed to create a fun, innovative and interactive event outwith clinic, to provide reassurance, promote independence and support transition planning. Guided discussion encouraged problem solving and reflection on proactive diabetes management.

Methods: A team of dietitians, doctors, psychologists, a diabetes specialist nurse, a school support assistant and a dietetic support worker created and ran the event. Edinburgh & Lothians Health Foundation provided funding. All diabetes patients, 10-12 years, attending NHS Lothian in the final 2 years of primary school were invited along with 1 accompanying adult. The event was at Edinburgh Zoo on a school day. Attendees were randomly assigned into 4 groups at a welcoming assembly. Groups participated in 4 interactive workshops (40 mins each), a coffee break and a graduation ceremony with certificates. The 4 bespoke workshops were run by dietitians, doctors, psychologists and a nurse/school assistant, following lesson plans. Families completed an evaluation form. Attendees had free entry into the zoo afterwards.

Results: 63 young people were invited. 37 (59%) attended: 54% insulin pump therapy and 46% basal bolus regimen. Mean HbA1c 59 mmol/mol (n=36), 1 newly diagnosed patient was excluded. Average diabetes duration 4.09 years (0-11). There was active participation from children and adults. During coffee breaks the adults chatted and children played together. Families grouped together to explore the zoo. The day was positively rated 8.8/10 (range 6-10) from 35 (92%) evaluation forms. 3 families emailed with additional positive feedback.

Conclusions: This high school transition event was well attended and well received. We plan to repeat this biennially as part of routine diabetes education for young people in NHS Lothian. Similar events for transition to primary school and prior to state exams are also being considered.

eP208
Perspectives of older adolescents with type 1 diabetes (T1D) on self-care responsibilities: patterns across racial/ethnic groups

A. Butler[1], C. Titus[1], B. Anderson[1]

[1]Baylor College of Medicine & Texas Children's Hospital, Department of Pediatrics, Houston, United States

Objectives: In the U.S., racial/ethnic minority adolescents with T1D have poorer health outcomes. The ADA recommends that T1D care responsibilities gradually shift from parents to teens during late adolescence (15-19 yrs.) to optimize health outcomes. Yet, little is known about how diabetes management responsibilities are divided in families of older teens. The aim of this study was to describe older teens' perspectives on how diabetes management responsibilities are divided within their families and explore differences by ethnic/racial group.

Methods: Thirty older adolescents (Mean age =17.1 yrs.) with T1D--non-Hispanic white (n = 11), Hispanic (n = 10), and African American (n = 9) --were recruited. Participants completed a structured interview via phone or in-person to determine their perspectives. Interviews were audio-recorded, transcribed, and codes were extracted using thematic analysis.

Results: Non-Hispanic white teens indicated that diabetes management tasks are equally shared between parents and teens or primarily carried out by the teen with some parent involvement. Hispanic teens indicated less parent involvement in care responsibilities ranging from tasks being equally shared, to the teen having sole responsibility for their care. African American teens indicated that they were either primarily responsible for their care with some parent involvement, only assisted by their parents in emergency situations, or solely responsible. Intentional shifting of care responsibilities from parent(s) to the teen was reported by non-Hispanic white and Hispanic teens, but not African Americans.

Conclusions: Having sole responsibility for their care during late adolescence may contribute to poor glycemic control in Hispanic and African American teens. Hispanic and African American families may benefit from interventions that emphasize family teamwork in diabetes management and that aim to help parents gradually transition care responsibilities during late adolescence.

ePoster Session 27 - Developing Countries

eP209

Triglyceride to HDL-C ratio levels in indigenous Argentinean children living at different altitudes

V. Hirschler[1,2], G. Maccallini[3], C. Molinari[2], P. Intersimone[4], M. Hidalgo[3], C. Gonzalez[2], San Antonio de los Cobres Study Group

[1]Durand Hospital, Capital Federal, Argentina, [2]University of Buenos Aires, Buenos Aires, Argentina, [3]Hidalgo Laboratories, Buenos Aires, Argentina, [4]Chicoana Hospital, Salta, Argentina

Background: Insulin resistance is considered one of the major risk factors for the development of type 2 diabetes mellitus (T2DM). Triglyceride (TG) to HDL-C ratio (TG/HDL-C) has been proposed as a good surrogate for insulin resistance.
Objective: To determine the association between TG/HDL-C and altitude in two groups of indigenous Argentinean children living at different altitudes
Methods: A cross-sectional study of 142 (66 females) Indigenous school children (4-14 years) from San Antonio de los Cobres (SAC), 3750 m above sea level, and 171 (86 females) from Chicoana (CH), 1300 m, were assessed for anthropometry, blood pressure, lipids, glucose, and insulin levels.
Results: There was not a significant difference in age between SAC (9.0 y) and CH (9.1 y) children. The prevalence of children's overweight/obesity was significantly lower in SAC 11.2% (17) than in CH 42%(74) (BMI >85%ile per CDC norms). Mean children's weight (29 vs 37 kg), height (130 vs 137 cm), BMI (17 vs 19 kg/m^2), HDL-C (46 vs 48 mg/dL), and insulin levels (5.3 vs 6.9 IU/L) were significantly lower in SAC than in CH, respectively. In contrast, systolic blood pressure (87 vs 70 mmHg), cholesterol (157 vs 148 mg/dL), TG (104 vs 88 mg/dL), and TG/HDL-C ratio (2.4 vs 1.9 mg/dL) were significantly higher in SAC than in CH. There was not a significant difference in glucose (84 vs 80 mg/dL) between SAC and CH. Multiple linear regression analysis showed that children's TG/HDL-C ratio was significantly associated with altitude, BMI, and insulin levels; adjusted for confounding variables (R^2=0.17).
Conclusion: This study shows that SAC children had significantly higher TG/HDL-C ratio than CH children, suggesting that high altitude could be associated with higher risk for future T2DM independently of ethnicity.

eP210

Dyslipidemia and diabetic kidney disease [DKD] in poverty associated childhood diabetes in India: prevalence correlates and challenges

K. Chethana[1,2], S. Srikanta[2], H. Akshaya[2], S. Amitkumar[2], T. Babitadevi[2], M.D. Chitra[2], K. Muralidhar[2], K. Rajeev[2], B.V. Reshma[2], M. Sapna[2], A. Sumitra[2], N. Vasanthi[2], S. Vasudha[2], R. Vibha[2], T. Jayalakshmi[2], M. Kavitha[2], Samatvam Jnana Sanjeevini Diabetes Collaborative Study Group

[1]Samatvam Endocrinology Diabetes Center, Diabetes Endocrinology, Bangalore, India, [2]Jnana Sanjeevini Diabetes Hospital and Medical Center, Diabetes Endocrinology, Bangalore, India

Aims: Analyse prevalence and correlates [2011-2017] of dyslipidemia and diabetic kidney disease in a cohort of economically underprivileged children with type 1 diabetes [onset 1-18 y] DISHA Free Clinic, India.
MethodsDISHA: Beginning 1987, 3000+ children provided free insulin, syringes, health counselling, 24 h help lines. Since 2006, BG meters and 5-10 strips/month added. Basal bolus insulin [meal time regular + bedtime NPH] 100%.
DISHA + CDiC/LFAC: 2011-ongoing: [Changing Diabetes in Children and Life for a Child with Diabetes] 343 children receiving enhanced support - 30 BG strips/ month, limited biochemical evaluations [TSH, quarterly HbA1c, annual urine albumin: creatinine ratio].
Results: Types: I. Type 1 Diabetes 95%; II. Type 2 Diabetes 1%; III. Other Specific Types 4%.
Rural: Urban= 48 : 52.
Follow up= 3.3 y.
HbA1C trend (%) Initial vs Latest: Improvement: 39%; Stable: 50%; Worsening: 11%.
Nephropathy prevalence (%) Initial vs Latest: Nil= 60 vs 66; Microalbuminuria= 33 vs 27; Macroalbuminuria= 8 vs 8. On ACE inhibitors / ARB = 25%.
Retinopathy: Non-proliferative: 3%; Proliferative 1%.
Hypothyroidism: 21% [At enrolment 13%; new diagnosis 9%].
Acute myocardial infarction: One 20 y girl with T1DM from age 4y.
Dyslipidemia: N= 76; on latest follow up.
Conclusions: Philanthropy based highest possible standards of medical care, resulted in improvements in glycemic control and lipid profiles and decrease / retardation of acute and chronic complications of childhood type 1 diabetes in a resource limited setting. Dedicated combination of **physical** [medical] and **"spiritual"** [empathy and love] support can foster better health and longevity of economically underprivileged T1DM children all over the world.

eP211

Activity of lipoprotein-associated enzymes in Argentinean indigenous children living at different altitudes

V. Hirschler[1], C. Molinari[2], E. Botta[2], W. Walter Tetzlaff[2], G. Maccallini[3], F. Brites[2], San Antonio de los Cobres Study Group

[1]Durand Hospital, Capital Federal, Argentina, [2]University of Buenos Aires, Buenos Aires, Argentina, [3]Hidalgo Laboratories, Buenos Aires, Argentina

Background: A low level of HDL cholesterol (HDL-C) is a known risk factor for type 2 diabetes (T2DM). Not only HDL-C levels, but also different lipoprotein-associated enzymes have been shown to be altered in T2DM.
Objective: To determine the association between PON-1 and CETP activities and altitude in two groups of Argentinean Indigenous school children who live permanently at different altitudes.
Methods: This was a cross-sectional study comparing 151 (80 females) schoolchildren from San Antonio de los Cobres (SAC), 3750 m above sea level with 175 (86 females) from Chicoana

Glycemic control [%]	Age Onset Years	Duration Years	HbA1c %	Urine ACR mcg/mg	S Creatinine mg/dl	T Chol mg/dl	LDL Chol mg/dl	HDL Chol mg/dl	Trig mg/dl
HbA1c < 8 [30]	12.4	8.6	7.1	46	0.67	174	93	57	113
HbA1c 8 - 10 [38]	10.5	7.3	8.3	32	0.54	199	101	59	193
HbA1c > 10 [32]	9.6	6.8	11.9	41	0.51	216	104	52	293
P value			<0.001		0.02	0.01			<0.0001

[Glycemic control, dyslipidemia, kidney disease]

(CH), 1400 m. Data for children's anthropometry, lipids, apo A1, apo B, and PON-1 and CETP activity were assessed.
Results: There was not a significant difference in age between SAC (9.7 ± 2 y) and CH (9.4 ± 2 y) children. The prevalence of children's overweight/obesity was significantly lower in SAC 17.2% (26) than in CH 42.5%(74) (BMI >85%ile per CDC norms). Mean z- BMI (0.3 vs 0.7), HDL-C (38 vs 40 mg/dL), apo A1/B (1.7 vs 1.8), and PON-1 activity (170 vs 243 nmol/ml.min) were significantly lower in SAC than in CH, respectively. In contrast, total cholesterol (156 vs 144 mg/dL), triglycerides (TG) (119 vs 94 mg/dL), apo B (84 vs 73 mg/dl), and CETP activity (181 vs 150 %/ml.h) were significantly higher in SAC than in CH, respectively. Several multiple linear regression analyses showed that altitude was significantly and directly associated with children's TG (beta 0.28, R^2=0.14), apo B (Beta 0.32, R^2=0.14), and CETP (Beta 0.38, R^2=0.15), whereas altitude was inversely associated with HDL-C (Beta -0.15, R^2=0.05) and PON-1 activity (Beta -0.36, R^2=0.16), adjusted for age, gender, and BMI.
Conclusion: This study shows that indigenous SAC children living at 3750 meters have lower HDL-C and PON-1 activity; whereas they have higher apo B levels and CETP activity compared with CH children living at 1400 meters. Therefore, SAC children may have a higher risk for T2DM than CH children.

eP213
Alterations in platelet indices with duration of disease and glycemic control in children with type 1 diabetes mellitus (T1DM)

G.V. Venkatesh[1], R. Kumar[1], P. Bhatia[1], D. Dayal[1]

[1]*Postgraduate Institute of Medical Education and Research (PGIMER), Department of Pediatrics, Chandigarh, India*

Objectives: DM is associated with platelet dysfunction that leads to atherothrombotic complications. There is limited data on platelet alterations in children with T1DM. We planned to study the changes in platelet morphological indices and effect of glycemic control & duration of disease in children with T1DM.
Methods: A prospective case control study was conducted on 260 children (130 T1DM &130 age & sex matched healthy controls) in a tertiary care pediatric hospital. Platelet indices(PLT-Platelet count, MPV-Mean Platelet Volume, PDW-Platelet Distribution Width, P-LCR-Platelet-Large Cell Ratio, PCT-Plateletcrit) were measured. Statistical analysis was done using t-test, ANOVA & Pearson correlation.
Results: MPV(11.8±1.7fL vs 9.9±0.6fL, p< 0.05), PDW (16.3±3.3fL vs 11.5±2.3fL,p< 0.05), P-LCR (39.4±12.1% vs 25.6±5.2%, p< 0.05) were higher than controls in T1DM. PLT was lower than controls in T1DM (3.0±1.1 vs 3.4±0.8 lakhs/cu.mm, p< 0.05). High HbA_1c group had higher values of all indices than controls (p< 0.05). PDW was higher than controls in new onset T1DM. MPV and P-LCR were significantly higher than new onset T1DM among the duration based subgroups.
Conclusions: T1DM children have platelet hyper-reactivity evidenced by altered morphological indices which start at the time of diagnosis itself and progress with time. Poor glycemic control is important risk factor for abnormal platelet indices.

eP214
"La vida normal": adapting to type 1 diabetes for Bolivian youth in a context of supply scarcity and stigma

K.J. Souris[1], M.D.C. Caballero[2], E. Duarte[2], C. Barrington[1], B.J. Anderson[3], E. Klatman[4], M. Castrati Nostas[2], G. Ogle[5]

[1]*University of North Carolina at Chapel Hill, Health Behavior, Chapel Hill, United States,* [2]*Centro Vivir con Diabetes, Cochabamba, Plurinational State of Bolivia,* [3]*Baylor College of Medicine & Texas Children's Hospital, Pediatrics, Houston, United States,* [4]*International Diabetes Federation Life for a Child Program, Brussels, Belgium,* [5]*International Diabetes Federation Life for a Child Program, Glebe, Australia*

Objectives: In Bolivia, many families are unable to afford the cost of care for youth with Type 1 Diabetes (T1D). For these families, supply scarcity and stigma provoke fear and anxiety, impeding positive adaptation to T1D. We explored the relationship between the family environment and adaptation to T1D in Bolivian youth and identified ways to bolster family resilience through a synthesis of educational, supply-based and peer support.
Methods: Nineteen youth beneficiaries with T1D aged 14-21 of the Life for a Child Program through El Centro Vivir con Diabetes and at least one of their parents participated in semi-structured qualitative interviews from May-June 2016. Interviews occurred in participants' homes or at clinics in five cities in the Altiplano and Central Valley and explored the challenges participants met as they learned to live with T1D.
Results: Youth and their families faced two primary challenges: test strip and insulin scarcity, and community stigma. Youth combated stigma by striving for 'la vida normal' (a normal life) as they integrated T1D into their identity. As a way of coping with the fear of stigma, some youth minimized or hid the effects of T1D, while for others, life with T1D had become 'la vida normal' because their families had formed a 'new normal' around it. Receiving supplies and clinical education helped families to fully share in the care of T1D and create a home environment that fostered acceptance and adaptation in youth. Connecting to peer support helped youth to accept T1D in others and themselves, mitigating some of the damaging effects of stigma.

Duration groups	PLT	P value	MPV	P value	PDW	P value	P-LCR	P value	PCT	P value	
0–2 mon	2–12 mon	−0.39	0.99	−1.68*	0.019	−1.02	0.99	−14.89*	0.0007	−0.02	0.99
	1–2yr	−0.003	1	−0.55	0.98	2.28	0.54	−5.05	0.91	−0.02	0.99
	2–3yr	0.28	0.99	−1.67*	0.02	1.12	0.99	−12.09*	0.02	−0.02	0.99
	3–4yr	0.12	1	−1.83*	0.003	−0.59	0.99	−12.79*	0.004	−0.05	0.80
	4–5yr	0.46	0.99	−2.41*	0.0001	−1.06	0.99	−18.38*	0.002	−0.02	0.99
	5–6yr	0.28	0.99	−2.38*	0.0001	−0.31	1	−16.86*	0.0001	−0.05	0.77
	6–7yr	0.21	0.99	−1.65*	0.01	1.42	0.97	−11.83*	0.01	−0.03	0.97
	7–8yr	−0.29	0.99	−1.84*	0.01	1.44	0.98	−11.96*	0.03	−0.09	0.06
	8–9yr	0.35	0.99	−2.08*	0.002	0.68	0.99	−12.52*	0.02	−0.01	1
	9–10 yr and above	0.33	0.99	−1.61	0.05	1.13	0.99	−11.65	0.05	−0.04	0.90
	Controls#	−0.33	0.98	0.44	0.98	5.22*	0.0001	2.88	0.98	−0.02	0.99

*Post hoc analysis with Turkey test; p value <0.05 is statistically significant, *indicates significant mean difference between the groups, #companison of new onset T1DM with controls, PLT-platelet count, MPV-Mean Platelet Volume, PDW-Platelet Distribution Width, P-LCR-Platelet-Large cell ratio, PCT-Plateletcrit.*
[Change in platelet indices each year past diagnosis in comparison with new onset T1DM]
MPV (r=0.26, p=0.02) and P-LCR (r=0.21, p=0.01) had positive correlation with T1DM duration.

Conclusion: Programs that provide supplies and clinical education for the whole family fill an important gap in less-resourced nations like Bolivia where supply scarcity and stigma threaten youths' well-being with T1D. The benefits to youth of participating in these programs are magnified by the emotional support they receive through ongoing opportunities to connect with peers.

eP215
Where are the missing children? Development and implications of improved type 1 diabetes prevalence estimates in less-resourced countries

G.A. Gregory[1,2], G.D. Ogle[1,2,3]

[1]International Diabetes Federation Life for a Child Program, Glebe, Australia, [2]Univeristy of Sydney, NHMRC Clinical Trials Centre, Glebe, Australia, [3]Diabetes NSW & ACT, Glebe, Australia

Objectives: Current estimates of type 1 diabetes (T1D) prevalence in less-resourced countries produced by the International Diabetes Federation (IDF) have various limitations. These include an assumption of zero mortality, a developed-country age-of-onset distribution with a fixed prevalence/incidence ratio, age range restricted to < 15 years (y), and no temporal incidence changes. We developed a model to address these limitations.
Methods: A discrete time Markov illness-death model with age and calendar-year-dependent transition probabilities was developed in R 3.3.1. A novel feature of the model is the inclusion of a two-fold impact of diabetes on mortality: a probability of death at onset (from misdiagnosis, or during initial ketoacidosis episode), as well as a sustained excess mortality.
Results: The model was validated against 17y of incidence/prevalence/mortality data from Uzbekistan, with an 8-fold reduction in mean squared difference compared to estimates based on IDF Atlas assumptions; and also against 15y of similar data from New South Wales, Australia (difference with model 1.3%).

Prevalence was modelled for various countries under varying assumptions. Estimates suggest that in a country such as Nigeria, the proportion of children aged 0-< 15y who die at onset or within 6 months of developing T1D may be 80-90+%. In sub-Saharan Africa, a very conservative estimate is that there are over 2,000 deaths annually < 15y alone.
Conclusions: This model improves prediction of incidence or prevalence or mortality in young people with T1D under varying measurements/estimations of two of these parameters. Results demonstrate the need for public health and clinical interventions in many countries to prevent deaths from misdiagnosis and improve ongoing management. A further implication is that numbers will quickly rise when care improves, requiring expansion of clinical services and increased requirements of insulin and other supplies.

eP216
Comparison of blood glucose levels in caesarean and vaginally delivered newborns at Lagos University Teaching Hospital, Nigeria

E. Ajayi[1], E. Oyenusi[2], A. Oduwole[2], M. Ibekwe[3]

[1]Eko Hospitals, Paediatrics, Ikeja, Nigeria, [2]Lagos State University Teaching Hospital, Paediatrics, Idi-Araba, Nigeria, [3]Ebonyi State University, Paediatrics, Abakaliki, Nigeria

Objective: To compare the blood glucose levels of new-borns delivered by Caesarean section (CS) with those vaginally delivered (VD).
Methods: It was a prospective observational study which was carried out at the Lagos University Teaching Hospital (LUTH), Lagos State, Nigeria. We studied 164 mother- neonates' pair, of which 85 were delivered through CS and 79 through VD. A pretested questionnaire was used to obtain information on socio-demographic variables, gestational age, feeding time of the new-born, maternal fasting time. Blood glucose was tested using Accu-chek Multiclix, every tenth sample was also tested in the laboratory for quality control.

The data was recorded and analysed using SPSS 21. Means and proportions of the clinical data and blood glucose levels was compared between women who delivered by CS and those who delivered vaginally using the Student's t-test and Chi test, respectively. Linear regression was performed where blood glucose levels were the dependent variable, and other variables (maternal and perinatal) were independent variables. A p-value less than 0.05 were accepted as statistically significant.
Results: The mean (SD) Cord blood glucose level was lower in the CS (68.7(10.1) mg/dl) than VD neonates (80.9(11.5) mg/dl, p = < 0.001). The mean (SD) blood glucose levels at 2 hours of life was also lower in CS (62.5(10.0) mg/dl) than VD neonates (71.2(10.9) mg/dl, p = < 0.001). Factors that were significantly associated with mean cord blood glucose levels were gestational age, maternal fasting time and mode of deliver , while at two hours of life cord blood, neonatal feeding time, gestational age and birth weight were significantly associated.
Conclusion: Cord and neonatal blood glucose were significantly lower in neonates who were delivered via CS compared to those delivered vaginally. Neonates should be fed immediately after birth irrespective of the mode of delivery. Efforts should be made to reduce maternal fasting time.

ePoster Session 28 - Diabetes Care

eP217

The association between treatment, age at onset and metabolic control and childhood height standard deviation score in children with type 1 diabetes

J. Svensson[1], A. Schwandt[2], J. Beltrand[3], N. Birkebæk[4], R. Cardona-Hernandez[5], K. Casteels[6], S. Castro[7], V. Cherubini[8], D. Cody[9], N. Fisch Shvalb[10], D. Hasnani[11], I. Kosteria[12], O. Kordonouri[13], A. Luczay[14], C. Maffeis[15], D. Pacaud[16], B. Piccini[17], P.-S. Luxmi[18], Z. Summit[19], C. De Beaufort[20]

[1]Herlev Hospital, Herlev, Denmark, [2]Institute of Epidemiology and Medical Biometry, and German Center for Diabetes Research, Ulm, Germany, [3]Pediatric Clinic, Paris, France, [4]Skejby University Hospital, Århus, Denmark, [5]Division of Endocrinology and Diabetes, Hospital Sant Joan de Déu, Barcelona, Spain, [6]Department of Pediatrics, University Hospitals Leuven, Leuven, Belgium, [7]Child and Young Department, APDP - Diabetes, lisboa, Portugal, [8]G. Salesi Hospital, Ancona, Italy, [9]Our Ladys Childrens Hospital, Crumlin, Dublin, Ireland, [10]The Jesse and Sara Lea Shafer Institute of Endocrinology and Diabetes, Schneider Children's Medical Center, Petach Tikva, Israel, [11]Diacare - Diabetes Care & Hormone Clinic, Ahmedabad, India, [12]'Aghia Sophia' Children's Hospital, Athen, Greece, [13]Kinderkrankenhaus Auf der Bult, Hannover, Germany, [14]Ist Dept. of Paediatrics, Semmelweis University, Budapest, Hungary, [15]University Hospital, University of Verona, Verona, Italy, [16]Alberta Children's Hospital, Calgary, Canada, [17]Meyer Children's Hospital, Florence, Italy, [18]Non-Profit Organisation T1Diams, Mauritius, Mauritius, [19]University Hospital Motol Prague, Praque, Czech Republic, [20]Centre Hospitalier de Luxembourg, Luxembourg, Luxembourg

Objective: To describe the association between growth (height) and duration of diabetes, age at onset, gender, treatment modality (pump or MDI) as well as metabolic control in children and adolescents with Type 1 Diabetes (T1D) participating in SWEET, an international network of centers treating pediatric diabetes.
Methods: Patients were collected from 55 different centers. The inclusion criteria were as follows: age 1-20 years (y), height measurements available, diabetes duration (DD) > 1 year, and no celiac disease. WHO growth curves were used to calculate standard deviation score (SDS). Continuous variables are presented as median and Inter Quartile (IQ) range or adjusted mean with confidence intervals (CI), categorical variables as percentage. The influence on height SDS (ht-SDS) was estimated using multiple regression models.
Results: 22941 subjects (51,8 % males) were included with a median age of 14.8 y (IQ: 11.2; 17.6), DD 5.6 y (IQ:3.1; 8.9), ht-SDS 0.34 (IQ: -0.37; 1.03), daily insulin dose: 0.82 U/kg (IQ: 0.66, 1.00). The mean ht-SDS was influenced by age at onset. Children were taller in the 4-8 y and 8-12 y age groups ht-SDS 0.33 (CI:0.22; 0.45) and 0.31 (CI: 0.20; 0.43) respectively. The ht-SDS decreased with DD, < 2 years ht-SDS 0.36 (0.24; 0.48) compared to > 2-5 years ht-SDS 0.13 (CI:0.10; 016) and >5 years ht-SDS 0.20 (CI:0.09; 0.32). For HbA1c >= 9% the ht-SDS was 0.11 (CI:0.00; 0.22) compared to 0.10 (CI:0.06; 0.15) and 0.35 (CI:0.24; 0.46) in those with HbA1c 7.5-9% and below 7.5% respectively. The ht-SDS in pump users was 0.36 (CI:0.26; 0.47) compared to 0.06 (CI:0.05; 0.28) and -0.10 (CI:-0.14; -0.06) in those taking 0-3 or >3 injections daily respectively.
Conclusion: Longer diabetes duration, conventional treatment and high HbA1c was associated with lower height. Optimizing metabolic control is important to ensure optimal growth in children and adolescents with T1D though impact on final height is minor compared to historical data.

eP218

Diabetes-related hospital admission rates before and after the start of continuous subcutaneous insulin infusion therapy for type 1 diabetes

T. Evans-Cheung[1], F. Campbell[2], J. Yong[2], R. Feltbower[1], R. Parslow[1]

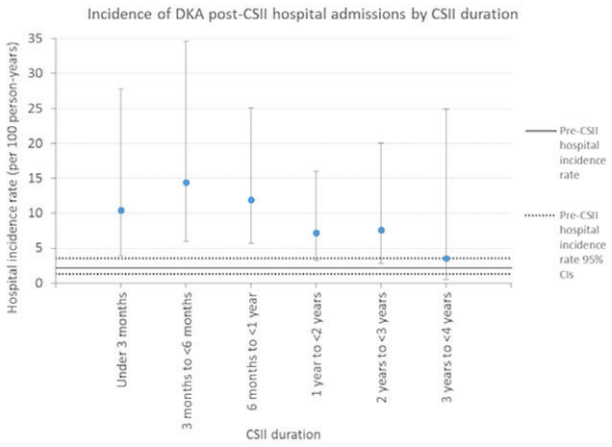
[1]University of Leeds, Leeds, United Kingdom, [2]Leeds Teaching Hospitals Trust, Leeds, United Kingdom

Objective: To examine hospital admission rates before and after the start of continuous subcutaneous insulin infusion (CSII) therapy for type 1 diabetes.
Methods: We extracted demographic and hospital admissions data from the Leeds Children and Young People's Diabetes Service database on all young people diagnosed with type 1 diabetes up to 20 years old who started CSII between 2002 and 2013.

Diabetes-related hospital admission incidence rates due to diabetic ketoacidosis (DKA) and severe hypoglycaemia were calculated for pre- and post-CSII start date. Admissions which occurred after CSII therapy had discontinued have been excluded from this analysis.
Results: Of 161 individuals, 38 had a diabetes-related hospital admission; 15 had 23 pre-CSII admissions and 31 had 33 post-CSII admissions. Seven individuals had both a pre- and a post-CSII admission.

There was a significant 3-fold increase in post-CSII incidence for DKA admissions compared with pre-CSII incidence (7.4 per 100 - person-years (5.1-10.8) vs. 2.2 per 100 person-years (1.3-3.6)). No significant difference was found in incidence for severe hypoglycaemia.

Analysis by CSII duration showed a significantly higher incidence of DKA up to a year after CSII start. There were no significant differences by duration periods for severe hypoglycaemia.



[Incidence of DKA post-CSII hospital admissions by CSII duration]

Conclusions: Risk of hospitalisation for DKA is increased during the first year of CSII therapy. There is no increased risk of severe hypoglycaemia with CSII.

eP219

Effect of discontinuing continuous subcutaneous insulin infusion therapy on HbA1c for type 1 diabetes

T. Evans-Cheung[1], F. Campbell[2], J. Yong[2], R. Feltbower[1], R. Parslow[1]

[1]University of Leeds, Leeds, United Kingdom, [2]Leeds Teaching Hospitals Trust, Leeds, United Kingdom

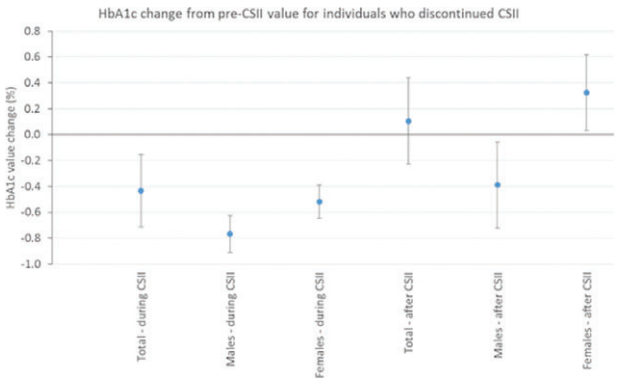
Objective: To examine HbA1c values of individuals with type 1 diabetes who discontinue continuous subcutaneous insulin infusion (CSII) therapy.
Methods: Demographic and clinical data were extracted from Leeds Children and Young People's Diabetes Service for under 20 year olds diagnosed with type 1 diabetes, who began CSII therapy between 2002 and 2013.

The cohort was grouped by continued and discontinued CSII. Random intercept models were used to assess HbA1c values pre- and during CSII. HbA1c values after CSII end were examined for the discontinued.
Results: Of 161 people, 30 discontinued CSII (27% males; 73% females). Median age at CSII end was 15.3 years (range 6.7-19.2 years). Median follow-up time after CSII discontinuation was 1.3 years (range 0.1-4.6 years).

Overall, the discontinued group had higher HbA1c values by 1.04% (95% CI 0.59-1.48%) compared with the continued group.

There was a significant HbA1c decrease of 0.43% (95% CI 0.15-0.71%) during CSII for the discontinued group. However, there was no significant difference between pre- and after CSII end values.

Males had significant HbA1c decreases from pre-CSII values during and after CSII end. Females decreased HbA1c during CSII by 0.52% (95% CI 0.4-0.7%) but increased after CSII end by 0.33% (95% CI 0.03-0.6%) compared with pre-CSII values.



[HbA1c change from pre-CSII value for individuals who discontinued CSII]

Conclusions: Despite improving HbA1c level during CSII, females are more likely to have elevated HbA1c levels after discontinuing CSII compared with pre-CSII levels.

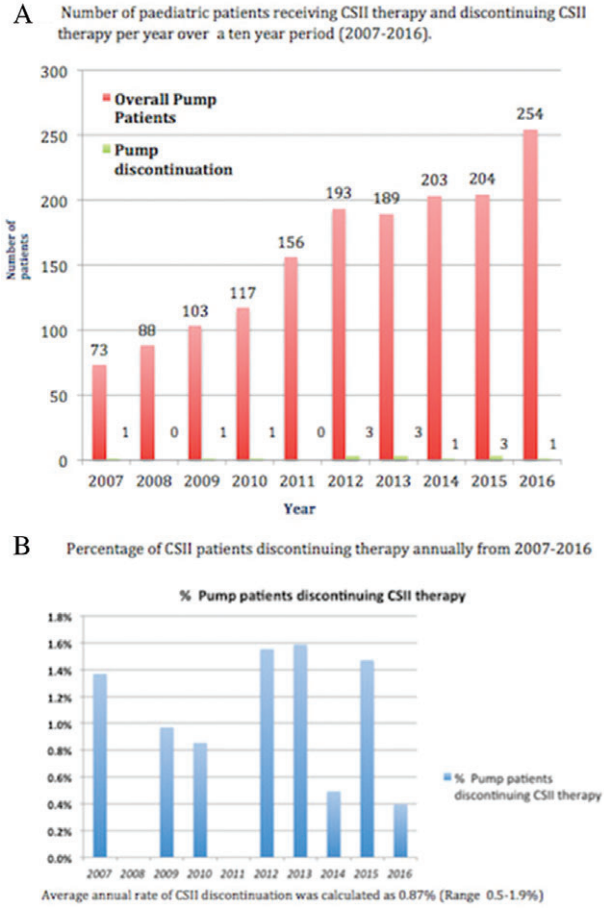
eP220
Factors influencing discontinuation of continuous subcutaneous insulin infusion (CSII), in children with type 1 diabetes: a population based cohort study

T. Conlon[1], E. Somers[1], C. Costigan[1], D. Cody[1,2]

[1]Our Lady's Children's Hospital Crumlin, Department of Diabetes and Endocrinology, Dublin, Ireland, [2]National Children's Research Centre, Dublin, Ireland

Objectives: Continuous subcutaneous insulin infusion (CSII) is a safe and effective mode of insulin delivery, in children and adolescents with Type 1 diabetes. Although there are numerous advantages to CSII therapy, barriers to success remain. CSII discontinuation rates in the paediatric population have not been well described to date. The aim of this study was to calculate the rate of CSII discontinuation, at an Irish tertiary paediatric centre, and to study the factors that influence the decision.
Methods: Eligible patients were identified through review of the electronic database "DIAMOND". All patients included had discontinued CSII therapy between January 2007 and December 2016. Subsequent electronic and medical paper chart review was performed to identify data variables of interest.

Results: There was an increase in the percentage of patients receiving CSII therapy at the centre, over the study period (16-52%). A total of 14 patients stopped CSII therapy, with an average annual discontinuation rate of of 0.87%. All patients discontinuing CSII therapy were in the adolescent age group (12.5-16.8yrs). Persistent missing boluses (n=12), increasing Hba1c (n=10) and adolescent stress (n=11), were the most common reasons quoted. Mean Hba1c in this group was highest at 75mmol/mol (58-99mmol/mol), in the year prior to discontinuation. Acute complications were high in this cohort, in the same period, with DKA (n=3), hypoglycaemia (n=3) and hospital admission (n=5). 4(28.5%) patients received shared care with a regional unit. There was a mean of 9(5-17) contacts per patient, with the diabetes team, in the preceding year. In 6 cases the decision was team initiated, with 8 patients requesting discontinuation.
Conclusions: CSII discontinuation is uncommon in our centre compared to published data. The factors contributing to CSII discontinuation are complex and the rate of pump failure appears to be significantly higher around the challenging adolescent years.



[CSII discontinuation rate]

eP221
Skin complications in Danish paediatric patients using insulin pump or glucose sensor

A.K. Berg[1,2], B.S. Olsen[1], J.P. Thyssen[3], C. Zachariae[3], K. Pilgaard[4], J. Svensson[1,2]

[1]Copenhagen University Hospital, Herlev-Gentofte, Department of Paediatrics, Herlev, Denmark, [2]University of Copenhagen, Copenhagen, Denmark, [3]Copenhagen University Hospital, Herlev-Gentofte, Department of Dermatology and Allergy, Herlev, Denmark, [4]Copenhagen University Hospital, Hillerød, Department of Paediatrics, Hillerød, Denmark

Objectives: The aim was to describe prevalence and clinical predictors of different skin complications among paediatric patients using Continuous subcutaneous insulin infusion (CSII) and/or Continuous Glucose Monitoring (CGM) in Denmark.
Methods: 145 patients age 2-20 years using CSII (n: 144) and/or CGM (n: 87) filled in an online survey about skin complications to both devices. Questions dealt with both current and retrospective skin complications. Descriptive statistics, chi-squared test and multivariate regression were used.
Results: Eighty nine percent of the 144 patients using CSII had experienced skin complications; 78% itching, 51% wounds and 46% eczema. Currently 63% of the patients had skin complications, eczema being the most frequent (26%). Atopy was significantly associated with current skin complications to CSII (OR 4.5, $p < 0.01$). Concerning CGM, 73% had experienced skin complications, while 41% currently had skin reactions to CGM. Eczema was the most frequent (32%) reaction to CGM also. On average the patients rated skin complications as a "moderate problem". However CGM was significantly worse compared to CSII ($p < 0.01$). Multivariate regression showed that current skin complications to CSII were significantly associated with low age and with a trend towards an increased risk in patients with longer duration of pump treatment.
Conclusions: Our data show that skin complications to both CSII and CGM are very common among paediatric patients, especially patients with atopy. The multivariate regression revealed that our clinical parameters HBA1C, BMI, age, sex, pump duration and diabetes duration were only vaguely associated with risk of skin complications. This indicates that other parameters and more individually approach must be taken in prophylaxis and treatment of skin complications. Also the focus on alternative adhesive and skin care during the education before CSII or CGM start as well as in the consultation during use must be strengthened.

eP222
Post-market follow-up survey of pediatric continuous glucose monitoring system users

D. Pontoriero[1], J. Bowers[1], D. Price[1], E. Casal[1], T. Walker[1], J. Welsh[1], C. Graham[1]

[1]*Dexcom, Inc., San Diego, United States*

Objectives: To collect information on real-world experiences of pediatric users of the Dexcom G5 Mobile continuous glucose monitoring (CGM) system.
Methods: The study included 53 children and adolescents in Sweden and Germany ages 2-17 who had used the system for at least 1 month and who used its data for insulin dosing decisions (i.e., nonadjunctively). Surveys consisting of 25 questions were mailed by local product distributors to parents/caregivers of patients, were completed at home by the users themselves or by a parent/caregiver of young children, and were mailed back. The survey included questions related to self-monitoring of blood glucose (SMBG) frequency, and nonadjunctive use. Results from the anonymized, completed surveys were analyzed with summary statistics.
Results: Of the 53 respondents, 38 (71.7%) stated they used the CGM reading most or all of the time to determine their insulin dose, while 7 (13.2%) rarely or never used it for this purpose. Twenty-nine (54.7%) respondents stated they rarely or never performed an additional SMBG test for insulin dose determination because of mistrust of the CGM reading, while 8 (15.1%) stated they commonly ("most of the time" or "always") did so. The frequency of SMBG testing fell after CGM was adopted, with 50 (94.3%) respondents performing ≥6 SMBG tests/day before CGM and only 9 (16.9%) performing this many tests while using CGM. The mean (±SD) decrease in SMBG testing frequency was 4.8±2.6/day ($p< 0.001$). Most subjects reported improved glycemic outcomes, with 33 (62.3%) reporting fewer hypoglycemic events and 28 (52.8%) reporting fewer hyperglycemic events.
Conclusions: Survey responses made by or on behalf of pediatric patients using the Dexcom G5 Mobile CGM system showed that it was consistently trusted for insulin dosing decisions. Its use was associated with significant reductions in SMBG frequency and in the frequency of perceived hypo- and hyperglycemic events.

eP223
Glucose profiles in continous glucose monitoring in children fed by PEG

A. Brandt[1], A. Borkowska[2], M. Myśliwiec[1]

[1]*Medical University of Gdansk, Clinic of Pediatrics, Diabetology and Endocrinology, Gdansk, Poland,* [2]*Medical University of Gdansk, Department of Paediatrics, Gastroenterology, Hepatology & Paediatric Nutrition, Gdansk, Poland*

Introduction: Continous glucose monitoring systems are useful tools to demonstrate changes in glucose profiles especially in diabetic patients. Children fed by PEG (Percutaneous endoscopic gastrostomy) due to some neurological or gastroenterological disorders could have changes in glucose profiles related to not physiological way of feeding.
Methods: CGM was used in 10 patients with PEG feeding. All patients included to the study were with psychomotor delay due to neurological disorders. Average time after implementation of PEG feeding was over 1 year. All patients had performed CGM for 7 days with ipro2 system. In all children HbA1c was checked.
Results: In almost all patients glucose varability were noted during the day and night. All of them had tendency to hypoglycemia in the night and 2-3 hours after meals. One patient had hyperglycemias after all meals with reactive hypoglicemias. Only one patient had normoglycemias. Average HbA1c level was 5,5 %.
Conclusions: Children fed by PEG with specilalistic nutrition meal formulation should be monitored due to possibility of having glucose varability and need to nutrition modification. Postprandial hypoglicemias can cause neuroglycopenia symptoms and worsen patients condition.

Study funded from GUMed - ST 120

ePoster Session 29 - Overweight/Cardiovascuar Issues

eP225
The rates of overweight (OWT) and obesity (OB) are higher in children with type 1 diabetes (T1D) than the general population

A. Marlow[1], C.E. Smart[2], B.R. King[2], E. Fisher[2], M. Pappas[2], D.G. Anderson[2]

[1]University of Newcastle, Newcastle, Australia, [2]John Hunter Children's Hospital, Newcastle, Australia

Maintenance of a healthy body weight is important to decrease the risk of cardiovascular disease, the leading cause of early mortality in individuals with T1D. The aim of this study was to determine the prevalence of OWT and OB in children and adolescents with T1D attending John Hunter Children's Hospital (JHCH) paediatric diabetes clinic, and compare these rates to local, state, Australian and international published outcomes. Secondary aims were to determine if correlations existed between BMI for age and insulin regime, HbA1c, gender, age, and duration of diabetes.

In this cross-sectional study we used data prospectively collected in 2016 in the JHCH endocrinology database, including weight, height, BMI, HbA1c, age at visit, and age at diagnosis. Study subjects were divided into age groups (<7 yrs (n=23), 7-11 yrs (n=104), 12-15 yrs (n=109), 16+ (n=90)) for analysis. STATA software was used to explore potential correlations. OWT and OB were defined as per Cole, WHO, and CDC classifications.

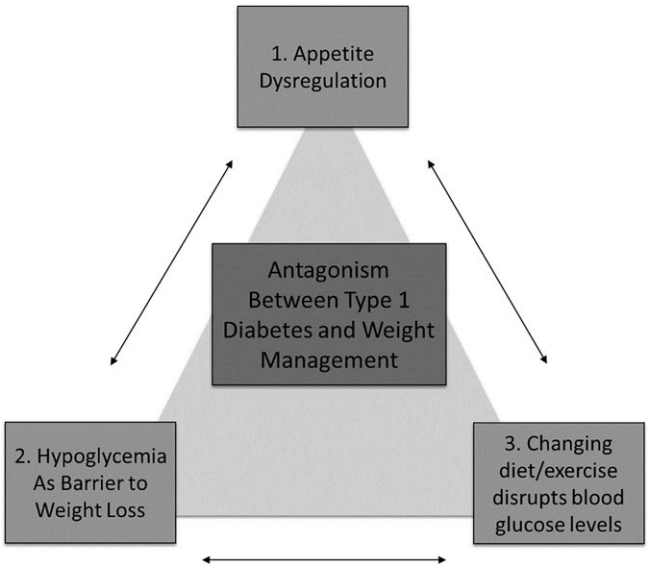
326 subjects 3-18 yrs (163 females (50%), mean age 12.9 $\pm$ 3.7 yrs, HbA1c 7.5% $\pm$ 1.4%, diabetes duration 5 $\pm$ 4.9 yrs, multiple daily injections (MDI) 51.8% (n=169), insulin pump 44.5% (n=145), conventional or fixed dose MDI 3.7% (n=12)) were included. There were 33.4% OWT and 4.6% OB subjects as per the WHO definition, 23% and 13.8% as per CDC and 27% and 9.5% as per Cole, respectively. There was a higher prevalence of OWT and OB in JHCH subjects compared to all Australian statistics. 35% OWT or OB in < 7 age group at JHCH, compared to 17% OWT or OB in 2-4 yrs old ABS data, and 44% OWT or OB in JHCH in 16+ age group, compared to 23% in 12-17 yrs old NSW health HNELHD data. There was a correlation with MDI (p=0.03), but no correlation between insulin regimen or glycaemic control. There was no association with gender and age. There is a strong need for interventions targeting the prevention and management of OWT and OB in children and adolescents with T1D.

eP226
A qualitative assessment of weight management in youth with type 1 diabetes

A.R. Kahkoska[1], M.E. Watts[1], K.A. Driscoll[2], F.K. Bishop[2], J. Thomas[1], J.R. Law[1], N. Jain[1], E.J. Mayer-Davis[1]

[1]University of North Carolina at Chapel Hill, Chapel Hill, United States, [2]Barbara Davis Center for Childhood Diabetes, Denver, United States

Obesity is common in youth with type 1 diabetes (T1D), but no current clinical guidelines focus on weight control in youth with T1D. The present study characterizes the patient-perceived experience and specific barriers to weight management in T1D. Participants were youth ages 12-17 with T1D > 1 year and HbA1c < 13% recruited from the University of North Carolina (n=16, 56% female, 60% white, 50% pump users, mean age 14.8, mean HbA1c 8.5%) and the University of Colorado (n=18, 50% female, 80% white, 53% pump users, mean age 15.3, mean HbA1c 9.3%). Focus groups were stratified by gender and weight status (BMI cutoff=25). Discussions were guided by a standard set of questions, audio-taped, transcribed, and analyzed using inductive qualitative methods. All groups expressed three interrelated themes of antagonism between T1D and weight management—appetite dysregulation, hypoglycemia as a barrier, and disruption of glycemia from changing diet or exercise patterns (Figure). Variance in emphasis of specific thematic elements was greatest across gender. Youth with T1D reported additional barriers to care with regards to weight management including communication and flow of information; the highest prevalence of these barriers was associated with female gender (p=0.02) and HbA1c > 9.0% (p< 0.02). Youth with T1D reported a desire for personalized, T1D-specific recommendations from an integrated care team to overcome the perceived antagonism between T1D and weight management.



[Figure: Major and themes identified from teens with T1D with regards to weight management]

eP227
Meal and snacking frequency and carbohydrate intake in children and adolescents with type 1 diabetes differ from those in their peers and are associated with glycemic control

C. Bächle[1,2], A. Hoyer[1,2], K. Castillo[1,2], A. Stahl-Pehe[1,2], O. Kuss[1,2], R.W. Holl[2,3], M. Kersting[4], J. Rosenbauer[1,2]

[1]German Diabetes Center, Institute for Biometrics and Epidemiology, Düsseldorf, Germany, [2]German Center for Diabetes Research, Neuherberg, Germany, [3]University of Ulm, Institute of Epidemiology and Medical Biometry, Ulm, Germany, [4]Pediatric University Clinic Bochum, Research Institute of Child Nutrition (FKE), Bochum, Germany

Objectives: The diet of people with type 1 diabetes may differ from that of healthy peers due to disease-related factors that may affect the course of diabetes. This cross-sectional study sought to compare meal and snacking frequency and corresponding carbohydrate intake among young people with intensively-treated type 1 diabetes and healthy peers and to analyze their association with glycemic control among diabetes patients.

Methods: Nutritional data of 712 11- to < 19-year-olds from a nationwide population-based survey on early-onset type 1 diabetes (52.7% boys/men, mean age 15.6 years) were compared with 949 food records of 296 healthy participants in the DONALD cohort study (49.7% boys, mean age 14.4 years) using linear mixed models. Furthermore, the association between eating frequency and/or carbohydrate intake with glycemic control (HbA1c) was analyzed with multiple linear regression models.

Results: After comprehensive adjustment, diabetes patients had, on average, 4.6 [95% confidence interval 3.6, 5.5] more meals or snacks/week but consumed 75.9 [64.5, 87.3] fewer grams of carbohydrates/day than the comparison group. Diabetes subjects also consumed

breakfast, lunch, dinner, and snacks more frequently but ate fewer carbohydrates at all eating occasions. Total carbohydrate intake and carbohydrate intake at breakfast were associated with higher HbA1c levels, while increased breakfast frequency was associated with lower HbA1c levels.
Conclusions: Eating frequency and carbohydrate intake differed between adolescents with early-onset type 1 diabetes and non-diabetic peers. The observed associations with glycemic control challenge the concept of a completely unregulated eating frequency and carbohydrate intake for people on intensified insulin therapy.

eP228
Metformin therapy in T1D adolescents with insulin resistance

J. Galhardo[1], M. Alcafache[1], C. Diamantino[1]

[1]*CHLC - Hospital de Dona Estefânia, Paediatric Endocrinology and Diabetes Unit, Lisboa, Portugal*

Objectives: To access the efficacy of metformin as an adjunct to insulin treatment on glycaemic and cardiometabolic control in T1D adolescents with insulin resistance.
Methods: Six months prospective study in 39 insulin resistant (≥1U/Kg/day) adolescents (Tanner stage ≥2), with HbA1c < 10%, and ≥1 year into T1D diagnosis. Metformin dose was previously built up during 4 weeks: from 500mg/day to 2g/day. Anthropometrics, metabolic control, total daily insulin (TDI), and estimated insulin sensitivity (eIS), at baseline and at 6 months were compared. eIS was calculated according to the Coronary Artery Calcification in T1D clump study. Statistical significance was set at $p < 0.05$.
Results: Patients were 62% male, and 92% white; median age was 14.6 (12-18) years; 28% had first-degree relatives with T2D; 21% were either SGA or LGA. At baseline: 27% were overweight, 10% were obese, 8% met IDF metabolic syndrome criteria, 39% were sedentary, 15% were smokers, mean HbA1c was 7.8 ±1.9%, and median T1D duration was 6.5 (1.3-14.5) years. All were on MDI and median TDI was 1.4 (1.2-2.2)U/Kg/day. None had hypertension or microvascular complications.

During the study, some patients reported mild gastrointestinal upset, but none withdrew it. After 24 weeks on 2g of metformin, and after adjustment for potential confounders, there was a mean difference of: 2.3mg.Kg^{-1}.min^{-1} in eIS (95%CI, 1.7 to 2.9mg.Kg^{-1}.min^{-1}); -0.5U/Kg/day in TDI (95%CI, -0.7 to -0.3U/Kg/day); -0.8% in HbA1c (95%CI, -1.2% to -0.4%); 11% in time in target range 80-140mg/dL (95%CI, 3% to 19%); -0.43 in waist circumference-SDS (95%CI, -0.64 to -0.22); -1.1mg/g in urine albumin/creatinine ratio (95%CI, -1.7 to -0.5mg/g).
Conclusions: Among adolescents with T1D and insulin resistance, the addition of metformin to insulin not only improved glycaemic control and insulin sensitivity but also seemed to be potentially beneficial in preventing renal function deterioration.

eP229
Carotid artery intima-media thickness (cIMT) in young type 1 diabetic patients in relation to comorbid additional autoimmune diseases and microvascular complications

B. Glowinska-Olszewska[1], B. Klonowska[2], D. Charemska[2], J. Jabłońska[2], A. Banach[2], A. Kącka[2], E. Szynkarczuk[2], M. Konopka[2], E. Jarocka-Cyrta[2], W. Łuczyński[1], A. Bossowski[1]

[1]*Medical University of Bialystok, Bialystok, Poland,* [2]*Faculty of Medical Sciences, University of Warmia and Mazury in Olsztyn, Olsztyn, Poland*

Background: Some diseases of autoimmune origin, as Hashimoto thyroiditis or celiac disease are supposed to be associated with a higher incidence of cardiovascular heart disease.
Aim of the study was evaluation of cIMT (*carotid artery intima media thickness)* and the risk factors of atherosclerosis in young patients with type 1 diabetes according to the comorbid autoimmune diseases and a comparison group of patients with known vascular complications.
Methods: The study involved 90 adolescents and young adults with T1DM aged 17 yrs, with an average disease duration of 10 yrs, who were divided into 4 groups - without complications - D, with celiac disease - DC, with Hashimoto´s thyroiditis - DH, with vascular complications - VC. The control group (C) consisted of 22 healthy volunteers. In statistical analysis we included: average HbA1C of all the years of illness, BMI, blood pressure, lipid values, duration of illness, and ultrasonography of cIMT.
Results: cIMT of T1DM patients was significantly higher: 0,47 than in healthy: 0,409 mm. In the group VC we found the highest cIMT value: 0,501 mm in comparison to the group D: 0,462mm; DC: 0,46mm; and DH: 0,46mm. HbA1c was highest in the group VC: 9,84%, compared to DH: 9,04%, DC: 8,84% and D: 8,55%. BMI was highest in the group VC: 23,3 kg/m^2 and DH: 22,6 kg/m^2. It was the same with waist circumference: VC: 79,33cm and DH:79,2 cm. Patients with VC were characterized by the higher blood pressure and lipids compared to patients with additional autoimmune disease.
Conclusions: Increased cIMT depends primarily on metabolic control and classic risk factors for atherosclerosis. The coexistence of autoimmune disease does not significantly affect the value of cIMT in the study population. The significance of greater BMI and waist circumference in patients with T1DM and Hashimoto´s thyroiditis in relation to possible increased cardiovascular risk needs further research.

eP230
Non-invasive measurements of central blood pressure as a predicative value of arterial stiffness in children with type 1 diabetes

A. Bossowski[1], K. Noiszewska[1]

[1]*Medical University in Bialystok, Dept. of Paediatrics,Endocrinology, Diabetology with Cardiology Division, Białystok, Poland*

Introduction: Evaluation of central arterial pressure parameters in pediatric patients with Diabetes Type 1, correlation between vessel elasticity indicators, lipid profile and glycemic control.
Materials and Methods: The study was conducted involving 93 children (mean age 13.7 ± 3). We sorted our patients into a control group (a) of 50 healthy patients and a group of 43 diabetes type 1 patients, divided into short duration(<5 years, b) and long duration (≥5 years, c) of treatment. We performed 3 measurements at 5 minutes intervals during the same examination, using the non-invasive cBP01 Centron Diagnostics system by brachial cuff. Also peripheral systolic and diastolic blood pressure, and AUG and AMP indices were marked. Glycemic control was assessed by glycated hemoglobin HbA1C, and lipid values of cholesterol, LDL-cholesterol, HDL-cholesterol and triglyceride were taken. For the statistical analysis we used Statistica 10.0.
Results: There were no statistical significant changes in cBP between our control group and our study groups, and also between males and females. We found no marked difference in the Augmentation (p = 0.71) and Amplification (p = 0.82) as an effect of treatment duration in our diabetic patients, but we observed a positive development with AUG (0.61 → 0.60) and AMP (1.67 → 1.69) in regards to vessel elasticity. Correlations between lipid parameters, HbA1C and cBP were not noted.
Conclusions: The markers for arterial stiffness were similar between both the control and diabetic groups. We postulate that it is because significant vessel changes may not occur during the early timing of disease. The indicators for arterial stiffness (AUG and AMP) showed an improvement during the therapy. All patients with diabetes type 1 should be closely monitored for risk factors of cardiovascular disease.

eP231

Endothelial progenitor cells in type 1 diabetes mellitus: relation to metabolic control and vascular complications

M. Salem[1], A. Abdelmaksoud[1], H. Issa[2], M. Ismail[3], O. Elhashash[1]

[1]Ain Shams University, Pediatrics, Cairo, Egypt, [2]Ain Shams University, Radiology, Cairo, Egypt, [3]Ain Shams University, Clinical Pathology, Cairo, Egypt

Background: Alterations in Endothelial Progenitor Cells (EPCs) may have an important causative role in the development and progression of virtually all diabetes complications.
Objectives: To estimate the level of EPCs as assessed by flowcytometric analysis of CD34 and CD133 coexpression in children and adolescents with T1DM and its relation to diabetic vascular complications.
Patients and Methods: This study included 60 patients) 37 females and 23 males) with T1DM with a mean age of 13.6 ± 3.64 yrs, and 60 age and sex matched healthy controls with a mean age of 12.15 ± 3.8 yrs. Data collected included age, sex, disease duration, history of diabetic vascular complications, mean RBS and HbA1c%, UAE, Fasting serum lipids, EPCs% and CIMT by carotid Doppler ultrasound.
Results: Patients had significantly higher levels of cholesterol, triglycerides, LDL, CIMT and significantly lower levels of HDL and EPCs % (P< 0.05). CIMT correlated positively to mean RBS (P=0.00 & r=0.504), HbA1c% (P=0.00 & r=0.475), cholesterol (P=0.005 & r=0.358), triglycerides (P=0.001 & r=0.425), LDL (P=0.006 & r=0.353) and correlated negatively to HDL (P=0.006 & r=-0.351), EPCs % (P=0.00 & r=-0.694), While; EPCs% is inversely correlated to cholesterol (P= 0.003 & r=-0.479), mean RBS (P=0.00 & r=-0.948), HbA1c % (P=0.00& r=-0.930), LDL (P=0.000 & r=-0.838) and mean CIMT (P=0.000 & r=-0.694). There was no significant relation of EPCs % to gender or microvascular complications (P>0.05). Multiple regression analysis revealed that EPCs % is the most independent predictor for increased mean CIMT.
Conclusion: We concluded that patients with T1DM are at increased risk for dyslipidemia and increased CIMT. EPCs % is an independent predictor for macrovascular disease and we suggest to include it in their follow up for early detection and prevention of this devastating complication.

eP232

Assessment of corrected QT interval (QTc) in children with type 1 diabetes mellitus

S. Elsayed[1], T. Elwalili[2], H. Adel[2], A. Khalil[2]

[1]Alexandria University, Pediatric Endocrinology and Diabetology, Alexandria, Egypt, [2]Alexandria University, Alexandria, Egypt

Objectives: QT interval is a measure of the time between the start of the Q wave and the end of the T wave in the heart´s electrical cycle. It should be between 0.33 and 0.44 seconds. Corrected QT interval (QTc) is the QT interval corrected for heart rate. The faster the heart rate the shorter the QT interval. QTc prolongation has been suggested as an independent marker of increased mortality in patients with Type 1 Diabetes Mellitus (TIDM) as well as a marker for the early recognition of abnormalities of the autonomic nervous system. The aim of this study is to study the presence of prolonged QT interval in children with TIDM and to assess its relation to poor glycemic control.
Methods: The study included 60 patients with T1DM compared to 60 healthy matched children. All are subjected to thorough history taking and clinical examination. QT interval was measured on 12 leads resting electrocardiogram and corrected QT interval (QTc) was calculated using Bazett's formula. Correlation between prolonged QT interval and HBA1C was studied.
Results: It was found that 33.3% of diabetic children had prolonged QTc interval ≥ 0.45 seconds. It was noted that with the increase in HbA1C and the duration of DM, the QTc interval increases.There was a significant statistical relation between previous history of Diabetic Ketoacidosis (DKA) and QTc interval. It was found that 60% of diabetic children with prolonged QTc interval were females, aged from 4 to 16 years old. About 90% of these children had previous history of DKA and their HbA1C ranged from 7.3 to 12.5 %.
Conclusions: Children with T1DM have a greater risk for prolonged QT interval. There was a significant relation between history of DKA and prolongation of QTc interval. Poor glycemic control increases the risk of QTc prolongation. Therefore good glycemic control and follow up of QTc interval is recommended to prevent cardiovascular complications in children with T1DM.

ePoster Session 30: Latebreakers Varia III

eP233

The incidence of diabetic ketoacidosis among existing pediatric patients with diabetes in Sweden is still higher among insulin pump users

J.H. Wersäll[1], P. Adolfsson[2], G. Forsander[2], A. Janson[3], E. Örtkvist[4], L. Wallensteen[2], R. Hanas[2]

[1]*Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Anaesthesiology and Intensive Care, Gothenburg, Sweden,* [2]*Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden,* [3]*Karolinska Institutet, Stockholm, Sweden,* [4]*Karolinska Institutet, Department of Women's and Children's Health, Karolinska University Hospital, Stockholm, Sweden*

Objectives: Comparison between Continuous Subcutaneous Insulin Infusion (CSII) therapy and Multiple Daily Injection (MDI) therapy with respect to the incidence of diabetic ketoacidosis (DKA), and initial pH values at presentation with DKA.
Methods: A 2-year national survey was conducted in Sweden between February 2015 and January 2017 where all cases of DKA among patients aged 0-17.99 years were included. Data was collected using questionnaires (patients/caregivers and the attending physician), laboratory parameters, and in-hospital events. Registry data was also obtained from the Swedish Pediatric Diabetes Quality registry (SWEDIABKIDS) and compared with data from the questionnaires. The test of proportion was used to compare the rate of DKA between the CSII group and the MDI group, and the Mann-Whitney U-test was used to compare pH values between the same groups at presentation with DKA.
Results: A total of 87 cases of DKA among pediatric patients with known diabetes were registered by July 31st 2017 (73% of the 120 DKA cases registered in SWEDIABKIDS for the same period). The proportion of CSII users among all pediatric patients with type 1 diabetes was 59% in Sweden during 2015-2016, while the proportion of CSII users among DKA cases with known diabetes was 71 % (p=0.02), representing 0.7 /100 pat. years for pen users and 1.2 for CSII users The median pH at presentation for DKA was 7.24 in the CSII group and 7.16 in the MDI group (p< 0.001).
Conclusion: The incidence of DKA was low but significantly higher in patients using CSII compared with MDI. CSII patients had significantly higher pH values at presentation compared with patients with MDI.

eP234

A novel technique for visualizing blood supply of the posterior eye and retina

A. Chopra[1], M.A. Saiyed[1], F. Sidhom[1], J. Wang[1], N.K. Mohindra[1], D. Sheron[1], I. Nwosu[1]

[1]*American University of the Caribbean School of Medicine, Department of Anatomy and Embryology, Cupecoy, Sint Maarten, Dutch part*

Objectives: Diabetes mellitus (DM) is a metabolic disease characterized by elevated blood glucose and is the leading cause of blindness in adults. In addition, previous studies have suggested that DM is one of risk factors associated with Retinal Artery Occlusion (RAO). Current literature further suggests that the prevalence of Diabetes is 21% higher in untreated patients with RAO in comparison to general population in the United States. The blood supply of the posterior eye and retina is mainly provided by the branches of ophthalmic artery (OA). One of its primary retinal branches, the central retinal artery (CRA), is well researched but the secondary suppliers, the short posterior ciliary arteries (SPCA) and cilioretinal arteries (CRNA), are not. These arteries may provide anastomosis to the retina when the central retinal artery is occluded in a diseased state. The initial purpose of this study was to establish a method to visualize and describe the identified arteries through histological methods.
Methods: Eyes were harvested from cadavers from both the American (USA) and Netherlands population. Specimens were embedded into a 50/50 Xylene/paraffin wax mixture and optic nerve sections were obtained using a Microtome and stained with Hematoxylin and Eosinophil.
Results: Structures of the posterior eye such as optic nerve/artery, CRA, and SPCA, were identified, while CRNA has yet to be visualized under light microscope.
Conclusions: The Histological approach of visualizing the posterior eye was successful in identifying the CRA and SPCA but not the CRNA. However, prevalence of the CRNA in Dutch and North American populations needs to be considered when evaluating this approach. Future studies are focused on applying this visualization method towards investigating prevalence of SPCA, CRNA, and other retinal branches amongst Dutch and American populations and their effects on ocular diabetic complications, specifically Retinal Artery occlusion and related sequelaes.

eP235

An assessment of oxidized low density lipoprotein, anti-oxLDL antibodies and lipoprotein-associated phospholipase A2 and their association with cardiometabolic markers in obese adolescents with and without type 1 diabetes

M.H. El Hefnawy[1]

[1]*National Institute for Diabetes & Endocrinology, Cairo, Egypt*

Background: Oxidized low density lipoprotein (oxLDL), anti-oxLDL antibodies (oxLDL Ab) and lipoprotein-associated phospholipase A2 (Lp-PLA2) are the sequel of lipoprotein oxidation and were studied individually for their contribution in atherosclerosis. However, the study of them contemporarily in obese adolescents with and without type 1 diabetes (DM 1) has not been well explored.
Subjects: The current study enrolled seventy five adolescents with DM 1 and seventy five control subjects matched for gender and age. Both the diabetic and the control groups were further divided into obese, normal weight and lean subgroups according to body mass index (BMI).
Results: The concurrent analysis of oxLDL, oxLDL Ab and Lp-PLA2 mass showed higher levels in patients with DM 1 than in control subjects (130.95±41.7, 1231.8±94and401.26±97.2 vs. 58.1±17.9, 424.9±290.0 and 315.7±70; p < 0.001). In patients with DM 1, direct correlations between both of oxLDL Ab and Lp-PLA2 mass and oxLDL, apo B/apo AI ratio, FG and BMI were found.
Conclusion: The current data provide evidence that oxLDL, its retroactive enzyme and antibody are present in circulation early in childhood primed by obesity and DM 1 and suggests that they take part in the pathogenesis of cardiovascular diseases(CVD).
Keywords: oxLDL; oxLDL Ab; Lp-PLA2; Cardiometabolic markers; Obese; Diabetes

eP236

Weight loss and changes in body composition in adolescents after bariatric laparoscopic surgery

J.P. Garcia-Pureko[1], J. Nieto-Zermeño[2], M. Molina-Diaz[1], B. Del Rio Navarro[3], B. Salgado Arroyo[4]

[1]*Hospital Infantil de México Federico Gómez, Pediatric Endocrinology, Mexico, Mexico,* [2]*Hospital Infantil de México Federico Gómez, Pediatric Surgery, Mexico, Mexico,* [3]*Hospital Infantil de México Federico Gómez, Immunology and Allergy, Mexico, Mexico,* [4]*Hospital Infantil de México Federico Gómez, Pediatric Nutrition, Mexico, Mexico*

Background: Evidence suggests bariatric surgery as a method to achieve sustained weight reduction in patients with morbid obesity. Currently outcomes in adolescents undergone bariatric surgery is limited.
Objectives: Evaluate weight loss, body composition changes and the improvement or resolution of some related comorbidities in adolescents with morbid obesity,12 and 24 months after surgery.
Methods: Cohort study that included 10 mexican adolescents diagnosed with morbid obesity, body mass index (BMI) >35kg/m^2 from the Bariatric Surgery Clinic at Hospital Infantil de México Federico Gómez (2011-2015). After one year of multidisciplinary treatment they were submitted to gastric sleeve laparoscopic surgery. Anthropometric assessment, body composition through impedanciometry, determination of blood pressure, serum glucose, insulin, total cholesterol, HDL-C, LDL-C, triglycerides, transaminases and glycosylated hemoglobin were performed before, 12 and 24 months after surgery. Descriptive, inferential statistics were performed with Fisher´s exact test, for pre and post-surgical changes, paired t-test and student's t-test for independent samples.
Results: The mean age was 14.3±1.4years, weight of 117.3±15.2kg, BMI of 43.71±4.1kg/m^2 and waist circumference of 128.5±cm. 50% had metabolic syndrome and non-alcoholic fatty disease (NAFLD), 3/10 hypertension and type 2 diabetes (DM2) was diagnosed in 3/10. The weight loss at 12 and 24 months was of 20.07% and 20.50% respectively, with 22.54% reduction of fat mass. Complete remission of NAFLD was observed, improvement in all cases of DM2 with suspension of metformin and insulin. Only 1/3 persisted with hypertension, with lower dose of antihypertensives.
Conclusions: Bariatric surgery resulted in significant weight loss, as well as a reduction of body fat percentage and remission of comorbidities such as NAFLD, hypertension and DM2. However, despite the encouraging results, further studies are needed with greater number of patients.

eP237
Pediatric type 1 diabetes mellitus incidence rate and anthropogenic metals in the environment

I. Halabi[1], I. Koren[2], M. Shirav-Schwartz[3], O. Blumenfeld[4], R. Leiba[5]

[1]Carmel Hospital, Clalit Health Services, Pediatric Department, Haifa, Israel, [2]Pediatric Diabetes Clinic, Armon Child Center, Clalit Health Services, Haifa, Israel, [3]Geochemistry and Environmental Geology, Jerusalem, Israel, [4]National Diabetes Registry, Gertner Institute for Health Policy and Epidemiology, Tel Hashomer, Israel, [5]Biostatistic Consultation, Statistics, Haifa, Israel

Objectives: The objective of this study was to assess pediatric T1DM incidence rate in 5 sub-districts in northern Israel in order to study possible correlation of T1DM incidence rate and concentration of metals in the environment.
Methods:
1. Pediatric T1DM incidence rate was calculated for the period 2002-2012 for 5 municipal sub-districts in northern Israel: Haifa, Yizrael, Acre, Kinneret and Sefad. The calculated rate is based on data obtained from the national T1DM registry and the Israeli central bureau of statistics.
2. Concentration of soil metals was obtained from the national geochemical mapping project (1998-2015) during and served to distinguish between anthropogenic input and the natural background of trace metals
3. Corelation between the T1DM incidence rate and the concentration of soil metals was carried out using SPSS version 21, applying ANOVA analysis, T test and Pearson correlation. Statistical significance was considered when p< 0.05; Factor analysis on log-normal data was performed by STATISTICA13.

Results: The results show positive correlation between pediatric T1DM incidence and the presence of a suite of anthropogenic-derived metals in the environment such as Antimony (Sb),Arsenic (As), Molybdenum (Mo), Zinc (Zn) Lead (Pb) Cadmium (Cd), Copper (Cu) and Chromium (Cr).

Factor analysis which was applied on the log-transformed data suggested an association of T1DM incidence rate and toxic elements, opposing natural occurring metals, in the soil.
Conclusions: The results imply that anthropogenic changes in the environment may contribute to the rising incidence rate of pediatric T1DM in northern Israel.

eP238
Correlation between hemoglobin A1c and average blood glucose in Haitian children and adolescents with diabetes mellitus

C. Schömig[1], K. Altenor[2], J.E. von Oettingen[3]

[1]University Hospital Köln, Pediatrics, Köln, Germany, [2]Kay Mackenson Clinic, Montrouis, Haiti, [3]McGill University Health Centre, Pediatrics, Montreal, Canada

Objectives: Existing equations to calculate an estimated average glucose (eAG) from hemoglobin A1c (A1c) may not apply to pediatric patients and different ethnic groups. Data from low-resource settings where glycemic control is suboptimal are limited. Our objective was to define the relationship between A1c and eAG in Haitian youth with diabetes, and to assess the validity of the derived eAG calculation.
Methods: Retrospective analysis of blood glucose logs and A1c measurements from 49 youth with diabetes followed at one center in Pierre Payen, Haiti, between 05/01/2014-08/01/2016. eAG was calculated as the arithmetic mean of self-monitored pre-meal and bedtime blood glucose levels (4 per day) over 3 months preceding an A1c measurement. Linear regression was used to assess the relationship in the whole group and in 3 A1c categories: low (A1c ≤8%), mid (A1c 8.1-10.5%) and high (A1c ≥10.5%). The derived formula was applied to a validation group of 9 patients (24 A1c levels). Results were compared to the Nathan formula for eAG.
Results: 164 A1c levels with preceding glucose monitoring periods from 49 patients (55% male, mean age 18±5 years; mean BMI z-score -1.0±1.0; mean A1c 9.5±2%) were analyzed. The equation eAG = 14.4*A1c+73.8 defined a linear relationship between A1c and eAG (r^2 = 0.4, p< .0001). In the low, mid and high A1c categories, eAG was calculated as 29.9*A1c -45, 18.4*A1c+43.9, and 12.4*A1c +94.6, respectively. Derived eAGs differed from Nathan formula results in all but the low A1c category (p=0.80). Validation group self-monitored blood glucose means were no different from A1c derived eAG (p=0.31).
Conclusion: A1c and eAG correlate well in a pediatric population with diabetes in Haiti, with estimates close to Nathan formula in the low A1c category, but distinct when A1c is >8%. Formulas derived to calculate eAG from A1c or vice versa should be used with caution in distinct populations, especially when race, age, diabetes type and glucose control differ.

eP239
Reduced AMP-activated protein kinase in obese children and adolescents and its association with insulin resistance

M. Nourbakhsh[1], Z. Arab Sadeghabadi[2], P. Pasalar[2], A. Golestani[2], M. Razzaghy Azar[3,4]

[1]Iran University of Medical Sciences, Faculty of Medicine, Biochemistry, Tehran, Iran, Islamic Republic of, [2]Tehran University of Medical Sciences, Faculty of Medicine, Biochemistry, Tehran, Iran, Islamic Republic of, [3]Metabolic Disorders Research Center, Endocrinology and Metabolism Molecular - Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran, Islamic Republic of, [4]Iran University of Medical Sciences, H. Aliasghar Children's Hospital, Tehran, Iran, Islamic Republic of

Objectives: Obesity is an established risk factor for type 2 diabetes. Several links between obesity and type 2 diabetes have been

identified including proinflammatory cytokines, insulin resistance, deranged fatty acid metabolism, and dysregulated cellular processes. One of the main elements in energy control, regulation of appetite, fat cell differentiation and cellular stress control is a serine/threonine kinase named AMP activated protein kinase (AMPK) because of its activation by increased AMP concentrations. AMPK activates catabolic processes and autophagy and alternatively inhibits inflammation, ER and oxidative stress, all of which are involved in the pathogenesis of IR. Therefore dysregulation of AMPK plays an important role in the pathogenesis of IR. The aim of this study was to assess AMPK levels in obese children and adolescents.

Methods: Sixty children and adolescents (30 controls; 30 obese), between the ages of 8 and 16 years, were selected and clinically evaluated. Serum phospho-AMPK and insulin levels were measured using ELISA, and insulin resistance was calculated by the Homeostasis Model of Assessment of Insulin Resistance (HOMA-IR). Fasting plasma glucose (FPG), triglyceride (TG), total cholesterol (TC), LDL-C and HDL-C were also measured. Metabolic syndrome (MetS) was determined according to IDF criteria.

Results: AMPK levels were significantly lower in obese children and adolescents compared to normal-weight subjects (45.55±1.04 vs. 58.82±4.13 ng/ml, respectively). AMPK levels were also significantly lower in obese children with MetS compared to obese subjects without MetS (41.39 ± 4.1 vs. 47.02 ± 1.6 ng/ml, respectively). AMPK levels showed significant negative correlation with HOMA-IR and FPG as well as BMI and waist circumference.

Conclusions: AMPK levels are deranged in obese children and adolescents and may be a contributing factor in obesity-associated insulin resistance.

eP240
Association of metabolic control with the distribution of abdominal fat in adolescents with type 2 diabetes

J.A. Orozco Morales[1], P.G. Medina Bravo[1], M. Aliaga-González[1], P. Diez-Suárez[1], S. Hidalgo-Tobón[1]

[1]*Hospital Infantil de México Federico Gómez, Endocrinology, Mexico City, Mexico*

Objectives: This study was designed to analyze the distribution of abdominal fat in adolescents with type 2 diabetes mellitus (T2DM). To compare the distribution of abdominal fat in adolescents with T2DM in good metabolic control and poor metabolic control.

Methods: Observational, transversal and comparative study. Fifty-five adolescent patients with T2DM diagnosed according to the criteria of the ADA who attended the Diabetes Child Care Clinic of the Children´s Hospital of Mexico Federico Gomez, were enrolled in the study. All patients were referred to perform magnetic resonance imaging (MRI) to determine the distribution of abdominal fat. In all, the concentration of HbA1c was determined.

Results: The study cohort was divided into 2 groups depending on HbA1c levels following the ADA 2016 recommendations.

Twenty-two patients entered the controlled group (HbA1c< 7%) and thirty-five patients to the uncontrolled group. We did not find differences in age (mean 14.16 ± 2.21 years) and anthropometry. Statistically significant differences were observed in mean diastolic blood pressure (p< 0.01), mean systolic blood pressure (p = 0.019), the levels of TC (p=0.002), LDL-C (p=0.007), Tg levels (p = 0.038) and HbA1c levels (p< 0.001).

As measured by MRI, patients within the highest HbA1c group were found to have a higher proportion of total abdominal fat (275.50 ± 27.62 cm2 vs 264.76 ± 28.41 cm2). A statistically significant difference was not observed in the distribution of abdominal fat between the groups; visceral fat (43.59 ± 4.21 cm2 vs 43.52 ± 5.29 cm2 [p = 0.972]) and subcutaneous abdominal fat (232.03 ± 24.61 cm2 vs 221.24 ± 24.03 cm2 [p = 0.965]).

Conclusions: In this group of adolescents with DM2, there was no association between poor glycemic control and abdominal fat distribution.

The amount of visceral fat was similar between both groups.

There was a trend towards a higher amount of subcutaneous and total fat in poorly controlled patients.