ISPAD 2014

POSTER SESSIONS

Poster Tour 1: Acute and Chronic Complications I

P1

Can serum bicarbonate concentration substitute for venous blood pH in the evaluation of children with new onset diabetes?

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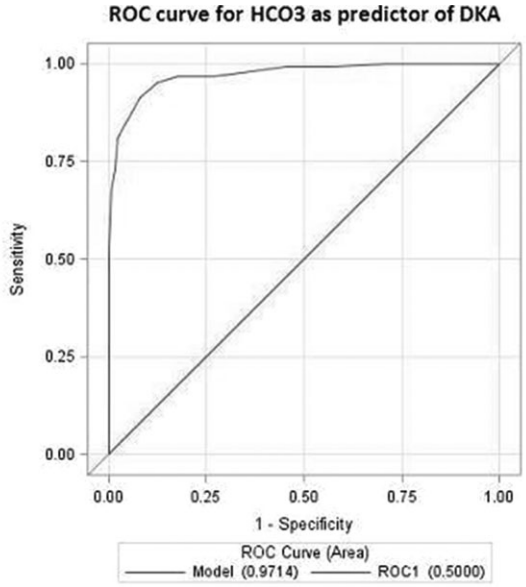
Objective: To investigate whether serum bicarbonate (HCO_3) levels accurately detect diabetic ketoacidosis (DKA) and classify its severity in children with new onset diabetes (NODM).

Methods: Retrospective study of all patients with NODM presenting to Boston Childrens Hospital from 1/1/09 to 7/1/13. Patients were included if serum HCO_3 was measured within 15 minutes of initial venous pH (vpH) measurement. DKA was defined as blood glucose >200 mg/dl, vpH <7.3 and urine ketones ≥2+. We used logistic regression to evaluate serum HCO_3 as a predictor of DKA, and linear regression to assess serum HCO_3 as a predictor of DKA severity.

Results: 674 patients (319 F, mean age 10.8 ± 4.3 years, 77% white) met inclusion criteria. DKA occurred in 126 (19%) patients of whom 19 (15%) had severe DKA (vpH <7.1). The ROC curve (Figure) showed an AUC of 0.97 (95% CI 0.97–0.99, p < 0.0001). Sensitivity, specificity, NPV and PPV of different HCO_3 cut-offs for detection of DKA and for classification of severe DKA are shown. The relationship between vpH and HCO_3 was log-linear (r = 0.86, 95% CI 0.84–0.88, p < 0.0001). The linear regression model showed that HCO_3 predicted vpH using the formula vpH = 6.80893+ (0.17965*log(HCO_3)) [R-square 0.74 (p < 0.0001)].

Conclusions: Serum HCO_3 alone can substitute for vpH to diagnose DKA and to assess its severity in children with NODM. It is suggested as an alternative to reliance on vpH, especially in resource poor settings where access to vpH measurement may be limited.



HCO3 cut-off	Sensitivity	Specificity	PPV	NPV
DKA				
15 mmol/L	83 %	96 %	84 %	96 %
16 mmol/L	87 %	94 %	78 %	97 %
17 mmol/L	91 %	92 %	72 %	98 %
18 mmol/L	95 %	87 %	63 %	99 %
Severe DKA				
5 mmol/L	84 %	99.7 %	89 %	99.5%
6 mmol/L	89 %	99 %	74 %	99.7 %
7 mmol/L	95 %	97 %	49 %	99.8 %
8 mmol/L	100 %	96 %	43 %	100 %

Figure HCO_3 as predictor of DKA.

P2

Increased rates of nocturnal hypertension in adolescents with type 1 diabetes mellitus

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Objectives: Premature atherosclerosis is the major cause of morbidity and mortality in patients with type 1 diabetes (T1D). The earliest sign of HTN in normotensive patients may be loss of the physiologic drop in BP during the night (non-dippers). Ambulatory blood pressure monitoring (ABPM) may identify subtle signs of HTN such as non-dippers and it calculates daily average BP. The aim of our study was to compare ABP in adolescents with or without T1D.

Methods: Adolescents aged 12–19 with T1D of at least 2 years were recruited alongside healthy age-matched controls. All subjects underwent ABPM at home. Non-dippers were defined as subjects with a dip of less than 10% between wake and sleep hours. HTN load was defined as the percentage of time during which BP was in the hypertensive range (>95‰).

Results: 19 diabetics and 12 healthy controls were recruited, with similar age and BMI SDS. Prehypertension (BP >90‰) was seen in 63% of diabetics based on a single BP measurement, and in 21% using ABPM (p-0.01). Nocturnal systolic and diastolic HTN load was seen in 14% and 13% of measurements in the diabetic group compared to 4% and 2% in the control group (p-0.07, p-0.04). 53% and 17% of diabetics and controls respectively were non-dippers (p-0.04). 21% of diabetics had nocturnal systolic HTN (BP >95‰) compared to 0% of controls (p-0.047). Average SBP and DBP during sleep were lower in diabetics who exercise regularly. 108 mm Hg vs. 101 (p- 0.076) and 61 vs. 52 (p-0.01) respectively.

Conclusions: A significant number of adolescents with T1D had prehypertension, and 53% of them were non-dippers. A high number of diabetics had nocturnal systolic HTN, and HTN load compared to the controls. Vascular changes in patients with T1D are seen

already during adolescence even when they are normotensive during clinic visits. ABPM was shown to be a useful tool in the clinical setting to identify patients who are non-dippers despite being normotensive.

Table 1 Demographic data

	T1D Group (N = 19)	Control Group (N = 12)
Age (years)	16.1 ± 2.1	16.4 ± 1.8
BMI Z-score	0.3 ± 0.8	−0.1 ± 0.9
Diabetes duration (years)	8.3 ± 2.9	NA
HbA1c (%)	8.4 ± 1.4	NA

P3
Impact of age, gender, duration of diabetes, degree of glycemic control and autoimmunity status on microvascular complications in children with type 1 diabetes (T1D) in Lithuanian pediatric population

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Objectives: To evaluate significance of gender, age, duration of T1D, degree of glycemic control and autoimmunity status for development of microvascular complications in Lithuanian pediatric population.

Methods: Data of 289 T1D patients <18 years were analyzed. The degree of retinopathy was evaluated by digital fundus photography. 24 h urinary albumin concentration was measured for the screening of nephropathy. Michigan Neuropathy Screening Questionnaire and tests for vibration, pressure and temperature sensation were used for neuropathy screening. The autoimmunity status was evaluated by measuring GAD65, IA2, and IAA (RIA); ICA antibodies were measured by ELISA method.

Results: Mean age of patients was 12.1 ± 4 years. Distribution by age: 0–4 years 4.5%, 5–8 years 18%, 9–12 years 23.2%, 13–17 years 54.3%. 48.4% were males. Mean duration of T1D was 4.2 ± 3.4 years, in 61.9% duration of disease was <5 years. Neuropathy, nephropathy and retinopathy were present in 9.3%, 4.7% and 1.8% of our patients, respectively. 2 patients had diabetic cataract. The average level of HbA1c was 8.1 ± 1.78%. 43.6% of patients had HbA1c <7.5%. Adolescents (both genders, 13–17 years) and girls had the worst glycemic control (mean HbA1c 8.49 ± 1.9 and 8.35 ± 1.8%, respectively).

Duration of T1D and glycemic control were significantly related to the presence of nephropathy and retinopathy ($p = 0.03$ and $p < 0.001$, respectively), but not to that of neuropathy. Anti-IA2 alone were found 56.4%, GAD65 - in 46.7%, both types of antibodies - in 31.1% of cases. IAA were found in 91.8%, ICA - in 6.1% of cases. No significant associations between presence of any type of antibodies and microvascular complications were found.

Conclusions: Adolescents, especially girls, have the worst glycemic control compared with other age groups. T1D duration ≥5 years and poor glycemic control have a major impact on the development of nephropathy and retinopathy. Autoimmunity status is not related to the risk of microvascular complications.

P4
Acute TAMOF (thrombocytopaenia associated multi-organ failure) in a young child presenting with severe acidosis, DKA and unrecognized type 1 diabetes

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Case report: A normally well 2 year old girl was found obtunded in the morning with a GCS of 3 and was transferred to our tertiary ICU.She had been unwell with a vomiting illness for 2 days prior to this, she had a severe acidosis (pH 6.7), glucose 20 mmol/l & was treated as a severe DKA.. The ketosis and hyperglycaemia of the DKA was quickly controlled however a severe metabolic acidosis persisted and she developed progressive thrombocytopaenia & incipient renal failure.

Her profound obtunded state, worsening renal function (creatinine 192) and worsening thrombocytopaenia prompted the presumptive diagnosis of TAMOF; this is a variant of TTP (thrombotic thrombocytopenic purpura.) She had positive pre type 1 diabetes antibodies, and HbA1c of 7.5%.

Empiric plasma therapy was commenced with fresh frozen plasma (FFP contains ADAMTS13), for ~1 week, during which time her condition stabilised, and her renal function & acidosis improved and she avoided dialysis. Correspondingly her neurologic status improved along with her platelet count from a nadir of 34. She required standard insulin dose replacement, ICU stay of 14 days.

Results: The ADAMTS13 activity measured prior to FFP was mildy decreased at 34% (normal >50%) (in TTP ADAMTS13 activity is <10%. ADAMTS13 activity at 3 months had normalised to >50%.

Comment: TTP is a haematological emergency with high rates of mortality and is caused by inadequate ADAMTS13 enzyme activity, which cleaves high molecular weight von Willebrand multimers into smaller components. The presence of high molecular weight multimers in the circulation leads to intravascular activation of the coagulation system, it appears that this was associated here by unrecognized diabetes.

Progress: She has made a remarkable neurological and renal recovery, and is requiring standard insulin replacement at 6 months after this insult.

Conclusion: TAMOF associated with new onset diabetes and DKA is very rare. Early treatment of such cases with FFP should be considered.

P5
Statural growth in children with type 1 diabetes mellitus and celiac disease

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Objective: To study the impact of type 1 diabetes mellitus (T1DM) and celiac disease (CD) association (TD1M - CD) on linear growth.

Study design: In this longitudinal study, statural growth of TD1M - CD patients was assessed. in all children, T1DM was diagnosed before 15 years of age, and all were followed-up from the onset of diabetes until 18 years age at least. statural growth of TD1M -CD was studied in comparison with matched and not associated CD

patients, not associated T1DM patients, and controls (from Sempé and Pédron growth curves).

Results: Overall 163 TD1M -CD were studied (78 boys, 85 girls) with a mean age of 8.77 ± 3.9 years at diabetes, and 12.82 ± 4.65 years at CD diagnosis. The mean height at diabetes was −1.10 ± 1.47 SDS in boys, and - 0.98 ± 1.37 SDS in girls. The mean height at CD diagnostic was −2.58 ± 1.54 SDS in boys, and - 2.15 ± 1.31 SDS in girls. The study of the mean height velocity showed absence of pubertal-peak in TD1M -CD subjects.

At 18 years, mean height in T1DM-CD boys was −2.92 ± 1.85 SDS (not associated T1DM: −0.86 ± 1.09 SDS, $p < 0.001$), (not associated CD: −0.99 ± 1.21 SDS, $p < 0.001$). At 18 years, mean height in T1DM-CD girls was −2.22 ± 1.54 SDS (not associated T1DM: −0.68 ± 1.10 SDS, $p < 0.001$ vs. T1DM-CD), (not associated CD: −1.25 ± 1, 02 SDS, $p < 0.001$ vs. T1DM-CD).

Conclusion: Subject to the same conditions of care than isolated T1DM and CD, our TD1M -CD patients have shown a significantly impaired growth particularly during puberty, clearly demonstrating the repercussion of T1DM-CD association on final height.

P6
Cystatin C in children and adolescents with type 1 diabetes mellitus. A new precocious biomarker of diabetic nephropathy?

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Introduction: Cystatin C (Cys-C) had been identified as an early biomarker of acute and chronic renal damage, and useful in diagnosis of Diabetic Nephropathy.

Objective: To determine urinary Cys-C in DM-1 children and adolescents, compared it with a control group and evaluate its correlation with clinical and biochemical parameters of renal function and metabolic control.

Methods: We studied 18 children and adolescents with DM-1 and 15 controls. Age, sex, anthropometry, time since diagnosis, Hb A1c, ACR, creatinine and Glomerular filtration rate by Schwartz was consigned. A 10 ml urine sample was centrifuged (12,000 g × 10 min) and then ultracentrifuged (38,000 g × 1 hr, 4°C) to obtain supernatant (S) and exosomal (E) fractions. Cys-C abundance was determined in 100 µg S and E by Western blot.

Results: 18 DM-1 and 15 controles. Table 1 show results in DM-1 and control groups. Correlation was found only between Cys-C/Flot and microalbuminuria ($p = 0.008$) but not for the other renal function parameters measured.

Conclusions: Urinary Cyst-C/Flotillin and Cys-C E/S is significantly more abundant in DM-1 than control children. Cyst-C/Flot correlates with microalbuminuria but not to other classical parameters of Diabetic Nephropathy.

Table General data and Cyst-C in DM-1 and control group

Group	DM1 (n = 18)	Control (n = 15)	p
Age (years)	13.3 ± 2.8	11.8 ± 3.4	NS
Male/Female	9/9	5/10	NS
Time from diagnosis (years)	5.7 ± 4.5		
HbA1c (%)	9.3 ± 2.2		
ACR (mg/g)	4.9 ± 5.2		
Cys-C (S) UA	47,637.5 + 70,860	28,740.1 + 18,840.8	NS
Cys-C (E) UA	552,000 + 130,267.6	12,187 + 12,725	NS
Cys-C/Flotilina	2.06 ± 2.35	0.6 ± 0.7	0.001
Cys-C E/S	1.96 + 2.26	0.57 + 0.42	0.03

P7
An audit on the care provided to paediatric diabetic patients at a district general hospital in the West Midlands, UK

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Introduction: Diabetes mellitus is a common chronic paediatric condition for which a multi-disciplinary team approach is needed to ensure adequate care. It is becoming increasingly recognised that very few children with diabetes in the UK are receiving the care and services they are entitled too. This lack of good structured care leads to poor glycaemic control and increased long term complications.

Aim: To assess whether we are meeting the local and national UK guidelines in the care of young people with diabetes mellitus in a UK District General Hospital.

Method: Data was collected retrospectively from hospital databases and compared with National Institute of Clinical Excellence, UK guidelines. 56 patients were identified and their electronic records were analysed between the dates of 1st April 2012 and the 31st March 2013. Information was collected on important aspects of care including annual reviews, HbA1c measurements, retinopathy screening, foot reviews, microalbuminuria, coeliac, thyroid function and cholesterol checks. The data was entered into excel and analysed.

Results: 100% (56/56) patients had an annual review and foot review within the time period of the audit collection. 11% (6/56) had a HbA1c <7.5%. 93% (39/42) of those eligible had retinopathy screened within the time frame. 93% (39/42) were screened for microalbuminuria. 75% (42/56) had cholesterol and triglycerides checked. 95% (43/46) of patients had their coeliac markers and thyroid function tests checked.

Conclusions: The UK district general hospital provided a high standard of care to children with diabetes in majority of aspects for e.g. Annual Reviews, retinopathy screen, thyroid and Coeliac Screen. The audit also highlighted the need to improve long term Glycaemic Control.

Poster Tour 2: Acute and Chronic Complications II

P8

Renal injury biomarkers in type 1 diabetic children and adolescents

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Introduction: Diabetic nephropathy (ND) is the main cause of end stage renal disease and early detection is crucial to prevent its progression. Classical markers of renal compromise (microalbuminuria (MA), urine albumin to creatinine rate (ACR), plasmatic creatinine (plCr), glomerular filtration rate (GFR) are late markers. Renal Injury Biomarkers (RIB) are small proteins that shows early tubular damage and it has been reported as useful markers in acute and chronic renal injury.
Objective: To measure urine RIB including neutrophil gelatinase-associated lipocalin (NGAL), Nuclear Factor Of Activated T-Cells 5 (NFAT5) and hypoxic inducible factor 1-alpha (HIF1-α) in urine of T1D and control group and correlate this finding with classical markers of DN and metabolic control.
Method: 42 T1D patients and 15 controls (13.0 ± 2.5 years) are included in this prospective cross-sectional study. Blood sample was obtained to measure MA, ACR, plCR, HbA1c in T1D patients and urine sample in T1D and controls. Urine was cetrifugated and ultracentrifugated to obtain supernatant (S) and exosomal (E) fraction. NGAL, NFAT5 and HIF1-a were quantified by Western Blot. Pearson correlation was done between clinical and lab parameters.
Results: NGAL was detected in E fraction (4,813.53 ± 6,936.9 Arbitrary Units) and S fraction (1,180 ± 2,977.6 AU) of T1D patients but not in any control. There was a positive correlation between NGAL and microalbuminuria ($r = 0.34$, $p = 0.05$), ACR ($r = 0.39$, $p = 0.02$), tanner Stage ($r = 0.4$, $p = 0.01$) and mean HbA1c in the last year ($r = 0.34$, $p = 0.05$). NFAT5 and HIF1-a was not detected neither T1D nor controls.
Conclusions: NGAL could be a useful biomarker in early onset of renal injury in T1D children, this supports the hypothesis of tubular damage preceding glomerular damage whose marker is microalbuminuria.

P9

Role of Doppler in early detection of diabetic nephropathy in children with type 1 diabetes

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Objectives: To study renal hemodynamics using Doppler ultrasonography to measure the renal Resistive Index (RI) for detection of early diabetic nephropathy, in order to delay or possibly prevent progression to end-stage renal disease, which is a leading cause of mortality among these patients.
Methods: Our study was a case control, cross sectional study including 20 patients with T1D (5–15 years old), with onset of diabetes 3–5 years, with normal kidney functions and albumin excretion rate (AER) as cases, compared to another 20 age-matched healthy children (controls). Children in both groups were subjected to full history taking, physical examination (including BP) and investigations (including HbA1C, AER, serum creatinine). Mean renal RI was measured in both groups using Doppler ultrasonography.
Results: Our study showed an increase in the mean renal RI in patients with T1D compared to their healthy controls (0.64 ± 0.5 vs. 0.58 ± 0.28), with a $p < 0.001$. Also, the increase in RI had positive correlation with duration of the disease, GFR and HbA1c.
Conclusion: Renal RI is increased early in T1D (before the development of microalbuminuria), so it can be used as a screening tool for early detection of nephropathy in T1D.

P10

Intra abdominal fat and insulin resistance in children and adolescents with type 1 diabetes mellitus

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Objectives: This case control study was designed to assess abdominal adiposity in relation to insulin resistance, lipid profiles and blood pressure in children and adolescents with type 1 diabetes mellitus.
Methods: Study included fifty patients with type 1 diabetes mellitus with mean age of 12.72 ± 3.17 years and mean disease duration of 6.1 ± 4.1 years as well as thirty age and sex matched healthy controls. Data included; age, sex, disease duration, anthropometric measures and percentiles[weight, height, BMI, waist circumference (WC), hip circumference (HC), waist/hip ratio (W/H) and skin fold thickness] and vital signs. Investigations included; HbA1c%, fasting lipid profile, fasting blood glucose and serum insulin by ELISA with calculation of HOMA-IR (Insulin resistance=HOMA-IR >3.16). Intra abdominal fat was measured by abdominal ultrasound.
Results: Patients had increased diastolic blood pressure percentiles, fasting lipid profiles, intraabdominal fat and skin fold thickness ($p < 0.05$) with no significant difference in other anthropometric measures. WC, HC, BMI and skin fold thickness significantly increased with longer disease duration ($p < 0.05$). Intraabdominal fat measurements were not related to gender or disease duration. It was positively correlated to age, WC, HC, skin fold thickness, SBP and DBP. It was not correlated to HbA1c%, lipid profiles or insulin resistance. Insulin resistance was detected in older patients with increased WC (>61 cm with 88.89% sensitivity and 60.87% specificity), HC, BMI and skin fold thickness (>16 mm with 74.07% sensitivity and 60.87% specificity). WC of 69 cm could differentiate obese from non obese with 80.95% sensitivity and 82.76% specificity.
Conclusion: Patients with type 1 diabetes are at risk of dyslipidemia and visceral adioposity. Anthropometric measures are directly correlated to insulin resistance and visceral adiposity assessed by ultrasound. No correlation between intraabdominal fat and insulin resistance was revealed.

P11
Revisiting young adults with type 1 diabetes: after transition

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Cohort follow-up provides the opportunity to review transition outcomes from paediatric to adult centres.

Objective: To assess education recall and identify response to transition to adult care, in two cohorts recruited for follow-up of microvascular complications (2008-14).

Methods: Prior to assessment 112 adults completed a current health care questionnaire, including knowledge of screening recommendations, individual complication status and HbA1c.

Results: The median age was 23.2 [21.7–25.5] years and diabetes duration 15.1 [12.8–17.3] years; 20 were from rural areas previously accessing tertiary paediatric diabetes outreach services.

Formal specialist-referred transition occurred from age 16–19 years; some had self- transitioned, after dropping out of specialist paediatric care. 57% knew the recommended (annual) frequency screening for retinopathy; and 42% for microalbuminuria. Retinopathy was present in 55/106 (52%), two had required laser therapy. 18 stated they had diabetes related eye problems. Microalbuminuria was present in 3/95 (3%) but nine reported kidney abnormalities. 9 stated they were on ACE inhibitors; 3 due to proteinuria, 1 high blood pressure and 5 gave no reason.

Only 66% recalled a value for their last HbA1c. 80% reported seeing an endocrinologist for diabetes care (3 monthly to 2nd yearly). Diabetes care with a general practitioner (GP) only was reported by 22 (9 rural) with 15 stating they always saw the same GP. Median HbA1c was highest (9.1%) in those seeing different GPs for diabetes management, compared to those managed by a single GP (7.8%) or an endocrinologist (8.1%) ($p = 0.031$).

Conclusion: While many young adults have good recall of their current glycaemic control and their diabetes health issues, some do not and this is a concern. The association of absence of a regular health provider with poorer glycaemic control increases their risk for long term health outcomes.

P12
Caffeine intake in adolescents with type 1 diabetes: does it affect resting heart rate and heart rate variability?

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Objective: To evaluate the effect of caffeine intake on the resting heart rate (RHR) and heart rate variability (HRV) as a measure of autonomic function, in adolescents aged 11–18 years with Type 1 Diabetes.

Methods: A total of 416 patients attending the Diabetes Complications Assessment Service at the Childrens Hospital at Westmead were asked about their caffeine intake in the 12 hours prior to HRV testing. Caffeine intake from coffee, tea, chocolate and caffeinated drinks was quantified. RHR and HRV were measured using a 3-lead ECG in the supine position for 10 minutes. Analysis was undertaken to determine the RHR, SDNN, RMSSD, TI and LF: HF ratio using the Lab Chart Pro 7 Analysis software. Participants were divided into Group 1 Non Caffeine ($n = 307$) and Group 2 Caffeine ($N = 109$) those who did consume caffeine, and compared for HRV.

Results: Caffeine consumption in Group 2 ranged from 25–215 mg (median 40 mg [40–80]). No difference was found between the groups for RHR or HRV.

Conclusion: Patients that consumed caffeine were older than those who did not and had a slightly higher HbA1c. Caffeine intake of up to 215 mg in adolescents with Type 1 Diabetes did not have a significant effect on RHR and HRV.

Table 1

	Non-Caffeine ($n = 307$)	Caffeine ($n = 109$)	p-value
HbA1c (%)	8.4 (7.5–9.4)	8.6 (7.8–9.5)	0.06
Age (years)	14.4 (12.9–16.2)	15.0 (13.5–16.5)	0.04
Duration (years)	6.0 (3.8–9.0)	6.8 (4.1–9.3)	0.28
RHR (bpm)	73 (65–81)	73 (65–80)	0.69
SDNN (ms)	68 (53–95)	67 (50–92)	0.98
RMSSD (ms)	55 (37–92)	60 (38–93)	0.98
Triangular index	15.8 (12.38–20.28)	16.3 (12.2–21.6)	0.46
LF/HF ratio	0.93 (0.51–1.46)	1.05 (0.59–1.57)	0.21

P13
Type 1 diabetes mellitus presented with diabetes ketoacidosis: prevalence by different demographic variables

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Background: Diabetic ketoacidosis (DKA) is the leading cause of death in children and adolescents with Type 1 Diabetes Mellitus (T1DM). Despite an increase in the disease prevalence, there has not been any reduction in the rate of DKA over the past years.

Objective: To examine the epidemiology of DKA at presentation of T1DM in Israel and determine prevalence and risk factors.

Methods: Data collected from the national registry at The Gertner Institute, including children (0–17 years) who were diagnosed between 2004 and 2008. In addition, a retrospective chart review of subjects with T1DM from three medical centers in Israel was conducted.

Results: The study included 1,450 cases from the national registry and 438 cases from the three medical centers. The rate of DKA was steady at around 39%. Demographic variables that were found to be associated with DKA at diagnosis were:

1. Young age- DKA was significantly more common among children under 6 years of age compared to 6–10 years and 11–18 years (47% vs. 39% vs. 35%, respectively, $p < 0.01$);
2. Maternal Ashkenazi origin was found to be a protective factor (OR 0.43, $p = 0.04$);
3. The rate of DKA was 49% in Jerusalem area, 41% in northern Israel, 36% in central Israel and 34% in southern Israel ($p = 0.04$);
4. DKA at presentation was significantly less common with first degree relative with T1DM compared to none (22% vs. 41% respectively, $p < 0.01$).

Conclusions: The study identified risk factors for DKA as presentation in Israel. Increasing the knowledge among population at risk about symptoms and signs of diabetes may allow earlier detection of T1DM and prevention of DKA at presentation.

P14
Rare, acute complications in children with diabetes mellitus type 1

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Objective: To present the clinical manifestations and laboratory findings of rare, acute complications in three patients with diabetes mellitus type 1(T1D).
Methods: The first patient is a 9.5-year-old girl with newly diagnosed T1D who developed insulin edema 8 days after presentation with diabetic ketoacidosis (DKA). Other causes of edema were excluded with appropriate clinical, laboratory and imaging studies. The second patient is a 13-year-old boy diagnosed with T1D 2 years ago and on insulin pump the last year, who presented with severe DKA and hyperkalemia. On the 3rd day of hospitalization he developed rhabdomyolysis with dark urine and elevated CPK (3,834 U/l). The third patient is a 5-year-old girl with new onset T1D and ketoacidosis complicated with extremely severe hypertriglyceridemia (TG>26,000 mg/dl) and cerebral infarcts.
Results: The edema of the first patient resolved within a week without specific therapy. Rhabdomyolysis of the second child was treated with forced hydration and infusion of sodium bicarbonate and gradually resolved. The third child required ICU admission due to worsening acidosis and coma. Hypertriglyceridemia gradually resolved following intravenous insulin and crystalloids infusion. However, her mental and kinetic status impaired dramatically due to cerebral infarcts.
Conclusions: Rarely, DKA can be complicated with potentially lethal disorders like severe hyperlipidemia and rhabdomyolysis. Physicians should have an increased level of suspicion to recognize and treat these complications early and appropriately. On the other hand, they should be aware of self-limited complications like insulin edema, since its recognition will minimize anxiety, and facilitate patient compliance with insulin therapy.

P15
A multicentre Italian retrospective survey regarding diabetic ketoacidosis management in children with type 1 diabetes

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Introduction: Data regarding epidemiology and management of diabetic ketoacidosis (DKA) in Italian children with type 1 diabetes (T1D) at disease onset are lacking.
Methods: From 1/1/2012 to 31/12/2013 a survey on DKA was conducted in all paediatric Centres belonging to the Italian Society for Pediatric Diabetology and Endocrinology. DKA was defined according to the ISPAD criteria. The following data were collected: treatment according ISPAD protocol yes or not, type of rehydrating solution used, bicarbonates use yes or not and amount of insulin infused.
Results: Data were returned from 68/77 Centres (87%) for a total of 14.493 patients with T1D. We recorded 2,453 children with T1D onset, with DKA in 945 (38.5%) (severe in 10.3%). Considering only preschool children DKA was observed in 72% (severe in 16.6%). Cerebral edema following DKA treatment was observed in 5 cases (0.5%). DKA treatment according ISPAD guidelines was adopted in 67% of the Centres, while 11% did not follow any specific guidelines. In the first 1–2 hours, rehydration was started with normal saline, at different rates: 5–10 ml/kg/h in 71%, 10–20 ml/kg/h in 16%, <5 ml/kg/h in 4%. After the first hours, differences among Centres were observed regarding the type of solutions used: saline 0.9–0.45% in 75%, 5–10% glucose solution in 19%, irrespective of glycemic values. Potassium supplementation was performed at the rate of 20–40 mEq/l in 63% of Centres. Bicarbonates were never used in 17% of Centres, while in 68% were exceptionally used according to pH and clinical conditions. Insulin was infused starting from 2nd to 3rd hour at the rate of 0.05–0.1 U/kg/h in 63% of Centres, while others used infusion rate lowest as 0.025 U/kg/h.
Conclusions: Nothwistanding prevention campaign, DKA is still observed at clinical diabetes onset in Italian children. Despite international guidelines (ISPAD), significant variability in DKA treatment still exists, underlying the need to share them among Centres.

P16
Clinical presentation, parental attitudes and medical practices in the admission of a recent consecutive series of 84 new cases of childhood T1D

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Objectives: The aim of this work was to analyze the clinical features, mode of presentation, risk factors of ketoacidosis, parental attitudes and medical practices to a T1D new case.
Patients and methods: All new cases of childhood T1D, under the same epidemiological register and hospitalized in two specialized services from June 2013 to March 2014 were analyzed. Recent history, clinical, biological and socioeconomic characteristics were identified upon admission.
Results: Eighty consecutive four were captured. The sex ratio is 0.54, age (mean ± SD) was 8.2 ± 4.4, father (47 ± 9.0 years) in 100% working and mother (37 ± 7.1 years) in 20%. Signs described in the month prior to admission are polyuria and polydipsia (96%), secondary enuresis (63%), weight loss (57%), appetite increased (48%), asthenia (40%) and abdominal pain (38%).In 80% of cases parental attitude was thinking of T1D. When a T1D is found in 1st and 2nd degree siblings, the proportion is 86% ($p = 0.34$). The Practitioner consulted speaks about T1D as a first intention at 79% plus 8% in its second consultation and 4% in the third visit. In 9% of cases, parents had consulted 2 or 3 different doctors to reach a result.

On site, an examination by strip was made possible in 45%. Biochemical confirmation was requested in 52%. The initial hospitalization occurred in a Medical day hospital in 40% and in regular hospital in 60%. The inaugural ketoacidosis was present in 20% of the cases, in 20% of children under 5 years, in 12% in 5–9 years and in 27% among 10–14 year-old ($p < 0.44$). It is being found in 12% when the disease was present in siblings against 76% inversely ($p < 0.02$).

Conclusion: Giving these relatively favorable outcomes of new childhood T1D cases, the vigilance reinforcement of parents and practitioners, will guarantee a good start of a more and more frequent and early affection.

Poster Tour 3: Genetics & Immunology I

P17

Type 1 diabetes disease-associated regions are not enriched for target sites of microRNA known to play a role in the disease

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Background: Genetic and environmental factors contribute the aetiology of type 1 diabetes (T1D). Over the last decade, identification of these genetic components has been made possible through the use of genome-wide association studies (GWAS). However, the mechanisms through which these genetic variants contribute to the causal cascade remain largely unanswered. Recent studies suggest that a number microRNA (miRNA) play a role in dysregulation of gene expression in T1D.
Methods: Our aim was to explore whether T1D associated genomic regions are enriched in genes coding disease-linked miRNAs or their target sites, more than expected by chance using the Meta-Analysis Gene Set Enrichment of Variant Associations (MAGENTA) software. We included 46 T1D associated regions and 54 disease linked miRNAs. The 95th and 75th percentile cut-off p-values were used for establishing enrichment.
Results: We tested the enrichment of genomic variants associated with T1D in the gene sets of the 54 miRNA known to play a role in the disease. Application of MAGENTA revealed no significant overlap between the disease-associated regions and disease linked miRNA genes or their target gene sets.
Conclusion: We found no support for a causal relationship between T1D associated genomic regions and disease-linked miRNAs. These results may help to identify future directions in understanding the pathogenesis of the disease.

P18

Clinical case of permanent neonatal diabetes due to a *GATA6* mutation

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Objective: To describe the clinical characteristics of syndromic neonatal diabetes in a family with a *GATA6* mutation.
Clinical case: A girl aged 9.7 years born to a healthy mother from normal pregnancy with intrauterine growth retardation: weight 1,600 g (−4 SDS), length 41 cm. The father underwent surgery during infancy for Ductus arteriosus persistens (DAP) and developed insulin dependent diabetes at 12 years of age. The daughter presented with severe dehydration and 30 mmol/l blood glucose at 9 days of age. Endogenous insulin assessed by C-peptide at age 20 days, 3 months, 2 years was low, but detectable: 73.1 pmol/l (174–960), 79.6 pmol/l and 19.4 pmol/l. Endocrine β-cells autoantibodies were negative. In early infancy the main features were hypotrophy, poor growth, persisting foramen ovale and DAP, mild transaminase activity, cholestasis, hypoproteinemia and iron deficiency. DAP was corrected at appropriate time. A small pancreas with 3.5 mm length was visualized by ultrasound. Exocrine pancreatic insufficiency persisted over time and pancreatic hypoplasia was established later by MRI. Sequencing of the *GATA6* gene identified a heterozygous splicing mutation c.1136-2A>G in the girl and her father. Testing of the grandparents showed *de novo* mutation in the father. The complex supplemental therapy resulted in a successful catch-up-growth. The girl has reached a height of 132 cm (−0.54 SDS), weight 24.3 kg (−1.1 SDS), BMI 14.12 (10th percentile). She started normal puberty, has normal intellectual development and good overall metabolic control. The father doesnt have exocrine insufficiency but an ultrasound showed a thin pancreas with normal length and anatomical structure. C-peptide was low (88.2 pmol/l), otherwise he had good metabolic control with insulin dose of 0.35 U/kg and no diabetes complications.
Conclusion: The identification of a *GATA6* mutation in this family explains the cause of the diabetes and enables prenatal or preimplantation genetic diagnosis.

P19

Type 1 diabetes mellitus combined with Cowden syndrome: a case report

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Introduction: PTEN hamartoma tumour syndrome (PHTS) refers to a group of disorders caused by mutations in the phosphatase and tensin homolog (PTEN) gene, the most common of which is Cowden syndrome (CS). We report a patient with newly diagnosed Type 1 diabetes mellitus (T1DM) who also fulfils the clinical diagnostic criteria of CS.
Case report: An 11 year old girl presented with T 1 DM after a typical prodrome. Increased anti-thyroid antibodies (995) and a thyroid nodule were noted at diagnosis. Ultrasonography revealed that the nodule exhibited features suspicious of malignancy. Histology confirmed that the lesion was a papillary carcinoma. Non-tumoural thyroid has shown mild lymphocytic infiltrate suggestive of lymphocytic thyroiditis.

Due to high TTG antibody titres, she was investigated for coeliac disease (CD). Although CD was not confirmed she was noted to have numerous duodenal polyps and hamartomatous lesions, a colonic ganglioneuroma and lymhangiectasia Macrocephaly had also been present since birth. The combination of hamartomatous lesions, thyroid carcinoma, thyroid autoimmunity and macrocephaly raised the possibility of CS, a diagnosis which was confirmed on genetic review. The results of mutational analysis are pending however mutations are found only in 25–80% of children with a clinical diagnosis of CS.
Discussion: An association between CS and autoimmune features including autoimmune lymphocytic thyroiditis and autoimmune haemolytic anaemia has been described in the literature however there have been no patients described with CS and T1DM. There is a growing body of evidence that suggests that decreased PTEN signalling, by acting through the PI3K-AKT pathway can result in immune dysregulation.

P20

Autoimmune encephalopathy in a child with type 1 diabetes mellitus

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Introduction: Autoimmune etiology is being increasingly recognized as a cause of encephalopathy and intractable epilepsy in children. Clinical suspicion for autoimmune encephalopathy may arise in patients with another established autoimmune disorder.

A 5 years old girl was admitted to our hospital with diabetic ketoacidosis. Laboratory data showed HbA1c = 10.32% and positive autoantibodies. She was discharged from the hospital with insulin dose 0.53 U/kg/d. A month later she presented attacks of abdominal pain, which became more frequent and severe and were accompanied by convulsions, paleness and episodes of unconsciousness. EEG showed temporal epilepsy and slowing of background activity. Brain MRI showed cortex dysplasia and hemimegaencephaly in the occipital area and FLAR and T2 signal changes. GADAb-65 titers in serum and cerebro-spinal fluid were >2,000 IU/l. Anticonvulsant therapy was initiated with no effect, then it was combined with immunoglobulin (Octagam) infusions (12 courses with 36 g per application so far). Nevertheless the seizures continued with increased frequency and unintentional voiding at the end of the most severe ones. The longest period without seizures was 7 days. But deterioration occurred with status epilepticus. Our next decision was to start corticosteroids - 3 pulses intravenous Methylprednisolone at the dose of 20 mg/kg/d for 5 days with temporary improvement of the condition. Plasmapheresis and immunosuppressive therapy with rituximab were initiated as well but with no significant effect on symptoms. She had four epi - statuses so far. The last treatment option was electrostimulation of vagus nerve (VNS) with no improvement so far. At the moment our patient is on multiple anticonvulsants (Neurotop, Rivotril, Epilan, Zonegran).

Conclusions: This rare autoimmune disorder of the central nervous system is progressive with increasing frequency of the seizures and intellectual degradation with worsening of the metabolic control.

P21
Metabolic and clinical characteristics of maturity onset diabetes of the young (MODY 2) in children

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Aim: Metabolic and clinical characteristics of maturity onset diabetes of the young (MODY 2) in children and screening all first-degree relatives to ascertain mutations status.

Material and methods: The study group comprised 27 children with GCK MODY (glucokinase mutations). Inclusion criteria to genetic testing corresponded to current guidelines. Additional inclusion criteria involved patients with mild diabetes mellitus despite the *presence* of autoimmune markers of type 1 diabetes. Diagnostics of GCK mutation carriers among first-degree relatives were run.

Results: GCK gene mutations constitute approximately 4.5% of diabetic children in Upper Silesian Child Health Centre. About 37.04% of subjects have overt diabetes in oral glucose tolerance test (OGTT). 15 patients (65.22%) had C-peptide positive diabetes. Statistical analysis revealed that children which fulfilled OGTT criteria for diabetes or which had C-peptide negative diabetes were more often treated with insulin than oral hypoglycemic drugs (OHD) or diet. 7 children (46.67%) were successfully transferred from insulin to OHA. 8/26 (69.23%) Positive beta cell antibodies were found in 18 out of 26 MODY 2 children (69.23%).

Total cholesterol and HDL cholesterol concentrations were found to be 15.6% and 32.9% respectively higher than in healthy children. Glucokinase gene mutations were found in 27 relatives, of whom 10 subjects were carriers.

Conclusions: MODY 2 is clinically heterogeneous disease with a different metabolic control, immunological and metabolic status as well as a type of treatment. When compared with current recommendations it appears that wider criteria should be defined to select subjects for genetic testing because the majority of cases remain misdiagnosed or undiagnosed and because of this the prevalence of MODY is underestimated.

P22
A patient with ABCC8 /p.R1353H/ missense mutation causing congenital hyperinsulinemic hypoglycemia

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Background: Congenital hyperinsulinism is a rare cause of hyperinsulinaemic hypoglycaemia /CHH/ and is due to an inappropriate secretion of insulin by pancreatic β-cells. Mutations in the genes ABCC8/KCNJ11, encoding SUR1/Kir6.2 components of the K[sub ATP] channels, respectively, are the commonest cause.

Objectives: To describe the clinical characteristics and genetic finding in a patient with ABCC8 missense mutation.

Subject and methods: A boy aged 1.7 years born from second pregnancy in 34th gestational week with BW 4,570 g and BL 55 cm and registered hypoglycemia in the first days of life. The mother had hypoglycemic episodes in her early childhood, became obese and developed type 2 diabetes in her 20 s. Her first pregnancy ended with stillbirth at 34th week. In the first trimester she was treated with metformin and insulin therapy was initiated from 6th month of pregnancy.

Early in the morning after more than 12 hours fasting the child had convulsions and the emergency team registered blood glucose 2.1 mmol/l, glucose solution was infused. The child was hospitalized in the clinic where the following examinations were done: Insulin – 93.7 mIU/l, blood glucose 10.3 mmol/l /after the i.v. infusion/, Beta hydroxybutyrate /BOHB/0.4 mmol/l, no ketonuria. The following 48 hours the examined blood glucose profile was: 10.3–7.0–5.1–4.0–3.1 mmol/l; insulin 6.76 mIU/l /corresponding blood glucose 3.8 mmol/l, ammonia 64.6 μmol/l (10–60), lactate 4.24 mmol/l (1.1–2.4), BOHB 0.1 mmol/l. Metabolic screening for organic aciduria was negative. Hyperinsilinism was suspected and genetic testing was performed. It revealed heterozygous ABCC8 missense mutation, p.R1353H. The same mutation was detected in the childs mother. The family was advised for a diet, continuous glucose monitoring performed 6 months later showed normoglycemia.

Conclusions: Dominantly acting ABCC8 mutations cause CHH which confer an increased risk of diabetes in adulthood.

P23

Diabetes mellitus in adolescent secondary to Bardet-Biedl syndrome: a case report

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IIntroduction: Bardet Biedl syndrome (BBS) is a rare autosomal recessive disorder. The incidence of BBS in Europe is 1/160000. The principal manifestations are rod-cone dystrophy (Retinitis pigmentosa), postaxial polydactyly, central obesity, mental retardation, hypogonadism, andrenal dysfunction. Other features not always present include hepatic fibrosis, diabetes mellitus, neurological, speech and language deficits, behavioral traits, facial dysmorphism, dentalanomalies and developmental delay. The authors are reporting the case diagnosed in Congo, which is rarely encountered in clinical practice.

Objective: To describe the clinical picture of unusual diabetes mellitus in adolescent with retinitis pigmentosa.

Case summary: Miss N, 16 years, transferred to diabetes service from the Intensive Unit Care. Admitted for coma, fever, polyuria, polydipsia and weight loss. Second born in the family of 4 children. Had learning disabilities, school level not appropriated. History of blurring of vision from 8 years and obese from her childhood. Her brother (9 years) is having blurring of vision too.

Physical examination: weight 62 kg, height 160 cm, postaxial polydactyly. Glycemia 364 mg/dl, glycosuria and Cetonuria +++ CRP 96 mg/l, Urine Culture- Gram - bacteria. Ophthalmic and fundus examination: nystagmus in both eyes, presence of pigmentary clumps osteoblastic appearance and narrowing of the vessels in favor of retinitis pigmentosa.

Discussion: The diagnosis of BBS, as reported in the literature was based on clinical criteria described by Beales et al.(1999). The primary features in our patient were retinitis pigmentosa, polydactyly, obesity and learning disability. Diabetes mellitus, revealed by DKA due to urinary infection and admission delay, explaining weight loss, was one of the secondary features

Conclusion: Diabetes due to BBS is rarely described in clinical practice. The clinical picture presenting with retinitis pigmentosa is the major orientation of BBS screening.

Poster Tour 4: Epidemiology I

P24

Cesarean section is associated to a small extent with an increased risk for type 1 diabetes in children and adolescents: a Swedish population-based registry study

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Objectives: All children registered in the Swedish pediatric diabetes quality registry (Swediabkids) between 2000 and 2012 were matched with four controls to investigate if birth by caesarean section is related to the risk of developing type 1 diabetes.

Methods: All Swedish children with type 1 diabetes between 0 and 18 years of age and registered in Swediabkids (n = 9376) were matched with four controls by year, day and county of birth, and gender (n = 37504) from the Swedish Medical Birth Register. Information regarding mode of delivery was collected for all 46,880 individuals.

Results: In total, 6,349 childbirths were cesarean sections (13.5%). Type 1 diabetes was developed in 14.7% of children delivered by cesarean section compared to 13.3% of the controls ($p < 0.0001$). No differences were seen between genders. There was no difference between cases and controls regarding birth by acute vs. planned cesarean sections (8.5%). Logistic regressions showed an increased risk for diabetes after cesarean section delivery with OR of 1.13 (95% CI 1.06–1.20; $p < 0.001$). If the mother had type 1 diabetes at the time of childbirth by cesarean section the OR increased to 7.7 (95% CI 5.7–10.3; $p < 0.001$). Including maternal diabetes in the regression model the OR for caesarean section alone disappeared; OR = 1.03 (95% CI 0.96–1.1). More children to mothers with diabetes developed Type 1 diabetes than children to mothers without diabetes (2.9% and 0.9%, respectively, $p < 0.0001$).The frequency of type 1 diabetes was greater in girls than boys if the mother also had type 1 diabetes (3.1% vs. 2.7%). In Sweden 53% of children with type 1 diabetes are boys.

Conclusion: Birth by cesarean section was found to be a moderate risk factor for the development of type 1 diabetes in Swedish children and adolescents. Acute cesarean section itself did not increase the risk. Children born by cesarean section with mothers who had Type 1 diabetes had the highest risk of developing type 1 diabetes.

P25

Seasonality at onset of type 1 diabetes (T1D) - lessons from the SWEET database

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Objectives: Seasonality at onset of T1D has been reported, however, the results are conflicting. The purpose of the study was to evaluate the presence of seasonality at onset of T1D based on a large database comprising data from different countries all over Europe.

Methods: The study cohort included 9,775 children and adolescents (51% males) with T1D onset before the age of 20 years between 1994 and 2013 out of 12,104 recorded patients in the international multicenter SWEET database (22 centers). Gender, year and month for birth and T1D-diagnosis were recorded. Data were stratified according to 4 age groups (<5, 5–10, 10–15, 15–20 years) at T1D onset or latitude of treatment center (Northern >47.5°N, Southern <47.5°N).

Results: Analysis by month revealed significant seasonality with January being the month with the highest and July with the lowest incidence ($p < .0001$, chi-squared test). Winter, early spring and late autumn months had higher incidence compared to late spring and summer months. Analysis by seasons revealed higher incidences in winter (N = 2,675) and autumn (N = 2,542) than in spring (N = 2,391) and summer (N = 2,167, $p < .0001$). Stratification by age at T1D onset showed similar seasonality patterns in patients < 5 years ($p = 0.006$), 5–10 years ($p < .0001$), 10–15 years ($p < .0001$), but no significant seasonality in those older than 15 years may be due to lower number of patients. Seasonality of T1D onset was similar in male and female patients as well as in Northern (12 centers, N = 6,200) and Southern (12 centers, N = 3,575) centers, but differed by year of diabetes onset ($p = .0043$, CMH-test).

Conclusions: Seasonality at onset of T1D is documented by the large SWEET database with higher incidence in autumn and winter and lower incidence in spring and summer. Seasonality patterns of T1D onset differ by year of manifestation, compatible with a hypothesis that viral outbreaks may be involved in the pathogenesis of T1D diabetes.

P26

Geographical variation in the incidence of diabetic ketoacidosis at onset of type 1 diabetes: an Italian nationwide study

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Objectives: To evaluate the distribution of ketoacidosis (DKA) at type 1 diabetes onset according to geographic area of residence; to analyze the incidence trend of DKA at diabetes diagnosis over the time.

Methods: Dates of birth and diabetes onset, gender, venous pH of newly diabetes cases occurred between 2005 and 2012 were retrospectively obtained from 19 Italian pediatric centers, 8 population-based registers and 11 clinic-based databases. DKA was defined according to ISPAD criteria; residence dichotomized between Sardinia and Mainland; the diagnosis period was subdivided in four two-year periods and age in four classes (0–4; 5–9; 10–14; ≥15 years). A polynomial logistic regression was used to evaluate the effect of area of residence and of diagnosis period on the risk of DKA; gender, age classes and data source (population-based register or clinic database) were covariates.

Results: A total of 2,026 subjects with type 1 diabetes mellitus were analyzed. In Sardinia the percentages of severe and mild DKA were 7.7% (95% CI: 4.0–13.1%) and 18.6% (95% CI: 12.8–25.6%), significantly lower than in Mainland, respectively of 12.6% (95% CI: 11.2–14.2%) and 30.5% (95% CI: 28.4–32.6%; $p < 0.001$). The risk of mild DKA significantly decrease over the time (OR: 0.89; 95%

CI 0.81–0.98, p = 0.02) and it was significantly lower in Sardinia (OR: 0.56; 95% CI 0.36–0.87, p = 0.01). Moreover, children aged 0–4 years were found at higher risk of both severe than the other age classes (p < 0.01); the risk of severe DKA was significantly lower in males (OR: 0.68; 95% CI 0.52–0.90).

Conclusions: The incidence of DKA at onset of diabetes is still high in Italy, although it seems to decrease over the years. In Sardinia there was a lower risk of DKA than in the other regions, possibly due to a high awareness for the high incidence of diabetes. These results strongly suggest the importance of continuing surveillance and developing strategies to prevent DKA.

P27
Global estimates of type 1 diabetes prevalence and incidence in children

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Objective: To construct global estimates of the number of children (aged <15 years) with type 1 diabetes.

Methods: A systematic literature review for type 1 diabetes prevalence and incidence in children was conducted using Ovid, PubMed, congresses, and references. Prevalence rates were derived from age-stratified incidence rates and 2013 UN World Population Prospects. A prevalence-to-incidence conversion factor was used if age-stratified rates were not available. Extrapolation from a similar neighbouring country was conducted if no data were available for a particular country.

Results: Worldwide, 88 countries (41%) had incidence or prevalence rates available. The coverage was lowest in the sub-Saharan Africa region, with only 8% of countries having appropriate data, followed by the Western Pacific region, with data available for 26% of countries.

In countries with available data, the annual incidence ranged from 0.1 per 100,000 in Papua New Guinea and Venezuela to 57.6 per 100,000 in Finland. The incidence tended to be lower in the 0–4 and 5–9 year age groups and usually increased in the 10–14 year age group. The median incidence was 9.1 per 100,000 (interquartile range 2.6 to 16.7). Worldwide 79,000 children were estimated to be newly diagnosed with type 1 diabetes each year. Data from the DIAMOND and EURODIAB registers suggest that incidence is rising by 3% annually.

Conclusions: Globally 497,100 children were estimated to have type 1 diabetes in 2013, equal to 0.03% of the worlds population of children.

Information for many low- and middle-income countries is missing, incomplete or out-dated. Variability between countries may be due to differences in risk factors, misdiagnosis, or study methodology. Prevalence estimates may not properly adjust for the higher rates of mortality in some resource-constrained countries.

Reference

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P28
Incidence of diabetes mellitus in children under 15 years of age in French Guiana: 2011-2013

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Background: French Guiana is classified among the regions of France with high prevalence of diabetes mellitus. On January 1st, 2012, Insee estimated inhabitants at 239,500 with 28.9% under 15 years and annual population increase rate of 2.36%. There is less or no data in the literature addressing the incidence of diabetes in children under 15 years of age in French Guiana.

Objective: To measure the incidence rate of diabetes in children under 15 years of age and describe the clinical and biological characteristics at diagnosis.

Design, Setting and Method: Using the ISPAD Diabetes Incidence and Prevalence electronic Registry, we prospectively registered newly diagnosed diabetes in children under 15 years of age in French Guiana from January 1st, 2011 to December 31, 2013. At diagnosis, we looked for a family history of type 1 & 2 diabetes. Ketoacidosis was defined as severe if pH <7.1 and moderate if pH <7.2. We calculated the age, the BMI z-score. Blood sample was collected for the determination of venous glucose, HbA1c and auto-antibodies.

Results: Table 1 shows the characteristics of the nineteen children included. For the study period, the annual incidence rate of diabetes mellitus for 10^5 children under 15 years was: 8.87 (2011), 10.11 (2012), 8.46 (2013); mean 9.15. Anti-GAD alone or associated with other auto antibodies was the most frequent.

Conclusion: Paediatric type 1 (T1D) remained the most frequent (4/5 cases). Paediatric type 2 diabetes (T2D) emerged with 1/5 of newly diagnosed diabetes mellitus. The clinical case description of T2D was a severely obese subject of both sexes, at pubertal age, of African origin with mostly moderate ketoacidosis at diagnosis. There was a strong family history of diabetes in both types. Given the strong correlation between obesity and T2D, the prevention of juvenile obesity should be one of the important public health challenges.

Table The characteristics of patients at diagnosis

n = 19	T1D (*n* = 15)	T2D (*n* = 4)
Males/Females (ratio)	3/2	1/1
Age (years)*	8.3 (1.6, 13.7)	12.9 (11.5, 14.3)
BMI Z-score*	−0.27 (−2.41, 2.25)	4.68 (4.35, 5.18)
family history of T1D/T2D	5/10	1/3
Blood glucose(mmol/l)*	31.6 (19.2, 45.5)	21 (10.3, 30)
HbA1c(%)*	12 (10, 14.5)	10.6 (7.7, 13.3)
Severe/Moderated ketoacidosis	1/12	0/3
Need of Insulin	Yes	Yes

*Mean.

P29
Impact of CDiC program on improvement of diabetes care in poor type 1 diabetics at DiaCare centre

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Background: Socioeconomic status (SES) is inversely associated with many chronic diseases including diabetes in the general population, with disadvantaged individuals faring worse than others, and this health inequality is becoming more pronounced over time. For diabetes, however, researchers evaluating the relationship between SES and diabetes complications have produced varied results. Lower SES may be one of the reasons of poor glycemic control in poor pediatric T1DM patients.
Aim: Present study was aimed to evaluate impact of CDiC program on diabetes care in poor type 1 diabetic patients.
Methods: A retrospective observational study included 507 type 1 diabetic patients. This study was undertaken in the out-patient setting of the DiaCare clinic between Dec 2012 and Jan 2013. An epidemiological study were conducted at baseline visit on various parameters such as age, gender, duration of diabetes, diet, family history of diabetes, daily glucose monitoring frequency, HbA1c level, DKA and hypoglycemic events (in past 3 months). The HbA1c level was estimated at baseline and after that at every 3 months for one year. The frequency of DKA and hypoglycemic events were noted at baseline and evaluated at every 3 months for one year.
Results: All patients were responded to study at end-point. The prevalence of T1D was noted higher in men than in women. A significant ($p < 0.001$) reduction in HbA1c level were noted after 3 months and continuous reduction were observed at 6, 9 and 12 months after the CDiC program. The frequency of DKA and hypoglycemic events were significantly ($p < 0.01$) decreased and frequency of glucose monitoring increased at 12 months after the CDiC programs when compared to baseline data.
Conclusion: Results of present study revealed that the providing free medication, regular follow-up and contentious education is helping for desired outcomes of diabetes care in poor type 1 diabetic subjects.
Key words: CDiC, HbA1c, SES, Type 1 diabetes

P30
A four-year longitudinal analysis of Hgb A1C in youth with type 1 diabetes

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Background: There have been a few, mostly small and non-longitudinal analyses of HgbA1C (A1C) values in youth with type 1 diabetes. These studies have reported A1C differences between diabetes centers, but have not focused on medical providers within each center. We analyzed A1C data over four years at a regional pediatric diabetes center, focusing on longitudinal patterns.
Methods: Age, sex, diabetes duration, treating physician and A1C values for visits from 2009 to 2012 were analyzed (Simens DCA, Labdaq Lite). Subjects with at least one A1C measure for each of the four years were included. Those with diabetes duration of <1 year were excluded to eliminate subjects with residual B cell function. The last A1C performed annually was utilized. Comparisons of A1C by physician and by year were made using the Kruskal-Wallis test. Paired comparisons of A1C by year were made using the Friedmans test for related samples. Proportions of patients meeting ADA targets were compared by the One-Sample Binomial Test.
Results: 539 subjects, mean age 13.0 years (SD = 3.9), mean diabetes duration 7.8 years (SD 4.5) were included. A1Cs over the study period compared favorably with reports from other centers ($p < 0.001$). The cohort had a trend of rising A1C over 4 years ($p = 0.001$), concomitant with routine medical visits decreasing from a mean of 4 to 3 visits annually. Analysis of the cohort by treating physician, showed a persistent and consistent significant difference in A1C, not related to provider experience ($p < 0.05$), although these cohorts did not differ in age, number of visits/year or diabetes duration.
Conclusions: Our data reaffirm the value of analyzing and reviewing longitudinal A1C data at pediatric diabetes centers. The variation in metabolic control by medical provider, as well as trend towards higher A1C during years with less diabetes outpatient visits provide an opportunity for effective intervention to improve outcomes for youth with type 1 diabetes.

P31
Prevalence of diabetes mellitus in a children population of Côte d'Ivoire

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Objectives: To assess the prevalence of the diabetes mellitus (DM) among children and adolescents in the district of Abidjan in Cote dIvoire.
Methods: A cross-sectional descriptive survey using a multi-stage sampling approach was conducted from March to April 2013. 1,572 children and adolescents aged 02–19 years(y) were surveyed in 687 randomly selected households in three municipalities. Capillary fasting glucose was performed in all subjects. In case of impaired fasting glucose (IFG), an Oral Glucose Tolerance Test (OGTT) was performed. Diagnosis of diabetes and pre-diabetes was based on the criteria of ISPAD Guidelines. Data were analyzed using SPSS 16.0. The prevalence of DM is calculated on the base of the result of the first capillary test and the OGTT.
Results: The prevalence of DM and IFG were 0.4% and 14.5% respectively. Prevalence of DM observed in both broad age groups (2–9 y and 10–19 y) was identical (0.4%). The prevalence of IFG increased with age and was higher in the age group of 10–19 y. The mean fasting blood glucose observed in the study population was 91 mg/dl (± 9 mg/dl). The mean 2 hour blood glucose post loading test recorded in patients with IFG was 106 mg/dl (± 18 mg/dl). No impaired glucose tolerance was identified in our series.
Conclusion: In our study, the overall prevalence rate of DM among children and adolescents was 0.4% which was higher than the prevalence rate of DM in US population less than 18 y (3.2 per 1,000) but comparable to the prevalence rate of 0.4% reported in a Tunisian study of schoolchildren aged from 13 to 19 y. Our results suggest that the glucose and the HbA1c approaches should be used together for the diagnosis of diabetes and prediabetes to get a true picture of diabetes among children and adolescents in Cote dIvoire for public health intervention. One single approach may underestimate or over estimate the prevalence of diabetes.

Poster Tour 5: Psychosocial Issues in Diabetes I

P32

Responsibility for the type 1 diabetes regimen and fear of hypoglycemia in adolescents who use insulin pumps and their parents

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Objective: Describe baseline psychosocial characteristics of adolescents (ages 10–18 years) with type 1 diabetes (T1D) and their caregivers who are participating in a randomized clinical trial to improve insulin pump adherence behaviors.

Methods: 40 adolescents (M_{age} = 14.02 years ± 1.86; 45% female; $M_{diabetes\ duration}$ = 7.00 years ± 3.69; $M_{pump\ duration}$ = 4.40 years ± 3.20; M_{A1c} = 8.59% ± 1.25) and their parents (M_{age} = 44.56 years ± 7.51; 80% female) completed the Diabetes Family Responsibility Questionnaire and Blood Glucose Monitoring (BGM) and Insulin Pump Responsibility Questionnaire (range 17–51; lower scores = more child responsibility; higher scores = more parent responsibility), and Hypoglycemia Fear Scale (range 0–100; higher scores = greater fear of hypoglycemia).

Results: Parents perceived themselves as having more responsibility for general T1D care (M = 35.63 ± 4.43) than adolescents (M = 33.07 ± 5.54; $t(37) = 3.34$; $p < 0.01$). There were no differences in the perceptions of responsibility for specific BGM and insulin pump tasks between parents (M = 26.58 ± 7.08) and adolescents (M = 25.71 ± 6.40; $t(37) = 1.50$; $p = 0.14$). As adolescent age increased, their responsibility for general T1D and BGM and insulin pump tasks increased (ps < 0.0001). Parents fear of hypoglycemia (M = 46.66 ± 12.28) was significantly greater than adolescents fear (M = 39.58 ± 13.77; $t(39) = -3.59$; $p < 0.001$). As parents fear of hypoglycemia increased, adolescents fear also increased ($r = 0.55$, $p < 0.001$).

Conclusions: This study is the first to describe responsibility for general T1D care and specific T1D self-care tasks in adolescents using insulin pumps. Future studies should investigate the relations between responsibility and insulin pump adherence behaviors (e.g., bolusing in the absence of BGM). Fear of hypoglycemia occurs in adolescents and their parents and may be a specific area in need of future intervention.

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P33

Long-term impact of childhood-onset type 1 diabetes: social insertion, quality of life, sexuality

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Objectives: Little is known about the long-term social outcome of diabetic children. This study aimed to describe social and professional life, quality of life (QOL) and sexuality at adult age of children and adolescents with type 1 diabetes (T1D).

Methods: Participants (n = 388, age = 28.5 ± 3.1 years; duration of diabetes = 17.0 ± 2.7 years, recruited from a French national register) completed a questionnaire (198 items). Data were compared to French general population (FGP) using indirect standardized ratios (SIR) matched for age, gender and period ± educational level, familial life. Linear regression was used to investigate correlates of Physical (PCS) and Mental (MCS) SF36 Composite Scores.

Results: Educational level was similar to FGP (68.6% ≥high school degree; SIR = 1.06), as well as familial life pattern. Unemployment was increased in women (15.3%, SIR = 1.5) but not in men (8.6%, SIR = 0.96). Frequency of daily alcohol consumption was increased (men: SIR = 3.34; women: SIR = 6.53); 7.2% (12/166) of men consumed more than recommended (2 glasses/day), 5.0% (11/220) of women (1 glass/day). Prevalence of sexual problems was higher in women (dysorgasmia: SIR = 1.91; decrease/loss of desire: SIR = 2.11), but similar in men. Overall, 7.1% were very dissatisfied with sexual life (SIR = 1.90). Social discrimination was more common (SIR = 5.64). PCS and MCS were respectively moderately (mean = 52.0 ± 7.5) and substantially (42.1 ± 12.4) decreased. Fatigue and abandoning sport were predictive of decreased QOL. Participants with complication(s) had preserved social outcomes but altered QOL.

Conclusions: Young adults with T1D have a satisfying social well-being but altered MCS, frequent dissatisfaction with sexuality and uncommon alcohol consumption suggest the high impact of disease on morale, especially in women. Improve the screening of sexual problems and alcohol consumption, as well as optimize the patients psychological support to cope with the T1D burden must be high priorities for health caregivers.

P34

Behavioral health perceptions and practices in pediatric diabetes clinics

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Objectives: Psychosocial and psychiatric factors are associated with diabetes coping, self-care behaviors, and health outcomes. Guidelines for the comprehensive care of youth with type 1 diabetes encourage appropriate behavioral/mental health screening and intervention (ISPAD, 2009; ADA, 2005; Wysocki, 2006), yet numerous barriers may complicate the identification, referral, and treatment process (Davis et al., 2012). To date, literature about behavioral/mental health referral practices and barriers has focused on primary care; this pilot study evaluated perceptions of behavioral/mental needs and referral practices within outpatient diabetes clinics and highlights future directions for improving behavioral/mental health service delivery models for youth with diabetes.

Methods: Interdisciplinary pediatric diabetes providers (N = 12; response rate 75%) were recruited from two urban, academic-affiliated medical institutions in the Northeast to complete an online survey that examined perceptions of behavioral/mental health needs and identification and referral practices.

Results: All respondents endorsed the importance of behavioral/mental health services for their patients, but comfort with identifying/addressing and referral practices for these concerns varied. Respondents identified greatest comfort identifying/addressing

adherence (83%) and coping concerns (75%) and least comfort with family problems (50%) and risk-taking behaviors (67%). Referrals to providers integrated in clinic (M = 4.00; SD = 0.63) were more frequent than referrals to community providers (M = 2.82; SD = 0.75, p = .003). Perceived barriers include limited training in behavioral/mental health screening (72%), lack of a standardized screening process (72%), and knowledge about referral processes (72%).

Conclusions: Integrated models of service delivery that include psychology may enhance patient outcomes through improved identification, referral, and treatment for behavioral/mental concerns.

P35

Confirmatory factor analysis of a novel transition to adult care readiness assessment tool for adolescents and young adults (AYA) with type 1 diabetes (T1D)

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Objective: To evaluate the psychometric properties of a novel diabetes-specific healthcare transition readiness tool developed for AYA with T1D.

Methods: A 54-item assessment was derived from recommendations of the American Diabetes Association and Understanding Diabetes (Chase et al., 2007). Two sites, Seattle Childrens Hospital (n = 55) and Cincinnati Childrens Hospital (n = 61) collected responses from patients with T1D ages 16–24 at outpatient visits. Participants rated confidence on a 5-point scale anchored from I havent thought about this to yes, I can do this. Statistical analyses included examining item descriptives and conducting confirmatory factor analysis using a hypothesized four-factor structure: diabetes knowledge, self-management, navigation and health behaviors. Items without variance in response and redundant items that loaded onto more than one factor were excluded.

Results: The four hypothesized factors were represented in the data (Figure 1). A larger sample is required to evaluate all possible variable responses.

Conclusions: The best-fit model analysis refined the initial transition readiness measure from 54 to 33 items. Some of the items deleted due to poor fit contain clinically relevant content that need to be rewritten for future iterations of the measure. Despite the need for additional development, this diabetes-specific transition readiness assessment appears to have some validity and may be a useful clinical and research tool.

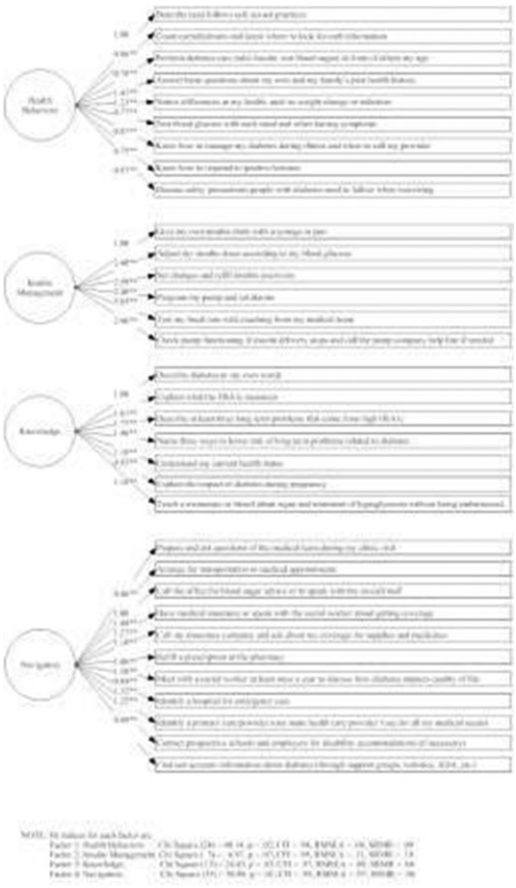

Figure 1. Factor analysis.

P36

Age dependent anticipation of worries and pain perception in conjunction with blood draws in healthy 1–4 year olds participating in The Environmental Determinants of Diabetes in the Young (TEDDY) study

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Objectives: TEDDY investigates triggers of islet autoimmunity in children with increased genetic risk for type 1 diabetes. Children in Sweden, USA, Finland and Germany have been followed from three months of age with blood draws every third month until four years of age. The lack of understanding of frequent blood draws prompted our question whether blood draws in healthy 1–4 year olds affected perception of worries/fears, pain and childs behavior in parents compared to the nurses.

Methods: Parents (n = 70) and the nurses (n = 3) in Sweden completed Likert-scale questionnaires after the blood draw at half year visits between 1–4 years of age. The questionnaires were administered during May 2010–February 2014.

Results: Worries/fears at home *before* the blood draw increased with increasing age of the child (p < 0.001). Worries in the child at the clinic *before* the blood draw also increased with age as perceived by parents (p = 0.007) and by nurses (p = 0.012). However, *during* the blood draw neither the parents (p = 0.996) nor the nurses

(p = 0.628) perceived that worries increased with increasing age of the child. The perception of pain in the child as perceived by parents (no pain was 58–69%) and by nurses (85–74%) was variable and not affected by the increasing age of the child. The child behavior, scored only by the nurses, suggested that crying decreased with increasing age (p < 0.001) along with kicking (p = 0.006) while stress (p = 0.916) and calmness (p = 0.096) did not change over time.

Conclusions: Fear and worries *before* but not *during* the blood draw, increased with increasing age of the child in both parents and nurses. The perception of pain was not affected by the age of the child. Both crying and kicking decreased with increasing age while perception of stress and calmness was not affected by age. Parents and nurses had comparable perception of blood draw worries/fears and pain. The older the child the less behavioral reactions to the blood draw.

P37

Relationship between glycemic control and quality of life (QoL) in young adults with type 1 diabetes (T1D): analysis of the global TEENs Study

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Objectives: TEENs is the largest worldwide (20 countries), contemporary, observational study of T1D (*N* = 5,960) in 8–25 year olds (y/o). Glycemic control and QoL in 19–25 y/o (23% of sample) are reported.

Methods: Centers collected data by interview, record review and survey. A1c was measured uniformly with A1cNow™ (Bayer). A1c target was defined as <7% (ADA). QoL was assessed with the PedsQL 3.0 Diabetes Module (5 subscales, scores range 0–100, higher score=better QoL). Association between A1c target and each QoL subdomain was assessed by logistic regression. Odds ratios (OR) for the 19–25 y/o group are presented.

Results: Only 19% of 19–25 y/o achieved target A1c. QoL scores were lowest for the Worry subscale; participants attaining A1c target reported higher mean QoL for all subscales (Table). Participants reporting high QoL (i.e. PedsQL scores within highest quartile) were more likely to meet A1c target than those reporting low QoL (PedsQL scores within lowest quartile) for Diabetes symptoms (OR [95% CI]: 2.16 [1.45, 3.23]), Treatment barriers (2.22 [1.50, 3.28]) and Treatment adherence (3.16 [2.10, 4.75]).

Conclusions: Only 1 in 5 young adults aged 19–25 y/o with T1D achieved A1c target. Significant association was observed between QoL and attainment of A1c target. Much remains to be learnt about optimizing glycemic control and QoL in young T1D patients transitioning to adulthood.

Study sponsored by Sanofi.

Table Ped sQL diabetes subscores in young adults, by A1c target attainment

	19–25 y/o (*N* = 1,382)	
Ped sQL subscale, mean (SD)	A1c at target *n* = 260 (19%)	A1c above target *n* = 1,122 (81%)
Diabetes symptoms	68 (16)	62 (15)*
Treatment barriers	80 (18)	71 (20)*
Treatment adherence	80 (17)	72 (19)*
Worry	57 (24)	53 (24)*
Communication problems	83 (22)	77 (23)*

*p < 0.05.

P38

Impact of regular educational support program, for parents of Indian type 1 diabetes patients, on the outlook towards type 1 diabetes facts and its management

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Objective: To study the impact of regular educational support program on the outlook towards Type 1 diabetes facts and its management in parents of Indian Type 1 diabetes patients.

Method: The study included, parents of Type 1 DM patients (*n* = 42). The parents were exposed to at least 3 group educational meetings after which they were made to respond to a questionnaire. The questionnaire studied parameters like, Awareness about the treatment of type 1 diabetes, Daily routine of the patient, Need for financial planning and marriage, Social stigma of the disease and Change in understanding and confidence levels post attendance of the educational meets.

Results: Majority i.e. 37 (89%) of the parents better understood the lifelong nature of the disease and the importance of insulin as the recommended treatment after attending these educational meetings. Around 11%, were however not impacted by the meetings and continued to believe that diabetes does have a permanent cure. After regular meetings majority of the parents were confident in being able to manage the complications. The perception with regards to communicating the disease to the relatives remained negative, with 25% of the parents not willing to share the diagnosis of Type 1 diabetes in their children with their relatives and 21% not willing to reveal the diagnosis with the school authorities. Perception with regards ability of such children to get married and lead a normal life compared to their siblings improved and was positive in 75% of the parents. 13% however, still felt that Type 1 diabetics should not marry as it may interfere with married life.

Conclusion: Outlook towards Type 1 DM improves among parents of Type 1 DM patients with regular exposure to group educational meetings. Subsets of parents however still continue to carry the social stigma in India and may require other additional methods.

P39

One giant leap: feelings of preparedness in transitioning from pediatric to adult diabetes care

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The transition from pediatric to adult diabetes care presents a significant challenge for patients, and occurs during a high-risk time period. Lack of preparation may impact the worsening glycemic control and poor follow up observed in this population during transition. This study examined transition knowledge and preparedness in emerging adults with type 1 diabetes and their families.

Two populations (172 patients 14–17 years, 53 patients ≥18 years) and their parents completed questionnaires prior to a pediatric diabetes care visit. Each population answered questions about transition to an adult diabetes practice (Table).

In both the 14–17 and ≥18 year old populations, a significant number of patients were anxious or worried about the transition with only a small percent having received information or discussed the transition process (Table). When compared to the younger age group, a larger proportion of ≥18 patients have discussed the transition process. However, very few have a plan for moving to adult care.

These data indicate the majority of patients and families feel unprepared to move to adult care and do not have a plan for the transition. Patients and families desire additional support and resources, and it would appear these critical transition conversations are not occurring during routine care. More research is needed to determine an effective way to begin these discussions in pediatric clinics and prepare this high-risk population for transition to adult care.

Table Patient and Parent responses and characteristics

Patient characteristics	14–17 years	≥18 years
Avg. Age (years)	15.4	19.1
Avg. Age at Diagnosis (years)	8.5	10.2
Avg. HbA1c (%)	9.3	8.8
% Agree or Strongly Agree with Statement		
"I am anxious or worried about the transition."	24.6	30.2
"My family has talked about transitioning."	25.7	64.2
"The doctors have talked about transitioning."	23.9	62.3
"I have been given information in regards to transitioning."	14.0	49.1
"My family and I have a transition plan."	8.8	15.1

P40

Prevalence of substance abuse in Chilean young patients with type 1 diabetes

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Introduction: Adolescence is a vulnerable period where high risk behaviors have negative impact on health. In type 1 diabetes (T1D) alcohol, cigarette and illicit drugs may contribute to the development of acute and chronic complications and also have a negative effect on psychosocial well-being.

Objective: To determine the current prevalence of alcohol, cigarette and marijuana consumption in Chilean adolescents with T1D and compare it with the last national survey of alcohol and drugs consumption on school population (SENDA).

Subjects and Methods: The SENDA survey was applied to adolescents with T1D between 12 and 19 years whom attended to the summer camp organized by the Diabetes Foundation in February 2014.

Results: Total 74 adolescents, 47.3% women. Average age 14.9 years (12–19 yo). 60.7% from public schools. 79.7% of adolescents reported having consumed alcohol at least once in their life, 43.2% have consumed during the last month vs. 34.7% (SENDA). 10.8% reported heavy drinking (more than 5 drinks per night) vs. 8.9% (SENDA). 37.8% reported having used marijuana at some time in their life and 28.3% consumed during the last year vs. 19.5% (SENDA). 56.7% reported have consumed cigarette at least once in their life. 12.1% of them recognizes habitual consumption (more than 20 days in a month) vs. 8.1% (SENDA). It is noteworthy that 56.7% of adolescents considered to have easy access to marijuana vs. 38.7% (SENDA) Only 51.3% of participants reported having received education on alcohol and drugs abuse at School in the last year and only 25% have never talked to their parents about this.

Conclusions: This study showed that substance abuse is a problem in adolescents with T1D. This is a population at risk, since they have a higher intake of alcohol, marijuana and cigarette compared with the national survey (SENDA). Therefore it is essential to implement education tools aimed to prevent and educate about consumption of these substances.

P41

A blinded randomized trial: the effect of guided imagery in children with type 1 diabetes mellitus on glucose levels and on glycemic control

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Introduction: Quality of life of youth with TIDM is associated with their metabolic balance; therefore psychosocial intervention is significant in improving their compliance to management. So far, we found no reports of guided imagery intervention in these patients.

Objectives: To assess the effect of guided imagery on glucose levels in children with T1DM during and after listening, and to assess the effect of a regular listening for three months on glycemic control and quality of life.

Methods: A blind randomized controlled study comparing the effect of guided imagery accompanied by background music against background music alone. The study included 13 children with T1DM. The study group included 7 patients exposed to guided imagery, age 11.6 ± 3.03 years. The control group included 6 patients who listened to background music only, age 12.17 ± 2.3 years. Each group included 4 females.

Part 1: the participants were connected to Continuous glucose monitoring system (CGMS) for 5 days, in which they listened to the recording twice a day. Quality of life questionnaires (QOL) were filled at enrollment and at the end of study.

Part 2: the participants were asked to listen to the recording twice a week for 12 weeks. Outcome parameter in part 1 was glucose levels on the CGMS after listening. Outcome parameters in part 2 were HbA1C and QOL questionnaires.

Results: CGMS glucose levels decreased in both groups after listening by 7.3% and 8.6%, respectively (p = 0.19). HbA1c decreased in both groups at the end of 3 months by −0.44% in the intervention and −0.30% in the control group (p = 0.27). The decrease in HbA1c in the study group was significant (8.51, 8.07, p = 0.04). No difference was detected in QOL.
Conclusion: Listening to guided imagery and background music by youth with T1DM was associated with a decrease in mean glucose, assessed by CGMS. Regular listening to guided imagery for three months may improve glycemic control in youth with T1DM and moderate control.

P42
Bridging the gap-transitioning young adults successfully to an adult provider

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At our pediatric diabetes clinic our clinicians were finding it difficult to ensure ongoing care for our Type 1 young adults. This area has gained much needed attention over the last few years including discussion among the special interest sections at the American Diabetes Association. Subsequently our pediatric clinicians met with our adult diabetes team to discuss plans for a development of a Transition Clinic. First a literature search was done to see what other facilities have been doing. Then we modified a skills checklist to assess where the young adults needed help. The monthly clinic began in June of 2011.

The clinic team consists of a pediatric endocrinologist, a pediatric nurse, an adult nurse practitioner and an adult diabetes specialist. We were not sure how we wanted to organize the visits so we tried several care models before we decided on our current approach. Sharing of information regarding care delivery and medications has been our greatest gain. Transitioning the young adults has continued to be our greatest challenge.

Currently we have structured the visits so that the young adults gradually get to know the adult practitioners. We do not have a young adult clinic so we give them names of physicians who are in their insurance plans. This system is still not ideal. We are still working on new ways to ensure that our patients receive ongoing care that they need.

Poster Tour 6: Diabetes Education I

P43

Short - and medium-term effects of therapeutic education in regroupings of children and adolescents with type 1 diabetes (T1D). Case-control study

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Objectives: The aim of this work is to present an evaluation of a pediatric service practices in terms of glycemic control, quality of life and knowledge.

Methods: Adolescents and mothers, for children, initially receive individual and small group trainings. In the following year, 6 days extramural educational regroupings are organized for 25 mother-children couples/teenagers with a practical training and theoretical teaching. Participants, called Regrouped (RG) were matched to Non-Regrouped (NRG). All were assessed within a period ranging from 6 months to 5 years after onset. The HbA1c is centralized (HPLC, DREW), quality of life is rated on a 0 to 100 scale (PedsQL, MAPI Institute), feeling is self-rated from 0 to 10 on a I am very well-very bad with my diabetes scale and knowledge is rated from 0 to 20 based on a local quiz.

Results: A total of 138 subjects, 66 RG and 72 NRG, contributed to the study. Their characteristics are comparable: averages for gender (sex-ratio: 0.89 vs. 0.89), current age (11.3 vs. 11.9 years), age at onset of T1D (8.4 vs. 9.0 years) and the diabetes duration (2.9 vs. 2.9 years). Overall, the effect of educational groups is not different between RG and NRG on the variables studied, except on the knowledge acquired (11.7 ± 3.0 vs. 9.7 ± 2.8, $p < 0.01$), respectively. Depending on T1D duration and in the interval (mean $\pm$ SD) of 18 ± 6 and 50 ± 6 months, HbA1c (mean $\pm$ SD) goes from 7.15 ± 1.90 to $8.56 \pm 2.00\%$ and from 7.36 ± 1.82 to $8.59 \pm 2.12\%$ ($p < 0.01$); the proportion of HbA1c $\leq 7.5\%$ goes from 69% to 35% ($p < 0.01$) and from 47% to 42% ($p = 0.62$) for RG and NRG, respectively. During the same time interval, were significantly modified: for RG average disease felt (4.07 vs. 5.25, $p < 0.01$) and, for NRG average quality of life (59.4 vs. 67.3, $p < 0.04$) and quiz (12.9 vs. 10.45, $p < 0.001$).

Conclusion: The effect of additional educational regroupings diminishes significantly over time. Therapeutic educational methods need to be refined.

P44

Impact of use of social media in patients with type 1 diabetes for management of diabetes

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Objective: Study was aimed to evaluate the impact of use of social media in type 1 diabetics for diabetes management.

Method: All type 1 patients more than 18 years of age ($n = 79$) attending the Dia Care clinic were taught for the use of social media like facebook, email IDs & Whatsapp for diabetes management. Their follow up visits have been conducted on improvement of Quality of Life (QOL) and Glycated Haemoglobin (HbA1c) up to 2 years. These patients were very well connected with team of Dia Care through various forms of social media like facebook, email & Whatsapp. In addition we have created a patient support group on Whatsapp and facebook for these patients. Patients are regularly sending their sugar reports, can discuss issues in day to day life, can get emergency treatment for Hypos & Hypers & can share their experience with other patients. In addition, our team can also send them reminders for follow up visits and getting their HbA1c and other blood reports regularly. The QOL was assessed by using 15 set diabetes quality of life (DQOL) questionnaire in 79 consecutive patients at Baseline (Before) and then at every 3 months up to 2 years. Decreased in DQOL score noted as improvement in QOL. The average HbA1c level was estimated at every 3 months up to 2 years.

Result: The overall DQOL score was significantly decreased at 6 months (65.79 ± 2.41 vs. 59.84 ± 1.89; $p < 0.01$), furthermore continuous reduction in average DQOL were noted. HbA1c level was significantly decreased at 6 months (9.21 ± 1.76 to 8.49 ± 0.89; $p < 0.01$), furthermore reduction was continued till 24 months. The numbers of hypoglycaemic events were decreased and frequency of SMBG was increased.

Conclusion: Result of study revealed that use of social media in management of diabetes can improve the quality of life, metabolic status and help to diminish the impact of diabetes in Type 1 diabetic patients.

Keywords: Diabetes, Type 1 Diabetes, Quality of Life, Social Media, HbA1c

P45

A comparison of ADRR scores in very young, school-age, and adolescent children with type 1 diabetes mellitus

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Objective: Glycemic variability (GV) in children with T1DM is remarkably dissimilar to variability in the adult population, and furthermore is unique to age-specific pediatric groups. The Average Daily Risk Range score has been shown to be a good indicator of GV in a population of mostly adults and some children; however, there are no data examining youths ADRR scores based on their age, gender, or socioeconomic status (SES). The primary purpose of this study is to explore ADRR scores by pediatric age group: age 1–5.99 years (Group 1), 6–11.99 (Group 2), 12–17.99 (Group 3), and examine the resulting scores based on youths demographic data.

Methods: This study will continue until there are 60 patients per group. Glucose data, patient demographics and SES are presented for 79 patients. Mean ADRR scores ($\pm$SD) were calculated for each of the three age groups using youths self-monitoring blood glucose data. ANOVA was used to compare ADRR scores based on youths age group. Correlations were used to examine associations between youths ADRR scores and demographic data.

Results: At the time of analysis 9, 22, and 48 patients were enrolled in group 1, 2, and 3, respectively. Preliminary results suggests a decreasing trend in ADRR scores as a function of increasing age

group with means (SD) of 50 (13), 47 (11), 45 (13) respectively; however, results were not significantly different (p = 0.457). Youths ADRR scores decreased with increasing SES (r = −0.224, p = 0.055). In contrast, there were no correlations between youths ADRR scores and youths age and gender.

Conclusions: Preliminary results extend the evidence base for characterizing risk of glycemic variability in youths. Data continue to be collected, but currently suggest youths ADRR scores may vary based on youths age and SES. Further research is needed to determine if ADRR risk categories are associated with outcomes of glycemic risk in children.

P46
Increased self-efficacy after short information video clips on diabetes type 1

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The aim of this study was threefold. The primary objective was to develop educational videos for adolescents with diabetes. The second objective was to evaluate the adolescents health related quality of life and their self-efficacy regarding the treatment of the disease before and after seeing the videos. The third objective was to evaluate the experience of the adolescents and their view regarding the usefulness of educational videos on the web, by using focus groups.

In the study a mixed method was used, an adjusted experimental design with pre- and post examinations and focus groups. When examining the quantitative data, descriptive statistical methods were used in addition to using inferential statistics to evaluate the effectiveness of using educational videos for adolescents with diabetes. Participants in the study were 27 adolescents in the age group of 13–18 years.

The main results were that the confidence of the participants was increased when having to perform many of the procedures which are part of successful management of the disease and their self-efficacy regarding treatment of diabetes such as performing treatment related tasks like insulin injection, evaluation of insulin need and response to emergency complications such as ketoacidosis. Additionally the studies showed increased confidence among participants when interacting with health professionals.

It can be concluded that even though adolescents with diabetes who have for years coped with their long-term and incurable disease and who may believe that they know everything there is to know about maintenance and treatment, there are aspects of their knowledge which while being relatively good, have not provided them with adequate security.

It can be concluded that educational material like videos on the web are an optimal way to educate adolescents with diabetes and to increase their self-efficacy when treating the disease and when interacting with health professionals.

P47
Disease management and treatment characteristics in 5960 children, adolescents and young adults with type 1 diabetes (T1D): the global TEENs study

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Objectives: TEENs is the largest worldwide (20 countries), contemporary, observational study of T1D (N = 5,960) in 8–25 year old (y/o) patients. Relationships between glycemic control and treatment characteristics are reported.

Methods: 219 centers collected data by interview, record review and survey from 3 groups: 8–12 y/o, 13–18 y/o and 19–25 y/o. A1c was measured uniformly with A1cNow™ (Bayer); A1c targets defined as <7.5% (58 mmol/mol, ISPAD) for ≤18 y/o and <7.0% (53 mmol/mol, ADA) for >18 y/o. Association between structure of care and glycemic control was assessed by logistic regression.

Results: Mean A1c was 8.5 ± 1.8%; 28% of patients met A1c target (32% of 8–12 y/o, 29% of 13–18 y/o, 19% of 19–25 y/o). Carbohydrate counting and blood glucose monitoring were used more often by 8–12 y/o and those at A1c target (table). Attaining target A1c was associated (all p ≤ 0.001) with: BGM frequency (≥5X/day: 1.91 [1.54, 2.37] (odds ratio [95% CI])); glucagon availability (1.32 [1.12, 1.55]); insulin regimen (pump vs. other regimen); provider of diabetes education (dietician/nutritionist vs. other providers).

Table: Treatment outcomes and characteristics by age and A1c target attainment

	8–12 y/o N=1724*		13–18 y/o N=2854		19–25 y/o N=1382	
	A1c target met n=553 |32%|	A1c target not met n=1170 |68%|	A1c target met n=833 |29%|	A1c target not met n=2021 |71%|	A1c target met n=260 |19%|	A1c target not met n=1122 |81%|
BG monitoring† times/day, mean (SD)	5.6 |2.6|	4.7 |2.3|	4.5 |2.2|	3.7 |2.2|	3.6 |2.3|	3.0 |2.1|
CGM use in last month, n |%|	28 |5.1|	38 |3.3|	41 |4.9|	62 |3.1|	11 |4.2|	55 |4.9|
Glucagon available at home, n |%|	423 |77|	788 |68|	620 |75|	1266 |63|	177 |68|	801 |54|
Insulin device, n |%|						
Pump‡	164 |30|	274 |23|	249 |30|	456 |23|	57 |22|	210 |19|
Pen	386 |70|	893 |76|	581 |70|	1557 |77|	202 |78|	909 |81|
Method used to determine amount of mealtime insulin, n |%|§						
Use of a bolus calculator on a pump	111 |20|	190 |16|	139 |19|	303 |15|	39 |15|	115 |10|
Counts carbs and uses insulin:carb ratios	212 |38|	314 |27|	306 |37|	547 |27|	79 |30|	309 |28|
Uses correction doses when BG out of range	245 |44|	504 |43|	342 |41|	802 |40|	69 |27|	387 |34|
Bases the mealtime insulin (bolus) amount on experience	106 |19|	221 |19|	209 |25|	441 |22|	86 |33|	305 |27|
Takes a daily fixed insulin amount	82 |15|	248 |21|	108 |13|	437 |22|	44 |17|	262 |23|

*Glycemic control data were not available for 1 participant in 8–12 y/o group;
†Using a blood glucose meter;
‡Includes pump use, pump and injection/pen and sometimes pump/sometimes pen;
§Participants could give more than one response

Conclusions: Only a minority of youth with T1D achieved target A1c levels. Intensive diabetes management and quality of diet recommendations provided were associated with attaining target A1c.

Study sponsored by Sanofi.

P48
In-patient care for children with type 1 diabetes across hospitals in the Yorkshire and Humber region in the north of England

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Objectives: Identify variations in in-patient care provided to children with type 1 diabetes across the Yorkshire and Humber region, with a view to standardisation of care.

Methods: The audit was conducted against in-patient care standards identified by the Children and Young Persons Diabetes Implementation Support Group (CYPDISG). Questionnaires were sent to clinical leads of all paediatric diabetes units in the region, which serves a total of 2599 children and young people with diabetes.
Results: Fifty-six per cent of the units, consisting of 2 tertiary and 7 secondary care units, responded. All units had paediatric nurses in areas where children were cared for, but only the tertiary centres had a trained paediatric nurse in the emergency department (ED) on every shift. Paediatric wards and EDs in all units had protocols for management of new diagnosis of diabetes, diabetic ketoacidosis (DKA), hypoglycaemia and surgery. All units had regular education sessions for ward staff, although 22% expressed concerns regarding poor attendance and only 22% of units had education sessions for ED staff. A 24 hour on-call service was only provided by 22% of the units.The diabetes team was usually contacted within 2 hours of an admission in tertiary centres and within 24 hours in secondary care units.Paediatric diabetes specialist nurses had an active role in in-patient management in all units. Only 2 units had insulin prescription charts and only tertiary centres routinely audited insulin prescription and administration errors.
Conclusions: There is a lack of 24 hour on-call service in majority of the paediatric diabetes units. Standardisation of on-call services and feasibility of implementation of the same needs to be explored. ED staff should be involved in education sessions and strategies to improve attendance need to be considered. Further work is needed to standardise in-patient care for children and young people with type 1 diabetes across the region and nationally.

P49
Providing consistency of care for students with type 1 diabetes in our schools - a partnership of the Annapolis Valley Regional School Board (AVRSB) and Valley Regional Hospital Diabetes Centre (VRHDC), Nova Scotia, Canada

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Background: Type 1 diabetes among school-aged children is prevalent. In the Annapolis Valley, NS, Canada approximately 50 students have been identified in 43 schools with Type 1 Diabetes; 50% of which use pump therapy. Collaboration between families, education and health care professionals is needed to effectively manage the school age child with Type 1 Diabetes. There appeared to be a gap in the communication between families, education and health care professionals. To address the issue a liaison was created with the Nurse Coordinator of the Student Health Partnership Program (SHPP) and Diabetes Centre Staff encompassing families, health and education.
Outcomes:: 1. The Diabetes Management and Emergency Plan of Care (DMEPC) was created and implemented in 2009. To date every student who has Type 1 Diabetes in the school board has a completed DMEPC.

2. The SHPP Nurse Coordinator facilitates annual meetings for individual student`s with Type 1 Diabetes to review their DMEPC.

3. A Comprehensive Diabetes Management In-service is offered annually to school staff by Diabetes Center staff and organized by the SHPP Nurse Coordinator. To date over 300 individuals have attended.

4. A school board policy and procedure for Students with Type 1 Diabetes was written and implemented in 2013. Available at www.AVRSB.ca
Conclusion: Evaluation forms completed by attendees at the annual in-servicing continue to result in overwhelming favorable responses in all areas.

A coordinated, collaborative approach between families, education and health care professionals in managing type 1 diabetes in school-aged children results in overall improved care for students both at home and in school.

P50
Short educational videos for mobile phones on diabetes type 1

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The preparation for the production of educational videos for adolescents diagnosed with diabetes started early in the year of 2011. The manuscripts for the videos were written using various information materials and professional experience.

The rationale behind the videos is that self-efficacy of adolescents dealing with diabetes will increase by seeing peers effectively solve problems. The 14 instruction videos deal with various aspects of diabetes such as hypoglycemia, hyperglycemia, the difference between ketoacidosis and emesis for other reasons, travel and diabetes, insulin injections and finally, general discussion of diabetes and introduction of the summer camp for adolescents. The recording of the videos was made in the summer camp for adolescents with diabetes in 2011. The adolescents in the summer camp themselves performed in the videos. A known Icelandic musician and a known Icelandic actress were asked to do the voiceover for the videos. The aim of their participation was to allow the adolescents to hear and connect with familiar voices.

Being participant in making instructional videos can be an incentive for increased self-efficacy among adolescents for self-care of diabetes.

The videos are freely available on YouTube and they are also available for anyone interested in translating them to other languages than Icelandic. To find the videos, the Icelandic keyword Sykursýki (diabetes) has to be used when searcing on www.youtube.com.

Here are some examples of the videos:
https://www.youtube.com/watch?v=ifOC0xnUJXM
https://www.youtube.com/watch?v=CzKOqTVs-DY
https://www.youtube.com/watch?v=SJYmsByZxIM

Ragnar Bjarnason Dr. Med. is the person responsible for the videos.

Poster Tour 7: Regimen-Based Innovations I

P51

Comparison of insulin degludec and other long-acting basal insulin analogues for type 1 diabetes: a meta-analysis of randomized controlled trials

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Objectives: Insulin degludec (IDeg) is a novel ultra-long-acting basal insulin with a consistent action profile reported to be longer than 24 hours and has been suggested to have low risk of hypoglycemia due to a peakless pharmacodynamics.

We conducted a meta-analysis to compare the efficacy and safety of insulin degludec compared with long-acting insulin analogues glargine and detemir in type 1 diabetic patients.

Methods: We searched electronic databases (MEDLINE, EMBASE, The Cochrane Library) up to January 2014) to identify randomized controlled trials of at least 12 weeks duration compared insulin degludec with other basal insulin analogues in T1D patients treated with a basal-bolus regimen.

Results: We included 4 publications involving 1846 patients with T1DM. The meta-analysis of all included studies showed non-significant change in HbA1c levels (MD 0.069, 95% CI −0.011 to 0.150, p = 0.092) or in fasting plasma glycaemia (FPG) (p = 0.180) between the examined groups. The rate of nocturnal hypoglycemic episodes was significantly lower with IDeg vs. controls (Rate Ratio 0.697, 95% CI 0.617 to 0.789, p = 0.000). The combined data from all trials showed a statistically significant reduction in the basal insulin dose (MD −0.072, 95% CI −0.067 to −0.018, p = 0.001) and the total daily insulin dose (MD −0.072, 95% CI 0.016 to −0.027, p = 0.002). There were no differences between the groups in terms of body weight change or adverse events.

Conclusions: Basal-bolus therapy with insulin degludec, when compared to subjects using insulin glargine or detemir, was safe. Insulin degludec provides comparable glycaemic control (expressed by HbA1c and FPG levels) to insulin glargine or detemir with added benefit of a reduced basal and total insulin dose, lower rate of nocturnal hypoglycemia, but without additional adverse events.

P52

Therapy of neonatal diabetes based on CGM - from the insulin pump to SU in child with Kir 6.2 mutation and phenylketonuria

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Male newborn in a 5-day-old was admitted to the hospital due to elevated levels of phenylalanine in the screening test. Diagnosis of classical PKU was confirmed with molecular test (R408W mutation in both alleles of the gene PHA). In addition chronic hyperglycemia (281 ± 60 mg/dl) was found, so he was transferred to the Dept. of Diabetology.

The infant from the beginning was treated with insulin pump with CGM. Results of the laboratory tests were as follows: C - peptide 0.4 μg/ml, ICA -0 UJDF, GAD-0.46 U/ml [$N < 10$], IA2-0.7 U/ml [$N < 20$], HbA1c 5.9% (HbF 28%). The insulin doses for meals and corrections was developed according the glucose sensor readings and trends. The child used a basal infusion 2.5 U and mealtime boluses for 100 kcal (BF and PKU diet). If the glucose levels <100 mg/dl, 0.05 U bolus was given after 30–60 min with the trend up, if the glucose levels >250 mg/dl, 0.1 U was given, and the meal after the fall <200 mg/dl and trend down. This method of therapy has offered a relatively stable glycemic profile with mean glucose levels 160 ± 26 mg/dl.

Genetic tests revealed the mutations in Kir6.2 (KCNJ11) R201C de novo. In 3 months, we switched the boy to SU using still CGM. Glibenclamide was introduced in 4 divided doses. We achieved normoglycemia and discontinuation of insulin, fasting C - peptide levels increased to 2.4 μg/ml. Currently 6 -months boy is treated with 0.8 mg-0.8 mg-0.8 mg-0.6 mg Glibenclamide every 6 hours (0.4 mg/kg/day). Glucose profile is stable, HbA1c 5.4%, the development of physical and psycho-motor properly. The levels of fhenyloalanine instable during insulin treatment, improved after switching to SU.

Conclusion: Our case report presents a rare occurrence of two monogenic diseases located on different chromosomes. Using CGM in a newborn allowed the quick stabilization of blood glucose, premeal bolus choice, reduced risk of hypoglycemia in child with the other illness, and safe change of therapy: from the insulin to SU.

P53

Infusion sets in CSII. Does the number of sites and frequency of changing of the infusion sets affect the treatment?

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Introduction: There are clear rules of infusion sets usage in continous subcutaneus insulin infusion (CSII). Patient should change the infusion set every 3 days and have the infusion sets placed at different sites of the body each time. However, many patients do not meet these criteria. The aim of this study was investigate the impact of the number of sites and frequency of changing of the sets of the outcomes of the treatment.

Method: Participants ($n = 96$, M/F 45/51) visited the outpatient clinic 3 times/3 months. During every visit, data from the BG meters and A1C were collected. During the first visit participants were asked to declare: how many infusion sites do they use and how often they change the sets.

Results: Patients that used more than 4 infusion set sites had significantly lower A1C than those using only 4 or less infusion sites, $F(88.6)=3.19$, $p < 0.01$. The same difference were in Mean BG $p < 0.01$ and percentage of Hyperglycemia $p = 0.01$. Those who use more sites had greater percentage of hypoglycemia, $p < 0.05$. There were no significant differences between both groups in keeping one infusion sets for more or less than 3 days in any of the treatment outcomes.

Conclusion: The analysed data suggest that rotating the infusion set sites has more impact on the outcomes of the diabetes treatment than changing the infusion set after max. 3 days. Further studies are recommended to confirm this findings.

Table Differences between rotating infusion sites

	4 and less infusion sets sites (Median, average, SD)	5 and more infusion sets sites (Median, average, SD)
A1C	6.9%, 6.95%, 1.24%	7.45%, 7.68%, 1.33%
Mean BG	148 mg/dl, 155 mg/dl, 32 mg/dl	165 mg/dl, 179 mg/dl, 46 mg/dl
% of Hyperglycemia	31%, 31.8%, 15%	37.5%, 41%, 18.6%
% of Hypoglycemia	12%, 12.5%, 6.47%	8%, 9.53%, 5.96%

P54
Technical problems with continuous subcutaneous insulin infusion in pediatrics and its metabolic complications

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Objectives: To help improve glycemic control and quality of life, many type 1 diabetics choose treatment using continuous subcutaneous insulin infusion (CSII). However, system malfunction is a concern, as it can precipitate dangerous complications, such as ketoacidosis. Hence, the question arises as to whether despite the advances in CSII, technical problems (TP) still exist. The goal of this study is to report on and describe TP with CSII in pediatrics.
Methods: In this prospective study, we recruited type 1 diabetics aged under 18 who were treated with CSII. Families were asked to fill out a questionnaire about frequency of TP, type, metabolic impact (hyperglycemia, cetosis, acidosis), repercussions on level of stress and absenteeism, and overall satisfaction with CSII.
Results: 303 patients were recruited. Mean age was 12.1 ± 3.9 years. 51.8% were on Animas, 27.7% on Medtronic and 20.5% on Omnipod. 60.7% patients reported TP within 1 year, and Chi-square test showed statistically significant differences between the pump groups ($p = 0.000$), with Omnipod having more frequent TP. 23.9% reported metabolic complications, however no statistical difference was seen between the groups ($p = 0.251$). 13.1% of parents reported absenteeism, with no visible difference between pump groups ($p = 0.656$). 58.4% of families reported increased stress levels, with significant differences between groups ($p = 0.011$). Finally, 98.6% of families still recommend CSII, regardless of pump group.
Conclusion: This study reports that within the pediatrics setting, TP with CSII are still prevalent, and cause a negative impact on stress levels and absenteeism. Despite the fact that complications are common, families still recommend CSII. In conclusion, we need to ensure that our patients are aware of the possible TP related to CSII, such that they can make a well-informed decision prior to opting to use CSII.

P55
The effect of lessons learned from the pilot ftudy on recruitment and retention to the multicenter CGM TIME trial

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Background: Recruitment failures and delays threaten the success and resources of clinical trials, with more than 80% of trials failing to reach recruitment targets.
Objective: To determine whether lessons learned from a pilot study improved recruitment in the multicenter trial.
Method: Pilot study recruitment rates and strategies were compared to those of the multicenter CGM TIME Trial (Timing of Initiation of Continuous Glucose Monitoring in Established Pediatric Diabetes).
Results: The pilot study and TIME Trial had the same eligibility criteria and design other than the TIME Trials longer trial duration (12 vs. 4 months). Both targeted pump naïve individuals about to start pump therapy and neither used a run-in period to preselect or screen patients likely to adhere to CGM. The pilot study required 24 months to recruit 20 patients through 2 sites, whereas the TIME Trial exceeded its required sample size, recruiting 144 patients through 5 sites within 21 months. In the pilot study, 41 of 149 (28%) patients starting pump therapy met eligibility criteria vs. 152 of 353 (43%) in the TIME Trial ($p = 0.001$). 20/41 (48.7%) patients eligible for the pilot study consented to participation vs. 144/152 (94.7%) in the TIME Trial ($p < 0.0001$). 5/20 (25%) of pilot study subjects terminated the study prematurely vs. 8/144 (5.6%) in the TIME Trial ($p = 0.002$). We attribute the TIME Trials success with recruitment and retention to lessons learned from the pilot study including when and how the trial was presented to potential participants and the structured support provided to study participants during the trial. In addition, the TIME Trial benefited from use of the Enlite sensor under an Investigational Testing Authorization as well as the infrastructure provided by the JDRF CCTN.
Conclusion: Pilot studies enable recruitment and retention challenges to be identified and addressed before embarking on the definitive trial.

P56
Does frequent use of an automated bolus advisor improve glycemic control in pediatric patients treated with insulin pump therapy? First results of the Bolus Advisor Benefit Evaluation (BABE) study

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Objectives: Use of automated bolus advisors improves glycemic control in type 1 and insulin-treated type 2 diabetes; however, the relationship between frequency of bolus advisor use and glycemic improvement has not been well studied.
Methods: The Bolus Advisor Benefit Evaluation (BABE) study, a single-center, retrospective cohort study, assessed the impact of frequent use of the Accu-Chek Aviva Combo system bolus advisor (BA) feature on glycemic control among pediatric type 1 diabetes patients on insulin pumps treated at a pediatric diabetology clinic in Germany. Measurements of HbA1c, hypoglycemia (<60 mg/dl), therapy changes, mean blood glucose and glycemic variability (SD) were assessed at baseline and after 3 and 6 months of BA use. A total of 104 pediatric patients with mean (SD) baseline: HbA1c 8.0(1.6)%, age 12.7(4.9) years, diabetes duration 46.7(43.7) months, and 58.7%

female were assessed. Baseline differences in HbA1c, diabetes duration and age were accounted for by ANCOVA.

Results: Seventy-one patients reported high frequency (HF) device use (≥50%) versus 33 patients who reported low frequency (LF) use (<50%) during the study period. HbA1c among HF users was significantly lower than LF users: 7.5(0.1)% vs. 8.0(0.2)% (p = 0.0252) at 6 months. There was no between-group difference in the percentage of hypoglycemia values (<60 mg/dl) within 30 days prior to 6-month visit: 5.5 (4.5)% vs. 5.9(5.8)%, p = 0.6526. More HF than LF users received therapy changes during the 6-month period: 62(87.3%) vs. 22(66.7%), p = 0.0174. HF users showed significantly lower mean blood glucose (164.4 [29.78] vs. 194.5 [38.70] mg/dl, p < 0.0001) and less glycemic variability as assessed by standard deviation (80.1 vs. 100.6, p = 0.0001) than LF users.

Conclusions: Frequent use of an automated bolus advisor was associated with significant improvements in glycemic control and more therapy changes with no increase in hypoglycemia in pediatric patients treated with CSII therapy.

P57
First insulin pumps in children in Algeria. Expérience of "C" pediatric's department, university hospital centre of Oran

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The first insulin pump in children in Algeria was set up on 23/05/2011, the indication was vital: resistance to any other route of administration of insulin (DRIASM syndrom: Diabetes mellitus with resistance to insulin administered subcutaneously or intramuscularly). Since August, 2012 14 other insulin pumps were placed in children in Oran.

Objectives: To report our experience, the indications for insulin pump setting, the evolution, the various problems and technical ones encountered in children.

Patients and methods: All patients are T1DM. The indications were: resistance to any other route of administration of insulin,1 time; severe hypoglycemia, one time; frequent moderate hypoglycemia, 3 times;, family request in which a multiplex family, 7 times, pregnancy, 1time, neonatal diabetes, 1time and Infant, 1 time. The pumps used: Medtronic Paradigm Real Time, 1time and Roche Accu Chek-Combo, 14times.

Results: Fifteen patients were put under insulin pump, 9 girls and 5 boys. Three pumps were removed, two for family discord and the last one untimely medical advice. The current age of our patients is 10.02 ± 6.91 years with a follow in pump of 1.06 ± 0.81 years, an age at diagnosis of 5.49 ± 4.59 years and mean disease duration 3.48 ± 4.46 years (0.02–4.98). The average age at the placement was 8.96 ± 6.83 years. The average HbA1c at placement was 7.76 ± 1.59%, at 3 months of evolution its 7.35 ± 2.15% (p = 0.44), at 6 months, 7.16 ± 0.74% (p = 0.72). There was no severe hypoglycemia. There were no significant changes in body weight. Various minor technical problems were noted.

Conclusion: In this modest experience, our results in terms of glycemic control are similar to those published. It remains advantage on quality of life. The cost incurred for families in the absence of support by health insurance is a major barrier to implementing insulin pump.

P58
Timing of initiation of continuous glucose monitoring (CGM) in established pediatric diabetes (The CGM TIME trial)

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Objective: To determine if initiating CGM at the same time as starting pump therapy in pump naïve children and adolescents results in greater CGM adherence and effectiveness compared to delaying CGM introduction by 6 months, and whether this is related to greater readiness for making behavior change at the time of pump initiation.

Method: Multicenter 5-site RCT of 5–18 year olds with T1D >1 year who are starting pump therapy and willing to be randomized to simultaneous initiation of pump (Medtronic Veo) and CGM (Enlite) or to standard pump therapy with delayed CGM introduction 6 months later. Primary outcomes are CGM adherence and A1C at 6 and 12 months post pump initiation. Secondary outcomes include glycemic variability and patient reported outcomes.

Results: Recruitment was completed in 21 months, during which 353 children started pump therapy. 144 (95%) of the 152 eligible patients were enrolled and randomized (73 simultaneous, 71 delayed; mean age 12.0 ± 3.3 (SD) years; T1D duration 3.3 ± 3.0 years; baseline A1C 8.0 ± 1.0%). Reasons for exclusions (n = 201) included: chose non Medtronic pump (but met other inclusion criteria; 53.2%), not willing to use CGM (20.8%), <5 years old (9.0%), <1 year T1D (7.0%), deemed ineligible by the investigator (3.5% - 3 children with developmental delay, 4 parental health/social issues), not naïve to pump therapy (2.0%), unwilling to be randomized to delayed CGM (1.5%), and lacked home internet access (0.5%). 124/144 (86%) have reached the primary 12 month outcome with 8 early terminations (3 simultaneous - all prior to pump start; 5 delayed - 2 before pump start, 2 moved, 1 DKA 1 week post pump start). Analysis of 12 month primary outcomes will begin in July 2014.

Conclusion: The CGM TIME Trial is the first study to examine the relationship between readiness for behavior change, timing of CGM initiation, and the effect on subsequent CGM adherence and A1C in children and adolescents starting insulin pump therapy.

Poster Tour 8: Diabetes Projects in Developing Countries I

P59

Vitamin D levels of children and adolescents with type 1 diabetes mellitus

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Objective: To determine the association between vitamin D levels and type 1 diabetes mellitus (T1DM) among children and adolescents with T1DM and healthy non-diabetic controls aged 6–18 years old living in Metro Manila, Philippines.

Methods: A case-control study was performed. The cases were randomly selected from the T1DM Registry of the Section of Pediatric Endocrinology and Metabolism, University of the Philippines-Philippine General Hospital, Ermita, Manila, diagnosed using the ISPAD (International Society for Pediatric and Adolescent Diabetes) criteria. Controls were apparently healthy non-diabetic schoolchildren from Epifanio Delos Santos Elementary School, Ermita, Manila. Frequency matching was done based on sex of the cases. Anthropometric measurements, serum biochemical analyses of 25-hydroxyvitamin D [25(OH)D], HbA1c, liver and kidney function tests were recorded. Vitamin D sufficiency, insufficiency and deficiency were defined as serum 25(OH)D levels at ≥30 ng/ml, 21 to 29 ng/ml and ≤20 ng/ml, respectively. Odds ratio (OR) was estimated at 95% Confidence Interval (CI).

Results: There were 43 children and adolescents with T1DM and 121 healthy non-diabetic controls. The diabetic participants had significantly lower 25(OH)D levels compared to non-diabetic controls (20.6 ± 4.2 vs. 24.4 ± 4.8) ($p < 0.05$). Vitamin D deficiency was found to be associated with T1DM (OR = 15.77, 95% CI: 6.459, 38.51).

Conclusion: This study suggests that there is an association between vitamin D deficiency and Type 1 diabetes mellitus.

P60

Chronic complications in children and adolescents with type 1 DM at the Lagos University Teaching Hospital

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Background: Type 1 DM is the 2nd commonest endocrine disease in Nigeria. Worldwide availability of insulin is helping children survive into adolescence and adulthood. However, metabolic control problems, especially chronic hyperglycemia are associated with vascular and neurological complications.

Objective: To describe the chronic complications in children and adolescents with Type 1 DM in the Lagos University Teaching Hospital.

Methods: We analysed the case records of the patients. Ethical approval and informed consent/accent were obtained. Data analysis was done with Microsoft excel.

Results: There were 39 patients (21 males and 18 females) with Type 1 DM. The mean age was 15 years(y) (range 2–28y). The mean BMI is 18.8 kg/m^2 (range 13.5–28.5 kg/m^2). The mean HbA1C is 10.8% (range 6.9 to >14%). The mean duration of DM was 11.0 y (range 0.1–22 y). The duration of disease is less than 5y in 19 patients (48.7%), 5–10 y in 16 patients (41.0%) and more than 10 y in 4 patients (10.3%). Further analysis of the 20 patients who have had DM for 5y and beyond revealed microalbuminuria in 20% and diabetic neuropathy in 5%. The mean total cholesterol was 3.88 mmol/l (range 2.59–5.3 mmol/l), mean LDL cholesterol was 1.77 mmol/l (range 0.28–4.34) and mean HDL was 0.95 mol/l (range 0.44–1.16). Hyperlipidaemia was seen in 18% of these patients. Blood pressure measurements of this group showed a systolic range of 90 to 130 mmHg and a diastolic range of 67 to 90 mmHg. Hypertension (either combined systolic and diastolic, or isolated systolic and diastolic) was recorded in 45% of these patients.

Conclusions: Chronic complications are being seen in our patients who have long duration of type 1 DM due to various factors, some of which are peculiar to resource-constrained settings like ours. Intensive efforts are advocated to ensure optimal metabolic control to prevent or delay the onset and progression of complications so as not to strain the already-stretched health budgets of the nation.

P61

Abstract withdrawn

P62

Innovative global health youth service delivery model targeting youth with type 1 diabetes (T1D) in the Dominican Republic (DR)

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Objectives: Empower youth to be leaders of social change by training them to work with and motivate youth with T1D in the Dominican Republic (DR). In doing so, this study aims to evaluate characteristics of the service delivery group and to evaluate the impact the experience has on their academic, professional, social entrepreneurial, and overall life goals and trajectory.

Methods: Characteristics of youth volunteers supporting youth with T1D in the DR were obtained by programmatic review of records from American Youth Understanding Diabetes Abroad (AYUDA). Youth were screened and selected through a volunteer application process. Accepted volunteers were then incorporated into the service delivery model that follows a standardized approach, including a 12-week online training course, in-person training summit, and in-country experience. Pre- and post-program surveys were administered online to AYUDA volunteers and analyzed.

Results: 29 AYUDA volunteers were trained and placed in the DR in 2013. High school students were the predominant age group (42.3%) followed by college (30.8%) and graduate/post-grad (26.9%) students. Youth with T1D (55%) and without T1D (45%) participated. Among participants with T1D, 84.6% reported last HbA1c value <7.5%. Health/medicine was the most common primary career interest (56%). Program impact evaluation demonstrated the experience had a critical or significant impact on personal academic goals (88%), career goals (85.8%), social entrepreneurial aspirations (95.3%), and overall life direction (95.3%).

Conclusions: This service-based learning approach represents an innovation method of service delivery to by using an underutilized and low-cost resource (youth volunteers) to help meet the needs of underserved youth with T1D in the DR. While the approach is public-spirited, it also demonstrated a profound impact on the individuals who are delivering the intervention (youth with and without T1D).

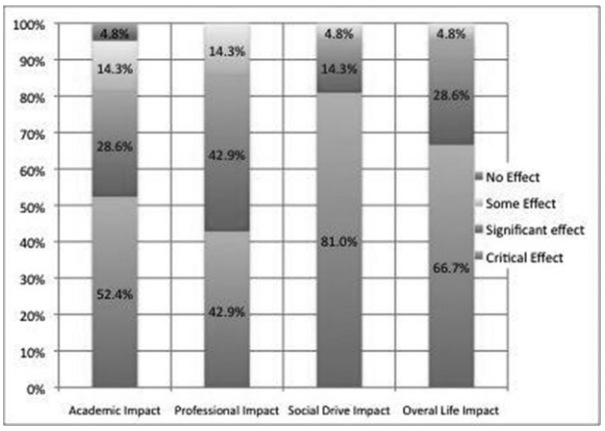

Figure Post-program Impact on Youth Working with T1D.

P63

Changes in glycemic control and insulin doses among children and adolescents living with diabetes who participated in a camp

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Objectives: The purpose of this study was to assess changes in glycemic control and insulin doses in a group of diabetic children and adolescents during and after a camp organized by the Program Changing Diabetes in Children in Cameroon.
Methods: During a 5-day camp, we collected data on doses of insulin, HbA1c, weight and blood glucose at six time points in a group of thirty-nine children and adolescents living with diabetes (21 Male /18 Female). We compared the evolution of these parameters 3 months after. Comparisons of averages were carried out using paired t-test. Pearsons correlation was used to find any association between variables.
Results: The mean age was 18.2 ± 2.9 years. The mean duration of diabetes was 3.6 ± 3.3 years. HbA1c decreased significantly at the end of the camp (7.9 ± 2.5%) compared to the beginning (8.6 ± 2.6%) ($p = 0.027$). This decrease was mainly observed among children under 18 years old ($p = 0.01$), children who performed more blood glucose tests after the camp (Pearson Coefficient = −0.169, CI = [−0.271, −0.068], $p = 0.002$) and children who had at least 2 consultations after the camp (Pearson Coefficient = −0.169, CI = [−0.271, −0.068], $p = 0.002$). The median insulin doses at the beginning (45.5 ± 17.9 units per day) were not significantly different 3 months after the camp (46 ± 17.4 units per day) ($p = 0.8$). Weight remained unchanged 3 months after the camp (59.7 ± 13.7 kg), compared to the beginning (60.5 ± 14.1 kg) ($p = 0.08$). Hypoglycemia during the camp was frequent (72% of participants) but the number of episodes of hypoglycemia per patient was significantly lower at the end of the camp (0.5 ± 0.6) compared to the beginning (1.1 ± 1.3) ($p = 0.004$).
Conclusion: Participation in a camp for children and adolescents living with diabetes is accompanied by a significant decrease in HbA1c. There is no significant change in insulin doses and weight three months after. Hypoglycemia is very common during a camp.

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Obesity & physical activity assessment for type 2 diabetes in young adults

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Introduction: Previously a disease of the middle-aged and elderly, type 2 diabetes has recently escalated in all age groups and is now being identified in younger age group, including adolescents and children, especially in high-risk population. Obesity & physical inactivity are two important preventable risk factors for the development of type 2 DM. This underscores the need for assessment of risk factors at an early age so that preventive measures are possible.
Objectives: To assess risk factors for diabetes like waist circumference & physical activity in young adults.
Methodology: The study was a cross sectional study. 523 (191 males & 332 females) young adults in the age group of 18–22 years participated in the study. Waist circumference was taken as a simple parameter to assess obesity as it indicate central as well as general obesity. It is measured in all the participants. History of physical activity was taken for each participants.
Results: We found mean waist circumference 77.87 ± 11.19 in females & 83.87 ± 12.82 in males. We found 57.25 &18% of students having mild moderate and severe physical activity.
Conclusions: The study showed obesity & physical inactivity was present in these student & being preventable risk factors for developing diabetes motivation to these student by health education is must for prevention of type 2 DM.

Poster Tour 9: Exercise & Obesity in Type 1 DM & Type 2 DM

P67

Beneficial role of voice inter-relating process and OM mantra enchanting in adolescents diabetic patients in south Delhi metro population

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Objective: According to World Health Organisation, a disease of the middle-aged and elderly, type 2 diabetes has recently escalated in all age groups and is now being identified in adolescents and children, especially in high-risk Indian populations living in metro cities.. Objective of present study to present new methods of controlling diabetes complications by OM Enchanting and Brahma Muhurat Awakening in adolescents diabetic patients in south Delhi metro population.

Method: Using a cross-sectional design, which includes age, family history of diabetes, exercise status and waist circumference, fasting glucose & insulin, glucose tolerance test (GTT), and glycosylated hemoglobin (HbA1c) were recorded for 45 obese children (subject) between 9–20 years old at Shri Mahamaya vaishnav devi mandir research institute, New Delhi, India. All children were treated for one hour in Brahma Muhurat Awakening (time duration of 04:00- 05:00 A.M) early morning with my frequency tuning by voice inter-relating process and children discuss their problem due to diabetes and life style and try to find their problem and provide them with astrological corrective measures for one month.

Results: Present study by Brahma Muhurat Awakening and Om enchanting ones physical and inner elements balance and a person is filled with the positive energy which makes him/her active enough to burn the required calories ultimately helping one to be fit without having any physical consumption of chemical salt. After one month treatment there were significant changes in glucose, insulin and glycosylated haemoglobin levels compare to normal levels with changes in life style and increase concentration for study.

Conclusion: In conclusion, adolescents diabetes can be controlled and regulate by treating patients with OM Enchanting and Brahma Muhurat Awakening in diabetic patients without using any harmful drugs.

P68

Hyperthyrotropinemia in overweight and obese children is associated with higher insulin resistance

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Background: Elevated thyroid-stimulating hormone (TSH) with normal thyroid hormone levels is found in up to 23% of obese children and correlates positively with body mass index (BMI). It seems to be rather a consequence than a cause of obesity.

The aim of this study was to investigate the association between TSH levels and insulin resistance in overweight and obese children.

Methods: Study included 289 overweight (OW) (BMI-SDS >1.0) and obese (OB) (BMI-SDS >2.0) children, mean age 13.5 ± 2.0 years; 43.3% were males. Mean BMI-SDS was 2.46 ± 0.8, 76.5% were obese. BMI was evaluated according to IOTF criteria for children. OGTT with analysis of glucose and insulin concentrations at 0, 30 and 120 minutes was performed; TSH, free thyroxine (FT4) and anti-TPO levels were determined from baseline blood samples. Children with increased anti-TPO levels were excluded from further analysis.

Results: Increased TSH (>4.0 IU/l) levels were found in 13.7% of OW/OB children and adolescents. BMI-SDS and waist circumference (WC)-SDS were significantly higher in children with increased TSH compared to children with normal TSH levels (mean 2.67 ± 0.8 vs. 2.39 ± 0.8, $p < 0.001$ and 1.7 ± 0.7 vs. 1.5 ± 0.7, $p < 0.001$, respectively). Insulin concentrations at 0, 30 and 120 min. of OGTT were significantly higher is children with increased TSH concentration (mean 21.1 ± 8.9 vs. 16.9 ± 7.8 mIU/l, $p < 0.005$, 148.2 ± 65.8 vs. 114.7 ± 69.5 mIU/l, $p < 0.026$ and 85.8 ± 66 vs. 67.5 ± 56.5 mIU/l, $p < 0.008$, respectively). HOMA-IR was significantly higher is those children who had increased TSH compared to those with TSH levels (4.91 ± 2.3 vs. 3.86 ± 1.9, $p < 0.002$, respectively). Glucose concentrations were similar in both groups.

Conclusions: OW/OB children with incresed TSH levels (>4 IU/ml) have higher BMI-SDS and WC-SDS, and are more insulin resistant than children with normal TSH levels.

P69

The peculiarities of neuroendocrine status in children with different forms of obesity

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Aim: To examine the peculiarities of neuroendocrine status in obese insulin resistance children.

Methods: We examined 285 children (153 simple (14.35 ± 2 years, BMI <35 kg/m²) and 53 morbid obesity (15.6 ± 1.6 years, >35 kg/m²)); 79 normal weight (control), 14.51 ± 2.2 years ($p = 0.95$), 19.9 ± 2.5 kg/m² ($p = 0.0001$)), observed in the endocrinology department of University clinic (Minsk) in 2013–2014. Obese patients were divided into subgroups: non insulin resistance (non-IR) (88 children, 14.9 ± 2.06 years, BMI 32.5 ± 3.8 kg/m^2, HOMA – 1.7 ± 0.5), and insulin resistance (IR) (118 children, 14.5 ± 1.9 years, BMI 35.1 ± 5.8, HOMA 4.8 ± 0.3). The levels of dopamine (D), neuropeptide Y (HY), ghrelin (G), leptin (L) were examined in all children.

Results: Obese children showed a significant D increase compared to control (($p^{s\text{-}c} = 0.012$), ($p^{m\text{-}c} = 0.0001$), ($p^{m\text{-}s} = 0.009$)). The reliable difference between D levels in IR and non-IR children werent noted ($p = 0.5$). The reduction of G levels were noticed in morbid and simple obese children compared to control ($p^{m\text{-}c} = 0.0001$), ($p^{s\text{-}c} = 0.0001$), ($p^{m\text{-}s} = 0.4$). The significant difference between non-IR and IR G levels didnt noted ($p = 0.6$). L levels in children with morbid and simple obesity were significantly higher than control ($p^{s\text{-}c} = 0.0001$), ($p^{m\text{-}c} = 0.0001$), ($p^{m\text{-}s} = 0.0001$). L levels were higher in IR than non-IR children ($p = 0.014$). L levels were correlated with G ($rs = -0.3$; $p = 0.07$). The reduced levels of NY were noticed in children with morbid and simple obesity compared to control ($p^{m\text{-}c} = 0.0001$), ($p^{s\text{-}c} = 0.0001$), ($p^{s\text{-}m} = 0.1$). The reliable difference between NY levels in IR and non-IR children werent noted ($p = 0.2$). There were correlation between NY and BMI

($r_s = -0.18$; $p = 0.022$) in children with different forms of obesity compared to control.
Conclusions: The differences between examined hormones, except leptin, were noted only between children with different forms of obesity compared to normal-weight control, but not between IR and non-IR children.

P70
Does the increase in BMI associated with initiation of insulin therapy among youth newly diagnosed with type 1 diabetes mellitus (T1DM) predict obesity at age 18?

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Objective: To examine if the change in Body Mass Index z-scores (BMIZ) within 6 months of starting insulin therapy in youth with T1DM is associated with obesity at age 18.
Hypothesis: After controlling for other factors, a change in BMIZ in the 6 months after initiation of insulin therapy in youth diagnosed with T1DM is not associated with obesity at age 18.
Methods: Clinical data from the Diabetes Education Resource for Children and Adolescents database was used for this study. This unique database combines extensive clinical information on each patient with virtually universal coverage. The study population comprised all children (2–18 years old) diagnosed with T1DM in Manitoba between 1997 and 2012 ($n = 423$). BMIZ calculated from measured heights and weights were used to classify weight status based on the Centres for Disease Control growth charts. Regression models were used to assess the association between change in BMIZ 6 months after diagnosis, and obesity status at age 18. The models controlled for sex, age at diagnosis and length of follow up. Additional stratified analyses examined sub-groups within the sample, to determine whether the effects were different for children with different characteristics (e.g. initial BMIZ, age at diagnosis, or sex).
Results: Preliminary results suggest an association between post-diagnosis changes in BMIZ and longer-term weight status, varying according to initial BMIZ. Participants in the underweight and normal BMIZ categories at diagnosis appear to have the largest increases in BMIZ while those presenting as overweight or obese at diagnosis show little or no significant changes.
Implications: If this study (as shown by initial results) finds a significant association between post-diagnosis weight gain and longer-term obesity, then clinical practice may need to be modified to monitor and control weight gain associated with initiation of insulin therapy.

P71
Impaired endothelial function in adolescents with overweight or obesity, measured by peripheral artery tonometry

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Background: Overweight and obesity in adolescents are associated with a subsequent increased mortality due to cardiovascular disease in adulthood. The reactive hyperemia-peripheral artery tonometry (RH-PAT) is a non-invasive method for endothelial function assessment.
Objective: The goal of this study is to investigate endothelial function as assessed with the RH-PAT in adolescents with overweight or obesity.
Methods: In 27 adolescents with overweight or obesity (16 male, 11 female) and 25 control subjects (12 male, 13 female) (age 12–20 years) RH-PAT score and baseline pulse amplitude was measured after an overnight fast. Confounding risk factors for endothelial dysfunction, including smoking and diabetes mellitus were excluded.
Results: RH-PAT score was lower in adolescents with overweight or obesity compared to healthy controls, while their baseline pulse amplitude was higher ($p = 0.027$, $p < 0.0001$ respectively). A significantly positive correlation was seen between baseline pulse amplitude and body mass index standard deviation score in the group with overweight or obese subjects.
Conclusions: Endothelial dysfunction, measured by lower RH-PAT score and higher baseline pulse amplitude, was present in overweight adolescents. Interestingly, we also report for the first time in literature a significant difference in baseline pulse amplitude between overweight adolescents compared to their peers.

P72
Comparison of different markers of insulin resistance in indigenous Argentinian school children

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Background: Insulin resistance (IR) is considered one of the major risk factors for the development of type 2 diabetes (T2DM). Therefore, early identification by using simple tools is essential for preventing T2DM. Triglyceride (TG) to HDL-C ratio (TG/HDL-C), non-HDL-C, apolipoprotein B (Apo B), and vitamin D have been proposed as tools to identify IR in children.
Objective: To compare the ability of different markers such as TG/HDL-C, non-HDL-C, Apo B, and vitamin D values to identify IR in children.
Methods: A cross-sectional study of 501 Argentinean indigenous school children (243 M), aged 10.0 ± 2.4 years was performed between 2011 and 2013 (spring season). Anthropometric measures and glucose, lipid, insulin, Apo B, and vitamin D levels were measured. IR was defined as the upper third quartile of homeostasis model assessment (HOMA-IR).
Results: The prevalence of overweight/obesity was 11.4% per CDC. Mean levels of various characteristics were: BMI 17.2 ± 2.6 (kg/m^2), z-BMI -0.16 ± 1.0, HDL-C 39 ± 9 mg/dl, TG 121 ± 58 mg/dl, TG/HDL-C 2.9 ± 1.8, non-HDL-C 107 ± 24 mg/dl, Apo B 71 ± 16 mg/dl, glucose 77 ± 8 mg/dl, insulin 44 ± 9 mIU/l, and HOMA-IR 1.0 ± 0.8. Several multiple linear regression analyses showed that IR was significantly associated with TG/HDL-C [$R^2 = 0.19$] and vitamin D [$R^2 = 0.17$] adjusted for age, gender, and BMI; whereas non-HDL-C and Apo B were not associated. However, the areas under the receiver operator characteristic curves were as follows: z-BMI = 0.68 (95% CI 0.62–0.73), TG/HDL-C = 0.70 (95% CI 0.64–0.76), Apo B = 0.56 (95% CI 0.50–0.62), non-HDL-C = 0.56 (95% CI 0.50–0.62), and vitamin D = 0.48 (95%

CI 0.42–0.54); indicating that only TG/HDL-C was an acceptable predictor for IR, since the area under the curve was ≥0.7.
Conclusions: This is the first study of TG/HDL-C in South American indigenous children. IR was associated with TG/HDL-C and it was the best marker to identify IR, suggesting that it could be used as a risk marker of future T2DM in this community.

P73
Clinical characteristics and laboratory findings of children and adolescents with diabetes mellitus and obesity

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Objective: The incidence of childhood type 2 diabetes mellitus (DM) is increasing worldwide in parallel with an increasing prevalence of childhood obesity. We investigated the type of diabetes and the clinical characteristics in the newly diagnosed diabetic children.
Methods: Retrospective analysis of clinical characteristics was done in 147 newly diagnosed diabetic children and adolescents under 18 years of age at Chosun University Hospital and Bundang Jesang General Hospital in Korea from March 2006 to December 2013.
Results: Children diagnosed with type 1 diabetes were 113 out of 147 (76%) and 29 out of 147 (19%) were type 2. Mean age of onset was 9.26 ± 0.99 years and there was no seasonal variation of incidence. 39% of children with type 1 diabetes presented initially with diabetic ketoacidosis. Mean BMI was 16.4 ± 3.5 kg/m^2, mean blood glucose level was 437.6 ± 202.5 mg/dl and mean glycated hemoglobin (HbA1c) level was 12.5 ± 2.18%. Positive result was revealed in 53% of the subjects with type 1 diabetes for antibodies to glutamic acid decarboxylase (GAD), 4% for islet-cell antibodies (ICA), 26% for insulin autoantibodies (IAA) and 61% showed positive results for at least one of these autoantibodies. 28 patients (19%) were diagnosed with type 2 diabetes. Mean age of onset of type 2 diabetes was 12.5 ± 3.3 years. 15 out of 28 (53%) subjects were diagnosed with type 2 diabetes in the process of evaluating the cause of obesity. Mean BMI was 28.5 ± 6.7 kg/m^2, mean blood glucose level was 219.7 ± 103.5 mg/dl and mean HbA1c was 9.0 ± 3.9%. 51% of the subjects diagnosed with type 2 diabetes had a family history of diabetes and 82% were either overweight or obese.
Conclusion: Although still not as common as type 1 diabetes among children, type 2 diabetes mellitus increasingly has been seen in children. Oral glucose tolerance test screening in obese children with other risk factors of type 2 should be emphasized to make early diagnosis and start management of type 2 diabetes to improve long-term outcomes.

P74
Junk food intake, impaired fasting glucose, hypercholesterolemia and obesity in Indian urban children: towards management of dietary behavior

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Backgrounds and aims: Modern age is the age of freedom. Freedom may be of thoughts, expression, or action and diet is no exception to that as far as modern eating patterns of urban life are concerned. Todays urban child, starts and ends his day with the food of his choice, which is the expression of his independence. His major motivators for eating varieties are TV advertisements, friends, and media which generally promote junk foods. Children find themselves amidst a complex society that is undergoing breathtaking changes due to media intervention in every part of our life, including food leaving a major impact on dietary patterns of society.
Methods: A sample of 156 school aged urban middle and upper class physically and mentally healthy children was selected from the schools of Bhopal city of India. A comprehensive dietary schedule was used by the investigator consisting of Demographic Profile, Nutritional Profile, Biochemical Profile, Dietary Profile and Cognitive Profile.
Results: The total calorie intake of the sample was found to be below or near the normal, however, calories from fat and proteins intake were relatively high. Impaired fasting glucose was found in 9% of the children. Serum cholesterol levels above acceptable limits were also found in half of the sample putting them at high risk of developing hypercholesterolemia later. A high level of total fat intake was also found in both the age groups of children. 52% children were on high junk food diet with a high impact of visual media like TV advertisements (87.0%). Higher levels of serum cholesterol were found in 67% of junk food eaters and 82.6% of such children were overweight or at risk of being overweight.
Conclusion: Recommendations for total diet, excess fat, life style and dietary behaviour management were made in order to enhance the healthy dietary practices among urban children. Parents, teachers and media were recommended to play a more responsible role in this regard.

P75
Indian Diabetes Risk Score (IDRS) for type 2 diabetes mellitus screening in young adults: effect of yoga and meditation

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Background: India is the country with the top most people with diabetes, and with time life style is changing among pediatric and adolescent populations well as aged peoples. Current research based on the prevalence and management of diabetes in Delhi metro population by Yoga and Meditation. There are several study are going on the patients about their social and mental problem in younger diabetic children as well as their family.
Methods: 32 school children (age group 10–20 years) and 35 aged diabetic patients (age 60–70 years) are scored using IDRS which includes age, family history of diabetes, exercise status and Waist circumference. After scoring them they are categorised into mild, moderate and high risk group. All group were treated with Yoga and Meditation for daily one month with balance diet at Shri Mahamaya vaishnav devi mandir research institute, New Delhi, India.
Results: We get 8%, 79% and 13% children in high risk, moderate and low risk group respectively for developing type 2 DM. After one month their blood glucose and insulin levels were closer to normal levels with increase in work efficiency in both younger and aged diabetic patients. Present study highlight that the successful treatment of diabetic children and adolescents not only requires anti-diabetic drugs; but also family care, life style education, harmonised mind-body-soul, awareness, psychological support, preventive approach toward activity of daily living.
Conclusion: Through counselling with meditation and yoga, we can help people to acknowledge and share the emotional challenges raised by diabetes complications. Therefore preventive diabetes education programme & promotion of Yoga and meditation will be future plan of action which can be suggested in the form of regular exercise and diet planning for the students as part of an integrated approach.

Poster Tour 10: Epidemilogy IV

P76

Does ß-cell autoimmunity play a role in cystic fibrosis related diabetes? Analysis based on the German/Austrian DPV registry

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Objective: Research on Ô-cell-autoimmunity in CF-related diabetes (CFRD) is still rare. We aimed to analyze the frequency of Ô-cell-autoimmunity and the influence on age at diabetes manifestation, insulin requirement, type of insulin therapy and hypoglycemic or ketoacidotic events in patients with CFRD compared to antibody negative patients.

Methods: We analyzed data of 526 patients with CFRD in the German/Austrian DPV database by multivariable mixed regression modeling.

Results: In our cohort 4.75% of CFRD patients (n = 25) were found to be Ô-cell-antibody positive. There was a higher female preponderance in this patient group: 80.0% vs. 57.7%. Diabetes onset (median [interquartile range]) was earlier: (13.00 [9.90–15.40] vs. 16.00 [13.60–20.60] years; $p < 0.005$) and insulin dose/kg bodyweight was higher: (1.08 [0.88–1.25] vs. 0.68 [0.32–1.10] IU/kg; $p < 0.05$). There were also differences in the type of insulin treatment. Insulin pump therapy (CSII) was significantly more often used in patients with Ô-cell-autoimmunity (20% vs. 4.8%; $p < 0.05$). The differences for multiple daily injections (ICT) and conventional therapy (CT) were not significant (ICT: 64% vs. 78.8%, CT: 16% vs. 16.4. Oral antidiabetic agents (OAD), where only used in antibody negative patients (5.2%). Rate of severe hypoglycemia with coma and rate of ketoacidosis /100 patient years were higher in antibody positive patients (hypoglycemia with coma: 3.88 vs. 3.43; n.s., ketoacidosis: 7.76 vs. 0.98; $p < 0.05$).

Conclusion: Presence of Ô-cell autoantibodies in CFRD appeared to be no greater than in the general population. Ô-cell-autoimmunity was associated with earlier onset of diabetes and higher insulin requirement. Insulin pump therapy was used significantly more often in patients with Ô-cell antibodies, comparable with type 1 diabetes. Antibody positive patients are at higher risks for severe hypoglycemia and ketoacidosis compared to Ô-cell-antibody negative CFRD patients.

P77

Recent incidence trends of type 1 diabetes in children and adolescents in Germany

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Objectives: To estimate recent trends in T1D among children and adolescents 0–19 years of age in the German federal state of North Rhine-Westphalia (NRW) between 2002 and 2012.

Methods: The NRW diabetes incidence register ascertains newly diagnosed cases of T1D according to EURODIAB criteria by three data sources: the prospective hospital-based active surveillance system ESPED, annual inquiries among medical practices, and the DPV database. Completeness of ascertainment was estimated by the capture-recapture-method. Incidences (per 100,000 person-years) were age- and/or sex-standardized by the direct method using equal weights. Time trends were estimated by Poisson regression.

Results: Between 2002 and 2012, 8,274 children and adolescents (4,465 boys) aged 0–19 years with new-onset T1D were registered. Ascertainment was 99% complete. The overall incidence rate was 20.8. The incidence among boys was higher than among girls (21.8 vs. 19.8, $p < 0.001$), owing to the male preponderance among age groups 10–14 (30.8 vs. 24.6) and 15–19 years (11.4 vs. 8.3). Age-specific estimates for age groups 0–4, 5–9, 10–14, and 15–19 years were 17.7, 28.0, 27.7, and 9.9, respectively ($p < 0.001$). On average, the incidence increased annually by 2.1% ($p < 0.001$) with no significant difference between boys and girls (2.3% vs. 1.9%, $p = 0.592$). Among boys, increasing trends were observed in the age groups 0–4, 5–9 and 10–14 years (2.3% vs. 2.9% vs. 2.3%), among girls in the age groups 5–9 and 10–14 years (3.7% vs. 2.9%) ($p < 0.05$ each). The incidence among 15–19 year-old girls tended to decrease (−2.6%, $p = 0.062$).

Conclusions: The data suggest that T1D incidence in childhood and adolescents is still increasing in Germany. But age-specific trends are not uniform in both sexes. Annually, about 3,200–3,700 children and adolescents are newly diagnosed with T1D in Germany. Causes of the continuous rise and the differential age-specific trends of T1D incidence between sexes have still to be identified.

P78

Are stressful life events during pregnancy related to type 1 diabetes in the child?

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Objective: The incidence of childhood Type 1 Diabetes (T1D) is increasing, particular at younger ages. In Sweden, immigrants born inside the country have an increased risk for developing T1D compared to siblings born in their native country. This suggests early environmental factors in utero or early infancy play an important role in disease risk. Psychological stress has been reported to be associated with T1D in retrospective studies. To evaluate whether perinatal stress increases risk for T1D, prospective studies are needed. The aim of the study was to examine whether serious life events experienced by non-diabetic mothers during pregnancy were related to T1D in the child.

Methods: The DiPiS study is a prospective population-based study of T1D in children. Of 35,683 singletons born between 2000 and 2004, 22,413 non-diabetic mothers answered questionnaires 2 months after delivery, including questions on serious life events during pregnancy.

Results: A total of 105 children of participating non-diabetic mothers had developed T1D up to March 2014. 18.5% of the mothers reported some stressful live event during pregnancy. Overall,

no association between reported life events during pregnancy and T1D in the child was seen. However, 3.8% of mothers to children developing T1D, but only 1.4% of mothers to non-diabetic children reported life events, such as domestic violence or serious accidents. Those life events were uncommon and no statistical significance was found ($p = 0.055$).

Conclusions: In this prospective population-based study, we did not find any significant association between stressful life events during pregnancy and development of T1D. However, a connection between traumatic life events like violence or serious accident during pregnancy and T1D in the child could not be excluded. The DiPiS follow-up will continue until the children are 15 years of age, and with complete data further analyses of stressful events during and after pregnancy will be possible.

P79
C-peptide trajectory in children after type 2 diabetes diagnosis

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The DCCT demonstrated that almost all adolescents had negligible c-peptide (c-pep) responses (<0.2 nmol/l) after 3 years of type 1 diabetes (T1D) ~ 30 years ago but the course of c-pep in youth with T2D has not been determined. The Pediatric Diabetes Consortium Type 2 Diabetes (T2D) Registry has collected longitudinal clinical and biologic data from youth with T2D cared for at 8 US Pediatric Diabetes Centers. In this study, we assessed c-pep levels in 342 youth with T2D (mean age 16.3 ± 2.5 years, mean T2D duration 3.1 ± 2.6 years).

Median (interquartile range) for 101 fasted c-pep measurements was 1.2 nmol/l (0.8–1.6 nmol/l) and for 241 non-fasted, random c-pep measurements was 1.4 ng/ml (0.8–2.3 nmol/l). Although c-pep tended to decrease with longer T2D duration (Figure, $r = -0.36$, $p < 0.001$ for fasted c-pep and -0.20, $p = 0.002$ for non-fasted c-pep), 97% of subjects had c-pep ≥0.2 nmol/l irrespective of duration. Among 78 subjects with T2D for ≥ 5 years, 87% had c-pep ≥0.2 nmol/l and 49% ≥1.0 nmol/l.

Conclusion: Unlike adolescents with T1D, there is substantial prolonged retention of residual insulin secretion in youth with T2D. As a result, youth with T2D may be good candidates for incretin-based therapies that enhance endogenous insulin responses to meals.

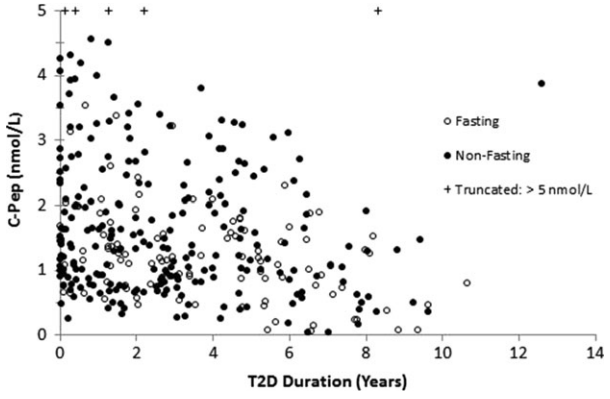

Figure C-peptide Abstract Table 1

P80
Non-HDL-cholesterol and LDL-cholesterol in an young type 1 diabetic population

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Objective: To evaluate the blood LDL-Cholesterol levels and non-HDL-Cholesterol and their relationship with anthopometrics measurements and to caracterize the prevalence of excessive body weight and obesity in young type 1 diabetic population.

Methods: Data was collected from 968 young type 1 diabetic patients followed in APDP Department of Children and youth (329 patientes with ages from 12 to 18; 639 patients from 19 to 26). The patients underwent an anthropometric examination, evaluation of blood LDL-cholesterol levels and calculation of non-HDL-C.

Results: In the individuals with ages from 12 to 18 there was a prevalence of excessive body weight of 14%, and obesity of 10.6%. The average of BMI, waist circumference and HbA1c of those with LDL-C < 110 mg/dl was significantly lower than tose with LDL-C >130 mg/dl:21.8(±3.7) vs. 23.6 (±5) kg/m^2, $p = 0.008$;75.7(±7.9) vs. 79.5(±12.2) cm, $p = 0.02$;9.1(±1.8) vs. 10.7 (±1.9)%, $p < 0.005$. The average of BMI and HbA1c of those with non-HDL-C < 120 mg/dl was also significantly lower than tose with levels>145 mg/dl: 21.7 (±3.5) vs. 26.1(±5.6) kg/m^2, $p < 0.05$; 9.2(±1.7) vs. 9.6(±1.9) %, $p < 0.005$. In the individuals with ages from 19 to 26 there was a prevalence of excessive body weight of 23.6% and obesity of 3.8%. The average of BMI and HbA1c of those with LDL-C < 100 mg/dl was significantly lower than tose with LDL-C ≥ 100 mg/dl (386 patients):23(±3) vs. 23.7(±3.6) Kg/m^2, $p = 0.01$; 9(±1.8) vs. 9.6 (±2.4)%, $p < 0.005$. The average of waist circumference and HbA1c of those with non-HDL-C < 30 mg/dl was also significantly lower than tose with levels≥130 mg/dl: 78.7(±7.4) vs. 81.8(±9.4) cm, $p = 0.01$; 9(±1.8) vs. 10.6(±2.6)%, $p < 0.005$.

Conclusions: In young type 1 diabetic patients, LDL-Cholesterol and non-HDL-Cholesterol is increased with poorer diabetes control and higher BMI. Non-HDL-Cholesterol appears to be a good screening test. There is a increased prevalence of obesity in children and adolescents with worse diabetic control and higher lipid profile.

P81
Prevalence of prediabetes using impaired fasting glucose (IFG) in secondary school students aged 10 to 19 years in Port Harcourt Local Government Area of Rivers State, Nigeria

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Background: The prevalence of type 2 diabetes is increasing in children. It is usually preceded by an asymptomatic period known as Prediabetes. Complications of diabetes can start during this asymptomatic period.

Objective: To determine the prevalence of Prediabetes using impaired fasting Blood Glucose in secondary school students aged 10 to 19 years in Port Harcourt Local Government Area of Rivers State and to determine some associated risk factors

Methodology: Fasting blood sugar for selected students age 10–19 years from selected schools was done. Anthropometric data, blood pressure was taken and bio data obtained with a questionnaire. All students who had fasting blood glucose of ≥5.6 mmol/l were to undergo an OGTT. Impaired fasting glucose was as stated in ISPAD/ADA guideline.

Result: A total of 880 students studied, 577 females and 303 males, mean age of females 14.7 years not statistically different from males of 15.6 years.

Prevalence of Impaired fasting glucose was 152 (17.3%), Prevalence in females 99 (17.2%) was not statistically significantly different from males 53 (17.5%).

The prevalence of IFG was comparatively higher in obese 8 (34.8%), Systolic prehypertensive 16 (22.5), diastolic hypertensive 7 (23.3) students. 24.2% of children with IFG had a positive family history of diabetes mellitus. There was no statistically significant association between the BMI percentile, blood pressure category, sex and age category or family history of diabetes mellitus and occurrence of impaired fasting glucose.

Prevalence of diabetes was 0.1%. 66 (43.2%) students with Impaired fasting glucose did an oral glucose tolerance test (OGTT) out of which 10 (15.2%) had Impaired glucose tolerance.

Conclusion: Prevalence of Prediabetes by IFG is 17.3%, Prevalence increased with obesity. There was no statistically significant association between age, sex, family history of diabetes, blood pressure, BMI percentile category and occurrence of IFG in the study population.

P82
Prevalence of overweight and obesity in school going children of Ahmedabad city: its relationship with socioeconomic status and associated lifestyle factors

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Aims and objectives: Obesity and overweight have become major epidemic problem in the world, and there is an urgent need to examine childhood obesity and overweight across the world following a standardized international standard. The present study was aimed to evaluate prevalence of Obesity and overweight and their relation to socioeconomic status (SES) and the risk factors such as diet, physical activity like exercise, sports, sleeping habit, eating habits and family history of diabetes and obesity.

Methods: The study was carried out in 1,150 school children of 12–18 years of age and having different SES. Various epidemiological parameters were evaluated in study. The obesity and overweight were considered using an updated body mass index reference. SES and life style factors were determined using standardized questionnaire.

Results: Age-adjusted prevalence of overweight was found to be 15.2% and 11.31% among male and female, respectively, where as the prevalence of obesity was 3.2% in male and 1.9% in female. The prevalence of overweight among children was higher in middle SES as compared to high SES group in both male and female whereas the prevalence of obesity was higher in high SES group as compared to middle SES group. The prevalence of obesity as well as overweight in low SES group was the lowest as compared to other group. Eating habit like junk food, chocolate, eating outside at weekend and physical activity like exercise, sports, sleeping habit in afternoon having significant effect on prevalence of overweight and obesity among middle to high SES group. Family history of diabetes and obesity were also found to be positively associated.

Conclusions: Results of the study revealed that the prevalence of Obesity and overweight remarkably associated with different socioeconomic status.

Keywords: Obesity, Overweight, SES

P83
What are the reasons for the improvements in outcome in type 1 diabetes? A hypothetical analysis

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At least 2 lines of evidence suggest that there has been a significant improvement in outcome in individuals diagnosed with type 1 diabetes during childhood or adolescence: first, e.g. Miller et al (Diabetes 2012; 61:2987, reported from the Pittsburgh Epidemiology of Diabetes Complications (EDC) study cohort that life expectancy at birth for those diagnosed in 1965–1980 was ~15 years longer than those diagnosed in 1950–1964; and second, e.g. Marcovecchio et al (Diabetes Care 2014; 37:805), report that of 3,353 youth with T1D screened for the Adolescent Type 1 Diabetes Cardio-Renal Intervention Trial (AdDIT) only 2.3–2.6% had microalbuminuria on one urine screen dropping to 0.7% with two screens. These data contrast to the 7–27% microalbuminuria reported in the 1980–1990s. These improvements in outcome in individuals with T1D are quite striking, & most likely multifactorial in nature. These factors can be considered in the following groupings:

1. Technological advances: among these are more appropriate insulin preparations, increasingly sophisticated techniques for blood glucose monitoring and insulin delivery, more appropriate tools for screening for early microvascular complications, better medications for managing hypertension & hyperlipidemia. Most prominent however may be development of assays to measure A1C levels, the first & best assessment of longer term metabolic control.

2. Knowledge transfer & availability of more sophisticated treatment teams, more able to put the technological advances into play.

3. Lifestyle changes: lower rates of smoking among teens and young adults, but not nutritional improvements since the outcome improvements span the era of the obesity epidemic.

The hypothesis is that these improvements result from continuous quality improvement in diabetes care since 1980. The average A1c at the start of the DCCT in 1983 was 9.8% in the adolescent cohort, it was 8.3% in the AdDIT cohort.

Poster Tour 11: Acute and Chronic Complications III

P84

Profile of leptin and ghrelin serum concentrations during diabetic ketoacidosis in a pediatric population

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Background: Insulins counterregulatory hormones in diabetic ketoacidosis (DKA) have been investigated since 1970–1980s and their elevation reduce sensitivity to insulin. Leptin and Ghrelin were more recently associated to glucose homeostasis; however, their participation in DKA is still controversial.
Objectives: To evaluate leptin, ghrelin and other counterregulatory hormones at DKA diagnosis, during the first 72 hours of treatment, after discharge and to compare them to healthy subjects.
Methods: We analyzed 25 DKA episodes from March 2010 to July 2013. Samples for glucose, insulin, leptin, ghrelin, GH, cortisol and catecholamines analysis were collected at admission (T0), after 2, 4, 6, 12, 24 and 72 hours of treatment. After discharge (AD), a sample was collected at least 3 months after DKA. A single blood withdrawn was performed in 22 healthy volunteers (control group, CG). For data analysis, $p < 0.05$ was considered significant.
Results: Leptin was significantly lower at T0 (median; range: 1,072 pg/ml; 37 pg/ml to 7,390 pg/ml), T2 (977 pg/ml; 173 pg/ml to 8,255 pg/ml) and T4 (1,530 pg/ml; 261 pg/ml to 18,609 pg/ml) compared to T12 (5,122 pg/ml; 490 pg/ml to 20,270 pg/ml) and CG (7,560 pg/ml; 860 pg/ml to 32,700 pg/ml); T0 and T2 were lower than T24 (3,847 pg/ml; 738 pg/ml to 22,770 pg/ml); and T0 was lower than AD (4,827 pg/ml; 510 pg/ml to 71,350 pg/ml). Leptin was positively correlated to BMI z-score at T0, AD and in the CG. Ghrelin was significantly lower at T2 (mean ± SD: 506.2 pg/ml ± 149.4), T4 (517.0 pg/ml ± 183.4) and T6 (521.3 pg/ml ± 199.3) compared to AD (727.8 pg/ml ± 225.7) and higher in the CG (1,058 pg/ml ± 440) compared to all samples in diabetic patients.
Conclusions: Leptin was lower at diagnosis and in the first hours of treatment of DKA, compared to after DKA resolution, and compared to control group. Ghrelin was low from 2 to 6 hours after treatment with insulin and fluids started in DKA, and overall low in diabetic patients compared to control group.

P85

Cardio-metabolic risk factors in parents of young people with type 1 diabetes and microalbuminuria

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Objective: A family history of cardiovascular disease has been associated with an increased risk of microalbuminuria in adults with diabetes, but there are limited data in subjects with childhood-onset type 1 diabetes (T1D). The aim of this study was to evaluate the associations between the presence of microalbuminuria (MA) in offspring with T1D and evidence of cardio-metabolic risk factors in their parents.
Methods: The study population was represented by 53 parents (age: 56.7 ± 6.2 years) of 35 young people with MA (MA+) and 86 parents (age: 56.1 ± 6.3 years) of 50 matched offspring with normoalbuminuria (MA−), who underwent clinical, biochemical and imaging assessments. The primary study endpoint was the difference, between parents from the MA+ and MA− groups, in a continuous clustered metabolic risk score, calculated as the average value of the standardized measures (z-scores) for waist circumference, blood pressure, fasting glucose, fasting insulin, HDL-cholesterol and triglycerides levels. Differences in cardiovascular parameters (carotid intima-media thickness (cIMT), flow-mediated dilatation (FMD), pulse wave velocity (PWV)) were also assessed between the two groups.
Results: The metabolic risk score was significantly higher in parents of MA+ offspring compared to parents of MA− offspring (0.18 ± 0.56 vs. −0.03 ± 0.59, $p = 0.04$). Parents of MA+ offspring tended to have higher values of waist circumference, blood pressure, insulin and lower levels of HDL-cholesterol, although differences in each individual parameter did not reach statistical significance ($p > 0.05$). No significant difference between the MA+ and MA− groups was found in cIMT (0.66 ± 0.14 vs. 0.64 ± 0.11 mm), FMD (6.11 ± 3.33 vs. 6.78 ± 3.53%), PWV (7.95 ± 1.86 vs. 7.49 ± 1.59 m/s) (all $p > 0.05$).
Conclusions: MA in young offspring with childhood-onset T1D was associated with an abnormal metabolic profile in the parents, confirming the role of a familial predisposition to risk of developing diabetic nephropathy.

P86

Metabolic control as a risk factor for peripheral diabetic neuropathy in children and adolescents with type 1 diabetes

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Objectives: Peripheral diabetic neuropathy (PDN) is a complication of type 1 diabetes (T1D) with increased morbidity and mortality. Metabolic control is a well recognized risk factor for PDN, which usually affects adult patients. However, there is evidence for early impaired indices of PDN in pediatric populations. Our aim was to identify the effect of metabolic control and other factors on indices of PDN in T1D children and adolescents.
Methods: 129 T1D patients (mean ± SD age 13.3 ± 3.5 years, mean ± SD T1D duration 5.4 ± 3.3 years) were classified into 3 categories according to their HbA1c values: good (HbA1c ≤7.5%, $n = 54$), moderate (7.5% < HbA1c < 8.2%, $n = 24$) and poor (HbA1c ≥8.2, $n = 51$) metabolic control. All patients were assessed with nerve conduction studies and vibration perception thresholds (VPT) on upper and lower limbs.
Results: Patients with poor glycemic control (PC) had lower motor velocities in median nerve (55.4 ± 5.0 vs. 58.9 ± 6.1 m/sec, $p = 0.014$) and longer latency time of peroneal nerve (4.5 ± 0.9 vs.

4.3 ± 0.6 msec, p = 0.042) compared to patients with good control. VPT of PC patients tended to be higher at all the examined sites, however without reaching statistical significance. Additionally PC patients were younger (13.5 ± 2.7 vs. 13.6 ± 3.9 years, p = 0.01) and shorter (height SDS: +0.0 vs. +0.4 SDS, p = 0.022), while they were not significantly different in terms of the age at diabetes diagnosis and duration.

Conclusions: In the present study, impaired early indices of PDN in the upper and lower limbs were found in the T1D children and adolescents with poor metabolic control. Maintaining a euglycemic profile in childhood diabetes is of major significance for the prevention or delay of diabetic complications.

P87

Relationship between vitamin D, insulin secretion, inflammatory cytokines and initial presentation of DKA in children with new onset type 1 diabetes

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Objective: To determine if 25-hydroxyvitamin D (25-OHD) at diagnosis of type 1 diabetes (T1DM) correlates with markers of insulin secretion, systemic inflammation, and initial presentation of diabetic ketoacidosis (DKA).

Methods: Serum 25-OHD, fasting c-peptide, inflammatory cytokines (CRP, IL-6 and TNF-α) and presence or absence of DKA was recorded in 36 children presenting with new onset T1DM (age 10.7 ± 3.1, BMI z-score −0.61 ± 1.6, mean ± sd). In children presenting with DKA (n = 15), 25-OHD was obtained following resolution of acute acidosis (37.5 ± 14.4 hours).

Results: Children presenting with DKA had lower 25-OHD levels at diagnosis (23.2 ± 2.0 ng/ml, mean ± SE) compared to children without DKA (31.1 ± 1.8; p = 0.006, Fig. 1). In all children, CRP was negatively correlated with 25-OHD (r = −0.32, p = 0.018); although this may have been explained by one outlier. Fasting c-peptide, IL-6 and TNF-α did not correlate with 25-OHD at diagnosis, nor were they different in children presenting with and without DKA.

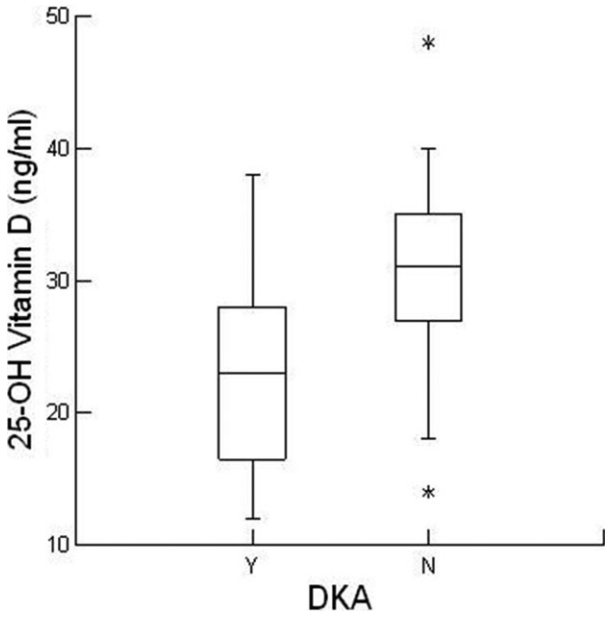

Figure 1

Conclusions: These results indicate that low serum 25-OHD may determine increased risk of presentation of DKA in children with new onset T1DM. However, the underlying mechanisms are unclear as we did not observe notable, significant correlations between 25-OHD and markers of insulin secretion and systemic inflammation.

P88

Peripheral nerve conduction study in children and adolescents at the clinical onset of type 1 diabetes and at five of more years post-diagnosis

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Objectives: To compare motor and sensory nerve conduction parameters at the onset of type 1 diabetes (T1D) and 5 or more years post-diagnosis. To evaluate the influence on sensory and motor nerve conduction of enterovirus (EV) infection, metabolic control, positivity T1D-related antibodies.

Methods: Lower limb electroneurographic (ENG) recordings [distal motor latency, compound motor/sensory action potential amplitude (cMAP/SAP) and conduction velocity of peroneal, tibial and sural nerves] of 84 children and adolescents with T1D were evaluated retrospectively. Thirty-four of them aged 10 (7) years were evaluated at disease onset. Fifty patients, aged 14 (6) years were evaluated after 85 (48) months of disease duration. The following parameters were evaluated:HbA1c levels, blood pH, EV positivity, positivity for autoantibodies (ICA, GADA, IAA, IA2A, ZnT8). Mean left and right ENG recordings were adjusted for age. Data are reported as median (IQR). The Mann-Whitman test was used for statistical analysis with significance set a p < 0.05.

Results: At the clinical onset EV-positive patients (19/24) showed significantly lower peroneal cMAP (p < 0.05) and sural SAP (p < 0.05) as compared to EV-negative patients (5/24). No significant correlation was found between ENG parameters and levels of HbA1c, blood pH, or positivity for T1D-related antibodies. As compared to patients with long-standing disease, patients at onset showed significantly longer peroneal distal (ankle) and proximal (fibular head) motor latency values (p < 0.01, p < 0.05, respectively), as well as distal (ankle) and proximal (knee) tibial motor latency values (p < 0.02, p < 0.01, respectively).

Conclusions: Diabetic neuropathy appears little influenced by metabolic control and disease duration and has likely a multifactorial origin. Close monitoring of the peripheral nervous system (neurological examination and ENG recordings) is to be recommended in T1D patients regardless of the length of illness and the quality of metabolic control.

P89

Reasons for admissions amongst children with type 1 diabetes mellitus in Mulago Hospital Kampala, Uganda

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Background: Regular outpatient care is essential to diabetes control and to reducing hospital admissions. This review aimed to determine the causes of inpatient admission and the outpatient clinic status of pediatric diabetes patients at Mulago Hospital.
Methods: The Mulago Paediatric Outpatient Diabetes Clinic cares for 110 children up to age 19 years, 30% of whom are ≤13 years. Only children ≤13 years are admitted to the paediatric wards, while those >13 are managed on adult wards. We reviewed discharge/death records of children age 6 months–19 years admitted to paediatric and adult endocrinology wards during January 2013–December 2013.
Results: Sixty one children were admitted to Mulago Hospital for diabetes during the study period. There were no diabetes-related deaths. Median age was 17 years (range 4–19), 56% male. The majority of children (62%) were previously known to have diabetes. Only 15% of admissions were to the pediatric ward. Seven of these 9 admissions were for diabetic ketoacidosis (DKA) in new-onset patients. One was admitted for severe hypoglycemia and another for uncontrolled hyperglycemia. All 9 patients attend pediatric clinic. Of the 52 children admitted to the adult ward, only 7 (13%) were new-onset patients in DKA. The majority of admissions were for DKA or uncontrolled hyperglycemia in established patients. Nine (17%) ran out of insulin prior to admission; one was inappropriately on an oral diabetes agent. Four had a urinary tract infection and 4 had malaria. One patient had 3 admissions in 1 year. Only 1 of the 52 patients age 13–19 on the adult ward attended Paediatric Diabetes Clinic; the rest were followed in an adult clinic.
Conclusion: Youth with diabetes followed at specialized pediatric clinics are less likely to require hospitalization than those followed by adult care providers. Efforts to link children and adolescents to age-appropriate outpatient care services may improve diabetes management and reduce the frequency of admission.

P90
Risk factors of microalbuminuria in children and adolescents with diabetes in Bangladesh

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Objectives: Microalbuminuria is well recognized as the earliest clinical sign of nephropathy. The aim of the study was to assess the frequency and the risk factors for in children and adolescents with diabetes.
Methods: Screening for microalbuminuria was undertaken in 199 children with diabetes attending CDiC Clinic in BIRDEM, a tertiary care Hospital in Bangladesh over a two year period: February 2012 to February 2014. Albumin concentration was measured by DCA 2000 analyzer. Normoalbuminuria was defined as urinary albumin concentration <30 mg/l and microalbuminuria as 30–300 mg/l on at least two occasions. Demographic and clinical data were recorded including age, gender, duration of diabetes, HbA1c, BMI SDS, Waist/height ratio, Blood pressure and insulin dose.
Result: Microalbuminuria developed in forty nine children and adolescents (25%). Among them seven patients (3.5%) had macro-albuminuria (>300 mg/l). Independent predictors of microalbuminuria were age (OR 1.3), systolic blood pressure (OR 2.1), BMI SDS (OR 1.5) and mean HbA1c (OR 1.3).
Conclusion: In addition to poor glycaemic control, high BMI and Blood pressure were modifiable risk factors for microalbuminuria. Evaluation of risk factors and early screening for microvascular complications in children and adolescents is imperative to assist in preventive strategies.

Table 1 Factors associated with microalbuminuri

Parameter	Normoalbuminuria	Microalbuminuria	p-value
Age (years)	15.6 ± 3.3	16.8 ± 2.1	0.005
Duration of diabetes (years)	3.8 ± 2.7	4.6 ± 3.2	0.133
BMI SDS	−0.47 ± 1.30	0.10 ± 1.35	0.013
Waist/height ratio	0.43 ± 0.07	0.47 ± 0.09	0.059
Systolic Blood Pressure SDS	−0.30 ± 0.877	0.48 ± 1.31	0.000
Diastolic Blood Pressure SDS	0.91 ± 0.855	1.46 ± 1.036	0.002
Insulin dose (U/kg/day)	1.16 ± 0.59	1.15 ± 0.58	0.937
HbA1c	9.7 ± 2.4	10.8 ± 2.1	0.006

P91
Pyoderma gangrenosum - a rare ulcerative dermatosis associated with type 1 diabetes (T1D)

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Background: Patients with T1D may develop dermatologic diseases as cutane infections or autoimmune dermatosis.
Case: We report on a 15y old girl with T1D since the age of 7, autoimmune thyroditis since the age of 11 and multiple ulcerative skin defects on the left lower leg. In her previous history, she had a fibrom on the left tibia with postoperative wound healing disturbances for 6 months at the age of 12. At age 14 she had a painful swelling, redness of the operation scar and reduced extension of the left knee which led to surgical removal of the scar. At age 15 she developed a phlegmone of the left lower leg after cat scratching which was treated with antibiotics due to pseudomonas colonization. No sings of necrobiosis lipoidica were histopathologically found. In the further course, the ulcerative skin defects recurred, the microbiological smears stayed negative. Thus, systemic treatment with methylprednisolone and topical glucocorticoids was started on suspicion of pyoderma gangrenosum (PG). Although a significant improvement of skin was observed, treatment was stopped due to marked hyperglycemia. Subsequently deterioration of skin was observed even leading to necrotising fasciitis of the anterior tibiale muscle which required fasciotomy. Wound healing problems lead to a debridement and adaptation of the wound edge. Systemic treatment with immunoglobulin was unsuccessful and followed by treatment with cyclosporine A. Under this treatment, no ulcerative defects appeared any more, but redness and swelling of the affected area persisted.
Conclusion: Considering PG as the cause for recurring ulcerating skin defects in patients with T1D is eligible after other skin diseases has been excluded. The pathergy phenomenon, i.e. minor trauma leading to the development of skin lesions that may be resistant to healing, is typical as well. Diagnosis and interdisciplinary treatment of PG on an early stage of the disease is of extraordinary significance for favourable outcome.

Poster Tour 12: Acute and Chronic Complications IV

P92

Color Doppler sonographic dynamic tissue perfusion measurement reveals significantly reduced renal cortical perfusion in children with Diabetes mellitus type 1 without microalbuminuria

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Motivation: Diabetes mellitus is the main reason for end stage renal disease and dialysis in industrialized countries. Today, very limited diagnostic and therapeutic possibilities exist to predict, to monitor and to prevent diabetic nephropathy (DN). New concepts for an early recognition and quantification of the prevailing microvascular changes in DN are urgently wanted. Therefore, we conducted the first cross sectional study to measure renal cortical tissue perfusion by means of standardized color Doppler sonographic videos in diabetic patients.
Material and method: 92 patients with Diabetes mellitus type 1 (DM1) without microalbuminuria and sonographically normal kidneys and normal serum creatinine were compared to 71 healthy probands. In both groups, dynamic color Doppler sonographic renal cortical perfusion measurement was carried out by means of the PixelFlux software (Chameleon-Software, Germany).
Results: Kidneys from children with DM1 had a highly significantly reduced cortical perfusion. The overall reduction was 31% compared to healthy probands. In the cortical periphery (distal hemicortex) the reduction was even higher (by 50%).
Conclusion: Color Doppler sonographic dynamic tissue perfusion measurements of the renal cortex offer a novel possibility to describe the state of the renal microvasculature in Diabetes mellitus in a patient-friendly, non- invasive manner. The method is ready for a broader use in studies to follow up the state of the renal microvessels in the long-term course of patients with diabetes.

P93

Abnormal lipid profiles associated with a higher risk for the development of atherosclerosis are more likely seen in overweight and obese type 1 diabetes patients

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Background: Diabetes is a major risk factor for cardiovascular disease (CVD). Dyslipidemia and BMI are strongly related to CVD risk in adults with diabetes. Reflecting the general population, type 1 diabetes (T1D) is now diagnosed in children of different weight categories bringing to attention non- traditional risk factors for atherosclerosis.
Objective: To examine differences and determinants of serum lipid profiles between children and adolescents with lean (L), overweight/obese (OW/OB) T1D and T2 diabetes (T2D).
Study design: A cross sectional study of 601 patients aged 2–19 years whose information was retrieved from the Montreal Childrens hospitals diabetes clinic database between January 2003 and March 2014. Inclusion criteria were availability of a complete lipid profile as well as anthropometric measures to establish a BMIZ score.
Results: Forty percent of our T1D population was in the OW/OB category. Overall, 57% of the patients were T1DL, 25% T1DOW, 14% T1DOB, and 5% T2D. The overall prevalence of patients not meeting the LDL-C threshold of <2.6 mmol (as per ISPAD guidelines) was 35.3% with no significant differences between T1DL, T1D OW/OB, and T2D. There were significant differences in mean tryglycerides (TG), mean HDL-C, and mean non-HDL-C ($p < 0.001$, $p < 0.001$, and $p = 0.01$ respectively) between the groups. Linear regression models demonstrated a significant correlation between BMIZ score and non-HDL-C ($p = 0.001$) but no correlation between BMIZ score and LDL-C in T1D. HbA1c was also correlated positively with LDL-C and non-HDL-C ($p = 0.002$ and $p < 0.001$ respectively).
Conclusions: T1D OW/OB now constitute a significant proportion of the T1D population and are characterized by higher non-HDL-C, TG, and lower HDL-C. They represent a group at higher risk for future CVD.

P94

Effect of allopurinol versus angiotensin converting enzyme inhibitors in decreasing microalbuminuria in type I diabetic patients

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Background: Diabetic nephropathy (DN) is a complex disease. Uric acid was found to play an important role in its pathogenesis.
Aim: We evaluated the short -term effect (6 months) of allopurinol treatment compared to angiotensin-converting enzyme inhibitor (ACEI) and placebo in type 1 diabetic patients (T1DM) with microalbuminuria.
Subjects and methods: Ninety T1DM patients (46 males and 44 females) were randomly categorized into three groups (30 patients each): group 1 received ACEI on 1 mg/kg/day every 12 hours, group 2 received allopurinol on 100 mg/day, the remaining 30 received placebo & served as control. Mean age of patients was 12.4 ± 3.185 years (range 8–18), mean disease duration was 8.867 ± 2.260 years (range 5–13) and mean microalbuminuria was 124.600 ± 70.193 (mg/l).
Results: After 6 months of receiving treatment; the microalbuminuria level did not change significantly either in the allopurinol group or in control group ($p = 0.124$, $p = 0.891$ respectively). However, ACEI proved to be superior to both in improving microalbuminuria ($p = 0.000$). Serum levels of uric acid were significantly lower in the patients on allopurinol tablets ($p = 0.02$) whereas other groups showed increase in its level ($p = 0.38$, $p = 0.24$ respectively). There were positive correlations between Hb1Ac ($r = 0.440$, $p = 0.001$), FBS ($r = 0.375$, $p = 0.001$), duration of diabetes ($r = 0.968$, $p < 0.001$), blood pressure ($r = 0.232$, $p = 0.028$) and microalbuminuria. A borderline correlation between uric acid & microalbuminuria was found ($r = 0.207$, $p = 0.050$) that emphasizing on the role of uric acid in pathogenesis of DN. No Side effects of medication were observed apart from mild increase in ALT levels in 13% of patients who received allopurinol.
Conclusion: Low-dose allopurinol was not effective in reducing microalbuminuria after 6 months of drug administration. Combination strategy should thus be a more effective tool for obtaining optimal control in patients with diabetic nephropathy.

P95

Role of magnetic resonance tomography in the early diagnosis of cognitive dysfunction in patients with diabetes mellitus type 1

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Objectives: To diagnose for cognitive dysfunction in patients with diabetes mellitus type 1 (DM1T) were examined 58 patients at the age of 22.45 ± 4.627 years, disease duration 6.6 ± 3.951 years.
Methods: To assess mental status used Montreal Assessment Scale cognitive dysfunction (MoCa test). Magnetic resonance imaging (MRI) of the brain was performed with Siemens Magnetom 1.0 tesla, using FLAIR programs. Statistical processing was carried out using an application software package R-system.
Results: Analysis of the MoCa test showed a decrease in the values of most scales (an average 25 points), which confirms the presence of cognitive dysfunction in patients with DM1T. MRI of the brain showed indirect signs of atrophy of the gray matter in the frontal and parietal lobes, that appeared arachnoids cerebrospinal fluid cystic changes 93.1% and expansion of convexital liquor spaces 72.4%. Patients with extension convexital cerebrospinal fluid spaces had a reduction on a scales of MoCa test: visual- constructional skills ($\chi^2 = 6.253$, $p = 0.012$), memory ($\chi^2 = 12.872$, $p = 0.025$) and attention ($\chi^2 = 6.820$, $p = 0.033$). MRI picture showed the presence of areas of gliosis in 15.5% of cases and 19% of foci leukoaraiosis. All patients with focal white matter changes had a reduction on the total MoCa test ($\chi^2 = 4.539$, $p = 0.033$).
Conclusions: MRI of the brain in patients with DM1T allows early diagnose signs of cognitive impairment in 72.4% of cases, signs of atrophy of the gray matter of the brain (expansion convexital spaces): specificity 62%, sensitivity 92%. Signs of white matter lesions of the brain: specificity 67%, sensitivity 88%. Analysis of the results showed that the risk of error is between 0.3–0.7, 95% confidence interval. Thus, carrying out routine MRI examination of the brain in patients with DM1T is a prerequisite for timely detection and correction of cognitive dysfunction.

P96

Average daily risk range (ADRR) predicts future glycemic excursions among youth with type 1 diabetes (T1DM)

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The ADRR is a measure of glycemic variability originally developed for adults with diabetes. The ADRR is now automatically computed by some glucometers. But clinical interpretation of youths ADRR scores is complicated by a lack of normative data. We present ADRR data for a sample of youths with T1DM and offer preliminary data supporting use of the existing adult ADRR risk categories in youths. 79 youths participated (mean age 12.1 ± 4.3 years). We computed ADRR scores using 30 days of self-monitoring blood glucose (SMBG) data (month 1). Scores were compared to SMBG data collected from the next month (month 2). We computed ADRR1 and ADRR2 using SMBG data from months 1 and 2, respectively, to examine stability. We used ANOVA to determine if youths ADRR1 scores associate with month 2 episodes of hypo- (<3.9 mmol/l) or hyperglycemia (>10 mmol/l). Youths mean ADRR1 and ADRR2 scores were 44.6 ± 14.2 and 46.3 ± 12.8, respectively, and showed a significant association ($r = 0.82$, $p = 0.000$). Using the existing adult ADRR risk categories, 4 youths were low-, 21 were moderate-, and 54 were high-risk for glycemic variability. ADRR1 risk categories were significantly associated with future hyperglycemic readings ($p < 0.000$), while its association with future hypoglycemic readings approached significance ($p = 0.09$). Specifically, the number of hyperglycemic events increased for youths in the low-, moderate- and high-risk ADRR categories (15 ± 17, 72 ± 47, and 113 ± 55, respectively). We also saw a rise in the number of hypoglycemic events for youths in the low-, moderate-, and high-risk ADRR categories (3 ± 3, 7 ± 6, and 10 ± 9, respectively). ADRR scores demonstrated a high risk of glycemic variability for the majority of our sample. The correlation between ADRR1 and ADRR2 suggests good stability in youths, while our ANOVA results suggest that the existing adult ADRR risk categories are sensitive to predicting hyperglycemic events in youths with T1DM.

P97

An analysis of the effect of introducing a best practice tariff for paediatric diabetes care to improve diabetes acute and long term outcomes on the compliance with quality standards and staffing levels in a regional paediatric diabetes network

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Objectives: The Department of Health introduced a year of care model to finance Paediatric Diabetes Services in England, called Best Practice Tariff, (BPT), in response to variation in service provision and outcomes. This became mandatory in April 2013 and depends on achievement of 13 quality standards (QS). The West Midlands (WM) Region covers an area of 5,020 square miles, where 2,700 Children with Diabetes receive care from 15 Hospital Trusts who are members of the Regional Paediatric Diabetes Network (WMPDN). The WMPDN, set up to improve standards and reduce the postcode lottery of Diabetes care, works to ensure services are supported to achieve QS and undertook a regional peer review of diabetes care across the WM. This study aimed to determine the impact of BPT on compliance with the 13 QS and staffing of services.
Methods: A questionnaire survey was conducted of lead clinicians at each Trust pre and 6 months post BPT introduction to assess compliance with QS and determine staff ratios of Consultants, Diabetes Nurses (PDSNs), Dieticians and Psychologists.
Results: A 100% response rate was achieved. Less than 80% compliance with 6 of the QS was observed pre BPT; including an inability to:

- offer 4 HbA1c measurements per year
- discuss a newly diagnosed child with a senior diabetes team member within 24 hours of diagnosis
- offer at least 8 additional contacts for every patient per year
- offer an annual additional dietetic appointment
- provide 24 hour advice to parents and health care professionals
- offer annual screening

6 months following BPT Trusts reporting compliance increased to over 80% for 10 out of 13 QS. 8/15 Trusts comply with over 90% of QS, compared to 2/15 trusts pre BPT. There were significant improvements in staffing ratios of PDSNs, dieticians, and psychology provision.

Conclusions: Introduction of the Best Practice Tariff has facilitated investment in paediatric diabetes services in the WM improving staffing levels and compliance with QS.

P98
Prevalence of microalbuminuria in children and adolescents with diabetes mellitus type 1

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Obective: Diabetic nephropathy, the leading cause of morbidity and mortality in adults with type 1 diabetes mellitus may have its roots since childhood. This study was done to determine the prevalence of microalbuminuria (MA) in child and teenager with Type 1 Diabetes mellitus (DT1) and its correlation with duration of DT1 and age at onset diabetes.
Methods: The DT1 patients with duration of diabetes ≥3 years and without known diabetic nephropathy were included. The MA research was realised with 3 methods: nephelometry (Beckmann Array 360) and turbidimetry (DCA 2000), in sterile urine samples. The Incipiens diabetic nephropathy was defined by an MA persistent between 30 et 300 mg/24 h, or urine-creatinine ratio (A/C) between 20 and 200 mg/g. the macroalbuminuriae was defined by MA greater than 300 mg/24, or a urine albumine-cratinine ratio A/C >200 mg/g.
Results: 610 patients DT1 were screened (293 girls and 317 boys). The mean age at diagnostic of diabetes 8.63 ± 4.09 years and the mean duration of diabetes 8.63 ± 6.07 years. An associated disease was noted in some subjects: 151 celiac diseases and 22 hypothyroids. The MA was positive in 175 patients (28.68%). Among them, 122 positives patients were controlled. We found 63 persistent MA and 59 transient MA. We found a frequency of 14, 8% of persistent MA. Significantly more pubertal patients had persistent MA. We found a correlation between pubertal onset DT1 and MA. The MA frequency was very hight in our recruitment.

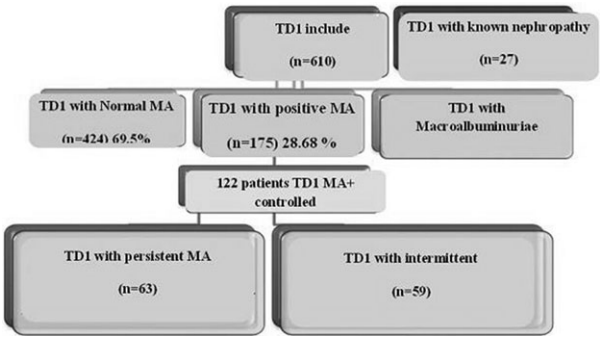

Figure Number of patients TD1 include with MA.

P99
Case report: the treatment challenges in the management of an exclusively breastfed infant with new onset type I diabetes

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Objective: To describe treatment challenges in the management of an exclusively breastfed infant with new onset type I diabetes.
Methods: We present an exclusively breastfed 5 month old male who presented to our emergency department with diabetic ketoacidosis. His mother reports that she found him floppy, pale and unresponsive after a 4 day history of vomiting. He was in severe shock, requiring multiple fluid boluses via the intraosseous route. He was hyperglycaemic with ketosis and severe acidosis (pH 6.871, PCO_2 3.19, HCO_3 4.4, BE −26.9). In view of fluctuating conscious level he was ventilated and transferred to paediatric intensive care unit. After 3 days, his glucose and ketones normalised and he was extubated.
Results: Four days after initial presentation, he was switched from IV insulin to subcutaneous insulin detemir (1.0u daily) and aspart (0.5u as required), with oral glucose gel for hypoglycaemia (<4 mmol/l). However glucose levels varied between 2.6 mmol/l and 21.5 mmol/l and he was commenced on continuous glucose monitoring (CGM). In view of the impracticality of carbohydrate counting, he was commenced on correction boluses of aspart, for glucose >14 mmol/l. After 8 days he was commenced on an insulin pump (Total basal insulin 0.8u/day), with periodic correction boluses as required, with a correction target of 7 mmol/l. With the assistance of CGM, we have refined his basal rate, and he is now stable with fewer glycaemic excursions (7 day glucose average 9.8 mmol/l).
Conclusion: At 5 months old, this exclusively breastfed baby with type I diabetes presented particular challenges. His blood glucose measurements were extremely variable with particular difficulties faced managing hypoglycaemia. As an exclusively breastfed male, the options include dextrose gel and breastfeeding where possible. We recommend the combination of an insulin pump, coupled with CGM and rescue correction boluses as the most practical approach to management.

Poster Tour 13: Genetics & Immunology II

P100

CpG methylation changes within the INS, HLA-G and PTPN-22 promoters in childhood type 1 diabetes

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Objectives: Alterations in DNA methylation status of specific genetic loci may affect gene expression, thus leading to autoimmunopathies. This study aimed to investigate possible differences in DNA methylation pattern between type 1 diabetes mellitus (T1DM) youngsters and healthy controls.

Methods: Ten T1DM participants and 10 age-/gender-matched controls were enrolled. DNA was extracted from white blood cells using the standard phenol chloroform technique. Genomic DNA (800 ng) was modified using the EZ DNA Methylation-Gold Kit. Treatment with sodium bisulfite converts unmethylated cytosines into uracyls, whereas methylated cytosines remain unchanged. PCR reaction was performed in a total volume of 50 μl targeting a specific sequence of the 3 genes promoters HLA-G 441, INS 415, PTPN-22 418 bp sequence, respectively. The primers used to amplify the promoters sequences were:

HLA-G forward 5′GGGAGGTAGGGAGTTTAGTTTA3′, reverse 5′CCATAACCACCATCCTTAAC3′, INS forward 5′TTTG GGGATAGGGGTTTGGGGATAGTA3′, reverse 5′CCTCTTCTA ATACAACCTATCCTAAAAAACTAAAAACTAC3′ and PTPN-22 forward 5′TGATGGAATGGAATTTTAGTTAAG3′, reverse 5′CACCAAAAATTCATTAACAAACTCC3′. Amplicons were analyzed by electrophoresis (1% agarose gel stained with ethidium bromide) and visualized by ultraviolet trans-illumination. PCR products were purified using Millipore Centrifugal Filters for DNA Purification and sequenced to identify any differences in DNA methylation.

Results: Methylation profile of 16, 4 and 9 CpGs of the HLA-G, PTPN-22 and INS promoter respectively, was analyzed. No difference between T1DM cases and controls concerning the CpGs of all studied promoters was found, although a trend towards increased levels of methylation was observed in a number of CpGs of the *INS promoter*.

Conclusions: These preliminary data suggest that a tendency for increased methylation in INS promoter already exists in T1DM in childhood. Studies with greater number of participants are needed to confirm these findings.

P101

HLA-DQ genotypes -but not immune markers- differ by ethnicity in patients with childhood type 1 diabetes residing in Belgium

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Objectives: The aim of this study was to compare genetic (HLA-DQ) and immunological (ICA, IAA, GADA, IA-2A) markers in a large population of diabetic children and adolescents residing in the same environment, but of different ethnic origin: European Caucasians (EC), Mograbin Caucasians (MC), Black Africans (BA) and of Mixed Origin (MO).

Methods: The study included 452 patients with T1D aged 0.1–17.5 years at diagnosis and recruited at the Diabetology Clinic of the University Childrens Hospital Queen Fabiola from May 1995 to March 2013. Clinical characteristics of the population were collected from patients files. HLA-DQ genotyping, diabetes-associated autoantibodies, organ-specific autoantibodies and other markers of autoimmunity were studied.

Results: The proportion of the different ethnic groups was: 55% EC, 35% MC, 6% BA and 4% MO. Between these 4 groups, there were no significant differences concerning age, HbA1c, presence of diabetic ketoacidosis, random C-peptide level at diagnosis and 2 years later. The 2 most frequent haplotypes were DQA1*0501-DQB1*0201 and DQA1*0301-DQB1*0302 with a significant higher prevalence in EC ($p = 0.002$ and 0.03, respectively). The high-risk genotype DQA1*0301-DQB1*0302/DQA1*0501-DQB1*0201 was more frequent in EC than in MC, while the homozygous genotype DQA1*0501-DQB1*0201/DQA1*0501-DQB1*0201 more prevalent in MC ($p = 0.019$). These susceptible genotypes were more frequent in youngest patients ($p = 0.003$). Diabetes-associated autoantibodies, organ-specific autoantibodies and other immune markers did not statistically differ between ethnic groups.

Conclusions: These observations in a large population of T1D children and adolescents of different ethnic groups residing in Belgium show significant differences in HLA-DQ risk status, but not in diabetes-associated autoantibodies, organ-specific autoantibodies or other immune markers.

P102

Some associated genetic variations with susceptibility to diabetic nephropathy in type 1 diabetes

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Introduction: Diabetic nephropathy is a major complication in patients with type 1 diabetes.

Aim of the work: The aim of this study was to inversigate the most common genotype associated with diabetic nephropathy in type 1 diabetes.

Subjects and methods: This study was done on 100 type 1 diabetics, 61 with normoalbuminuria, 39 with microalbuminuria, and 33 as healthy control group.

Results: Dismorphism was apparent in both alleles of ENPP1 in 5.1%, in 10.3% of GCLC, and 12.8% of CYBA in mincroalbuminuria group. While dismorphism was apparent in one allele only in 8.2% in ENPP1, in 11.2% of GCLC, and 4.9% of CYBA in normoalbuminuria groups. As regarding the control group, the negative presence of both alleles was 57.6% in ENPP1 and zero% GCLC groups, while it was negative as both alleles in 54.5% of CYBA group.

Dismorphism was apparent in one allele only of ENPP1 in 64.1%, in 51.2% of GCLC, and 61.5% of CYBA in mincroalbuminuria group. While dismorphism was apparent in one allele only in 60.7% in ENPP1, in 37.7% of GCLC, and 72.1% of CYBA in normoalbuminuria groups. As regarding the control group, the dismorphism in one allele only was 6% in ENPP1 and 60.6% in GYBA groups, while the dismoephism was in 36.4% of CYBA group.

Dismorphism was absent in both alleles in 30.8% of ENPP1, 38.5% in GCLC and 25.6% of CYBA in microalbuminuria groups. Dismorphism was absent in 30.8% of ENPP1, 38.5% of GCLC and

25.6% of CYBA in microalbuminuria groups. Dismorphism was absent in both alleles in 31.1% of ENPP1, 50.8% in GCLC and 22.9% of CYBA in microalbuminuria groups. Dismorphism was absent in 30.8% of ENPP1, 38.5% of GCLC and 25.6% of CYBA in normoalbuminuria groups. Dismorphism was absent in both alleles in 36.4% of ENPP1, 39.4% in GCLC and 9.1% of CYBA in control groups.

Conclusion: This study identifies several polymorphisms spanning the entire *ENPP1, GCLC and CYBA* gene locus and a common haplotype as risk markers for diabetic nephropathy in type 1 diabetes.

P103
Wolfram syndrome in three sisters

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Introduction: Wolfram syndrome (WS) is a rare autosomal disorder, with an estimated prevalence of 1/770,000. WS is also known as DIDMOAD, acronym for Diabetes Insipidus (DI), Diabetes Mellitus (DM), progressive Optic Atrophy (OA) and sensorineural Deafness (D). Natural history begins with DM at an average age of 6 years; OA follows at 11 years, DI at 14 years in 75% of the patients, D at 16 years. Other manifestations as renal tract abnormalities and generalized brain atrophy begin in the third decade leading to death in the fourth decade.

Case report: We report the cases of 3 sisters. Parents are Moroccan and consanguineous at first degree. The oldest girl, 23 years old, was the most affected: DM was diagnosed at 4.5 years, progressive OA at 8 years, D and depression at 16 years, neuropathic bladder at 17 years and infertility at 23 years. The second child developed DM at 3.5 years, DI at 5.5 years, OA at 11 years, and D at 12 years. The apparition of symptoms was earlier in the third girl: DM at 3 years, OA at 7 years, severe constipation and neuropathic bladder at 8.5 years and DI at 9 years; until now, there is no D. DM was non-autoimmune related and HLA-DQ was not at risk for type 1 diabetes in the 3 sisters. Molecular analysis showed an homozygous mutation c.1113G>A (p.Trp371) in exon 8 of WFS1 gene.

Discussion: WS is a neurodegenerative progressive disorder leading to death and is related to the Wolfram gene (WFS1). Most of the reported mutations are concentrated in the exon 8. WFS1 encodes for wolframin, an endoplasmic reticulum membrane-embedded protein and has a crucial role in membrane trafficking and secretion processing. Ubiquity of this protein explains this multisystem affection with poor prognosis and no specific treatment.

Conclusion: WS is a rare and severe disease. It is exceptional to have 3 cases in the same family. WS should be searched in patients with non type 1 insulindependent diabetes with other symptoms of this syndrome.

P104
Genetic of type 1 diabetes (T1D) in South America

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Objectives: To review genetic of T1D in different countries in South America.

Methods: A detailed search of the literature (Pubmed and Scielo registers) was carried out. Studies performed in the last decade were included preferably.

Results: The DiaMond study group has shown that alleles considered to be Caucasian predisposing to development and the presence of native alleles are protective for T1D in Latin America population (1996). The frequency of HLA class II and its correlation with autoimmune markers is similar to that the rest of the world suggesting that T1D in LA is conditioned to the degree of European heritage of the mestizo population as demonstrated by Rojas-Villarraga in a 2010 meta-analysis with 21 studies included (1,138 cases and 1,920 controls) where the most significant alleles associated with T1D in LA were DRB1*0301 (OR: 9.65; 95% CI: 5.69–16.36; p = 0.0001), DRB1*1201 (OR: 4.84; 95% CI: 1.97–11.91; p = 0.001), DQB1*0302 (OR: 4.58; 95% CI: 3.36–6.26; p = 0.0001), DQA1*0301 (OR: 3.02; 95% CI: 1.37–6.65; p = 0.0059) and DQB1*0602(OR: 0.19; 95% CI: 0.11–0.33; p = 0.0001), DRB1*14 (OR: 0.18; 95% CI: 0.06–0.55; p = 0.0024), and DQB1*0501(OR: 0.47; 95% CI: 0.26–0.83; p = 0.0097). DQB1*0302 allele could be considered as the most important susceptibility allele for developing T1D in an admixed population shown in 2004 in Uruguay. However, there are case reports on native breeds with not classical Caucasians (HLA non-class II) alleles in Temuco, Chile (Pérez-Bravo, 2005).

Regarding other genes, a Chilean study (Balic, 2009) showed that CTLA-4+ 49 A/G and −318 C/T polymorphisms were not linked with a higher genetic risk for T1D in Chileans child but the presence of a GG genotype or G allele dosage was associated with more complications at diagnosis (DKA) and anti-GAD65 serum autoantibodies.

Conclusions: Caucasians alleles still are the most related to DM1 in LA and Amerindians alleles are protectors. However, cases have been described in native with non-European HLA.

P105
Next generation sequencing for maturity onset diabetes of the young

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Maturity-onset diabetes of the young (MODY) is a monogenic form of diabetes, caused by mutations in any of thirteen known genes. Traditionally, diagnosis requires Sanger sequencing each gene individually. In contrast, massive parallel sequencing enables sequencing of multiple genes simultaneously.

Objectives: We assessed whether whole exome sequencing (WES) was sensitive and specific for mutation detection in MODY.

Methods: WES was undertaken in five subjects with known mutations and eleven subjects clinically diagnosed with MODY but no previously identified mutation.

Results: Three of five known mutations were detected by WES using our standard in-house bioinformatics analysis, with no false positives. A large deletion encompassing *HNF1B* (MODY 5) was subsequently detected using Exomedepth. The fifth mutation (in *INS*) was not detected due to insufficient coverage despite prediction of complete *INS* capture by the Nimblegen platform; this sample is re-running with an alternative platform. Two of the unknown samples had novel mutations in known MODY genes, *ABCC8* and *HNF4A*.

Conclusions: WES can identify the genetic mutations of MODY. However, both laboratory and bio-informatics approaches need to be considered carefully a priori for maximum sensitivity of mutation detection.

P106

Transient hyperglycaemia preceded by neonatal hyperinsulinaemic hypoglycaemia in an infant with a novel *HNF1A* mutation

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Objectives: The phenotype associated with heterozygous *HNF1A* gene mutations has recently been extended to include neonatal hyperinsulinaemic hypoglycaemia (HH) in addition to maturity-onset diabetes of the young (HNF1A-MODY).

Case presentation: The baby boy was born at 38th week of gestation; BW 4,110 g; BL 53 cm (LGA). The mother had gestational diabetes; her father is treated with sulfonylurea for diabetes mellitus. The boy developed hypoglycaemia since the first day of life that required intravenous glucose administration; during hypoglycaemia (2.0 mmol/l) the level of insulin was not suppressed (4.2 mIU/l) confirming HH. After the neonatal period, hypoglycaemias resolved spontaneously.

At age 10 months, the boy developed acute respiratory failure during viral pneumonia with severe dyspnoea; tachypnoea and dehydration. At admission, he had hyperglycaemia 18 mmol/l and mild acidosis; he had no history of polyuria and polydipsia. His HbA1c was 34 mmol/mol, pancreatic antibodies were negative. During the subsequent therapy with high-dose corticosteroids and mechanical ventilation, he required continuous insulin infusion for seven days. Insulin therapy could be discontinued after the respiratory stabilization, afterwards the glycaemias remained normal. At the age of 12 months, the HbA1c is in normal range (32 mmol/mol) without antidiabetic treatment.

Results: The proband, his mother and maternal grandfather were shown to carry a novel heterozygous mutation (L254Q) in the *HNF1*A gene by direct sequencing.

Conclusions: To our knowledge, this is the first observation of HNF1A-MODY with a history of neonatal hypoglycaemia followed by transient stress hyperglycaemia in infancy. This suggests that the capacity of beta-cells to respond to high demands on insulin secretion may be impaired since an early age.

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P107

Transfer to glibenclamide treatment in a 13-year- old girl with DEND syndrome

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Introduction: Neonatal diabetes is diagnosed in the first six months of life. Heterozygous activating mutations of KCNJ11 and ABCC8 are responsible for approximately 50% of cases. Those patients have been successfully treated with oral sulfonylureas.

Objective: We report a transfer from insulin therapy to glibenclamide in a 13- year- old girl with DEND syndrome.

Case presentation: A patient was born at 40 GW, from healthy unrelated parents, BW was 2,600 g. She presented at 5 months with a plasma glucose of 60 mmol/l and features of hyperosmolar coma and diabetic ketoacidosis (pH 7.13). She was treated with insulin and iv fluids and discharged on NPH insulin bid. In next year it became evident that she had developmental delay. At the age of 8 years she had generalized seizures and was started on sodium valproate.

During the follow up, her HbA1c was in range of 8.5–9.5%, insulin dose between 0.7–1.2 U/kg/d. At 13 years of age, we performed genetic testing. Sequencing analysis has identified a heterozygous KCNJ11 missense mutation, p.R50P. This mutation has previously been reported in a patient with developmental delay, epilepsy and neonatal diabetes (DEND) syndrome. The patient was transferred to sulphonylurea (SU) therapy according to Exeter outpatient protocol. We were able to terminate the bedtime insulin and to substantially decrease the daily insulin dose. Glibenclamide was increased to 1.6 mg/kg/day without any side effects. Her EEG reported to be better.

Conclusion: We present a girl, initially diagnosed with Type 1 diabetes at 5 months of age. At the age of 13 years we confirmed the DEND syndrome and tried to transfer her to SU treatment. Although we were not able to stop the insulin completely, her HbA1c and EEG improved.

Table Transfer to SU

Age (years)	Insulin dose (U/kg/d)	SU (mg/kg/d)	HbA1c (%)
13.5	1.23		9.5
14	0.75	1	8.2
14.5	0.5	1.6	7.3

Poster Tour 14: Epidemiology II

P108

More children with severe diabetes ketoacidosis at onset of type 1 diabetes are vitamin D deficient - a population based, nationwide study from Norway

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Objectives: Norway has one of the highest incidences of childhood-onset type 1 diabetes (T1D) in the world. The aim of this study was to assess whether low serum 25(OH) vitamin D was associated with a more severe onset of disease.

Methods: The study is based on data from the Norwegian Childhood Diabetes Registry (NCDR), a nationwide population based registry including all newly-onset T1D cases, 0–14 years old. Data were analyzed between 1. March 2013 to 1. February 2014, in 241 newly onset T1D cases, 55% were male, mean age 8.8 years (range 0.8–14.9). Vitamin D deficiency was defined as 25(OH) vitaminD <50 nmol/l, insufficiency as values between 50 nmol/l and 75 nmol/l. The severity of DKA was categorized by the degree of acidosis: Mild DKA: Venous pH <7.3 or bicarbonate <15 mmol. Moderate DKA: pH <7.2 or bicarbonate <10 mmol/l. Severe DKA: pH <7.1 or bicarbonate <5 mmol /l.

Results: At onset of T1D only 7% of the children had 25(OH) vitamin D ≥75 nmol/l. For the total group mean 25(OH) vitamin D was 48.7 nmol/l (range 13–100). When comparing groups; DKA negative and DKA positive, the mean values were 49.9 nmol/l (18–100), and 45.4 nmol/l (13–96) respectively. The difference was not significant (p = 0.09). Vitamin D deficiency was identified in 133 cases (55%) and vitamin D insufficiency in 90 cases (37%). 66 cases (27%) fulfilled the criteria of DKA; respectively 35%, 26%, 39% had mild, moderate or severe DKA. Mean 25(OH) vitamin D was 50.3 nmol/l (range 19–79), 50.8 (13–96), 37.7 (20–71), in mild, moderate and severe DKA respectively. Mean vitamin D was significant lower in severe DKA, p = 0.03. No children with severe DKA had sufficient serum levels of 25(OH) vitamin D. When stratified by age and gender, vitamin D was significant lower in the age group 10–14 years, and in boys.

Conclusion: Low levels of serum Vitamin D may lead to a fast and more severe betacell destruction and severe DKA at onset of type 1 diabetes.

P109

Predictors of mortality in young people with childhood onset type 1 diabetes: role of complications assessment

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Introduction: Both albuminuria and autonomic neuropathy may predict mortality in type 1 diabetes (T1D).

Objectives: To determine if complications status in adolescence (1990–2000) predicts mortality in young people with T1D before age 40 years.

Methods: Four hundred and thirteen T1D patients (male 48%) were assessed (median age at first visit 14.4 years [IQR 12.9–16.2], median duration 6.2 years [3.6–9.2]). Pupil size was assessed by an infrared computerized pupillometer; abnormal defined as less than the fifth percentile of reference ranges. Elevated albumin excretion rate (AER) was defined as mean excretion rate >7.5 μg/min in three consecutive timed overnight urine collections.

Mortality data was obtained from the National Death Index in February 2014 (median diabetes duration 28 years). National standardised death rates for the relevant age groups were used for comparison.

Results: Diabetes data totaling 11,838 person-years of follow up was analysed. Seventeen patients were deceased: 4.1% of cohort, 59% male, median age 27.9 years [24.0–31.9], median duration of diabetes 20.3 years [13.5–23.2]. Acute complications of diabetes were the primary cause of death (COD) for 4 patients (24%). Chronic kidney disease was the primary COD for 1 patient. Other causes of death included road traffic accident (n = 4), malignancy (n = 3), intracranial haemorrhage (n = 1), opioid dependence (n = 1) and suicide (n = 1). COD was not available for 2 patients.

Standardised mortality ratio was 2.3 (95% CI 1.7–2.9) for males and 3.0 (95% CI 1.9–4.0) for females.

Mortality was predicted by elevated AER (OR 4.2 [1.5–11.81]) and abnormal pupillometry (OR 2.6 [1.08–6.23]), but not HbA1c. In multivariate analysis, only elevated AER remained significant.

Conclusion: Between 1992 and 2012, SMR for T1D was still above national rates. Early signs of autonomic dysfunction and renal disease are predictors of mortality.

P110

Increasing incidence of type 1 diabetes in children in the Netherlands: a nationwide cohort study (young DUDEs-1)

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Objectives: To describe the incidence of type 1 diabetes in children in the Netherlands in 2009, 2010 and 2011 and compare the incidence rates with earlier years.

Methods: This study is a retrospective nationwide cohort study covering 2009 until 2011 and describes the incidence and prevalence of type 1 diabetes in Dutch children aged 14 years or younger. It is part of the Young DUDEs (Dutch Diabetes Estimates) initiative. We selected patients on basis of registries used for imbursement of care by health care providers in secondary care (DBC) and invoices for insulin and other blood glucose lowering drugs. In the Netherlands, all children aged 14 years or younger with diabetes are treated by pediatricians and all inhabitants of The Netherlands in this age group are covered by the Dutch Health Insurance Act.

Type 1 diabetes was defined as a child with a diabetes DBC and/or using insulin. Children in (divided by age and sex) The Netherlands are known in the a database of the Dutch Central Bureau of Statistics (CBS). Incident type 1 diabetes in 2010 and 2011 was defined whenever the child did not receive insulin in the preceding year and had no DBC in the preceding year.

Results: The incidence of type 1 diabetes is still increasing (see table) and has almost doubled since 1978–1980. In the very young (0–4), this doubling of the incidence already occurred in 1996–1999 and remained stable onwards. The overall prevalence of type 1 diabetes in the Netherlands per 100,000 children is 144 during 2009–2011, 144 in boys and 144 in girls.

Conclusion: The incidence of type 1 diabetes in children in The Netherlands is still increasing, not so in the very young, but in children of 5 years and older without relevant differences between sexes.

Table Incidence (95% CI) of T1DM in the Netherlands

	1978–1980	1988–1990	1996–1999	2010–2011 Boys and Girls	Boys	Girls
0–4 year	6.8 (6.6–7.1)	6.4 (6.2–6.7)	12.9 (12.0–13.9)	12.4 (10.8–14.1)	12.5 (10.3–14.9)	12.3 (10.1–14.9)
5–9 year	10.9 (10.3–11.6)	12.4 (12.0–12.7)	19.3 (18.0–20.7)	23.4 (21.3–25.6)	21.9 (19.2–25.0)	24.9 (21.8–28.3)
10–14 year	14.3 (13.4–15.3)	18.1 (17.6–18.6)	24.2 (21.9–26.6)	27.7 (25.4–30.1)	27.3 (24.2–30.7)	28.0 (24.8–31.6)
0–14 year	11.1 (10.5–11.7)	12.4 (12.0–12.8)		21.4 (20.2–22.6)	20.8 (19.2–22.5)	22.0 (20.3–23.8)

P111

The increase of incidence rate of diabetes mellitus type 1(T1DM) among Silesian children (Poland) still maintains the high tempo, in years 1989–2012

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Objective: The aim of this study was to estimate the dynamics of the incidence rate of diabetes mellitus type 1 among children aged 0–14 in 1989–2012 in Silesia, Poland.

Results: During this period, 2,215 new cases (1,146 boys) were recognized. The standardized incidence rates, estimated in 4 periods (1989–1994, 1995–2000, 2001–2006, 2007–2012) separately, showed a sharp increase from 5.80/105/year through 10.44/105/year and 15.05/105/year to 18.94/105/year, respectively, with the annual increase ~8%. Analysis of age subgroups showed the greatest increase in the incidence rate among the younger children: 2.58–14.00; 4.96–19.43; 8.84–22.15/105/year in age groups 0–4; 5–9; 10–14 respectively. No significant difference in sex was observed.

Conclusions: Such high increase of incidence rate noted (~380%) shows a secular trend of an epidemic of diabetes mellitus type 1 in Silesia, Poland and a sustained conversion from countries with the lower incidence rate in Europe to the countries with the highest one.

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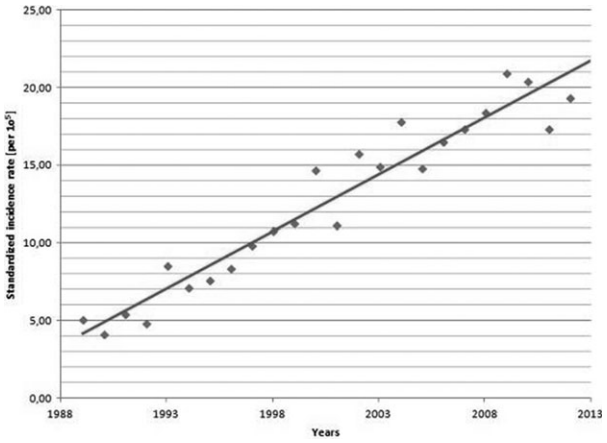

Figure EPIPJCH.

P112

Incidence of type 1 diabetes mellitus in 0–14 years old children in Croatia – 2004–2012 study

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Background: The incidence of type 1 diabetes mellitus (T1DM) among children and adolescents increased during the last 50 years. The T1DM incidence in Croatia was 8.87/100,000/years over 1995–2003, with an annual increase of 9%, which placed Croatia among countries with moderate risk for T1DM.

Objectives: To investigate incidence rates and trends of T1DM from 2004 to 2012 in Croatian children 0–14 years old, and to compare the results with previous studies in Croatia and other European countries.

Methods: T1DM crude incidence rates are estimated for the entire group and three subgroups: 0–4, 5–9 and 10–14 years. Standardized incidence is calculated using the method of direct standardization according to WHO standard world population. The incidence rates by gender, age groups, seasonality and calendar year, and their interactions were analyzed using Poisson regression model.

Results: A total of 1,066 cases were ascertained over 2004–2012. The standardized incidence was 17.23/100,000/years (95% CI 16.19–18.26), with no significant differences in incidence rates or trends between boys and girls. Statistically significant annual increase of 5.87% ($p < 0.001$) was found for the whole group, and for the subgroups 5–9 years (6.82%; $p < 0.001$) and 10–14 years (7.47%; $p < 0.001$). In the youngest subgroup (0–4 years) annual increase was lower (2.43%; $p = 0.338$) and not statistically significant.

Conclusions: The incidence of childhood T1DM is increasing in Croatia, thus placing Croatia among countries with high risk for T1DM. The annual increment of 5.87% is considerably lower than 9.0% reported earlier, but still higher than the European average (3.9%). The increase in incidence ceased in youngest children.

P113

Changing epidemiology of type 1 diabetes (T1D) in South America according to region, socioeconomic status and ethnicity

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Objectives: To review incidence of T1D in different countries in South America, association of ethnicity, and socioeconomic status.
Methods: A detailed search of the literature (Pubmed and IDF registers) was carried out. Studies performed in the last decade were included and compared to studies performed by our group in Chile according to the DiaMond methodology.
Results: Few countries have published data of incidence of T1D in Latin American (LA). T1D incidence in Chile has increased from 2.36/100,000/year in 1986 to 4.02/100,000 in 2003. Later on, a report of the Metropolitan Region of Chile showed an increase in incidence from 5.44 to 8.33/100,000 in 2001 and 2004, representing an increase of 8.2% annually. The highest incidence in LA has been reported in Argentina, Tierra del Fuego (10.3/100,000, DiaMond 2006 report). Some countries have an intermediate incidence (Montevideo, Uruguay 8.3/100,000), while others show a very low incidence (Caracas, Venezuela 0.1/100,000; Lima, Peru 0.5/100,000).

Incidence may vary according to socio-economic status. We studied incidence of T1D in different counties of Santiago de Chile, from 2000 to 2004, and observed that communes had an incidence that varied from 1.5 to 26.6/100,000 (Carrasco et al.).

A 1996 study of our group has evaluated the role of ethnicity and showed that T1D is observed more frequently in subjects of European origin and is very infrequent in regions where a higher Amerindian component is present (Peruvian and Mapuche communities in the south of Chile, Temuco, 0.42/100,000 in 1996). An inverse correlation between component Amerindian and incidence ($r = -0.75$, $p = 0.008$) and estimated prevalence ($r = -0.78$, $p < 0.0001$) in Latin America was shown by Collado-Mesa in 2004.
Conclusions: The incidence of T1D in LA countries is in the low to middle range, but has increased significantly in some countries. Higher incidence has been reported in more affluent places and in subjects with a European ascent.

P114

Towards a New Zealand Child and Youth Diabetes Register

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Objectives: Diabetes is one of the commonest diseases of childhood but nationwide incidence and prevalence data for New Zealand (NZ) are lacking. A national register that can monitor epidemiology, clinical indicators of diabetes care and improve the care of these children through collaborative audit and research is needed. This research aims to establish a national register of children and young people with diabetes from routinely collected clinical data, and to determine the true prevalence of type 1 diabetes less than 15 years in NZ.
Methods: Data grouped by District Health Board (DHB) was obtained from the 2011 Virtual Diabetes Register (version 6.82). The diabetes service in each DHB was given a dataform pre-populated with all individuals thus identified as having diabetes aged under 15 in that DHB. Each service validated the list and added individuals who had not been captured. Diabetes flags included diabetes-associated hospital admissions, prescriptions for diabetes-related therapies, attendance at specialist or management clinics, and retinal screening.
Results: In preliminary results from all 20 DHBs, 1,103 cases of type diabetes under 15 years of age were confirmed, giving a prevalence of 127/100 000. Among cases the mean (SEM) age at diagnosis and at end 2011 was 6.79 (0.11) years and 10.90 (0.10) years respectively. The mean (SEM) last recorded HbA1c was 71.7 (0.5) mmol/mol, $n = 1{,}040$). Two (33.4%) and three (29.5%) injections per day were the most common insulin regimens, followed by insulin pumps (20.7%). Among the diabetes flags employed, the sensitivity and specificity of attendance at specialist or management clinics was highly variable, suggesting different coding practices between DHBs. Retinal screening showed excellent specificity but poor sensitivity.
Conclusion: The use of data routinely collected by the Ministry of Health to form the basis of a national register is feasible but currently requires detailed local validation.

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Diabetological health provisions in Upper Silesia region in the years 2009–2012

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Objectives: The study aimed to analyze the specialist diabetes care in the Upper Silesia, Poland in the years 2009–2012.
Methods: Population data of Upper Silesia were obtained from the Main Statistical Office. Raw data concerning the number of patients, visits and their costs were obtained from the database of the national healthcare provider. The analysis included only patients with the main diagnosis E10 (non-insulin dependant diabetes) or E11 (insulin dependant diabetes) according to ICD-10 (International Classification of Diseases). Morbidity, number of health provisions within the primary health care (PH), outpatient specialist care (OS), complex outpatient specialist care (COS) and hospitalizations as well as their cost were calculated.
Results: Between 2009 and 2012 there was a 0.54% decrease of the population, a 4.4% increase of the number of people with diabetes and 0.7% increase of diabetes morbidity. A decrease of PH health provisions and of the number of hospitalizations was shown (respectively by 24.1% i 14.3%). The number of health provisions within OS (by 0.9%) and COS (by 37%) increased. The cost of the OS and COS health provisions rose by 17.1%. The mean cost of hospitalization per person with diabetes increased by 7.7%, but the value of inpatient treatment of diabetes decreased by 7.8%.
Conclusions: Diabetes morbidity in Upper Silesia shows an increasing trend. The number of patients and healthcare provisions in the out patient system (OS and COS) rose, but the number of provisions within PH as well as hospitalizations dcreased. The cost of outpatient healthcare provisions rose systematically. The dynamics of the changes in diabetes morbidity and specialist healthcare costs demands to seek for solutions that will secure the needs of patients with diabetes and expand prophylactic actions.

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Parental styles in mothers with children with T1D and mothers with healthy children

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Objectives: The aim of the study is to compare parental styles of mothers who have children with type 1 diabetes (T1D) and mothers with healthy children. Previous studies have shown that parenting styles may have a relationship with the childs wellbeing and quality of diabetes care in children with T1D.

Methods: The participants were the mothers of 63 children with T1D onset before the age of five years and the mothers of 86 children without diabetes. The children were 9 to 10 years of age. Mothers parental styles were assessed with the Blocks Child Rearing Practices Report (Roberts et al., 1984; Finnish version), which includes 23 statements on a 5-point Likert scale. The sum scales of Affection, Behavioral Control, Psychological Control and Parenting Stress were used in the analyses. Grouping was made according to the childs health status (T1D vs. non-diabetes). Differences in parenting styles between the groups were analyzed with *t*-tests and further with ANCOVA with childs gender and mothers education as covariates.

Results: The group differences were found in psychological control ($t(142) = -2.83$, $p = 0.005$), but not in behavioral control, affection or parenting stress. When controlling for gender and mothers education, the result remained similar ($F(1,136) = 6.79$, $p = 0.010$); the mothers of children with T1D used more psychological control than the mothers of children without diabetes.

Conclusions: Mothers of pre-pubertal children with T1D use more psychological control with their child than mothers of healthy children. Psychological control, for example quilt induction, can be harmful for children, because it is associated with poorer wellbeing of the child.

P117

Readiness for transition to adult care in adolescents and young adults (AYA): a comparison of youth with and without type 1 diabetes (T1D)

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Objectives: This pilot study: (1) Compared a general measure of transition readiness (health knowledge and self-report of health-related skills) in AYA with and without T1D; (2) Examined whether general transition readiness scores in youth with T1D correlate with diabetes-specific knowledge and awareness of screening frequency recommendations for adult care.

Methods: Participants ages 13–22 (M = 18 years, SD = 2) were recruited from outpatient teen health and diabetes centers at a pediatric hospital ($N = 35$/group). Participants completed demographic questionnaires and the Transition Readiness Assessment Questionnaire (TRAQ). T1D patients answered items about self-management and screening for diabetes-related complications. Analyses included: analysis of variance, Pearsons r correlation, and multiple linear regression.

Results: T1D had statistically significant lower transition readiness sum scores (M = 64.88, SD = 14.38) compared to youth without T1D (M = 78.77, SD = 13.18; $F(1,67) = 17.51$, $p < 0.01$). After adjusting for age, gender, race, maternal education (a proxy for SES), and IEP status, the difference in transition readiness was no longer significant ($B = 6.13$, $p = 0.14$). Among youth with T1D, higher transition readiness scores were significantly associated with knowledge of current hemoglobin A1c ($r = 0.41$, $p = 0.02$). TRAQ scores were moderately related to diabetes knowledge sum scores ($r = 0.36$, $p = 0.04$) and accurate responses to screening for diabetes-related complications ($r = 0.27$, $p = 0.12$).

Conclusions: In this pilot study, after adjustment for demographic factors, transition readiness scores for AYA with and without diabetes were not significantly different. Findings support that general transition readiness skills and diabetes-specific knowledge are related, yet distinct, constructs. Thus, validated tools for general transition readiness such as TRAQ may be used in this population, but should be complemented by diabetes-specific content.

P118

Timing and impact of transition from pediatric to adult care on glycemic control among adolescents and young adults with diabetes: results from the SUPREME-DM pilot study

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Objective: To identify transition from pediatric to adult care and evaluate its impact on glycemic control using electronic health records (EHRs).

Methods: Timing of transition was estimated from EHRs of 14–19 year olds receiving diabetes (DM) care in Kaiser Permanente Southern or Northern Californias Pediatric departments in 2005 based on their age at first adult visit after which there were no pediatric visits through 2011. A1C values of patients aged 18, 19, and 20 years. were compared by transition status, adjusted for race/ethnicity, DM type, Medicaid status, and endocrinologist care using linear regression. Mean A1C values in the 365 days pre- transition (pre-T) and 365 days starting 120 days post-transition (post-T) were examined for 716 persons with both measures, adjusting for race/ethnicity, endocrinologist care, type, and age using mixed models. A1C values were log transformed for analysis.

Results: Of the 1,426 youth (mean age 16.1 ± 1.5 years, mean membership post-2005; 5.5 ± 1.2 years; 76% type 1 and 24% type 2), 44.4% transitioned to adult endocrinology, 31.0% to adult primary care, 12.3% remained in pediatric care, and 12.3% disenrolled before age 19 years. Mean age at transition was 19.0 ± 1.2 years. Adjusted A1C values for non-transitioned vs. transitioned patients were 8.50 vs. 9.19% for 18 years ($n = 1{,}054$, $p < 0.001$), 8.17 vs. 8.85% for 19 years ($n = 841$, $p = 0.0002$) and 8.33 vs. 8.90% for 20 years ($n = 744$, $p = 0.006$). Difference in mean values pre- and post-T were similar but significantly different (8.57 vs. 8.69%, $p = 0.01$).

Conclusions: A1c was higher among transitioned versus non-transitioned patients in each one-year age group. However, pre- vs. post-T values within individual demonstrated statistically but not clinically significant increases in A1C after transition. All mean values exceeded the ISPAD A1C target of <7.5%, demonstrating a need to focus on the challenges young adults face in achieving good control during this period with many potential life changes.

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The relationship between paediatric parenting stress and HbA1c, insulin regimen and recency of diagnosis in parents of children with T1DM

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Objectives: Paediatric parenting stress is a construct used to define stress that is associated with bringing up a child with a chronic illness. Studies have found that parents of children with T1DM report experiencing increased paediatric parenting stress, however findings from cross-sectional studies investigating the relationship between parent stress and glycaemic control have been inconsistent. The present study aims to examine the relationship between pediatric parenting stress and HbA1c, insulin regimen and recency of diagnosis.
Methods: Parents of children with type 1 diabetes ($N = 100$) completed the Pediatric Inventory for Parents (PIP) while attending their regular clinic visit. The PIP is a self-report questionnaire that measures the stress related to caring for a child with chronic illness. HbA1c, insulin regimen (pump verses injections) and recency of diagnosis were also recorded.
Results: Paediatric parenting stress demonstrated a weak positive correlation with HbA1c, both in terms of frequency (Pearson Correlation = 0.226, Sig = 0.024) and difficulty (Pearson Correlation = 0.224, Sig = 0.025). No correlation was found between pediatric parenting stress and insulin regimen or between paediatric parenting stress and recency of diagnosis. In terms of sub-analysis, a weak positive correlation was found between HbA1c and frequency in the communication, emotional distress and role function subdomains but not in the medical care subdomain. A weak positive correlation was also found between HbA1c and difficulty in the emotional distress subdomain only.
Conclusion: The results indicate that increased HbA1c is associated with increased paediatric parenting stress and as such HbA1c, but not insulin regimen or recency of diagnosis, may be a mediating factor is the diabetes specific stress experienced by parents of children with T1DM. However, the causality of the association between HbA1c and pediatric parenting stress is unclear and warrants further investigation.

P120

Whose HRQOL is it anyway? Discrepancies between youth and parent health-related quality of life (HRQOL) ratings in type 1 and type 2 diabetes

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Objective: To explore potential differences between self- and parent-report of health-related quality of life (HRQOL) from youth with type 1 (T1D) or type 2 diabetes (T2D) and to evaluate associations between rating discrepancies and glycemic control.
Methods: Youth and parents in the SEARCH for Diabetes in Youth study (T1D: age 5–18, $n = 3{,}402$; T2D: age 8–18, $n = 353$) completed the PedsQL Generic Core and Diabetes Module to assess HRQOL and youth provided a blood sample to assess glycemic control (A1c). Discrepancies (youth minus parent HRQOL ratings) were calculated, and positive (youth>parent) and negative (youth < parent) discrepancies were each regressed on glycemic control using linear regressions. All analyses were stratified by age-band (5–7, 8–12, 13–18 years).
Results: Significant positive and negative discrepancies existed between youth- and parent-report of generic and diabetes HRQOL in T1D and T2D (ps < 0.01). Positive discrepancies were more common (61–71%) than negative discrepancies among 8–18 year-olds with T1D and T2D. Negative discrepancies were more common (65%) among 5–7 year olds with T1D. For 13–18 year-olds with T1D, poorer glycemic control was related to larger positive discrepancies of generic (B = 0.57, SE = 0.19) and diabetes HRQOL ratings (B = 0.53, SE = 0.18). Glycemic control was not related to negative discrepancies. For youth with T2D, discrepancies were not significantly associated with A1c.
Conclusion: HRQOL discrepancies suggest that parent-report may often underestimate youths HRQOL except for the youngest children. Associations between positive discrepancies and A1c, particularly among teens, likely reflect shifts in family dynamics and values for diabetes control: parents may not perceive that their child has good HRQOL if glycemic control is suboptimal, while youth may not link glycemic control with their perception of HRQOL. When feasible, collecting both reports of HRQOL is recommended; otherwise, youth self-report should be prioritized.

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Multidisciplinary team perceptions of factors contributing to disparities in type 1 diabetes management in a paediatric population

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Objective: The Hospital for Sick Children is the primary pediatric center in Toronto, Canada, caring for a large, economically and ethnically diverse patient population. Recent data in adolescents revealed significant race/ethnic differences in average HbA1c amongst patients followed in our clinic. The study aim was to assess staff perceptions of the factors contributing to these disparities and to identify areas for improvement.
Research design and methods: Three major themes (language barriers, culture, and socioeconomic status) were identified from existing literature as topics for further exploration in face-to-face structured interviews with nineteen members of the inter-professional diabetes team.
Results: Overall, staff perceived that socioeconomic status and culture are more influential than language barriers in determining health outcomes, but that all three factors are more influential than

inherent biological differences between ethnic groups. Interviews highlighted a team that is engaged and sensitive to cultural influences on health behaviours; however, many found it challenging to intervene on these cultural influences or to otherwise change patient behaviour to optimize diabetes management. They believed that interpreter use is effective but recognized that the clinic needs to improve availability of written materials. It also described that in families of low socio-economic status, direct costs relating to diabetes medications and supplies were better addressed as compared with ongoing challenges related to food and financial security.
Conclusions: Staff perception of the causes of race/ethnic disparities was largely consistent. Factors related to changes in clinical practice (e.g. language issues), addressing health belief models, and issues extending beyond clinical encounters (e.g. socioeconomic resources) were identified. Further work is required to identify both causes of race/ethnic disparities in HbA1C and potential solutions.

P123
Associations between single symptoms of depression and HbA1c in young adults with early-onset type 1 diabetes of long duration

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Objectives: Depression is a heterogeneous construct consisting of various symptoms. Little is known about the association between individual depressive symptoms and metabolic outcomes. The aim of this study was to evaluate the association between DSM-5 symptoms of depression and metabolic control in female and male young adults with early-onset type 1 diabetes (T1D).
Methods: Data of 211 18- to 21-years-old T1D patients from a population-based, nationwide survey (40.2% male, mean age 19.4 (standard deviation 1.7) years, mean HbA1c 8.4 (1.6) % [68 (18) mmol/mol]) with T1D onset before the age of 5 years and at least 10 years diabetes duration (mean 15.7 (1.0) years) were included. The German version of the 9-item Patient Health Questionnaire (PHQ-9) was used to assess symptoms of depression according to DSM-5 criteria. For each individual PHQ-9 depressive symptom, mean HbA1c of screening-positive and screening-negative patients were compared by t-test stratified for sex.
Results: A total of 43.0% of the female and 33.3% of the male participants reported of at least one symptom of depression, 2.5%/5.0% met the criterium for a major depressive syndrome (≥5 screening-positive depressive symptoms, one thereof dysphoria or anhedonia). Among the young men, HbA1c was increased with sleep difficulties (9.1% vs. 7.9% [76 vs. 63 mmol/mol], $p = 0.012$), lethargy (9.6% vs. 7.9% [81 vs. 63 mmol/mol], $p < 0.001$) and overeating/poor appetite (9.4% vs. 7.8% [79 vs. 62 mmol/mol], $p < 0.001$). Among the young women, overeating/poor appetite (9.6% vs. 8.3% [81 vs. 67 mmol/mol], $p = 0.002$) and psychomotor agitation/retardation (10.8% vs. 8.5% [95 vs. 69 mmol/mol], $p = 0.019$) were associated with higher HbA1c, respectively.
Conclusions: The association between depressive symptoms and HbA1c varies with the kind of symptom and sex. Differentiation between the different symptoms of depression and targeted interventions may help to improve metabolic outcomes in young adults with early-onset T1D.

P124
Teen power: group intervention for poorly adherent teens with insulin-treated diabetes mellitus and their families

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Background: Teens with type 1 diabetes are at significant risk for depression compared to same-age peers and depression may negatively impact medical adherence and future health outcomes. Caregiver response to the diagnosis of diabetes and efforts to help with medical adherence has implications for the diabetic teens psychological and physical health. The intervention, Teen Power, is a group therapy intervention for teens with insulin-treated diabetes. This group was developed to promote teen and caregiver use of effective coping strategies as evidenced by a decrease in symptoms of depression, increase in level of positive feelings about diabetes, and a decrease in parental distress. The Teen Power group includes a parallel caregiver support group. Interventions include cognitive-behavioral and psychoeducational techniques, including workshop activities and discussion. Results from a female only version of this group indicated that levels of caregiver distress and adolescent depression decreased overall. Comparisons for a co-ed version of this group revealed a downward trend in level of depression and a positive shift in attitude toward diabetes among teens.
Objectives: The current study examines the impact of the Teen Power intervention on levels of depression in teens with insulin-treated diabetes and caregiver stress.
Methods: Participants: Teens diagnosed with insulin-treated diabetes and their caregivers. Measures: Teens completed the Childrens Depression Inventory (CDI). Caregivers completed the Parenting Stress Index (PSI).
Results and conclusions: A significant overall decrease in CDI score (mean pre-CDI score=47, mean post-CDI score=42) at $p < 0.01$ and stable, clinically elevated PSI scores were previously reported based on data for 48 teens and their caregivers. Updated results based on additional data ($N = 125$) are offered in this presentation. This group intervention appears to facilitate a decrease in levels of depression and caregiver stress.

P125
Review of motivational interviewing interventions to promote adherence in pediatric type 1 diabetes

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Objectives: Among many contributors to diabetes management, self-efficacy and motivation are two factors that consistently relate to adherence in pediatric type 1 diabetes (T1D). By targeting these social-cognitive factors to promote health behavior change, Motivational Interviewing (MI) may improve youths diabetes management. Our aim is to synthesize the existing evidence base for MI interventions promoting T1D adherence, discuss lessons learned from MI studies with other pediatric populations, and identify future directions for research and clinical implementation.
Methods: Introduction to core principles of MI and comparison with other common health counseling approaches. Critical review of

current MI intervention research in T1D, including studies with null results.

Results: Components of MI are increasingly integrated in T1D intervention research, yet results regarding efficacy are mixed. Some pre-post study designs demonstrate significantly improved adherence and glycemic control, yet duration of treatment effects varies and between-group differences compared to control groups are rare. Mixed results reflect variability in study design, delivery mode and dose, MI training and fidelity, and targeted outcomes (e.g., adherence behaviors versus biomedical outcomes). Recommendations include targeting specific and modifiable health behaviors, using MI strategies at points of potential behavior change such as during developmental transitions, and training a range of health care providers to use MI.

Conclusions: Although initial MI research findings with pediatric T1D populations have been mixed, integrating MI with other behavioral interventions appears most effective when targeting specific adherence behaviors versus distal biomedical outcomes of A1c. Next steps include evaluating MIs utility upon implementation of diabetes technology devices, brief and effective MI training, and evaluation of MI-based interventions in diverse clinical settings.

Poster Tour 16: Diabetes Education II

P126
Use of educational multimedia applications for promoting a correct self-management of the disease in type 1 diabetic children

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Background: Multimedia applications might be used to consolidate and internalize informations and behavioral strategies in type 1 diabetic children, helping them to reach the self management of the disease.
Aim: In the last years the Diabetology Division of our Hospital and the Department of Informatics co-created many multimedia applications (edutainments, virtual environments, role serious games, electronic diary smartphone apps, tutorial teaching) for promoting the empowerment of diabetic children, their families and unaffected friends.
Methods: In the role game Treasure Hunter 8/12 years users are trained to control the balance between energy/physical activity. The player learns that physical activity causes energy consumption and energy stocks must be periodically renewed. The energy available to the player increases and decreases in relation to the care that he/she has in balancing supply (a correct diet) and physical activity. Diabetland is an open 3D world-simulator game in which 12/14-year-old patients become familiar with terms commonly used when discussing diabetes and learn to follow a correct diet. With Diabetes diary, app for Android and Iphone, 13/15-year-old patients can record glycaemic values and communicate them to their physician in real time. Hyper/hypoglycaemic episodes might be reduced. In Serious Mika the 7/10 year-old-children, through the learning by doing approach, take care of a virtual ant affected by Type 1 diabetes.Smile D is a tutorial teaching (for Android) in which the protagonist explains symptoms and situations that he/she experienced before being diagnosed with diabetes (for 4/8 year-old children).
Conclusions: Educational applications motivate young patients and improve their therapy compliance, reaching and keeping a good metabolic control, minimizing the risk to develop acute and chronic complications, modifying the destiny of the disease and therefore reducing health care costs in the future.

P127
ACTIVE@ISPAD - Gothenburg 2013; report and results

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Objectives: The ACTIVE@ISPAD run/walk event was presented to all participants at the ISPAD Conference 2013 in Gothenburg. Each performed activity resuted in a donation to the IDF Project Life for a Child. An evaluation was conducted in all participants of the event.
Methods: Posters were used to advertise the ACTIVE@ISPAD event. Information of the two different run/walk routes was distributed along with a short questionnaire to all participants.
Results: During the ISPAD Conference in Gothenburg, 327/1,458 (22%) participated in the event and all (100%) stated that they enjoyed such an event. 259/327 (79%) did prefer to implement this type of activity on freely chosen time. 326/327 (99.7%) wanted this type of event to be present at future ISPAD Conferences.
Conclusion: Bearing in mind that this was the first ACTIVE@ISPAD event the number of participants was high with a vast majority stating satisfaction and wish for a repeated event. A considerable donation was acchieved as well as an increased physical well-being among the participants.

P128
Examination of diabetes nurse educator guided diabetes care team in pediatric type 1 diabetes

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Objective: To establish a diabetes nurse case manager guided care team in a tertiary hospital pediatric diabetes outpatient clinic. Disease-management programs have demonstrated effectiveness for improving glycemic control in adults with diabetes. Currently, there is an absence of published literature exploring this model of care in pediatric type 1 diabetes.
Methods: Using a Before-After research design, the nurse case manager model of care was initiated in the pediatric diabetes program at McMaster Childrens Hospital (Hamilton, Canada) in October 2013. In the new model, youth with type 1 diabetes receive outpatient diabetes care from their nurse case manager every 3 months in collaboration with the staff physician, dietitian and mental health specialist as needed. Primary outcomes are caregivers and participants diabetes self care scores and the burden of diabetes care measured using validated surveys that are administered at baseline and 6 months after exposure to the nurse case manager model. Secondary outcomes include glycemic variability and health care utilization.
Results: Recruitment was completed in 3 months, during which 201 youth-caregiver pairs with type 1 diabetes greater than 1 year were enrolled; mean age 11.9 $\pm$ 3.4 (SD) years; 46% male and 54% female. Mean glycosylated hemoglobin was 8.5 $\pm$ 1.3% (non diabetes range 4–6%). Only 18% of participants achieved ISPAD target glycosylated hemoglobin at baseline. Baseline Problem Areas in Diabetes score was 57% indicating significant parental care burden and mean youth Daily Self Management score was 23/35 indicating inadequate self-management routines.
Conclusions: A diabetes nurse case manager guided care team can be successfully implemented in a pediatric diabetes outpatient clinic. This model may provide an opportunity to improve diabetes care for youth with type 1 diabetes. Analysis of 6 month primary outcomes will begin in June 2014.

P129

Risk factors associated with the development of diabetic ketoacidosis among children and adolescents with diabetes type 1

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Diabetes ketoacidosis (DKA) prevalence in the pediatric population in the United States is 21.1%, and its frequency at onset (*de novo*) is 29.4%. In Puerto Rico, there is no evidence about DKA prevalence in children and adolescents as well as its risk factors. In this case-control study we want to determine risk factors associated with development of severe DKA in children admitted to the Pediatric Intensive Care Unit (PICU) at three hospitals in San Juan. Controls (patients with no history of DKA for the last 6 months) were recruited at two outpatient clinics. An anonymous questionnaire was given to patients caretakers, gathering information about: demographics, family history, Diabetes management and disease complications. A total of 123 patients met the inclusion criteria: 53 controls and 70 cases. Patients were mostly diagnosed with Diabetes Mellitus (DM) Type 1 between 6 through 12 years old (72% controls, 54% cases). 30% of patients (21/70) were diagnosed with DM Type 1 upon their admission with DKA. Hospitalized patients had more risk factors to develop DKA (86%) than controls (69%). Parents from controls had more knowledge (83%) about health complications associated with DM Type 1 than parents of patients admitted with DKA (59%). Clinical factors demonstrate that cases were at higher risk for DKA development than controls (86% vs. 64%). We found that patients with younger age were at higher risk to develop DKA as reported in the literature. Cases were at higher risk to DKA due to lack of knowledge of caregivers about DM Type 1 and DKA (41% of cases vs. 17% of controls). This study demonstrates that a good educational plan for diabetes management in the pediatric population is essential to prevent or decrease DKA development risk in patients with DM Type 1.

P130

The development and evaluation of web-based diet and diabetes education programme for use by children with type 1 diabetes

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Introduction: Diabetes education is one of the essential components of standard diabetes care. Rapid advances in technology and access to the internet have made the internet a viable mode for the delivery of educational interventions to young people with type 1 diabetes (T1D). There is a paucity of research on the effectiveness of web-based education in management of T1D in children.

Objective: To evaluate the feasibility of a web-based diet and diabetes education programme (My Diabetes) designed to improve dietary management, knowledge, diet-monitoring and self-efficacy of pediatric patients with T1D living in Malaysia.

Methods: A qualitative study using semi-structured interviews with 12 children (aged 10–14 years) with T1D, and their parents. Interviews were conducted 6 months after introduction to the programme. Participants were recruited from a pediatric diabetes clinic in University Malaya Medical Centre, Malaysia.

Results: Most participants reported using the programme to obtain information about carbohydrate content of the food and drink they consumed and adjusting their insulin accordingly. They also reported they had made changes in their food choices based on the information and knowledge they obtained from the programme. Most of them did not record their blood glucose regularly in the web programme. The majority of participants felt confident that they would be able to manage their diet, insulin, and monitor their blood glucose, however, a few reported lack of confidence and difficulty managing their diabetes. It was not possible to ascribe this to the intervention.

Conclusion: Overall, participants described this programme as useful, accessible, and beneficial to them in managing their dietary intake and diabetes. This study demonstrated feasibility of using the web-based education programme. Further research is required to determine the effectiveness of the programme in improving self-management of T1D by young people.

P131

Reducing health disparities: text messaging facilitates a transition to intensive insulin therapy in underserved patients with poorly controlled type 1 diabetes

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Introduction: Basal bolus insulin therapy improves glycemic control in children with Type 1 diabetes (T1DM), but underserved children are less likely to receive this therapy. Reasons include the high level of training and parental support required to use these technologies, and the need for patients to have proficiency with basic diabetes care, such as testing blood glucose at least four times per day.

Methods: Underserved children (e.g., receiving government health insurance) ages 8–17 years with T1DM for ≥12 months and HbA1c ≥8.5% were eligible. Patients already on pump therapy were excluded. Patients were seen monthly for 5–7 months, and at each visit saw a pediatric endocrinologist, diabetes educator, and dietician. After 1–3 visits, patients were transitioned per patient/family choice to either basal/bolus MDI or insulin pump. Families were provided with a cellular phone and given the option to communicate via text message with the diabetes care team.

Results: Fifteen children have entered the program. In the first cohort of 11 patients, 9 completed and 2 were withdrawn per protocol. Four more are in progress with cohort #2. Mean participant age is 12.7 ± 2.7 years and mean diabetes duration is 5.4 ± 3.3 years. Eleven transitioned to pump therapy, 3 to basal/bolus MDI, and one non-completer remained on NPH. In the first cohort mean HbA1c was 10.4 ± 2.4% at baseline and 9.9 ± 2.1% at study completion; for those transitioned to pump therapy mean HbA1c was 10.0 ± 2.7% at baseline and 9.1 ± 1.6% at completion. There were no episodes of severe hypoglycemia. There were 3 episodes of DKA, all in the 2 children who were withdrawn from the program. All patients and families utilized text messaging.

Discussion: This monthly intensive education program pilot study with communication via text messaging holds great promise for helping underserved children with T1DM succeed on intensive insulin therapy, and in particular insulin pump therapy.

P132
Carb counting technique in children and adolescents with type 1 diabetes: effect on metabolic control, dietary habits, lifestyle, quality of life and body composition

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Objectives: To test an educational instrument suitable to help patients in adjusting insulin dose to their eating habits, in order to avoid diet prohibition perception and to improve dietary independence maintaining a fair metabolic control.
Methods: Sixty-three patients aged 14 ± 3 year (Median ± IQR) affected by type 1 diabetes treated by Multiple Daily Injections Therapy (MDI) or Continuous Subcutaneous Insulin Infusion (CSII), were divided in three groups: group A who attended a one weekend carbohydrate counting course; group B already using carb counting; group C not using carb counting. Every patient was evaluated at enrollment (T0), after three (T1), six (T2), twelve (T3) and eighteen months (T4). At T0, every patient enrolled was asked to fill a questionnaire about his/her use of carb counting. Those who declared not to use this technique were invited to take part to an intensive multi-disciplinary course on carb counting. During the study we monitored HbA1c, frequency of blood glucose monitoring, type of therapy, quality of life, food diary, anthropometric measures and lifestyle. Wilkoxon signed-rank and Kruskal-Wallis tests were used as appropriate for statistical analysis.
Results: The parameters analyzed were similar among the three groups at T0 and during the follow-up period. A significant increase in fat free mass ($p < 0.02$), a decrease in fat mass ($p < 0.02$), a decrease in consumption of saturated fats ($p < 0.02$) and simple sugars ($p < 0.05$), a decrease in glycemic index ($p < 0.05$) and energy density of diet ($p < 0.02$) were observed only in group A at T4 compared to T0. We found no significant change of QoL, lifestyle and metabolic control in the three groups comparing T0 and T4.
Conclusions: In accordance with a previous trial (Spiegel G, 2012), education to carb counting is not sufficient to improve metabolic control and QoL at medium term. We showed that carb counting improves body composition and dietary habits and allows a better perceived dietary freedom.

P133
Healthier food intake among youth with early-onset type 1 diabetes compared to the general population

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Objectives: To evaluate food consumption in youth with long-duration early-onset type 1 diabetes (T1D) compared to representative, normative data for the population of children and adolescents in Germany.
Methods: The 11- to 17-year old participants were diagnosed with T1D when they were younger than 5 years of age and had a T1D duration of at least 10 years at follow-up ($N = 629$). Data on food consumption were compared with those of a representative German sample (KiGGS study, $N = 6{,}813$). The average food frequencies and portion sizes in recent weeks were assessed by means of the same questions in both studies. Food frequencies and food specific portion sizes were converted into food intakes (grams per day, g/d). Multivariable regression analyses were performed (SAS 9.3, SURVEYREG procedure) adjusted for age group, sex, socioeconomic status, migration background, region of residence, family structure, and weight status.
Results: The characteristics of the T1D sample were 54% boys, mean age 15.3 years (standard deviation 1.7 years), diabetes duration 12.5 (1.6) years, and HbA1c 8.3 (1.3) %. A total of 29% of the youth with T1D had a nutritional counselling during the past 12 months. Youth with T1D reported a higher intake of fresh fruits (adjusted difference $\beta = 90$ (standard error 16) g/d, $p < 0.001$), raw vegetables ($\beta = 63$ (8) g/d, $p < 0.001$), and cooked vegetables ($\beta = 26$ (4) g/d, $p < 0.001$). Youth with T1D consumed less soft drinks ($\beta = -91$ (32) g/d, $p = 0.005$) and sports/energy drinks ($\beta = -50$ (9) g/d, $p < 0.001$), while there were no differences in the consumption of burger/doner kebab/grilled sausage/curried sausage, whole wheat bread, and white bread ($p > 0.05$).
Conclusions: The rough estimate of food intake indicates that youth with T1D had a more beneficial food consumption pattern with less sweet drinks and more fruits and vegetables compared with the general population.

Poster Tour 17: Regimen-Based Innovations II

P134
Modulation of metabolic parameters and antioxidant enzymes in diabetic aging female rats: beneficial role of metformin

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Objective: The objective of this study was to investigate beneficial effects of metformin on membrane bound enzymes (monoamine oxidase, Na^+ K^+ ATPse,) and antioxidant enzymes (sueroxidase dismutase, glutathione S-transferases), lipid peroxidation, neurolipofuscin, DNA degradation in diabetic aging female rats.
Methods: Young (3 months) adult (12 months) and aged (24 months) rats will be diabetic by using alloxan monohydrate. Metformin was administered i.p. at a dose of 200 mg/kg/day for 30 days to both control and diabetic aging rats. Learning was tested in a Morris water maze. A detailed study was carried on membrane linked enzymes, membrane fluidity, neurolipofuscin, antioxidant enzymes and DNA degradation to identify the antidiabetic and antiaging role of metformin using biochemical, molecular and histiochemical study.
Results: Present study shows that there was a similar pattern of increased lipid peroxidation, neurolipofuscin, DNA degradation and monoamine oxidase activity and a decrease in membrane fluidity, Na^+ K^+ ATPse, antixodant enzymes activities in both aging and diabetes. Metformin was found to be an effective treatment in stabilizing and normalizing the membrane functions; therefore this therapy can be considered an alternative to be explored further as a means of diabetic and aged related disorders control. Metformin treatment also helped to reverse the age related changes studied, to normal levels, elucidating an anti-aging, antidiabetic and neuroprotective action.
Conclusions: The results of this study will be useful for pharmacological modification of the aging process and applying new strategies for control of age related disorders including metabolic syndrome.

P135
Insulin pump therapy in childhood diabetes - cost implications

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Objectives: To examine the predictors of elevated direct costs of pediatric type 1 diabetes (T1DM) in the National Health System in Greece and the cost of implications of insulin pump therapy.
Methods: All T1DM patients, followed in the University Diabetic Clinic of one of the two major Childrens hospitals in Athens, from 1st January 2011 to 31st December 2012 were included. Data on age, gender, insulin dosage, type of insulin regimen, outpatient visits and hospital diabetes-related admissions, laboratory tests and supplies costs were collected. Metabolic control was estimated as the mean of all HbA1c measurements over the 2-years study period.
Results: Total diabetes-related direct costs per person-year were estimated at €2,712 (95% CI: 2,468–2,956). Diabetes healthcare provider visits including laboratory tests, accounted for only 7.6% of total costs. Costs for hospitalizations were only 1.7%. Medication costs were 17% and were the highest for multi-injection therapy. Supply costs accounted for 73.7% and were the highest for insulin pump therapy ($p = 0.0001$). Multivariate linear regression analysis showed that total costs were significantly higher for a) pump therapy ($p < 0.0001$), b) older age ($p < 0.001$) and c) daily insulin dose ($p < 0.001$). Patients on pump therapy had significantly higher cost €5,538 (95% CI: 4,480–6,597) compared to patients on multi-injection €2,447 (95% CI: 2,320–2,574) and conventional regimen €1,978.5 (95% CI: 1,682–2,275) ($p = 0.0001$). However, patients on pump therapy had better glycaemic control compared to the rest of the patients (HbA1c: 7.2 ± 1.0 vs. 8.3 ± 1.5%, $p = 0.039$).
Conclusion: The main factor that predicted direct cost of diabetes care was the use of pump. Supply costs accounted for the majority of annual direct costs. However, the use of pump was associated with better glycaemic control, which has to be co-estimated, since long-term microvascular complications constitute the major component of the total long-term diabetes care cost.

P136
Real-life performance evaluation of the New Generation Enlite™ glucose sensor in patients with diabetes mellitus

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Objective: To assess the overall sensor performance of the New Generation Enlite™ glucose sensor when used with Paradigm® Veo™ insulin pumps in adult and pediatric patients with Type 1 Diabetes Mellitus in daily life.
Methods: This was a single-center, non-interventional analysis of the performance of the New Generation Enlite glucose sensor. Real-life data from sixty-one subjects (47 pediatrics; mean age 14.4 years; age range 5–53 years) were extracted from the Medtronic CareLink® Personal database over a 5 month period, during which the patients transitioned from the Enlite sensor to the New Generation Enlite sensor. Performance statistics were calculated by comparing the New Generation Enlite sensor glucose (SG) values to the values entered into the insulin pump from the patients blood glucose (BG) meter.
Results: During 6 days of wear the mean agreement rate of within 20% of the SG value to the BG values was 80.6%, the mean ARD was 13.03%, 96.87% of paired BG-SG values were within the A+B zones of the Clarke error grid and 98.52% of paired BG-SG values were within the A+B zones of the consensus Clarke error grid. In comparison, the sensor agreement rate for the previous generation Enlite sensor was 76.5%, mean ARD was 14.25%, Clarke A+B was 96.84% and consensus Clarke A+B was 98.26% in different retrospective timeframe. The New Generation Enlite hypoglycemic accuracy in terms of absolute bias (mean absolute difference, between SG and BG reference) was 14.31 mg/dl for BG interval 40–80 mg/dl.
Conclusion: This preliminary analysis showed that the accuracy of the New Generation Enlite sensor when used in combination with the algorithm of the Paradigm Veo system is satisfactory, in a real-life setting. Furthermore, the sensor demonstrated consistent performance and accurate readings in the hypoglycemic range. Further testing is needed to generate sensor accuracy with respect to other reference methods (e.g. YSI) and used with other algorithms.

P137

An inpatient pilot study assessing the safety of using real-time sensor glucose values for treatment decisions in adolescents with poorly-controlled type 1 diabetes mellitus (T1D)

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Objectives: CGM are FDA-approved for use with fingerstick glucose for treatment decisions. This study explored whether real-time sensor glucose (SG) data used for treatment decisions would be safe in adolescents with poorly-controlled T1D.

Methods: 10 pts with A1c ≥9% on CSII were admitted to CRC after lunch. A CGM was inserted. Reference plasma glucose values were measured at least hourly using Yellow Springs Instrument Glucose Analyzer (YSI). Starting at dinner, SG was used for treatment decisions unless any of the following criteria were met: (1) YSI <70; (2) SG <70 and YSI >250; (3) absolute difference between SG & YSI ($AD_{SG\text{-}YSI}$) was above pts insulin sensitivity factor (ISF) or >100; (4) rate of change of YSI (ROC_{YSI}) or SG (ROC_{SG}) was <60 but other was ≥60 mg/dl/hr; (5) YSI & SG were changing in opposite directions. Participant was discharged after lunch the next day.

Results: 10 pts (7 males; 15.2–17.8 years old) completed the study. Mean (±SE) absolute difference (MAD) and mean absolute relative difference (MARD) for SG vs. YSI were 30.4 ± 4.1 mg/dl and 17.0 ± 2.0%, respectively (range 14.0–53.3 mg/dl and 9.4–27.4%). A total of 32 (1–4/pt) high BG corrections were given during CGM use, 9 (0–2/pt) used YSI glucose for correction: 7 because $AD_{SG\text{-}YSI}$ was >ISF; 2 because ROC_{YSI} <60 and ROC_{SG} was ≥60 mg/dl/hr. There were 5 episodes of mild hypoglycemia (2 pts YSI <70, 1 SG <70); 2 episodes in 1 pt were symptomatic (YSI 61–68), 1 pt with SG 47 had symptoms but YSI was 148. Two of 5 lows occurred after using SG for dose calculations. Five doses using SG for calculations (1 in each of 5 pts) led to an increase of BG by >100 (range 101–135) within 3 hours, none up to ≥350.

Conclusion: Use of real-time CGM for treatment decisions in this study was safe. Correction and mealtime doses using SG data did not result in significant over- or under-treatment. Use of SG for treatment decisions under supervised inpatient conditions is a suitable alternative to repeated fingerstick BG.

P138

An evaluation of the Manitoba Pediatric Insulin Pump Program

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In 2012, provincial funding was announced for the new Manitoba Pediatric Insulin Pump (MPIP) program, which includes coverage for the cost of insulin pumps for children with type 1 diabetes who meet the programs eligibility criteria. Components of the program include an individual clinical assessment, two group pump education classes and an individual pump start.

Objectives: This quality audit examined changes in glycemic control, BMI, incidence of acute complications and rates of discontinuation in youth (n = 50) initiating continuous subcutaneous insulin infusion (CSII) between October 2012 and March 2014 through the MPIP program.

Methods: A1c was evaluated at CSII initiation, 6 months after CSII start and annually after CSII start using paired t-tests. BMI z-scores were evaluated at CSII initiation and annually after CSII start using paired t-tests.

Results: At CSII start, the children (50% male) had a mean age of 13.1 years (range 3.0–17.5). As of March 2014, 27/50 youth have used CSII for at least 6 months; A1c significantly decreased by 0.44%, from 7.98 to 7.54% ($p < 0.05$) from CSII start to 6 months post-CSII start. 14/50 youth have used the pump for 1 year or more. Although A1c decreased 0.45% from CSII start to 1 year post-CSII, this was not statistically significant likely due to small sample size. In females, BMI z-score significantly increased during the year of CSII from 0.91 to 1.09 ($p < 0.05$). There was 1 case of DKA (3.2 cases per 100 pt-years) and no severe hypoglycaemia. 2/50 (4.0%) youth have discontinued CSII.

Conclusions: The MPIP program is a new, standardized approach to assessment, education, initiation and follow-up of CSII. Although in the early stages, CSII has improved glycemic control. Increasing BMI z-scores in our female pumpers is worrisome and warrants further review.

P139

Continuous subcutaneous insulin infusion versus multiple daily insulin injection in children with type 1 diabetes in Kuwait: glycemic control, insulin requirement and BMI

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Objectives: The aim of our study was to report experience with CSII in a large cohort of children and adolescents in comparison with MDI in Kuwait.

Research design and methods: Patients ≤18 years of age started on CSII during the period of July 1st 2007 until December 31st 2012 were included. Data collected included gender, age at diagnosis and at pump insertion, diabetes duration. Body mass index (BMI), hemoglobin A1c (HbA1c), insulin dose and adverse events were measured at baseline and every 3 months during. Similar data were collected on patients on MDI followed during the same period.

Results: Main reason for switching to CSII was to achieve better control. The drop of HbA1c was most significant in first year of pump therapy, but it continued to be significantly lower in the CSII group compared to the MDI throughout the study period (CSII 7.94 ± 0.82 vs. MDI 8.31 ± 1.03; $p < 0.001$ in the 1st year, and 8.28 ± 1.22 vs. 9.02 ± 1.62; $p < 0.045$ in the 5th year.). Total daily insulin maintained significantly lower in the CSII group. BMI z scores increased in both groups, more in the CSII, but the difference was not significant (0.76 ± 1.19 vs. 0.71 ± 1.21 in 1st year; $P = 0.69$ and 1.34 ± 0.89 vs. 0.92 ± 1.28; $P = 0.15$ in 5th year). Two patients discontinued CSII therapy. There was no significant change in the rate of diabetic ketoacidosis in both groups. CSII group had more severe hypoglycemic episodes at baseline than MDI group (9.7 vs. 3.7 event per 100 patient-year; $p < 0.05$). However, the rate of the episodes were decreased significantly in the CSII group (5.7 vs. 17.7; $p < 0.05$ in the 1st year and 4.1 vs. 19.7; $p < 0.05$ in the 5th year).

Conclusion: CSII is a safe form of intensive insulin therapy in children and adolescents with type 1 diabetes mellitus, without significant adverse effects but with a markedly lower rate of severe hypoglycemia and daily insulin requirements. With the available resources (financial and professional) it could be used for all children with type 1 diabetes.

P140

Frequency of diabetes complications in children with DM1 in Ukraine, which were treated by CSII vs. MDII

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Objectives: The frequency of acute and chronic diabetes complications as well as HbA1c level were compared in two groups of children with DM1, which were treated by continuous subcutaneous insulin infusion (CSII) and multiple daily insulin injections (MDII).

Methods: We created Ukraine Pediatric Diabetes Register in 2004. It contains all information about children with DM1 aged 0–18 y.o., including the frequency of acute complications (diabetes ketoacidosis (DKA) and severe hypoglycemias (SH), chronic complications (cataract, retinopathy, nephropathy, peripheral neuropathy (PN), steatohepatosis, hairopathy, microangiopathy of lower extremities), children without chronic complication, HbA1c level, etc.

Results: We studied a database of 401 children aged 10.5 ± 4.5 y.o., with duration of DM 4.4 ± 3.4 years, which were treated by CSII vs. 7,426 children which were treated by MDII, aged 12.1 ± 4.4 y.o., with duration of DM 4.3 ± 3.7 years ($p > 0.05$).

The most of the children who used the CSII were aged 6–10 y.o. (30.7%) and had a duration of DM1 1–5 years (61.4%).

The frequency of diabetic steatohepatosis and hairopathy in CSII group was 16.0 and 14.1% vs. 12.8 and 6.4% in MDII group accordingly.

Conclusions: Children who were treated by CSII had lower rate of diabetic cataract, retinopathy, microangiopathy of lower extremities and DKA 2–3 as well as lower HbA1c level vs. children who were treated by MDII ($p < 0.05$).

Table The frequency of acute and chronic complications

	Diabetic cataract	Diabetic retinopathy	Diabetic nephropathy	Diabetic PN	Diabetic microangiopathy	No chronic complication	DKA 2–3	SH	HbA1c, %
CSII ($n = 401$)	0.3*	1.5*	7.3	19.5	8.8*	61.4	7.9*	1.1	8.0 ± 1.7*
MDII ($n = 7426$)	1.6	4.9	9.9	17.9	14.2	58.1	11.4	0.5	8.8 ± 1.9

*$p < 0.05$.

P141

Continuous subcutaneous insulin infusion (CSII) in children and young people with type 1 diabetes (TID) commenced at diagnosis compared to those who commenced CSII one year or more after diagnosis

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Objectives: To evaluate clinical outcomes and quality of life (QOL) in children and young people with T1 Diabetes managed on CSII. It compares those who started CSII at diagnosis with those who started at 1 year or more.

Methods: Commencement of CSII within 30 days of diagnosis (G1) was compared to those who commenced >12 months after diagnosis (G 2). Data was collected retrospectively including anthropometric data, HBA1c, episodes of diabetes ketoacidosis (DKA), severe hypoglycaemic episodes, total daily insulin doses.

Differences between the 2 groups were compared by *t*-test.

Results: G1, $n = 49$ patients (female $n = 18$), G 2, $n = 37$ patients (female $n = 18$). Mean age at diagnosis for G1 was 9.02 years (±4.81) (mean ± SD) and G 2; 4.9 years (±2.9), The age at pump start for G1 was 9.04 years (± 4.81) and G2 9.12 years (± 3.2). The mean basal insulin dose for G1was 0.70 ± 0.234 compared to 0.78 ± 0.179 for G2.

There was no significant difference between the two groups other than their duration of diabetes at pump start G1; 5.59 (±7.19) days and G2; 4.72 (±3.2) years.

Glycemic control between the two groups was statistically different at each time point over the 48 months with HbA1c in G1 < G2. Mean HbA1c for G1 6.68% compared to 6.93% in G2.

21 patients in G, 25 patients in G2 ≥ 13 years. At each time point over 48 months the HbA1c in G1 was statistically lower than G2.

No episodes of DKA occurred in G1 or G2 once CSII started. Severe hypoglycaemic episodes were decreased in G2 by 75%.

QOL Inventory data showed that there were no significant differences between the two groups with both parents and the children. Parents mean 80.0 SD ±2, children mean 81.5 SD ±1.5.

Conclusions: Starting insulin pump therapy within 1 month of diagnosis resulted in improvement in HbA1c, reduced rate of hypoglycaemia, no episodes of DKA and no detrimental effect on quality of life. In subjects aged ≥ 13y who started CSII at diagnosis there were better outcomes than those who started after or equal to 12 months.

Poster Tour 18: Diabetes Projects in Developing Countries II

P142

Health literacy: a universal language in diverse diabetes care systems - a pilot project to test health literacy of caregivers of children with type 1 diabetes in Kuwait

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Introduction: Health literacy is an increasingly recognized concept in diabetes care. The Newest Vital Sign (NVS) is an English instrument testing health literacy using a nutrition label. No studies looked into health literacy in the Arab world and no validated tool established to test health literacy in Arab-speaking populations. We aim to translate and validate the NVS tool to Arabic and test it on a pilot of Arabic-speaking caregivers of children with type 1 diabetes.
Methods: Phase 1 (Production of the Arabic version): The original NVS was translated to Arabic then reviewed by a panel of expertise. A modified Arabic version was then created and back-translated. Phase 2 (Translation Validation): The original and back- translated versions were compared based on the comparability of language and similarity of interpretation. Phase 3 (Pilot Project): the Arabic version is used to measure health literacy among a pilot of caregivers of pediatric patients of type 1 diabetes.
Results: The mean comparability and similarity scores were accepted for each item on the Arabic version (<2.5) except for three items. These three items were not reviewed and accepted as is as it is the official presentation of product information on food labels in Kuwait. The mean NVS score for the pilot was 3.2 ± 2.1. Children of caregivers with adequate health literacy scores did not have poor glycemic control (HbA1C ≥9%). Children of caregivers with likely limited health literacy did not have good control (HbA1C ≤7.5%).
Conclusion: The Arabic version of the NVS tool seems to be an accepted tool to measure health literacy in Arabic-speaking populations. Although based on small numbers, limited health literacy of caregivers seems to be linked to inadequate glycemic control of their children. Further link should be studies on a larger sample in order to be generalized to Arabian populations.

P143

Reduction strategy of the inaugural ketoacidosis (IDKA) of T1D in the Oran's province, Algeria

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The incidence of T1D in the province of Oran in 2013 was 30×10^5 children under 15 years, an average annual increase of 7.4% over the last 15 years. This increase fears of a growing number of IDKA. Many campaigns around the world, as the Parma campaign showed that it is possible to reduce this complication.
Objective: To review IDKA at T1D diagnosis to establish an appropriate strategy to reduce this latter on the basis of local findings and possibilities.
Materials and methods: One hundred and thirty-five new cases of pediatric T1D, hospitalized in 2 specialized departments from June 2013 to March 2014 were analyzed. Recent histories, clinical, biological and socioeconomic were identified upon admission. In the absence of blood pH, IDKA was established on clinical criteria: clinical signs of DKA, rehydration, hospitalization in intensive care unit.
Results: IDKA was present in 31% of the all cases; the distance is a risk factor with 20% of IDKA in Oran province patients vs. 57% among those from neighboring provinces ($p < 0.0001$). It is present in 20% of children under 5 years, 12% in 5–9 years old, and 27% among 10–14 years old ($p < 0.44$). It is found in 12% of cases when the disease exists among siblings against 76% inversely ($p < 0.02$). The sex ratio was 0.87. Parents thought of T1D in 46% in the case of DKA vs. 75% in the opposite case. Practitioner consulted mentioned the DT1 to the first consultation in 51% in case of CIDA vs. 79% otherwise.
Conclusion: IDKA is relatively low in our context. The distance from diabetes major centers appears to be a risk factor. DKA reduction strategy must be based on families information to lead them to consult faster and physician awareness of the therapeutic emergency.

P144

Each one teach one: training students for pediatric diabetes and nutrition peer education in schools

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Objective: To provide a Diabetes in-school support system; to enable peer education in a general setting without discrimination.
Background: A 2007 result revealed approximately 300,000 people ages 15–74 living with Diabetes in Jamaica, a 2009 research showed about 10,000 children with about 1,300 receiving care in public health facilities.
Methods: Over 200 student leaders such as monitors and Peer educators ages 10–14 were chosen from 18 schools. We used the Novo Nordisk Changing Diabetes in Children presentations given at the 2013 ISPAD conference to teach about DM and Nutrition, to enable peer education on DM; as well as writing essays. 162 questionnaires were given initially to assess the students knowledge of Type 1 DM.
Results: 22 (13.5%) of the ($n = 162$) said in T1DM the body makes insulin but more insulin is needed, while 67 (41.4%) said the body does not make insulin and the treatment is pills and plenty water only. 33 (20.4%) said Diabetes affects only old people, 126 (77.8%) said all children can get DM. 157 (96.9%) said eating a variety of Vegetables, Legumes and some Fruits are important in DM management. 11 (6.8%) and 9 (5.6%) respectively, said if their friend had Diabetes they should not play or talk with them anymore and 142 (87.7%) said they should show love and support. 147 (90.7%) said if they learnt about Diabetes, everyone should learn too, 15 (9.3%) said they should keep it to themselves, share with family or their secret keepers only. 96 (59.3%) said children with DM can take part in all activities and 23 (14.2%) said if they have DM they cannot go to school. Amongst the class teachers 6 questionnaires were given, 4 (66.7%) said in Type 1 DM the body makes insulin however, more insulin is needed.

Conclusion: In-school DM and Nutrition education is necessary for understanding of the illness, and to facilitate students with DM. Importantly good teaching aids are needed and the Changing Diabetes in Children tools are indeed beneficial.

Table Answers to Questionnaire

The answers include; 1. a) Your body makes insulin but, you still need to take more insulin c) Your body does not make insulin and you need to take insulin by injection. d) Your body does not make insulin and you need to take pills and drink lots of water. 2. a) Old people d) All children 3. c) Lots of Vegetables, Peas and Beans and some fruits d) Lots of Dumpling, Irish Potato and Meat 4. a) Should not play with him/her. b) Should play with him/her and show love and support. d) Should not talk to them anymore. 5. a) Only My family. c) Everyone, so they can learn too. 6. a) Cannot take part in any activities at school. b) Can take part in most activities. c) Can take part in all activities. d) Cannot come to school

Figure 1 : Shows the responses by the students to the Pediatric Diabetes questionnaires that were administered before the education session.

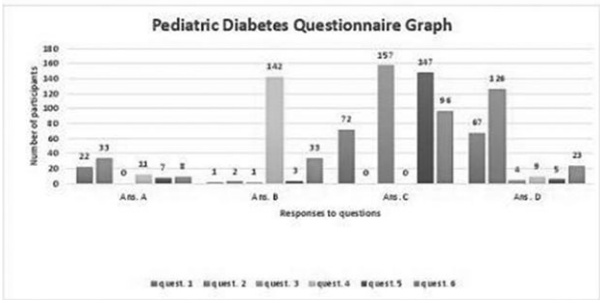

Figure 1. Pediatric diabetes questionnaire results.

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Abstract withdrawn

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Abstract withdrawn

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Functional insulin therapy used in Tetouan (Morocco) in adolescents with type 1 diabetes

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Objectives: The objective of this study was to evaluate the effect of instauration of the basal bolus insulin regime on the glycemic control as well as the quality of life of Moroccan poorly controlled type 1 diabetes adolescents.

Methods: 22 type 1 diabetes patients between 8 and 21 years old with an HbA1C ≥8% and a minimum level of education were included between Feb 2012 and March 2013, if they had at least 1 complication of their diabetes. The subjects received a formation of 36 hours on basal bolus insulin regimen. Afterwards, they were divided in 2 groups, all being treated with basal bolus insulin at home and received material for frequent finger blood glucose controls.

Results: A mean decrease of 2.34% in HbA1C was observed 3 months after instauration of the basal bolus regime. This decrease has even improved throughout the follow up period of 19 months with another 0.5%. There was a 25% decrease in episodes of mild hypoglycemia. No episodes of severe hypoglycemia requiring hospital care were observed.

Conclusions: Even in a peripheral region of Morocco, where no patients or professional team had any prior knowledge of functional insulin therapy, it is possible to obtain, as in most Western countries, a significant improvement in HbA1c by instauring an intensified basal bolus insulin therapy. Furthermore, this treatment regimen is highly accepted by patients, giving them freedom in their dietary habits allowing them to achieve knowledge on carb counting, and motivating them in better diabetes control.

P148

Diabetes youth care-support group for young people living with diabetes mellitus in Ghana

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Introduction: The prevalence of Diabetes Mellitus (DM) in Ghana is estimated at 3.35% in a population of 25 million however, the incidence of diabetes in young ones under the age of 30 years is unknown. Moreover, knowledge about DM in young people is minimal with no or little information in both health and non-health professionals.

Diabetes Youth Care (DYC) consisting of both medical and non-medical volunteers was created to support young ones living with diabetes.

Objectives: 1. Create a support network for young ones under the age of 30 living with diabetes and their families.

2. Create a platform for the dissemination of information to medical personnel and the general public about diabetes.

Invitation to Group/Methods: Open invitations were sent to young people living with diabetes and their families through health facilities and social networks online. Monthly meeting were started from November 2012 till date with a range of topics in diabetes care.

Activities and Outcomes: The DYC started with 5 young people and has a membership of 40 to date, the youngest member is 8 years old and the oldest is 30 years old.

In DYC they do not feel isolated as they meet their peers also living with DM.

Glucometers and strips, for home monitoring of blood glucose together with insulin are provided for members through donations.

Education of the young ones with diabetes about management of emergencies has resulted in improved care and drastic reduction in emergency room visits.

Parents or guardians who attend DYC have been able to manage emergencies such as hypo- and hyperglycemia.

Home visits are also conducted by DYC personnel to augment clinical and social services.

A website was developed www.diabetesyouthcare.org together with a social media platform – www.facebook.com/diabetesyouthcare.

Conclusion: Diabetes Youth Care is currently the only support group in Ghana and is making strides in improving the lives of young ones living with diabetes and the lives of their families.

Figure Diabetes youth care.

Poster Tour 19: Diabetes and Adolescence

P149

Insulin resistance is independently associated with a reduced muscle mass in healthy Chilean adolescents

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Objective: We examined whether low muscle mass in 668 Chilean adolescents (16.8 ± 0.3 years old) from a longitudinal follow-up was associated with higher risk of insulin resistance (IR).
Methods: BMI, waist circumference (WC), glucose, insulin, adiponectin, diet and physical activity (PA) habits were measured. Fat and fat free mass (%) were assessed with DXA. Fat Mass Index (FMI) and Fat-Free Mass Index (FFMI) were estimated. Percentage values of FFMI ≤25th percentile in our sample were considered low muscle mass, after adjusting for sex. Data on family history of DM2 in 1st degree relatives (FHDM) was self-reported. HOMA-IR was calculated and values ≥2.6 were considered insulin resistance (IR). We used bivariate and multivariate regression analysis to examine the association between low muscle mass and IR. Multiple logistic regressions assessed the relationship between low muscle mass (exposure) and the odds of IR (outcome). Models were adjusted for potential confounders: obesity (BMI z-score ≥2 SD), abdominal obesity (IDF), physical inactivity, low adiponectine and FHDM.
Results: 16.3% of adolescents had IR. Adolescents with IR showed significantly higher mean values of BMI z-score, WC, fat mass (%), glucose and insulin, and significantly lower mean values of lean mass (%) and adiponectin. We found a significant association between IR and obesity (crude OR: 6.6; 95% CI: 4.1–10.6), abdominal obesity (crude OR: 3.8; 95% CI: 2.5–5.7), low muscle mass (crude OR: 4.9; 95% CI: 3.2–7.5), low adiponectin (crude OR: 2.5; 95% CI: 1.6–4.0), low PA (crude OR: 1.8: 95% CI: 1.2–2.7) and FHDM (crude OR: 1.7; 95% CI: 1.1–2.9). Low muscle mass was significantly associated with IR, after adjustment for obesity, abdominal obesity, low PA, low adiponectin, and FHDM.
Conclusions: Healthy adolescents with reduced muscle mass showed a higher risk of IR, independent of obesity status, adiponectin levels and FHDM.
Funding: NHLBI/NIH (grant no. R01HL088530).

P150

Cardiometabolic risk in healthy Chilean adolescents: influence of physical inactivity and sarcopenia

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Objective: We examined whether physical inactivity and sarcopenia in adolescents were associated with higher cardiovascular risk as measured by the Metabolic Syndrome (MetS).
Methods: In 667 adolescents (16.8 ± 0.2 years old) from a longitudinal follow-up, physical activity was measured by the total amount of time devoted to sedentary activities, recreational games, active commuting, and weekly scheduled exercise. Fat and muscle mass were assessed with DEXA. Fat-Free Mass Index (FFMI) was estimated. Percentage values of FFMI ≤25th percentile in our sample were considered sarcopenia, after adjusting for sex. BMI, waist circumference (WC), blood pressure (BAP), triglycerides (TG), HDL-cholesterol, glucose, insulin and HOMA-IR were measured. MetS was diagnosed according to the IDF. Logistic models assessed the relation between physical inactivity and sarcopenia, and the odds of MetS, after adjusting for confounders or mediating factors, including sex, obesity (BMI z ≥ 2 SD) and insulin resistance (HOMA-IR ≥3.3).
Results: Seventy-nine percent of adolescents had at least one cardiovascular risk factor (CVRF) and 9.2% had MetS. Forty percent of participants were physically inactive and 37% had sarcopenia. Having three or more CVRF (MetS) significantly increased BMI z-score, WC, fat mass, BAP, TG, glycemia, insulin and HOMA-IR, and lowered HDL-chol and lean mass. Physical inactivity (OR: 2.7 CI: 1.3–5.6) and sarcopenia (OR: 6.9 CI: 2.7–17.6) significantly increased the risk of MetS.
Conclusions: In adolescents, we found a high prevalence of obesity, abdominal obesity, dyslipidemia, fasting hyperglycemia and MetS. Physical inactivity and low muscle mass were both predictor of MetS. Sarcopenia was a stronger risk indicator of MetS than obesity and insulin resistance.
Funding: NHLBI/NIH (grant no. R01HL088530).

P151

Polycystic ovary syndrome and hyperandrogenism in type 1 diabetes: adolescent girls are already at risk

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Background: Although it has been described that adult women with Type 1 Diabetes (T1D) have a high prevalence of Polycystic Ovary Syndrome (PCOS), and that it can initiate during puberty, there are no reports in the literature about the prevalence of PCOS exclusively in adolescents with T1D.
Objective: The present study has the objective of determining the prevalence of PCOS in adolescents with T1D, and evaluating the diagnostic criteria in this age group.
Methods: We evaluated 22 T1D patients, with chronological age (CA) between 12 and 20 years. Antecedents of menarche and menstrual cycles were obtained through a structured questionnaire, and the clinical signs of hyperandrogenism through physical examination. We performed, in all cohort, biochemical exams (androstenedione, testosterone and DHEA sulfate) and ovarian ultrasonography. PCOS diagnosis was defined by Rotterdam criteria.
Results: From the 22 patients (CA = 16.7 ± 2.2 years), 5 (22.7%) fulfilled criteria to PCOS and 17 (77.3%) were classified as NON-PCOS. Hirsutism was found in 60% (3/5) of those PCOS and in 5.8% (1/17) of the NON-PCOS. Lab hyperandrogenism was found in 6/22 patients, 2/5 from the PCOS-Group. Ultrasonographic alterations compatible with PCO Morphology (PCOM) were found in 100% of the PCOS patients, and in none from the NON-PCOS

Conclusions: To our knowledge, this is the first study that evaluates the association, exclusively in adolescents, between T1D and PCOS.

We found a high prevalence of PCOS, similar to what is described in adult patients with T1D. Our results suggests, besides, that clinical data (hirsutism or oligomenorrhea), associated to typical features of ovarian US (performed by experienced professional and with strict criteria), independently of biochemical results, could detect precociously all cases of PCOS. Diagnosis of PCOS in this early phase could lead to specific treatments and avoid the progression of the disease and late consequences in adult life.

P152
Moving on. . .with diabetes: supporting successful transition for young adults with type 1 diabetes

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Transition from pediatric to adult care for youth with type 1 diabetes (T1D) is challenging. Unsuccessful transition is associated with diabetes complications. This project aimed to promote, disseminate, and obtain feedback on 2 new patient transition resources created by the Diabetes Care Program of Nova Scotia: a handbook and accompanying app, designed to be practical, with checklists, tips for success, and memory aids.

Informal information sessions were hosted by a young adult with T1D and transition experience, for youth ages 16–20 (& optional parent/support person) at 3 sites across the province of Nova Scotia. Events were approximately 90-minutes and involved: dissemination of the handbook, introduction to the app, and discussion of transition issues highlighted in the tools (e.g. appointments, insurance, travel, transition to university, driving). For part of each session, parents were hosted separately. Feedback was obtained immediately on the session through an evaluation form and on the transition tools two weeks later via electronic survey.

Of 20 participants (10 youth; 10 parent/support), 19 completed evaluations at the end of the event. Most participants found the session very informative and liked the relaxed/comfortable/social environment. The only suggestion for improvement was to make it longer (2/19). 26% requested more/regular social events. From preliminary results of the online survey ($n = 7$), 71% found the handbook very helpful (5/5) on a 5-point scale. 43% (3) stated that the checklists were one of the most helpful aspects of the handbook. Only 3 people used the mobile app but reported ease of use as helpful.

Although small, this project highlights the need for peer support during the period of transition for youth with T1D. It also illustrates that a social gathering or information session can be an effective forum for knowledge translation for youth and parents. Preliminary responses suggest the tools were well received.

P153
Sexuality and contraceptive use in Greek teenagers with type 1 diabetes mellitus (T1DM): preliminary report

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Introduction: It has been reported that adolescents with type 1 diabetes mellitus (T1DM) may differ from their healthy peers in respect to sexual activity and contraceptive use.

Aim: Study of sexual behaviors and contraceptive usage in T1DM adolescents and healthy peers.

Material and method: Of 69 adolescents with a mean ± SD age of 16.3 ± 2.0 years, 23 T1DM adolescents (mean age 16.8 ± 2.7 years, disease duration 6.68 ± 3.2 years and HbA1c: 9.01 ± 1.9%) were compared to 46 healthy peers (controls), matched for age, gender and socio-economic level. Anonymous self-completed questionnaires were used to evaluate the source, frequency of sexual education, sexual behaviors and contraceptive use.

Results: The T1DM adolescents were less inclined to ask their parents for information, related to sexual education (52.2%) compared to the controls (22.2%) ($p = 0.048$), even when thinking adults were the appropriate source of information (59.1% vs 26.7%; $p = 0.014$). 73.7% of T1DM adolescents (male/female: 12/2) reported as having had sexual intercourse compared to 63.2% of controls ($p = 0.636$). The T1DM adolescents reported initiation of sexual activity at age 16.2 ± 2.2 years, while the controls at age 15 ± 2.1 years ($p = 0.193$).

The majority of the T1DM teenagers (35.7%) had 2 sexual partners, while the majority of the control group teenagers (32.1%) had more than 4 ($p = 0.207$). With respect to condom use, 57.1% of T1DM teenagers used it in every sexual contact, versus 41.4% of controls ($p = 0.124$). 78.6% of T1DM adolescents and the 63% of control group, used it during their first intercourse, but 37% of the controls refused to respond ($p = 0.020$). Intoxication by alcohol prior to sexual contact was reported by 7.1% of T1DM teenagers versus 25% of controls.

Conclusions: T1DM adolescents showed no appreciable differences, regarding sexual experience, althought there is a tendency to a later onset of sexual activity and more responsible attitudes, compared to their healthy peers.

P154
Comparing two transition pathways: influence on diabetes outcome measures

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Objectives: To examine the outcomes for patients undergoing transition to adult care. Locally there are two different clinic set ups. One (City) is a young adult clinic for patients 16–24 year staffed by both paediatric and adult clinicians. The other (Sandwell) has a single transfer clinic where care is formally handed over to the adult team. Both have the same transition policy and preparation for transition and serve a similar population. Difference in outcome between the sites would be useful to inform service design as there is currently a lack of research evidence to inform the best model for transition clinics.

Methods: 20 City (C) & 29 Sandwell (S) pts were transferred to sole adult care 2010–2012. Mean age 17 years at City and 18 years at Sandwell. We calculated the median HBA1c for each service before and after transfer. Paired T test was used to compare service mean HBA1c. Chi squared test was used to compare the % of patients lost to follow up, % of pts that improved HBA1c, % that achieved HBA1c of <58 mmol/l, DKA rates and hypoglycaemia admissions 1 and 2 years after transfer.

Results: Median HBA1C was worse both sites 1 year following transfer but this was not significant. There was no significant difference in the 2 sites in % of pts achieving ideal HBA1C or improving their HBA1c following transfer. However a significant

Table HbA1C outcomes

	1Y pre transfer S	1Y Pre transfer C	1Y Post transfer S	1Y post transfer C	2Y Pre transfer S	2Y pre transfer C	2Y post transfer S	2Y post transfer C
Median HbA1C mmol/l	75	73	76.9	81	78.6	79	76.5	78.75
% patients with HbA1C <58 mmol/l	18%	10.5%	8.3%	5.2%	8%	6%	5%	6%
% with improved HbA1 after transfer			39%	31%			55%	30%

number of Sandwell pts were lost to follow up at time of audit compared to City (14/29 vs. 3/20) ($p < 0.5$). No patients had admission with DKA or hypoglycaemia in the 2 years pre transfer. Post transfer 2 Sandwell patients were admitted with DKA and 1 City patient was admitted with hypoglycaemia.

Conclusions: This patient population had poor control which did not change with clinic set up, however there was significantly better retention with the joint young adult clinic set up at City.

P155
Type 1 diabetes mellitus and precocios puberty: rare association

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Precocious puberty is defined as pubertal development that begins at an earlier age than expected; most pediatric endocrinology subspecialists use cutoff ages of 8 years for girls and 9 years for boys. We reported in this case, rare association between type 1 diabetes mellitus and precocios puberty.

We present a girl with type 1 diabetes developed at the age of 3 years, with good glycemic control using insulin. She also had a developmental.

At the age of 6 years child had breast enlargement, height increase, and an increase in growth velocity. On examination, she was found to have Tanner stage 3 breast development, and her vaginal mucosa was estrogenized. Her height was above the 97th percentile. Biochemically, she was diagnosed as having central precocious puberty, and magnetic resonance imaging of her pituitary gland diagnosed central precocious puberty idiopathic. Treatment with leuprolide resulted in normalization of her growth rate and regression of the breast development; the vaginal mucosa also became unestrogenized.

Conclusion: Precocious puberty and type 1 diabetes is a rare association. the relationship has not been determined.

Poster Tour 20: Acute and Chronic Complications V

P156

Adrenaline and cortisol levels are decreased under nocturnal versus day time hypoglycemia in prepubertal children with T1D

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Objective: To investigate the counter regulatory hormone profile (glucagon, cortisol, adrenaline and growth hormone (GH)) in children during a hyperinsulinaemic hypoglycaemic clamp procedure during day and night time.

Methods: 8 children (4 boys) age 9.6 ± 2.3 years with type 1 diabetes, diabetes duration 3.0 ± 1.4 years, HbA1c 55.5 ± 3.4 mmol/mol, 7/8 on CSII. Two clamps were performed: (i) at day- and (ii) night time. After a run in period of 45 min with an iv infusion of glucose (3.3–6.7 mg/kg/min) and insulin (80 mU/m^2/min) with BG at 7–9 mmol/l, blood sampling for counter regulatory hormones at baseline were collected. Venous blood glucose (BG) was measured every 5 minutes and the hyperinsulinaemic hypoglycaemic clamp was initialized by a slow reduction in glucose infusion until BG reached 3.5 mmol/l (hypo) and ≤2.2 mmol/l (nadir), where the 2nd and 3rd set of hormones were collected. Paired t-testing and multiple linear regression models for the respective analyses were performed. $p < 0.05$ was considered significant.

Results: The BG levels (mmol/l) were comparable during the two clamp settings: baseline: 8.3 ± 1.9 vs. 7.3 ± 2.7; hypo: 3.3 ± 0.4 vs. 3.4 ± 0.4 and nadir: 2.3 ± 0.5 vs. 2.1 ± 0.3; day and night, respectively. The rate of BG decline were 0.04 vs. 0.06 mmol/l/min (NS) from hypo to nadir, day vs. night, respectively. The levels of glucagon and GH at nadir day and night were comparable; however the levels of adrenalin (nmol/l) 0.6 ± 0.5 vs. 1.9 ± 1.3 and cortisol (nmol/l) 42 ± 40 vs. 319 ± 229 were blunted at night compared to daytime. The increase in hormone concentration from hypo to nadir were independent of BG decline day and night, but the increase in adrenalin and GH were higher during daytime vs. night ($p = 0.04$ and $p = 0.01$, resp).

Conclusions: The response of adrenalin were blunted comparing night to day for

(i) absolute level as well as for

(ii) rate of increase when BG dropped from hypo to nadir, whereas only the absolute level was reduced during night time for cortisol.

P157

Abdominal obesity evaluated by waist-to-height-ratio as an independent predictor of carotid intima media thickness (IMT) in young patients with type 1 diabetes mellitus (T1D)

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Objectives: Starting from young age T1D-patients have a high risk of developing cardiovascular diseases (CVD) early in their lives. Carotid IMT, a marker for atherosclerosis was often found elevated in young T1D-patients. However, the association of IMT and glycemic control in young T1D-patients has been inconsistent. We wanted to evaluate the relation and role of IMT and other CVD risk factors.

Methods: We measured mean and maximum IMT (IMTm) in 77 young adults and adolescents with T1D (age: 19 ± 3 years, diabetes duration (DD): 11 ± 3 years, HbA1c 7.8 ± 1.4%) and in 25 controls (age:23 ± 2 years) via ultrasound. We examined CVD risk factors i.e. serum lipids, body-mass-index (BMI), waist circumference (WC), waist-to-height-ratio (WHTR), blood pressure, interleukin-6 (IL6) and high-sensitive c-reactive protein (hsCRP).

Results: T1D-patients had higher systolic blood pressure (SBP) than controls ($t = 2.669$, $p = 0.009$) and larger WC ($t: -2.485$, $p = 0.015$). There was no significant (sign.) difference in BMI, serum lipids, hsCRP or IL-6. Age-adjusted IMT did not differ sign. between groups. In controls IMT was only SBP-related ($r = 0.482$, $p = 0.017$). In diabetics there was no correlation of IMT with HbA1c, SBP, BMI, IL-6 or hsCRP, but IMTm was related to WC ($r = 0.281$, $p = 0.017$) and WHTR ($r = 0.258$, $p = 0.033$). Adjusting for age, sex, Hba1c, DD, SBP, smoking and lipids, WHTR remained the only significant independent predictor of IMTm (beta=0.329, $p = 0.024$). T1D-patients with increased WHTR (>0.5) (19%) had higher levels of hsCRP ($t = -3.316$, $p = 0.013$) but they did not differ sign. in HbA1c-levels.

Conclusions: We found no significant difference in IMT between controls and young adults with T1D. Every 5th young T1D-patient had an increased WHTR. The association of WHTR with higher IMT independent of other CVD risk factors suggests the importance of measuring WHTR in young T1D-patients. Independent of glycemic control, young diabetics with abdominal obesity could be the group most at risk for CVD.

P158

Be aware of the importance of good metabolic control in pediatric diabetes care

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Objectives: To compare the impact of good (HbA1c <57 mmol/mol IFCC/7.4% NGSP) and poor metabolic control (HbA1c >78 mmol/mol IFCC/9.3% NGSP) during adolescence with HbA1c and cardiovascular complications in young adults.

Methods: Data on 4,239 persons with type 1 diabetes registered in the Swedish Pediatric National Quality registry (Swediabkids) 13–18 years of age and later in the National Diabetes Registry (NDR) year 2011 and 2012 was used. Mean HbA1c, smoking and microvascular complications were studied in the groups shown in the table. These groups were chosen to highlight possible differences.

Results: Micro- and macroalbuminuria was significantly more frequent ($p < 0.01$) in the patient group that had mean HbA1c >78 mmol/mol in both registries compared to the patients with HbA1c <57 mmol/mol. The age distribution showed that the largest proportion of patients (93.5% $n = 3{,}975$) was below 30 years of age, and yet over 80% of those with HbA1c >78 mmol/mol in Swediabkids already had retinopathy. There were significantly ($p < 0.001$) more smokers in the group with HbA1c >78 mmol/mol.

Table 1

Mean HbA1c in SWE-NDR mmol/mol	Microalbuminuria % (n=affected/total)	Macroalbuminuria % (n=affected/total)	Retinopathy % (n=affected/total)	Smoking % (n=smokers/total)
<57–<57	3.8 (12/315)	1.7 (5/297)	26.6 (85/319)	9.1 (33/360)
<57–>78	9.1 (5/55)	0 (0/53)	32.8 (21/64)	13.6 (10/74)
>78–<57	10.3 (6/58)	3.3 (2/60)	86.2 (50/58)	17.7 (12/68)
>78–>78	17.9 (44/246)	6.7 (16/239)	81.6 (235/288)	39.1 (136/322)

Conclusions: It is important that the pediatric diabetes teams are aware of the impact of a good metabolic control during adolescence to reduce the risk of microvascular complications in young adults. Smoking must be reduced as those with the highest HbA1c also more frequently were smokers which further increases the risk of complications.

P159
Epidemiology of lipohypertophy versus lipoatrophy among type1 diabetic school children in Menofia, Egypt

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Objectives: Studying prevalence & incidence of lipohypertrophy and lipoatrophy among type 1 diabetic children in Menofia, and to investigate their distribution and associated factors.
Materials and methods: A cross sectional study was done on diabetic school children (6–18 years) (n = 783) in Menofia from June till Dec 2013, all had been under treatment with human insulin at least for three months, excluding those with other autoimmune diseases or HIV. First, anthropologic, demographic and clinical features of patients were recorded in a questionnaire in which risk factors for lipodystropy, regarding relevant literature, were investigated. Then all of them were examined clinically for localized lipodystrophy by observation and palpation techniques. In all patients, glycosylated hemoglobin (HbA_{1C}) and Insulin antibodies (IA) were measured. Lipodystrophic patients were classified as lipoatrophic or lipohypertrophic. Data then were statistically analyzed.
Results: Prevalence of lipodystrophy, lipohypertrophy and lipoatrophy in our study was (50.3%, 47.6% and 2.7%) and incidence of these lesions during preceding 12 months was (4.1%, 3.8% and 0.3%) respectively. Lipohypertrophy occurred more among males, low social standard patients and 12–18 years age group ($p < 0.01$). lipoatrophy occurred more in high social standard patients ($p < 0.01$) without significant age and sex preference. (Both lesions significantly were related to longer diabetes duration (>10 years), higher HBA_{1c} levels and usage of one needle more than once. Lipohypertrophy significantly was associated with fixed sites of injection, more than 4 daily injections and higher insulin dose/kg. lipoatrophy significantly was associated with higher IA levels, usage of (Aspart/Lispro), pump infusion and lower BMI) as descendingly arranged according to odds ratio.
Conclusions: Even with human insulin, frequency of the lipodystrophy particularly of lipohypertrophy still remained high, preventable risk factors should be targeted.

P160
Subcutaneous regular insulin for the treatment of diabetic ketoacidosis in children

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Objectives: DKA treatment protocols vary between medical centers, however low-dose intravenous (IV) administration of regular insulin is the standard care for replacing insulin in most. A small number of studies, the majority in adults, demonstrated subcutaneous injections of rapid acting insulin every 1–2 hours to be a valid alternative. It is our current practice to administer sub-cutaneous regular insulin (approximately 0.8–1 μ/kg/day) every 4 hours when treating children with DKA and a pH >7.0. We aimed to review our experience with sub-cutaneous regular insulin in the treatment of DKA in children and evaluate the effectiveness and safety of such treatment.
Methods: Charts of children treated with subcutaneous regular insulin for DKA at the pediatrics department, Meyer Children's Hospital, Rambam healthcare campus, Israel between 2007 and 2009, were reviewed. Data regarding clinical characteristics at diagnosis, response to insulin treatment and occurrence of complications were analyzed. Further data from 2010 to 2014 are currently being analyzed.
Results: Forty one children met inclusion criteria (21 females). Mean age was 10.6 ± 3.8 years. Ten out of 41 children presented with new onset type 1 diabetes mellitus. Mean time to resolution of hyperglycemia (Glucose <250 mg/dl) was 8.5 ± 6.3 hours and time to resolution of DKA (pH >7.30, $HCO_3 > 15$) was 15.0 ± 13.1 hours. The mean total insulin dose until resolution of DKA was 0.5 ± 0.3 (unit/kg). During the time between admission and DKA resolution no episodes of hypoglycemia or arrhythmia were recorded. No incidents of brain edema or mortality occurred while in hospital.
Conclusions: Subcutaneous regular insulin administered every 4 hours appears to be an effective and safe alternative for the insulin treatment of DKA with pH >7.0 in children. Such treatment has the potential to simplify insulin administration when compared to either IV or q1-2 hour subcutaneous insulin and reduce both admission costs and patient inconvenience.

P161
Insulin treatment and HbA1c in a large paediatric cystic fibrosis clinic

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Insulin treatment has been shown to improve body mass index (BMI) and pulmonary function in dysglycaemia in Cystic Fibrosis but adds to the burden of disease treatment.

Aims: To characterize insulin dose and regimen, HbA1c and growth in subjects with Cystic Fibrosis (CF) at The Childrens Hospital at Westmead (CHW).

Method: This study reviewed current insulin requiring subjects with CF ($n = 28$) in a large CF clinic population ($n = 211$, $103 \geq 10$ years of age). 8/28 subjects were excluded from analysis due to insulin refusal (2), not currently requiring (3), transplant (1), newly diagnosed (2). Routine OGTT screening takes place from age 10 years. Included were five with Impaired Glucose Tolerance (IGT) and/or other*: random hyperglycaemia with poor weight gain and/or declining lung function deemed to benefit from insulin. Insulin dose and regimen, HbA1c, height and BMI SDS were compared in 4 groups: CFRD, IGT, other causes and T1DM, before and after insulin.

Results: 26 of 103 children >age of 10 years require insulin (25%). Median age at starting insulin was 13.0 [10.3–14.3] years. Those classified as T1DM (2+ve Ab) required more insulin and had higher HbA1c. There was no statistical difference in growth parameters and insulin doses. Characteristics of 4 groups analysed are shown in table below.

Conclusion: Insulin use is common in age group ≥10 years in our CF clinic. Dose and HbA1c were very similar across CFRD, IGT and other groups. Glycaemic targets for therapy and monitoring may need modification in this population to maximise benefit from insulin therapy.

Table Current characteristics of 4 glycaemic groups

	CFRD ($n = 10$)	IGT ($n = 5$)	Other *($n = 3$)	T1DM(2 + veAb's) ($n = 2$)
Duration on insulin (months)	19.5 (9.9–28.1)	25.3 (3.0–27.7)	20.0 (10.1–23.8)	76.4 (48.8–104.0)
Insulin (U/kg/day)	0.114 (0.071–0.157)	0.171 (0.171–0.184)	0.245 (0.096–0.543)	1.149 (0.582–1.717)
Basal-bolus vs. basal insulin	1/9	1/4	0/3	2/0
BMI SDS	−0.03 (−0.91 to 0.65)	−0.85 (−1.26 to −0.24)	0.23 (−0.80 to 0.41)	−0.21 (−0.35 to −0.08)
Height SDS	−0.92 (−1.31 to −0.58)	−2.19 (−2.92 to −1.71)	−0.80 (−1.57 to 0.10)	−0.69 (−0.94 to −0.44)
HbA1c (%)	5.8 (5.7–6.0)	5.4 (5.4–6.3)	5.7 (5.6–6.3)	7.5 (6.7–8.3)

P162
Insulin edema in an adolescent with newly diagnosed type 1 diabetes mellitus

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Objectives: To describe a case of insulin edema requiring diuretic therapy, and to review the existing literature on this condition.

Methods: We describe a case of a 15-year-old male with newly diagnosed type 1 diabetes (DM1) who developed edema of the lower extremities one day after initiation of subcutaneous insulin therapy. Other causes of edema were excluded. Similar to previously described cases, the patient was an underweight adolescent (BMI 15.2 kg/m^2 at diagnosis) and required high doses of insulin (maximum 2.9 units/kg/d). Ongoing fluid retention was evident with worsening edema in the lower extremities and periorbitally, as well as marked weight gain (18.6 kg) over a six-week period following diagnosis. Furosemide therapy was therefore initiated.

Results: The edema significantly improved on furosemide, and treatment was discontinued after a four-week course with no subsequent recurrence of edema. In previously reported pediatric cases, patients have been between the ages of 10–16 years, are typically underweight at diagnosis, and in most cases required more than 1 unit/kg/d of insulin to achieve glycemic control. Of the cases we found, 71% spontaneously resolved and 29% required treatment with furosemide or ephedrine. The pathogenesis of insulin edema has been attributed primarily to a direct antinatriuretic effect of insulin on the kidneys and an increase in vascular permeability.

Conclusion: Insulin edema is a rare complication of DM1 that can occur in children and adults after initiating or intensifying insulin therapy. It is typically self-resolving, but cases requiring treatment have been reported. Furosemide for four weeks was an effective therapy in our patient.

P163
Diabetes ketoacidosis in L-asparaginase therapy

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Background: Diabetic ketoacidosis (DKA) as a complication of L-asparaginase therapy in children with acute lymphoblastic leukemia (ALL) is rare. We report a patient with B-C ell ALL who developed DKA while on treatment with L-asparaginase.

Case: E.C, 10 years old female admitted due abdominal pain. Patient is a diagnosed case of ALL presenting with body weakness, anemia and hematoma and was confirmed with flow cytometry since 2 months prior to her present admission. She has been receiving 8 doses of L-asparaginase and Prednisone (60 mg/day for a week then 40 mg/day for 3 weeks) for one month before her admission. One week prior to hospitalization, the patient had nocturia, polyuria and polydipsia. On the day of admission, she had sudden onset of dyspnea associated with severe abdominal pain and vomiting. She came in non-ambulatory, in cardiorespiratory distress with BP: 100/70 mmHg, HR: 150/min, RR: 60/min, Temp: 37.3°C. Pertinent physical exam showed signs of dehydration with abdominal tenderness, and signs of circulatory compromise. Fluid resuscitation was immediately given. The initial assessment at the ER was pancreatitis but the serum amylase and lipase were normal. Other lab work-ups showed blood glucose of 26.8 mmol/l (NV: 3.08–7.92), sodium at 115 mmol/l (NV: 132–143), potassium of 3.3, Chloride at 88 mmol/l (NV: 98–116). Blood gas showed ph of 7.1, a pCO_2: 50, HCO_3 at 3.7, and a base deficit of −22.5 mmol/l. Urinalysis showed +4 of glucose and +3 of ketones. The patient was then managed as a case of DKA and fluid resuscitation was continued and insulin drip was started. The HbA1c level at diagnosis was 11.4% but the C-peptide was normal. Patient condition improved and was discharged with insulin injection. The insulin was discontinued after completion of her induction phase and with normalization of blood glucose.

Conclusion: Early recognition of the precipitating factors for DKA is important to prevent L-asparaginase fatal consequences.

Poster Tour 21: Acute and Chronic Complications VI

P164

Combined use of urinary neutrophil gelatinase associated lipocaline (uNGAL) and renal resistance index as early predictors of diabetic nephropathy in children and adolescents with type 1 diabetes mellitus

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Background: Although diabetes related renal disease is rare in childhood, yet early subclinical abnormalities may be present many years before overt manifestations.
Objective: We aimed to evaluate the level of urinary neutrophil gelatinase-associated lipocalin (uNGAL) and the intrarenal resistive index (RI) as an early detector of diabetic nephropathy in children with type 1 DM.
Plan: Seventy patients with T1DM were recruited from diabetes clinic, Ain-Shams University Hospital, they were divided into 2 groups; Group 1: with normoalbuminuria (<30 mg/24 hrs) and Group 2: with microalbuminuria (30–300 mg/24 hrs). Controls consisted of 40 healthy children and adolescents matched in age, gender to the diabetic groups. Urinary NGAL was measured using ELISA and the doppler sonography of the interlobar arteries was performed for all participants.
Results: Patients with T1DM had a higher uNGAL level compared to controls ($p < 0.01$), with higher value in group 2 compared to group 1. The mean resistive index of the right and left kidneys was higher in diabetic groups compared to controls. UNGAL was positively correlated with both serum creatinine and urinary microalbumin excretion.
Conclusions: Our data suggest that; evaluation of uNGAL excretion and Doppler intrarenal RI could be a useful complementary test in the evaluation of early stages of diabetic nephropathy. Longitudinal monitoring may better define their relevance in progressive kidney disease.

P165

Type and frequency of reported gastrointestinal symptoms in pediatric & adult type 1 diabetes patients evaluated as part of the CD-DIET study

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Type 1 Diabetes (T1D) patients present with gastrointestinal (GI) symptoms related to diabetes complications but also to other associated pathologies.
Objectives: To describe GI symptoms reported by children and adult patients with T1D assessed as part of the screening phase of the Celiac Disease & Diabetes - Dietary Intervention & Evaluation Trial (CD-DIET).
Methods: Individuals aged 8–35 years with T1D duration ≥1 year completed a self-reported questionnaire - Gastrointestinal Symptom Scale (GISS) to qualify for CD serology screening (www.celiacanddiabetes.com). GI symptoms were evaluated over the previous 7 days, with an 8-item symptom questionnaire which included no symptoms, upper and lower abdominal pain, loss of appetite, nausea, loose or hard stool, vomiting and a Visual Analog Score (VAS, 0–100) to assess symptom severity. Age categories were defined as children ≤18 years and adults >18 years.

Results: 954 patients are reported: 751 (78%) children and 203 (22%) adults. Overall, 82.4% children and 81.1% adults reported no GI symptoms. In the group that had symptoms, adults most frequently reported lower (22.2%) and upper (20.6%) abdominal pain and loose stool (19%) while children reported lower (28.3%) and upper (22%) abdominal pain and nausea (16.1%) as main symptoms. Mean for the VAS score were low for both groups: 5.8/100 in children and 6.0/100 for adults. In subjects reporting at least one GI symptom, a correlation between number of symptoms and severity as measured by the VAS score was seen in children ($p = 0.019$) and adults ($p = 0.005$). Adults with ≥3 symptoms revealed a trend towards a greater increase in the VAS score ($p = 0.05$).
Conclusions: The frequency of GI symptoms was low in both pediatric and adult T1D subjects screened in clinic. The pattern of symptoms differed between the age groups and a stronger correlation was seen between number of symptoms and the severity in adults.

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ISPAD's HbA1c targets for children and adolescents are more realistic than ADA's

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Background: ISPAD's HbA1c targets are lower than ADA's, and the Swedish are even lower (<52–56 mmol/mol (<6.9–7.3%) in all age groups). Our aim was to look more closely into glycemic control, side effects and long-term complications in a population-based cohort to

see which HbA1c targets that can be attainable in different age groups.

Methods: Pumps, glucose meters and continuous glucose monitors were downloaded at a routine visit. Parents of pen users were asked for details on insulin doses. Data on severe hypoglycemia is recorded at each visit. Data on complications were taken from medical records. All 84 children and adolescents below age 18 with diabetes duration >0.5 years at our clinic were included.

Results: Pump use was 100% in <7 years, 50% in age 7–12 and 58% in age 13–17, the others used pens with MDI. See table for results. Two persons had simplex retinopathy (14.3 and 14.9 years duration), none microalbuminuria.

Conclusions: Young children have a better metabolic control than teenagers (6.8 vs. 7.6%, $p < 0.001$). ADA targets seem to be set unrealistically high in the era of intensive treatment 30 years after DCCT. It is quite possible to achieve HbA1c levels that are well within the ISPAD target of <7.5% (58 mmol/mol) for all age groups, and still have a low rate of severe hypoglycemia, resulting in low rates of long-term complications. The lower HbA1c targets of ISPAD and in Sweden have probably contributed in achieving the reported results.

	<7 years	7-12 years	13-17 years
n	11	28	45
Diabetes duration, years (range)	2.4±1.2 (0.7-4.0)	3.9±2.4 (0.6-9.1)	6.6±4.2 (0.5-14.9)
Insulin dose, U/kg/day	0.69±0.18 (0.37-0.92)	0.70±0.18 (0.42-1.11)	0.83±0.26 (0.37-1.54)
HbA1c, %	7.2±0.6	6.7±0.7	7.6±1.3
mmol/mol	55±7 (43-64)	50±8 (30-69)	60±14 (31-101)
ADA target	<8.5% (69 mmol/mol)	< 8.0% (64 mmol/mol)	< 7.5% (58 mmol/mol)
% within ADA target	100	93	44
ISPAD target	< 7.5% (58 mmol/mol)	< 7.5% (58 mmol/mol)	< 7.5% (58 mmol/mol)
% within ISPAD target	64	89	44
Unconsciousness /seizure*	0	0	2.0 (2)
Help from other*	26.6 (4)	15.7 (8)	15.6 (8)
DKA after onset*	0	0	0.5 (1)

*Episodes per 100 patient years (number of patients)

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Racial disparity between African-Americans and Caucasians in HbA1c variability and microalbuminuria risk among children with type 1 diabetes mellitus (T1D)

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Background: African-Americans (AA) with T1D have higher risk for complications compared to Caucasians (CC). HbA1c variability, as measured by Standard Deviation (SDA1c), influences T1D nephropathy. Whether AA children with T1D have higher SDA1c and/or higher risk for microalbuminuria (MAU) is unknown.

Objective: To assess the differences in SDA1c and MAU risk between AA and CC children with T1D.

Methods: Using retrospective chart review (1993–2009), children with T1D who had ≥4 HbA1c values, ≥2 HbA1c⁄yr, and ≥1 year of T1D were identified. MAU was defined as albumin excretion rate ≥20 mcg⁄min or urine albumin⁄creatinine ≥30 mg⁄gm in 2 of 3 consecutive samples.

Results: Among 1,198 patients included, 1,059 (88%) were CC and 91 (8%) AA (Table1A). AA had higher meanA1c & SDA1c ($p < 0.0001$). In addition, 74% AA vs. 47% CC had SDA1c above the cohort median of 1.47 ($p < 0.0001$). When stratified by both meanA1c and SDA1c, 64.8% of AA vs. only 27.6% of CC fell in the HighMean/HighSD group ($p < 0.0001$). Although MAU incidence was not different, time to MAU was significantly longer in AA. In Cox Proportional Hazard model (Table1B), SDA1c was associated with MAU (HR 1.52, $p = 0.0017$) and AA had lower risk compared to CC (HR 0.28, $p = 0.01$).

Conclusions: AA children with T1D, despite having higher HbA1c variability, have lower risk and take longer to develop MAU compared to Caucasians. This suggests the presence of possible protective factors in AA that need to be further explored in larger studies.

Table 1 Summary of patient characteristics (A) and results of the CPH model for MAU (B)

(A) Summary of Patient Characteristics

Variable	Entire Cohort (All, *n* = 1198)	Caucasians (CC, *n* = 1059)	African-Americans (AA, *n* = 91)	p-value AA Vs. CC
Gender (% Male)	53%	53%	48%	0.49
Age at T1D diagnosis (yrs)	9.1 ± 3.9	9.1 ± 3.9	9.21 ± 3.4	0.88
Duration of T1D (yrs)	5.7 ± 3.5	5.7 ± 3.5	6.1 ± 3.7	0.27
diagnosis	1.15	1.09–1.22	**<0.0001**	
MeanA1c (%)	8.8 ± 1.3	8.7 ± 1.1	10.5 ± 2	**<0.0001**
SDA1c (%)	1.7 ± 0.9	1.6 ± 0.9	2.2 ± 1.1	**<0.0001**
MAU Incidence	14.4% (*n* = 172)	15% (*n* = 156)	9% (*n* = 8)	0.12
Time to MAU(yrs)	4.6 ± 3.1 (*n* = 172) Min:1.0 Max: 15.2 Median: 4.0	4.6 ± 2.9 (*n* = 156) Min:1.0 Max: 15.2 Median: 4.0	7.5 ± 4.6 (*n* = 8) Min:1.1 Max: 13.3 Median: 7.5	**0.0081**

(B) Cox Proportional Hazard (CPH) Model for MAU

Variable	Hazard Ratio	95%CI	p-value
meanA1c	1.05	0.95–1.17	0.34
SDA1c	1.52	1.17–1.97	**0.0017**
Age at T1D			
Gender (M vs. F)	1.15	0.81–1.64	0.44
Post-hoc analysis for Race			
AA vs. CC	0.28	0.1–0.78	**0.02**
Non-AA vs. CC	1.29	0.56–2.98	0.55

Data in 1A are presented as Mean ± SD. Results in 1B are shown as hazard ratios for every 1-unit increase in each variable. The CPH model was designed using annually updated meanA1c series & SDA1c series and adjusted for gender, race, & age at T1D diagnosis; duration of T1D was used as the time variable. Analyses were done using SAS 9.2 and SPSS 20.

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A randomized controlled trial to evaluate the efficacy and safety of a gluten-free diet in patients with asymptomatic celiac disease and type 1 diabetes. Celiac disease and diabetes - dietary intervention and evaluation trial (CD-DIET)

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Background: Patients with Type 1 Diabetes (T1D) are at an increased risk for Celiac disease (CD) with 5–7% of T1D patients presenting with both conditions. Many patients present without symptoms and it is unclear whether the benefits of screening and treating asymptomatic individuals with a gluten-free diet (GFD) outweigh the harms of imposing an additional diagnosis in patients already living with T1D.

Objectives: The CD-DIET study will evaluate the impact of screening and dietary management in relation to clinically relevant outcomes, such as metabolic control, bone mineralization and well-being in T1D patients (aged 8–45 years) who are asymptomatic and have biopsy-confirmed CD.

Methods: CD-DIET is a multi-centre randomized controlled trial that will screen approximately 5,000 T1D patients at pediatric and adult Ontario healthcare institutions as part of the JDRF-Canadian Clinical Trial Network (JDRF-CCTN). T1D subjects, aged 8–45 years, identified with asymptomatic CD ($N = 200$) will be randomized to a dietary assignment of either the gluten-free diet treatment for one year, or to a control group with a usual gluten-containing diet. Primary outcome is HbA1c at one year. Secondary outcomes include bone mineralization measured by dual-energy X-ray absorptiometry (DXA) of the lumbar spine, frequency of hypoglycemic episodes, blood glucose variability (by continuous glucose monitoring); and self-reported health-related quality of life.

Results: To date 1,200 patients have been screened across Ontario, with a reported serology positivity rate of 3.4% in pediatric patients and 6.1% in adult patients. Currently subjects are being randomized into the intervention phase.

Conclusions: Results from the CD-DIET Study will provide evidence-based guidelines for clinical care, benefiting future individuals diagnosed with both T1D and asymptomatic CD, and will contribute to knowledge and management of this dual diagnosis.

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Estimation of recent past glycemic control using glycoalbumin/ A1C ratio

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Objectives: Long-term glycemic control has been assessed by A1C as a gold standard, usually measured every 3 or 4 months not enough to assess the recent past change. On the basis of each glycated protein half-life, we try to clarify whether glycoalbumin (GA)/ A1C ratio obtained by simultaneous measurement can estimate the glycemic control for approximately past 1 month.

Methods: Three hundred and six patients with T1DM obtained each individual intrinsic GA/ A1C ratio over time by the average value using simultaneous measurement of GA and A1C more than ten times. The SD scores (SDS) of GA/ A1C ratio were also applied. ΔA1C between A1C at estimation and that one month ago were individually evaluated totally 937 occasions by %ΔGA/A1C = (GA/ A1C ratio at estimation - each patients intrinsic GA/A1C ratio) ÷ each patients intrinsic GA/A1C ratio*100.

Results: The individual consistency of GA/ A1C ratio over time was confirmed by the product of any pairs between SDS at each term and average SDS in each patient with significant quadratic curves ($R^2 = 0.77$ to 0.81). If the increases of %ΔGA/A1C were divided into four groups, A:0~< +3%, B:+3~< +6%, C:+6~< +9% and D:≥+9%, average ΔA1C were revealed to be −0.03, −0.06, +0.16 and +0.25%, respectively. The worsened ΔA1C defined by ≥+0.2% one month apart were seen in 99 of 309 and 109 of 206 occasions in groups A+B and C+D, respectively, significantly different ($p < 0.0001$). If the decreases of %ΔGA/A1C were divided into four groups, E:0~>−3%, F: −3~>−6%, G: −6~>−9% and H: ≤−9%, average ΔA1C were revealed to be −0.07, −0.27, −0.19 and −0.28%, respectively. The improved ΔA1C defined by ≤−0.2% one month apart were seen in 53 of 174 and 100 of 248 occasions in groups E and F+G+H, respectively, significantly different ($p = 0.004$).

Conclusions: We suggest that the fluctuation of GA/ A1C ratio in our real practice may estimate glycemic control past one month, especially worsening and improving if ≥+6% and ≤−3% ΔGA/A1C, respectively.

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Comparison of β-cell function and complications among babies born to mothers with or without gestational diabetes mellitus - one year cross sectional study

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Objectives: Gestational Diabetes Mellitus carries significant burden on individuals and healthcare services through its complications affecting both mother and baby. This study was aimed to assess outcomes in babies born to GDM mothers like raised C-peptide levels, hypoglycemia, hyperbilirubinemia and macrosomia.

Methods: One year cross sectional study was conducted in the Department of Pediatrics. Babies born to mothers with and without GDM (n = 30 + 30) were included for the study.Mothers with predisposing illnesses and not willing to consent were excluded. HbA_{1C} and blood glucose levels were noted in GDM mothers. Estimation of Serum C-peptide levels, random blood glucose at birth, 1,4 and 6 hr of life and serum bilirubin done in moderately icteric babies of GDM mothers using Kramers scale, wherein RBS was done at birth in babies of normal mothers. Birth weights were recorded.

Results: The mean HbA1c levels in GDM mothers were 13.8 ± 2.34. In the present study, 28.9% mothers delivered late preterm babies compared to 4.4% in control group. Further, 60% babies were born by caesarean section in test group versus 6% in control (P = 0.002); 30% had birth weight more than 3,500 grams versus 3.3% control (P = 0.027) respectively. In the study group, hypoglycemia (the mean blood glucose levels 41.5 mg/dl) was noted in 83.3% versus 0% in Control ($p < 0.001$). All babies in the test group and control group had normal C-peptide levels. However, 66.6% of babies in the test group had C-peptide levels on higher normal as compared to 24.9% in control group (p = 0.001). In the present study, in the test group 66.33% had hyperbilirubinemia verses 30% in Control (P = 0.010).

Conclusion: Babies born to uncontrolled GDM mother are prone to have higher C-peptide level which may predict early onset of diabetes in these children. The complications such as hypoglycaemia, hyperbilirubinemia and macrosomia are higher in these babies and hence these children must be monitored closely after birth.

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Prevalence and awareness of functional and structural foot abnormalities in children and adolescents with type 1 diabetes

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Objectives: Literature shows that abnormal peripheral nerve conduction is seen in young insulin dependant diabetic patients. Therefore, ISPAD guideline 2011 advises annual podiatric screening to detect late-onset foot complications and identify other possible risk factors such as functional and structural foot abnormalities. Annual podiatric screening in children and adolescents with T1DM is uncommon in standard diabetes care in the southern part of the Netherlands. The aim of this study was to assess the prevalence and awareness of functional and structural foot abnormalities in children and adolescents with T1DM.

Research design and methods: All patients aged 0–18 years with T1DM were invited for a foot examination by a certified podiatrist. History of foot problems, foot care habits and awareness of long-term complications were assessed by structured questionnaires.

Results: Data were obtained from all 127 children. The average age of patients was 13 years with a mean duration of T1DM of 6.03 years (range 0–16 years). Mean HbA1c was 72.5 mmol/mol (1 SD = 17.5 mmol/mol). Sixty-nine percent of patients were treated with an insulin pump. Twenty-five percent (n = 4) children ever visited a podiatrist. Preliminary results show significant structural and functional foot problems in 94% (n = 15) of these children. Forty-four percent (n = 6) of the children lacked properly fitting shoes. None of the examined feet show long-term complications. The awareness level of the importance of foot care in relation to late onset complications was 88% (n = 14). Nevertheless, none of the participants checked their feet and shoes daily. Seventy-five percent (n = 12) of the patients checked their feet weekly.

Conclusions: Functional and structural foot abnormalities are a frequent problem in children and adolescents with T1DM. Although there is awareness of the long-term complications, little attention is paid to foot care. Education and implementation of the guideline are necessary.

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Evaluation of the erythropoietin responsiveness to anemia in type 1 diabetic children

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Background and aim of the work: Circulating erythropoietin (EPO) levels increase during hypoglycemia and may represent protective hormonal counter-regulatory responses. The aim of this study was to evaluate the EPO responsiveness to anemia in type 1 diabetic children.

Subjects & methods: Forty patients (20F/20M) with type 1 DM aged from 8–18 years with history of diabetes more than 5 years. They matched with age, BMI and genderhealthy 20 subjects (10F/10M) and 20 anemic non diabetic patients (10F/10M) were recruited for this study. All groups were subjected to estimation of Fasting Blood Glucose, serum EPO, ferritin, Total Iron Binding Capacity (TIBC), iron as well as well as Hemoglobin level, RBCs count and HbA1c in addition to moicro-albumin/Creatinine ratio.

Results: Fasting blood glucose concentration showed increase significantly in patients with type IDM than in the healthy controls and anaemic non diabetic group (P 0.001) serum EPO levels were significantly higher in patients with type IDM than in the healthy controls 0.05) while serum EPO levels showed statistically highly significant < (P

Difference between diabetics and anemic non diabetic group (49.85 ± 24.9 & 212.54 ± 65.31 respectively $p < 0.001$) diabetic patients had lower Hb levels than healthy one ($p < 0.05$) and non significant difference than anemic patients Also diabetic patients showed significant increase in ferritin and iron levels and significant decrease in TIBC levels than anemic patients group. there were statistically significant differences between diabetics with positive microalbuminuria (n-12) and diabetics with non microalbuminuria (n-28) as regarding HbA1c concentration Hb concentration with HbA1c concentration and highly significant positive significant positive correlation with microalbuminuria in diabetic group and showed inverse correlation with Hb levels in the same group.

Poster Tour 22: Genetics & Immunology III

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Prevalence of anti-insulin, anti-IA2, anti-GAD, anti-IR auto-antibodies and anti-Neu5Gc antibodies in type 1 and type 2 diabetic patients

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Objective: To establish the prognostic value of Anti-Neu5Gc abs in the development of type 1 and type 2 diabetes. Neu5Gc is a sialic acid synthesized by animals but not humans and birds. It can be incorporated in human cells and can trigger an immune response. Anti-Neu5Gc abs were detected by our team in diabetic patients, proposing it as a probable environmental factor.
Methods: Anti-Insulin/anti-IA2/anti-GAD/anti-IR auto-antibodies and anti-Neu5GcIgG/IgM/IgA antibodies were measured in 40 type 1 and 50 type 2 patients. A probable correlation between the development of anti-Neu5Gc antibodies and auto-antibodies was investigated to establish their prognostic value for the disease.
Results: IgG/IgM/IgA auto-antibodies as well as anti-Neu5Gc antibodies were present in 50% of type 1 diabetic patients. 88.9% of auto-antibody positive samples were also anti-Neu5Gc positive and 90.9% of auto-antibody negative were also anti-Neu5Gc negative. Anti-insulin/anti-IA2/anti-GAD/anti-IR IgG/IgM/IgA were present in 13.8% of type 2 diabetic patients, 83% of which were also anti-Neu5Gc positive.
Conclusion: The results indicate a correlation between the development of auto-antibodies and anti-Neu5Gc abs and introduce measurement of anti-Neu5Gc abs as a probable prognostic factor mainly for type 1 diabetes.

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Case report: infliximab induced partial remission of type 1 diabetes mellitus

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Case History: We present a case of remission of Type 1 Diabetes (T1DM) following infliximab for concurrent Juvenile Idiopathic Arthritis (JIA).

M was diagnosed with JIA aged 13 years. She was treated with methotrexate but required treatment escalation, including high dose steroids, leflunamide and etanercept, Aged 15 years, she developed polyuria, polydipsia and weight loss. Bloods: random venous glucose 23.1 mmol/l, ketones 0.4 mmol/mol, HbA1c 92 mmol/mol, anti-glutamic decarboxylase acid antibodies 26.0 u/ml (NR <5). Steroids were stopped. M initially declined insulin treatment but after progressive ketosis and symptomatic hyperglycaemia, biphasic insulin aspart twice daily was started. Steroid-induced diabetes was rejected due to the severity of hyperglycaemia, positive anti-GAD antibodies and progressive ketosis.

Following steroid discontinuation, Ms JIA flared severely and infliximab was started. Reduction in insulin doses and in HbA1c into the non-diabetic range was seen following commencement of infliximab (a chimeric TNF-α monoclonal antibody). After 14 months, Ms insulin was switched to daily insulin detemir, due to episodes of hypoglycaemia. The patient progressively decreased the frequency of insulin injections to 1 injection every ~10 days, as glucose levels normalised. An oral glucose tolerance test was performed. Insulin detemir was withheld for 48 h prior to the test. Two hour glucose was 7.5 mmol/l, with a physiological C-Peptide rise confirming endogenous insulin secretion. The subject subsequently discontinued insulin and has remained off insulin for over 6 years.
Discussion: We present a patient with T1DM complicating JIA, who demonstrated sustained long-term remission of diabetes following infliximab therapy. TNF-α is implicated in the pathogenesis of T1DM and previous case reports in adults with T1DM given anti-TNF therapy have reported partial remission of T1DM. We propose that infliximab may preserve pancreatic beta cell function in newly diagnosed T1DM.

P175

Organ-specific autoantibodies and celiac disease-associated antibodies in Libyan children and adolescence with type 1 diabetes mellitus

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Background: The association of type1 diabetes (T1DM) with autoimmune thyroiditis, celiac disease (CD) and Addison disease has been documented. Our aim is to determine, for the first time, the prevalence of different organ specific autoantibodies and levels of coexistence of these antibodies in Libyan type 1 diabetic patients.
Methods: We analyzed sera from 340 T1DM patients (54.4% females, mean age 11.8 ± 4.7 years with a mean duration of diabetes of 4.6 ± 4.0 years) for the prevalence and co-occurrence of the following antibodies: anti-GAD and anti-IA-2 antibody; anti-thyroglobulin (TG-Ab) and anti-thyroid peroxidase antibodies (TPO-Ab); anti-tissue-transglutaminase (tTG-Ab) and anti-endomysium antibodies (EMA).
Results: Overall frequency of T1D autoantibodies was as follows: 72% of patients were positive for GAD, 32.6% were positive for IA-2 and 78.2% of patients were positive for one or both of the anti-pancreas antibodies. For thyroid antibodies: 18.5% were positive for TPO-Ab and 7.9% were positive for TG-Ab. The prevalence of CD-associated antibodies (tTG-Ab) was 12.6% and 76.7% of these were also positive for EMA. Focusing on the coexistence of antibodies in our cohort; 24.4% of type 1 diabetic patients presented with at least two disorders and 1.8% of the subjects were positive for all investigated disorders. Overall, these autoantibodies are more frequently found in females ($p = 0.01$).

In literature; the prevalence of autoimmune thyroid disease and CD-associated antibodies in addition to T1DM related autoantibodies was 11.2% and 9.6% respectively, which are similar to those found in the present study. Patients who were positive for all three disorders in this study amounted to 1.8% which is lower compared to literature (6.6%).

Conclusions: It is important to adopt an antibody screening strategy for the presence of organ specific antibodies in T1DM patients and in particular these patients should also be routinely screened for autoimmune thyroid and celiac diseases.

P176
Gluten-free diet in newly diagnosed children with type 1 diabetes

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Objectives: Type 1 diabetes patients with remaining insulin production have lower incidence of hypoglycemia and long-term complications. Gluten is shown to influence the incidence of diabetes in animal studies. The aim was to test if gluten-free (GF) diet is acceptable at onset and to test the effect of GF on remission.

Methods: A pilot study of 14 individuals started on GF diet. Twelve have been followed for 12 months. Stimulated c-peptide was tested after mixed meal. The results were compared with two previous cohorts. Linear mixed models were used to analyse differences regarding c-peptide, insulin adjusted A1c (IDAA1c) and HbA1c.

Results: The majority of patients are interested in intervention to preserve beta-cells, GF diet though seems for many overwhelming to start with at onset, of those who starts on GF few a capable of assuring 100% adherence to GF over 12 months. The children on GF had significantly lower HbA1c ($p < 0.001$) and IDAA1c ($p < 0.01$) during the first year, compared to previous cohort, but no difference in c-peptide levels. In addition blood glucose level was higher after mixed meal in the Danish cohort compared to those on GF diet. If remission is defined by IDAA1c GF diet significantly increases the length of remission; whereas if remission is defined by c-peptide there is no significant difference.

Conclusion: Despite the study is underpowered to show differences in length of remission, there was a significantly lower IDAA1c indicating that gluten-free diet has some effect on outcome. The higher glucose after mixed meal may indicate that those in the gluten-free trial were less stimulated by the mixed meal or they improved their insulin sensitivity. Diet composition especially low carbohydrate content is another potential factor influencing IDAA1c. GF diet is feasible and diet significant effects outcome during the first year after onset. However, the effect of the diet to preserve the residual beta-cell function in humans remain to be clarified.

P177

Abstract withdrawn

P178
Transient neonatal diabetes mellitus (TNDM) caused by activating novel KCNJ11 gene mutation and succesfull transfer to sulphonylurea therapy

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Introduction: Neonatal diabetes mellitus (NDM) is a rare monogenetic form of diabetes that presents within the first six months of life. Permanent NDM requires life-long treatment while TNDM resolves few weeks or months after treatment initiation, with relapse occuring in around 50% of patients during adolescence. In more than 70% TNDM is due to over-expression of paternally expressed imprinted genes of chromosome 6q24. In less than 30% of TNDM cause of the disease are mutations in ABCC8, or in KCNJ11 gene. We present female patient with TNDM caused by KCNJ11 novel gene mutation and succesfull transfer to sulphonylurea therapy.

Case report: A 5-month old female infant was admitted into our hospital in the stage of severe diabetic ketoacidosis. After 2 months of insulin therapy the patient entered remission requiring insulin therapy only in one occasion during pneumonia treatment. At the age of 10 years, the patient entered relapse first manifested by increase in fasting plasma glucose above 7.0 mmol/l. Nutritional dietary managment was continued and HbA1c levels were between 6.2–7.4%. During the follow-up b-cell antibodies were negative, with low levels of C-peptide in the serum and urine. At the age of 12 years, intensive insulin therapy was introduced. With the total daily insulin dose of 0.85 U/kg/day adequate diabetes control was not achieved and HbA1C levels were between 7.4–12.7%. During the follow-up there was no record of diabetic ketoacidosis or severe hypoglycemia. At the age of 22 years genetic testing found a novel KCNJ11 missense mutation on exon 1 (c.145A>T; p.I49F) and confirmed TNDM due to a activating mutation in the Kir6.2 subunit of the K-ATP channel. The patient was transferred to sulphonylurea therapy according to the Exeter TNDM Transfer Protocol resulting in normalisation of HbA1C and C-peptide.

Conclusion: Using genetic analysis to confirm monogenetic form of diabetes changes the therapeutical approach with positive effect on disease control and course.

P179
MODY2 with a novel mutation of glucokinase gene in a Chinese boy and the clinical follow-up

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Objective: To explore the clinical characteristics of MODY2 and diagnostic methods using molecular analysis.

Methods: The clinical and follow up data of 1 patient with MODY2 were reviewed. GCK gene mutational analysis was performed by PCR and direct sequencing in the proband and his family members.

Results: The 9 years and 6 months old boy was referred to our department for short stature and mild hyperglycemia. His fasting blood glucose was elevated at 7.4–7.8 mmol/l, hemoglobin A1C 6.7%. His height was 122 cm (−2SD), weight 25 kg (−1SD), BMI 16.8 kg/m^2. His physical exam was unremarkable without dysmorphic features or acanthosis nigricans. The oral glucose tolerance test (OGTT) showed fasting glucose 8.17 mmol/l, insulin <2.0 μIU/ml, 2 h glucose 8.69 mmol/l, insulin 5.06 μIU/ml. The boy was treated with insulin injection for half a year. His fasting blood glucose was stable at 5.6–8.5 mmol/l, hemoglobin A1C 6.7–6.8%. His mothers fasting blood glucose was 6.86 mmol/l, OGTT 2 h blood glucose 10.36 mmol/l, hemoglobin A1C 6.8%. GCK gene sequence revealed a novel GCK mutation c.34_44+15del26 in the proband and his mother, which was co-segregated with diabetes. The boy shifted from insulin injection to diet and exercise after the diagnosis of MODY2 was confirmed. Being followed up for 2 and a half years, his hemoglobin A1C was stable at 6.8–7.1%.

Conclusion: Testing fasting glucose in apparently unaffected parents helps to early recognition of MODY. The clinical features in MODY that suggests the diagnosis of MODY2 are persistent and stable fasting hyperglycemia over a period of months or years and small blood glucose increment (less than 3 mmol/l) after an OGTT (2 h glucose - fasting glucose). We identified a novel c.34_44+15del26 mutation in GCK gene which co-segregates with diabetes phenotype in this family. The identification of GCK mutation in MODY2 helps to optimize the treatment.

P180
Neonatal diabetes mellitus mimicking perinatal asphyxia: a case report

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Introduction: Neonatal diabetes mellitus (NDM) is a rare form of hyperglycemia occurring within the first month of life, lasting for at least two weeks and requires insulin therapy to maintain normal blood glucose level. It could be permanent or transient and little is known about this disease in Nigeria.

Methods and results: We report a case of transient NDM in a three day old male neonate who presented with refusal to suck since birth, fever, fast breathing, weight loss, dehydration and depressed primitive reflexes. He was initially managed for severe perinatal asphyxia but following blood glucose level that remained very high despite rehydration with normal saline and low C-Peptide levels, the diagnosis was changed to neonatal diabetes mellitus and he was placed on intravenous and later subcutaneous insulin for 32 days, when blood glucose level reduced to between 3.6 and 7.5 Mmol/l and insulin was discontinued.

Discussion and conclusion: NDM shares similar clinical features with other neonatal illnesses so that it can only be diagnosed with high index of suspicion and very low threshold for blood glucose estimation in patients admitted into neonatal units in resource poor countries.

Poster Tour 23: Epidemiology III

P181
Comparison of HbA1c and OGTT to diagnose diabetes in Korean children

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Objectives: Recently, the American Diabetes Association introduced HbA1c test for diagnosing diabetes with a cut point of ≥6.5% in addition to criteria based on either fasting plasma glucose (FPG) or 2 hour plasma glucose after on oral glucose tolerance test (OGTT). The aim of this study was to evaluate the correlation between plasma glucose (FPG and 2-h OGTT) and HbA1c for diagnosing diabetes in Korean children.
Methods: A total of 147 children without known diabetes completed an OGTT and HbA1c sampling between 2010 and 2013. Diabetes was defined as a 2-h OGTT ≥200 mg/dl, FPG ≥126 mg/dl or HbA1c ≥6.5%.
Results: Of 52 children with diabetes, 46 (88.5%) were diagnosis by only HbA1c, 44 (84.6%) by 2-h OGTT, and 31 (59.6%) by FPG. Diagnostic sensitivity and specificity of diabetic criteria was 88.5% and 100.0% for HbA1c: 84.6% and 100.0% for 2-h OGTT and 59.6% and 100.0% for FPG. Substantial agreement existed for HbA1c and FPG criteria (κ coefficient = 0.670), HbA1c and 2-h OGTT criteria (κ coefficient = 0.776) and HbA1c and FPG and/or 2-h OGTT criteria (κ coefficient = 0.793) for diagnosing diabetes. HbA1c had the highest estimated area under the curve (AUC) among 3 diagnostic criteria. The AUC of HbA1c for identifying diabetic subjects according to FPG or 2-h OGTT criteria was 0.961 and 0.942. And, we found that an HbA1c level of 6.15% had higher sensitivity than 6.5% and improved positive predictive value and negative predictive value.
Conclusion: As a screening test for diagnosing diabetes, HbA1c is useful better than FPG and 2-h OGTT in children and adolescents. But, because of low sensitivity of HbA1c ≥6.5%, we recommend that children with HbA1c of 6.15–6.5% should be tested OGTT to confirm diagnosis of diabetes.

P182
Screening intervals for coeliac disease in youth with type 1 diabetes: systematic review

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Objectives: To systematically review the incidence and prevalence of coeliac disease (CD) in type 1 diabetes (T1D) and determine the optimal screening frequency for CD.
Methods: Systematic review of longitudinal cohort studies screening for coeliac autoimmunity in T1D. Outcomes examined were: prevalence, incidence and cumulative incidence of biopsy proven CD. Data sources included MEDLINE, EMBASE and the Cochrane Library to 31 Dec 2013.
Results: 402 non-duplicate citations were identified, with 45 studies selected for full-text review. Nine longitudinal cohort studies met the inclusion criteria involving 11,156 young people aged <21 years at diabetes diagnosis. No adult studies were identified. Median follow up was 6 years, range 1–18 years. The proportion of patients screened declined from 50% at the end of year 1 to 35% ($p < 0.001$) at the end of year 5, and 12% at the end of year 10 suggesting under ascertainment of cases by the investigators. There were 587 cases of biopsy-proven CD of whom 41 were diagnosed prior to T1D [pooled prevalence 5.3%, 95% CI (4.8–5.7)]. Of the remaining 546 CD cases, 40% were diagnosed within 1 year of T1D, 55% within 2 years and 79% within 5 years of T1D [median age at CD diagnosis was 9.7 years [IQR 9.4–10.7]. Cumulative incidence was 19.8 per 1,000 patient years at 1 year, 26.8 at 2 years and 40.0 at 5 years.
Conclusions: CD is relatively common in young persons under 21 years of age with T1D; the risk is greatest within 2 years of diabetes onset but 21% are diagnosed after more than 5 years diabetes duration. We recommend screening at diabetes diagnosis, annually for the first 2 years, and again at least once before 5 years of diabetes duration. Whilst CD can be diagnosed beyond 10 years after diabetes diagnosis, more research is required to establish the optimal screening frequency beyond 5 years of diabetes duration as well as the optimal screening frequency in adults with T1D.

P183
Relationships between socioeconomic conditions and the spatial distribution of the incidence of type 1 diabetes in childhood in North Rhine-Westphalia, Germany

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Objectives: To analyze the relationships between socio-economic conditions (SEC) and the incidence of type 1 diabetes (T1D) in children younger than 15 years between 1996 and 2012 in North Rhine-Westphalia (NRW), the most populated German federal state.
Methods: Data sources were the INKAR database and the Regional Database Germany provided by Federal Offices and the NRW Diabetes Incidence Register. Incidence and confidence interval (95% CI) were calculated per 100,000 person-years (py). Descriptive statistics were calculated to characterize the regional distributions of T1D and SEC over 54 districts. Associations between the incidence rate and various SEC (including the German Index of Multiple Deprivation (GIMD)) were assessed by simple Poisson regression adjusting for age (0–4, 5–9, 10–14 years) and sex. Relative risks (RR) of type 1 diabetes associated with SEC with 95% CIs were estimated in terms of an increase by one standard deviation of the respective SEC.
Results: Between 1996 and 2012, 10460 cases aged 0–14 years (53% boys) with incident T1D were registered in NRW. The incidence rate was estimated to be 22.5 (22.1; 22.9). The mean of regional incidences was 22.4, the range was 8.5–39.8. The GIMD (RR: 0.976 (0.955; 0.998)), the rates of non-German nationals (0.951 (0.932; 0.970)), incoming migrants (0.960 (0.940; 0.980)), welfare recipients (0.971 (0.951; 0.990)), unemployment (0.975 (0.955;

0.996)), and population density (0.963 (0.943; 0.984)) were inversely associated with the T1D incidence. An index of low professional training (1.036 (1.016; 1.057)) and living space per person (m^2 per person) (1.039 (1.016; 1.063)) were positively associated (all $p < 0.05$), and income per resident (1.007 (0.985; 1.030)) was not associated with the incidence ($p = 0.521$).

Conclusions: The results suggest that the risk of T1D is lower in children living in socially deprived and more densely populated areas and in regions with a higher proportion of non-German nationals.

P184
Environmental factor(s) affecting the age of type 1 diabetes onset in Japanese children

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Objectives: The downtrend in the age of type 1 diabetes onset was reported around the world. The reason is unclear yet. To clarify environmental factor(s) affecting the onset age of type 1A diabetes (T1AD), we performed a statistical examination.

Methods: Our subjects were 277 T1AD patients registered with the Japanese Study Group of Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT). The age at onset of all patients was 16 years and under. Median age at onset was 6.9 years old. We performed the linear regression analysis; age at T1AD onset as the objective variable, and various environmental factors as the explanatory variables.

Results: Among explanatory variables, we found that the presence or absence of older sibling and the beginning period of baby food were related to the age at onset. Therefore, regarding the presence or absence of older sibling, age at onset of the presence group ($n = 162$) is higher than the absence group ($n = 115$) (the regression coefficient = 0.996, $p = 0.028$). In addition, regarding the beginning period of baby food, age at onset of the 4–5 months old group ($n = 126$) and the 6 months and later group ($n = 68$) were each lower than the 3 months and below group ($n = 65$) (the regression coefficient = −1.103, −1.982, $p = 0.041$, 1.38E-03, respectively).

Conclusions: We revealed that the age of T1AD onset was lower in the case of the absence of an older sibling, and the later the baby started eating baby food, the lower the age of T1AD onset became. These results suggest environmental factors in early childhood relate to the onset age of T1AD. The result of a presence or an absence of an older sibling is explicable by the Hygiene hypothesis. As regards the baby food, most Japanese baby food are rice gruel and gluten-free. It is considered that the beginning period of baby food gets involved with the maturation of the immune system.

P185
The effect of primary care access on DKA risk at disease onset: a population-based study

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Diabetic Ketoacidosis (DKA) at disease onset is an avoidable complication of diabetes (DM). Factors such as low socioeconomic status, younger age and decreased regional incidence of type 1 diabetes are associated with DKA at disease onset. Studies have shown that primary care is important in improving health outcomes in children with chronic diseases. Little is known about the relationship of having a usual provider of primary care and DKA at disease onset. We determined if having a usual provider of primary care reduces the risk of DKA at disease onset in a retrospective cohort study of children (ages 1–17 years) diagnosed with DM between 2002 and 2012 in Quebec, Canada. We used population-based linked health administrative data (registered persons data, physician claims and hospital admissions data). We used Poisson regression with robust error variance to examine the relationship between our exposure (having a primary care provider) and outcomes (DKA at diagnosis), adjusting for confounders (age at diagnosis, sex, geographic region and socioeconomic status). Our cohort consisted of 4739 new cases of DM during the study period. Of these, 1,196 (25%) presented with DKA. In the multivariate Poisson regression, the risk of DKA at DM onset increased by 2% per year during the study period (Rate ratio [RR] 1.02, 95% Confidence Interval [CI] 1.01, 1.04). Further, those with a usual provider of primary care were 22% less likely to have DKA at disease onset (RR 0.78, 95% CI 0.69, 089). Younger age at diagnosis was also associated with DKA at disease onset. Risk was highest in children ages 1–2 years compared to ages 12–17 years (RR 2.1, 95% CI 1.8, 2.5). A significant number of Canadian children continue to present with DKA at disease onset and factors such as having a usual provider of primary care mitigates this risk. Our findings have important implications for human health resource planning and for preventing this frequent acute complication.

P186
Increasing incidence of type 1 diabetes in children aged 0–14 years in Oran, Algeria (1978–2012)

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Aim: The aim of this study was to determine whether or not the pattern of increase in the incidence of type 1 diabetes (TD1) in children aged less than 15 years varies with age at onset in Oran (Algeria) over a 34 year period.

Methods: To determine incidence, all new cases of TD1 with onset under 15 years of age from 1978 to 2012 were obtained from the diabetes register of Oran department, validated since 1978. Incidence was expressed as the crude value and as standardized incidence. To determine prevalence, all cases of TD1 in children aged 0–14 years at 31 December 2012 were obtained.

Results: One thousand and five hundred and ninety (1,590) cases were identified between January 1978 and December 2012. No significant difference between males and females in the incidence of TD1 was observed (sex-ratio = 0.98). The annual incidence rate passed from 12 per 100,000 during 1993–2002 to 21 per 100,000 in

2003–2012. The incidence was higher in 2012 with 27 per 100,000 children. The average annual increase in incidence was 7.5%. The incidence was significantly associated with age: annual incidence rate at 28/100,000 in those aged <5 years and 27 per 100,000 and 25 per 100,000 for those aged 5–9 and 10–14 years, respectively (Fig. 1). At 31 December 2012, prevalence of DT1 in Oran was 126 per 100,000 children aged 0–14 years.

Conclusion: These results indicate significantly increasing of the incidence of DT1 in children in Oran, with an even steeper increase among younger children.

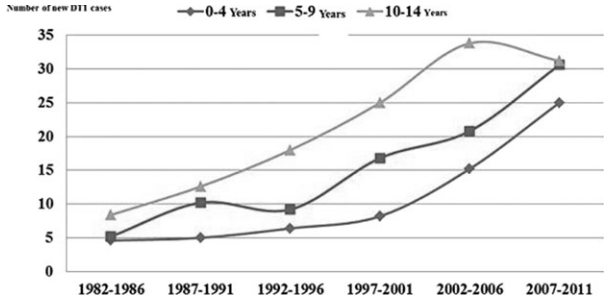

Figure 1. Incidence of DT1 according to age groups.

P187

Dramatic increase of type 1 diabetes mellitus incidence in Chilean children between 2006 and 2012

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Objective: Type 1 diabetes mellitus (T1D) incidence in children varies across regions and countries, but there are no recent epidemiological studies of T1D incidence in South America. Between 1990 and 1999 the DIAMOND study showed an incidence of 6–7/100,000 in Chilean children. The objective of this study is to determine the incidence of T1D in children in Chile between 2006 and 2012.

Methods: We reviewed mandatory notifications of T1D in Chiles public health system in population younger than 20 years between 2006 and 2012. Data were obtained from the Chilean Ministry of Health. Data were analyzed by gender, age, region and season. Time trends of T1D incidence were analyzed by linear and exponential regressions.

Results: A total of 2,435 T1D cases in children were observed from 2006 to 2012. Median age was 14 (IQR 10–17) and 51% were male. Highest caseload of T1D incidence occurred in winter (28%) and lowest in summer (23%). The average annual T1D incidence was 9/100.000, with an increase from 5.7 in 2006 to 12.1 in 2012 (β 1.1, 95% CI 0.95–1.3, $p < 0.001$) with no significant difference between genders. A significant increasing linear trend of T1D incidence was observed in age groups 5–9 (β 1.59, 95% CI 1.42–1.77, $p < 0.001$) and 10–14 (β 2.39, 95% CI 2.0–2.79, $p < 0.001$), but not in age group 15–19 where a non-significant decreasing trend was observed (β −0.33, 95% CI −0.81 to 0.15, $p = 0.14$). Trend in incidence in children younger than 5 years was better modeled to an exponential curve with an increase from 0 to 40 cases from 2006 to 2012 (β 1.74, $p = 0.002$). There was no association between latitude and T1D incidence. The lowest regional incidence of T1D was observed in the Araucania Region which has the largest population of indigenous Mapuche ethnicity in Chile.

Conclusions: Incidence rates of T1D in Chile are rapidly increasing, particularly in younger age groups. The low rate of T1D observed in regions with high Mapuche ethnicity rates may suggest protective genetic factors.

P188

Abstract withdrawn

Poster Tour 24: Psychosocial Issues in Diabetes III

P189

The Sugarsquare study: a multicenter randomized controlled trial on a web-based patient portal for parents of a child with type 1 diabetes

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Objectives: Raising a child diagnosed with type 1 diabetes (T1D) can have a profound impact on parents. Having to combine the demands of the disease and treatment with every day parenting tasks can be overwhelming. In a previous study we found that, to support parents in coping with the disease and self-management in everyday life, healthcare professionals could address this impact in consultations, fit the treatment to the childs developmental level and parents level of experience in disease-management, provide up-to-date disease information, organize local peer support, and be transparent about accessibility. This study encompasses the assessment of feasibility and efficacy of a web-based patient portal, called Sugarsquare, which provides online parent-professional communication, online peer support and online disease information.
Methods: The assessment will be conducted by means of a multicenter randomized controlled trial, in 7 clinics for diabetes care in the Netherlands. The 189 included participants are all parents of a child with T1D under the age of 13. Participants were recruited offline from one of 7 participating clinics in the Netherlands. User statistics were gathered throughout the study-period for feasibility, which was assessed in terms of acceptability (did recipients use Sugarsquare?), demand (did recipients continue to use Sugarsquare?), practicability (can recipients access Sugarsquare?) and integration (does using Sugarsquare fit with international guidelines for diabetes care?). For efficacy (what is the effect of using Sugarsquare on recipients?), self-reported parenting stress (PSI-SF) was assessed at baseline (T0) and at six (T1) and twelve (T2) months following baseline.
Results and conclusions: In the presentation, results of a multilevel analysis and conclusions will be presented along with an overview of Sugarsquare and best practice of usage of a web-based patient portal in pediatric diabetes care.

P190

The influence of a friend's participation in a one month psychoeducational group program for adolescent girls with type 1 diabetes

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Objective: In adolescence, peer influence on health attitudes and behaviors increases (Tindley, 1992). We measured the effect over 6 months of participating with a friend who does not have diabetes in a 1 month psychosocial educational group program for adolescent girls with type 1 diabetes.
Methods: Participants (M = 13 ± 1.5 years) were randomly assigned to participate with a friend (intervention; n = 8) or individually (control; n = 10). The program consisted of four 2-hour sessions led by a clinic nurse and social worker. Topics included diabetes management, problem solving skills, conflict resolution, and stress management. Outcomes included the Paediatric Quality of Life Inventory (PedsQL; Varni et al., 2003), Diabetes Social Support Interview (DSSI; Bearman & La Greca, 1995), and HbA1C at baseline, 3, and 6 months post-intervention.
Results: There was no significant difference in quality of life (QoL; $p > 0.05$). There was a small trend to improved QoL in the control group and QoL slightly increased then decreased at 6 months in the intervention group. Overall QoL was moderate in both groups. In both groups results of the DSSI indicated that the majority felt that their friends and family were supportive, particularly in regards to exercise and blood glucose testing. No significant change in HbA1C ($p > 0.05$) was noted.
Conclusion: The trend towards improved QoL in the control group suggests that participating in a psychoeducational program for adolescents with type 1 diabetes may be more beneficial than participating with a friend who does not have diabetes. Moderate scores in QofL in both groups were concerning. Future programs should pay particular attention to mental health modules.

Table HbA1C and QoL Results

	Pre-intervention	3 months post-intervention	6 months post-intervention
Control HbA1C	8.4 (±0.2)	8.2 (±0.9)	8.3 (±0.4)
Intervention HbA1C	8.6 (±0.6)	8.5 (±1.6)	8.8 (±0.1)
Control PedsQoL	67.86 (±16.88)	68.21 (±15.08)	70.89 (±13.69)
Intervention PedsQoL	65.43(±16.75)	68.95(±18.07)	57.37(±16.36)

P191

Parental collaboration in diabetes care in children with type 1 diabetes mellitus (T1DM) on multiple daily injections (MDI) versus continuous subcutaneous insulin infusion (CSII)

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Objectives: Assessing the degree of involvement of caregivers and children with Type 1 Diabetes Mellitus (T1DM) in diabetes care, differences in the degree of involvement based on the type of insulin administration (multiple daily injections: MDI or continuous subcutaneous insulin infusion: CSII), and its effect on glycemic control.
Methods: This prospective cross-sectional study was performed using a Diabetes Family Responsibility Questionnaire (DFRQ). Participants with T1DM, ages 6–13 years were recruited. All caregivers (n = 99) and participants between ages 11–13 (n = 49) completed the DFRQ.
Results: A significant difference was found between the CSII versus MDI groups' responses for question B (who boluses/injections

insulin) based on both participants ($p = 0.012$) and caregivers responses, ($p < 0.001$). Agreement between participants and caregivers for ages 11–13 ($n = 49$ pairs) was in the fair agreement category for all questions combined (Landis et. al Biometrics, 1977). The difference in HbA1C based on the degree of parental involvement in diabetes care-related tasks was insignificant (caregivers, $n = 99$, $p = 0.34$, participants, $n = 49$, $p = 0.93$).

Conclusions: Patients with T1DM on CSII acquire responsibility for their diabetes care more frequently before age 14 compared to the ones on MDI. Caregivers and patients between ages 11–13 disagree significantly in reporting the degree of parental involvement in diabetes care-related tasks. Based on reported degree of parental collaboration, HbA1C did not differ significantly however the consequences of independence before appropriate age in diabetes care are yet to be determined in longitudinal studies.

Table DFRQ

QA: Remembering to take insulin
QB: Giving insulin injection/bolus
QC: Rotating insulin injection/infusion site
QD: Remembering to check BS
QE: Noticing early signs of low BS
QF: Carrying a form of sugar for low BS
Answer key:
1: almost always by parent/caregiver
2: shared responsibility
3: almost always by patient

P192

Treatment among young people with diabetes. Importance of adaptative response

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Puberty is a period of major changes that set the path from childhood to adulthood. The manner in which this period of life is faced and managed determines whether or not an individual is prepared and able to undertake the responsibilities of adulthood. The goal of the diabetes care team is to ensure that adolescents will become adults who are: socially adapted, physically capable, metabolically controlled, and psychologically stable. To obtain maximum patient cooperation, the diabetes care team should answer the following questions: Will our young patient accept the new changes that diabetes will bring into his/her life? What does he/she think about this new condition? What does he/she think about future? What does he/she expect from the social environment? What can the health providers do to improve his/her quality of life? What can our young patient do to improve his/her own quality of life?

Objective: In order to detect factors that may influence in treatment compliance of our patients, we made a multi-centre study analyzing the adaptative answer of a group of 90 young patients, aged from 10 to 25 years. We implemented a questionnaire of 32 questions, previously made and validated at our centre measuring the total adaptative answers, and separated in different aspects: Assessment of the severity of the disease. Obstacles in the accomplishment of treatment; Health conduct; Nuisances associated to the disease; Psychological repercussion;

Results: Metabolic control was similar according to age, time of diabetes and educational level. Those with better adaptative responses had better control $p < 0.003$ and stable family $p < 0.05$

Conclusions: Improving adaptative response of people with diabetes influence positively in metabolic control.

P193

Assessment of parent-proxy and patient-reported quality of life (QoL) in youth with type 1 diabetes (T1D): the global TEENs Study

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Objectives: TEENs is the largest worldwide (20 countries), contemporary, observational study of T1D ($N = 5960$) in 8–25 year old (y/o) patients. QoL and metabolic control are reported.

Methods: 219 centers collected data by interview, record review and participant/parent survey from 3 groups: 8–12 y/o; 13–18 y/o; 19–25 y/o. A1c was measured uniformly using A1cNow™ (Bayer); A1c targets defined as <7.5% (ISPAD) for ≤18 y/o and <7.0% (ADA) for >18 y/o. QoL was assessed with the PedsQL 3.0 Diabetes Module (5 subscales, scored 0–100, higher score=better QoL) by patients and parents reporting perceptions of their childs QoL. Associated factors were identified by logistic regression.

Results: QoL scores (child and parent) were higher in youth at A1c target across all ages. Parents tended to report lower QoL for their child than youth themselves (table).

Associations with higher parent-reported QoL ($p \leq 0.006$ on ≥3 subscales) included: exercise (>30 min/week), BGM monitoring (≥5 times/day), diet management (based on carbohydrate counting). Associations with lower parent-reported QoL ($p \leq 0.026$ on ≥3 subscales) included: female youths; presence of eating disorders; diet management (based on sugar avoidance); missing school (>10 days/years).

Table: PedsQL Diabetes Module subscale scores by age group and A1c target attainment

	8–12 y/o (N=1723)		13–18 y/o (N=2854)		19–25 y/o (N=1382)	
PedsQL Mean (SD)	A1c at target n=553 (32%)	A1c > target n=1170 (68%)	A1c at target n=833 (29%)	A1c > target n=2021 (71%)	A1c at target n=260 (19%)	A1c > target n=1122 (81%)
N (minimum)						
Child self-report	543	1146	808	1994	248	1059
Parent report	535	1142	746	1857	67[1]	256[1]
Diabetes symptoms						
Child self-report	69 (14)	64 (14)*	69 (14)	63 (15)*	68 (16)	62 (15)*
Parent report	67 (13)	62 (14)	68 (15)	61 (15)	68 (18)	63 (17)
Treatment barriers						
Child self-report	80 (18)	73 (21)*	77 (19)	71 (20)*	80 (18)	71 (20)*
Parent report	70 (20)	64 (21)	69 (21)	62 (22)	71 (21)	66 (21)
Treatment adherence						
Child self-report	85 (14)	80 (17)*	82 (16)	77 (17)*	80 (17)	72 (19)*
Parent report	80 (15)	76 (18)	78 (17)	72 (19)	79 (18)	71 (19)
Worry						
Child self-report	73 (24)	65 (26)*	65 (23)	59 (25)*	57 (24)	53 (24)*
Parent report	58 (26)	53 (27)	58 (26)	54 (27)	57 (26)	51 (26)
Communication problems						
Child self-report	77 (23)	73 (26)*	80 (22)	75 (24)*	83 (22)	77 (23)*
Parent report	77 (26)	69 (28)	74 (27)	69 (28)	80 (23)	75 (27)

*Differences in child self-reported PedsQL scores between A1c at target/not at target were statistically significant for all subscales in all age groups ($p<0.05$, analysis of variance)
[1]A limited number of parents/guardians of patients aged 19–25 completed PedsQL parent report

[PedsQL Diabetes Module subscale scores]

Conclusions: Youth at A1c target reported higher QoL than youth above target for all subscales and age groups. Parents reported lower

QoL for their child than youth themselves, with lower worry and treatment barrier subscale scores.

Study sponsored by Sanofi.

P194

Parents' experiences, needs and preferences in pediatric diabetes care: suggestions for improvement of care. A qualitative study

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Objectives: Parents who are raising a child with type 1 diabetes (T1D) are supported best when diabetes care fits their needs and preferences. These are, however, sparsely reported in literature. To fill this gap, experiences, needs and preferences of parents of a child with T1D concerning pediatric diabetes care were investigated, with special interest for parents attitude towards using the Internet in fine-tuning care.

Methods: Seven focus group interviews were conducted in seven clinics for diabetes care in the Netherlands. Participants were parents of 35 children with T1D, aged 2 to 12. Focus group interviews were transcribed verbatim. Transcripts were inserted in Atlas-TI and analyzed according to steps of thematic content analysis.

Results: Analyses revealed that parents experience that raising a child with T1D profoundly impacts their lives, resulting in feelings of uncertainty. They claim that, especially in the period around diagnosis, due to lack of useful social support, the diabetes care team is their major source of support. Parents express their need for tailored care, disease information, peer support and accessibility of the team. They report that the Internet can be used for fine-tuning and delivery of care.

Conclusions: The focus group interviews provided useful suggestions for tailoring care to parents experiences, needs and preferences: actively address the daily impact of diabetes in consultations (1), fit the treatment to the childs developmental level and parents level of experience in disease-management (2), provide up-to-date disease information (3), organize local peer support (4) and be transparent about accessibility (5). These findings will be leading in ongoing research, in which a web-based patient portal is developed and tested for efficacy and feasibility.

P195

Factitious hypoglycaemia due to exogenous insulin 'Don't forget the skin'

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Introduction: Serum C Peptide is traditionally used to diagnose factitious Hypoglycaemia due to exogenous Insulin. However in our case we were able to initiate child protection work up on the basis of skin marks which were noted during childs admission in hospital.

Case report: 2 year old male presented with 3 days history of diarrhoea and vomiting. Past history and examination were unremarkable. Mother had gestational diabetes and was on insulin during pregnancy whilst Grandmother who died 1 month previously had type 2 diabetes managed with Insulin. He was admitted and commenced on ORS. His blood glucose (BG) dropped to 2.8 mmol/l. He had Hypoglycaemia screen and BG improved with sugary fluids. He continued good oral intake and was discharged the following day. He had 2 further repeat admissions with history of poor oral Intake, floppy episodes, none of which were witnessed on the wards. On 3rd readmission he was kept in for prolonged observation during which he was noted to have low BG (2.6 mmol/l) with low blood ketones of 0.3 mmol/l. He required >8 mg/kg/min of intravenous glucose to maintain euglycaemia. This was consistent with hyperinsulinism. Hypoglycaemia screen was repeated. Marks which matched imprints made by an insulin pen, were noted on the legs and arm of the child the next day. We instituted strict 1:1 nursing to ensure mother and other family members had only supervised access to child and his BG improved. Police Protection Order was put in place. Results showed Insulin >100 mU/l, C Peptide <50 pmol/l, confirming exogenous insulin administration. Mother was arrested by the police. Child remained well and now is fostered.

Discussion: Presence of insulin pen imprints enabled us to suspect exogenous insulin administration prior to receiving hypoglycaemia screen results. We recommend thorough skin examination in any child with persistent hypoglycaemia.

P196

Psychosocial characteristics of children with diabetes

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Purpose: To evaluate the psychosocial characteristics of children with diabetes in Samara region.

Materials and methods: The psychological status evaluated 30 patients with diabetes who were treated at the department of endocrinology Samara City Children′s Hospital № 1. As a control group analyzed data from surveys of the secondary school children. Research methodology used perception of social emotions Talanov NN; Projective situations; Assessment of subjective well-being OA Prusakov and EA Sergienko. As an additional technique to characterize the sample used the method Luscher Color Test .

Discussion: Evaluation of level of positive perception of their own emotional states in situations of communication produced a decline in the subjective well-being in patients with diabetes to 41.66% compared with the control group (70.83%). To a large extent this is expressed in patients with concomitant neurological disorders nondiabetic nature. Adequacy level (54.16%) and positivity (70.8%) of social relations in children with diabetes is high and not so different from that in the control group (50.0% and 83.33%, respectively). This is due to the ongoing work of medical staff with children and parents: in school self-control, including the use of interactive and innovative teaching methods; introduction of high-tech care, interaction with psychologists.

Conclusions: The systematization of knowledge of patients and their parents, the introduction of modern technologies of treatment, interdisciplinary interaction help to significantly reduce the level of anxiety, increase positive social relations.

P121

The efficacy of a group therapy program for teens with elevated A1c levels: impacts of gender at follow-up and replication results

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Objectives: This study evaluates the efficacy of an 8 week group therapy program for adolescents with elevated A1c levels, maintenance of improvements in glycemic control one year following group participation, and initial results from a replication of the group in a second diabetes clinic in western Canada.

Methods: Thirty-nine adolescents (22 females and 17 males) between the ages of 13–17 years (M = 15.3 years, SD = 1.4) with poorly controlled type 1 diabetes attended an 8 week therapy group informed by motivational interviewing and cognitive behavioral approaches. Participants had been diagnosed with diabetes for an average of 8.2 years (SD = 3.4) and had a mean A1c level of 11.0% (SD = 1.6) prior to their attendance in the group. A1c levels were obtained prior to group participation, 2–3 months following participation and 1 year following completion of the group program.

Results: Participants had a significant decrease in A1c levels from pre-group to follow-up 2–3 months after the end of the group sessions ($t(32) = 3.29$, $p = 0.002$). There was a trend towards improvements in A1c at one year follow-up ($F(1, 36) = 1.80$, $p = 0.08$). There was a significant impact of gender at 1 year follow-up ($F(1, 36) = 5.52$, $p = 0.02$), with boys having greater improvements in A1c compared to girls. Results from a replication of the group in a second diabetes clinic in Western Canada will be available by the date of the presentation.

Conclusions: The therapy group appears to be useful for improving the glycemic control in adolescents with diabetes, and appears to be particularly helpful to boys in long term follow-up.

Poster Tour 25: Diabetes Education III

P197

Using an online insulin pump adjustment education module for families of children with diabetes to educate health care professionals

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Background: British Columbia Children's Hospital developed an online learning module for families of children using insulin pumps, Getting the Most out of Insulin Pump Therapy. Content is interactive, self-paced, and includes pattern management, fine-tuning basal and bolus insulin and using advanced pump features. It was evaluated by 13 families and found to increase knowledge and confidence of learners to adjust pump settings on their own.
Objectives: The aim of this project was to evaluate use of this module for health care professional (HCP) education on insulin pump management, measuring changes in learner knowledge and confidence.
Methods: Participants included 16 HCPs from a variety of disciplines. They had no previous experience with development or use of the module, and 0–15 years of experience in diabetes care. The HCPs worked on the module independently, completing pre and post module questionnaires. Participant knowledge and confidence related to insulin pump adjustment were assessed using scales and open ended questions.
Results: Participants had varied levels of experience with insulin pumps. Pre and post module questionnaires indicate that 16/16 participants had increased knowledge and the number who felt confident to adjust pump settings increased from 8/16 to 14/16. All participants would recommend the module to colleagues and patients. Suggestions were made for adding more complex case studies.
Conclusions: Participants found the program engaging and liked the e-learning format. It is challenging to provide ongoing HCP education in an accessible manner. Findings suggest online learning modules for families can be effectively used for diabetes staff education. A separate module for HCPs, with more complex learning activities related to clinic experiences would be helpful. The module is accessible at http://endodiab.bcchildrens.ca along with 6 other modules on insulin dose adjustment, carbohydrate counting and basal-bolus insulin.

P198

Health professionals' perspectives on delivering home and hospital care for children diagnosed with type 1 diabetes: a qualitative study from the DECIDE trial

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Objectives: The DECIDE trial was conducted to compare home or hospital care at diagnosis for children with diabetes. Results showed no significant differences between arms for the primary outcome, glycosylated haemoglobin 2 years post diagnosis. This qualitative sub-study evaluated healthcare professionals views about delivery of both approaches to care.
Methods: 21 semi-structured interviews with consultants, diabetes/research nurses and dieticians from the 8 participating centres. Data were audio-recorded, transcribed and analysed thematically.
Results: 2 of the 8 centres practised home care at diagnosis before the trial started; at completion, only 2 centres (not the original 2) continued. The main reasons for not continuing concerned resource issues. Most nurses preferred home care despite logistical challenges. Working as a team, with workload responsibility equally divided, was essential to successful delivery of home care. Most nurses enjoyed the increased responsibility afforded by home care. They reported that home care allowed development of stronger relationships with families, and a greater ability to understand family dynamics and identify gaps in education but there were concerns about home care resulting in over-reliance/dependence on one individual (nurse providing home care). Consultants described greater difficulty in developing rapport with home-managed patients/families due to not meeting them at diagnosis; some centers changed practice to ensure consultants always met families before they went home. Dieticians sought more specific guidance on how, when and what to teach.
Conclusions: Whilst the trial showed that home care at diagnosis provided a safe alternative to hospital care it requires effective teamwork to be successful and for health professionals to believe it is logistically feasible. How each approach to care affects teams should be fully considered to ensure successful team adaptation and delivery of integrated and coordinated patient care.

P199

A new indwelling catheter, I-PORT advance, to improve adherence to basal-bolus treatment in children and adolescents with type 1 diabetes: a randomized, crossover pilot study comparing glycemic control and satisfaction

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Basal-bolus regimen is the best treatment for children with type 1 diabetes (T1D). It would require several insulin injections a day, but boluses before snacks or to correct hyperglycaemic peaks are often missed for the needle-fear and discomfort related to insulin administration.
Objectives: To compare glycemic control and satisfaction with a new injection port (I-PORT) to multiple daily injection (MDI) in order to improve the compliance to a strict basal-bolus regimen in children and adolescents with T1D.
Methods: 20 subjects (5 M, mean age 9.5 $\pm$ 2.6 years, mean T1D duration 3.1 $\pm$ 2.3 years) were enrolled. They were randomly assigned to group A (starting using I-PORT) and B (on traditional MDI). Participants were trained to change the device every 3 days and to inject both basal and bolus insulin through it. Subjects were invited to move to a strict basal-bolus regimen (insulin injections for meals, snacks and hyperglycaemic peaks). After 8 weeks the 2 groups switched to the other arm. HbA1c was detected at baseline, before the cross-over and at the end of the study (16 weeks). At the end a questionnaire was provided to collect satisfaction about the new device.

Results: 2 participants dropped out and were excluded from the analysis. Mean baseline HbA1c was 8.02 ± 1% (64 ± 11 mmol/mol), mean HbA1c after I-PORT period 7.53 ± 0.7% (58 ± 8 mmol/mol), mean HbA1c on traditional MDI 7.92 ± 0.9% (63 ± 9.3 mmol/mol) (p = 0.06). No dka or severe hypoglycaemic episodes occurred related to the device or to the use of both lente and rapid analogues through it. At the end of the study 15/20 (75%) of participants appreciated I-PORT and decided to maintain it.
Conclusions: In this pilot study, even with small case-series, I-PORT has proven to be safe and seems to improve metabolic control in children with T1D during real-life setting. Attenuating the discomfort of multiple injections, the device allowed to follow more strictly basal-bolus regimen. Children and adolescents seem to tolerate and appreciate this device.

P200

Abstract withdrawn

P201

Reproductive health knowledge, attitudes and beliefs in young women with type 1 diabetes mellitus aged 15–25 years attending a tertiary centre multidisciplinary transition clinic: a descriptive study

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Objective: Sexually active adolescents with type 1 diabetes mellitus (T1DM) are at high risk for unplanned pregnancies and reproductive complications. Routine pre-pregnancy counselling and education is recommended for all adolescent girls with T1DM according to the American Diabetes Association (ADA) guidelines. The primary objective of this study was to assess issues related to the existing reproductive health knowledge, attitudes and beliefs in young women with T1DM in our diabetes transition clinic regarding diabetes and reproductive issues, sexuality and contraception, and to identify barriers to these women achieving optimal diabetes control, obtaining appropriate pre-pregnancy counselling and planning pregnancies.
Methods: This is a descriptive study conducted in young women attending our Young Adult Diabetes Service (YADS) clinic which is a transition clinic at Monash Medical Centre, a conception to end of life tertiary health facility. There were 173 eligible young women on our YADS clinic database between June 2011 and June 2013. Data was collected on a cross-sectional basis from a web-based interview on a sample of 100 (58% of those eligible) female adolescents with T1DM, using a modified reproductive health attitudes and behaviour (RHAB) questionnaire.
Results: Diabetic Nurse Educators (DNEs) were considered to be the most useful source of health information. Sexually active girls perceived themselves to be at much lower risk of unplanned pregnancies and STDs compared to their risks of weight gain and blindness in their responses to questions related to their personal concerns about their future health. Adolescent girls with T1DM are becoming sexually active at an early age, with a high risk for an unplanned pregnancy. Despite the high perceived benefits of prepregnancy counselling (PC), low PC delivery rates were reported by study participants. Poor metabolic control (HbA1C ≥9.5%) was not correlated with socio-economic status and high risk behaviours in this study.
Conclusion: We endorse recommendations of ADA 2009 guidelines that young adolescents, starting at puberty need developmentally appropriate information with a sensitive, proactive, preventative approach before these young women become sexually active, to enable them to make informed choices regarding reproductive health.

P202

An audit of usage of insulin pen devices in children with type 1 diabetes mellitus (T1DM)

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Objective: To perform an audit of usage of pen devices by families with T1DM on follow-up with a multi-disciplinary childhood diabetes clinic of a developing country.
Methods: A cross-sectional survey of all patients attending the childhood diabetes clinic from January 2014 to April 2014 was done. Details pertaining to the type of pen, technical aspects of its usage and change, practical aspects of administration enquired into and entered on Microsoft-excel. All parents were requested to demonstrate insulin injection with a pen device in controlled setting.
Results: Out of 36 children (mean age 7.6 ± 3.4 years; 45%female) on follow-up in the clinic, 30 children were on pen devices & one on both pen and syringe; data retrieved from 21 families (30 pen devices). Of the 21, 20 (95%) went on to pen directly, one shifted from syringe to pen. Of the thirty, 23 (77%) are disposable and 7 (23%) permanent pen devices are being used. All injections were primed, one family has injected twice (by father and mother) once (due to oversight), none had excess dosage dialed and 5 (16.8%) have had blood oozed from injection sites. Counting was appropriate in 25 (87%) families, rotation performed by all families. All families stocked medicine ahead (mean duration 1 month). Wrong storage of insulin was seen in 7 (33%) families. Handling cloudy appearance of insulin was inappropriate in 10 (33%) leading to inadvertent wastage. The sites of insulin injection is shown in Figure 1. Fathers of four subjects and four children themselves injected, otherwise it was predominantly by mothers. Disposal of needles was inappropriate in all families. All families were confident about insulin dosing and children were compliant owing to minimal pain.
Conclusions: Technical errors in insulin administration with pen was minimal in our setting. Paternal participation, abdomen injection and self reliance of child was poor in our cohort. Safe Needle disposal was made a part of diabetes education by the team.

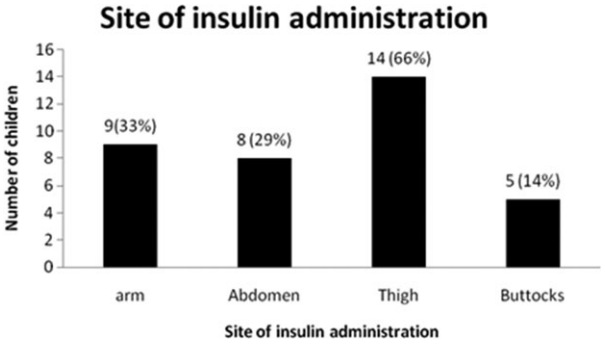

Figure 1. (a)

P203

Abstract withdrawn

P204

Type 1 Think Tank: understanding the T1 experience

J. Hanson & Type 1 Think Tank

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Objectives: The T1 Think Tank has been developed to address a variety of health-related challenges specific to life with Type 1 diabetes. Goals of the project are to

(1) improve communication between individuals with diabetes and healthcare providers;

(2) elevate the standard of care within the Type 1 experience; and

(3) empower individuals with diabetes by providing skills for better self-management.

Methods: To create better patient experiences within the healthcare system, a solid understanding of the current experiences of both the patient and healthcare professional must be developed. The T1 Think Tank project addresses this challenge. In May 2013, the project brought together Patient Opinion Leaders (POLs) and leaders within the healthcare field to engage in facilitated conversation around the patient experience. Patient narratives were developed and used as a tool to drive conversation.

Results: Several themes emerged through the patient narratives including: the need for balance, the importance of community, and a desire for collaboration between the patient and the healthcare team. Patients shared feelings anxiety, shame, and guilt; the need for empathy, active listening and acceptance; and reported a therapeutic value to sharing experiences without feelings of judgement. A consistent theme throughout the narratives was a lack of support through the years of transition from paediatric to adult care.

Conclusions: Moving forward, the T1 Think Tank is creating tools to improve the patient experience with a specific focus on transition periods. Next steps include using endocrinologist narratives to better understand the experiences of healthcare professionals and how these experiences impact the patient. This healthcare professional focused workshop will take place in June 2014.

Poster Tour 26: Regimen-Based Innovations III

P205

Protective effects of vanadate and *Trigonella* synergistically regulate glucose transporter and mitochondrial enzymes in alloxan-diabetic rats

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Objectives: The Indian traditional system of medicine is replete with the use of plants for the management of diabetic conditions. The use of biguanides, sulfonylurea and other drugs are valuable in the treatment of diabetes mellitus, their use, however is restricted to their limited action, pharmaco kinetic properties, secondary failure rates and side effects. The present study explored the prospect of using combined doses of sodium orthovanadate (SOV) with *Trigonella foenum graecum,* seed powder (TSP), another antidiabetic agent, and to evaluate their antidiabetic effect in diabetic rats.
Methods: Diabetes was induced by administration of alloxan monohydrate (15 mg/100 g b.wt.) and rats were treated with 2 IU insulin, 0.6 mg/ml SOV, 5% *Trigonella* in the diet and a combination of 0.2 mg/ml SOV with 5% *Trigonella* separately for 21 days. The effect of these antidiabetic compounds was examined on general physiological parameters, activities of acetylcholinesterase (AChE) and monoamine oxidase (MAO), calcium homeostasis, membrane fluidity, glucose transporter 4 (GLUT4) and lipofuscin accumulation in liver, brain and muscle tissues.
Results: Diabetic rats showed hyperglycemia with almost four fold high blood glucose levels. Diabetic rats exhibited an increased level of calcium, MAO activity with lipofuscin accumulations and decreased membrane fluidity and activity of AChE and GLUT4 expression. The present study showed that combined therapy of lower dose of vanadate with TSP revived normoglycemia and significantly decreased lipofuscin, calcium levels and MAO activity and a reversal of membrane fluidity, AChE activity and GLUT4 levels was achieved. TSP treatment alone is partially effective in restoring the above diabetes-induced alterations.
Conclusion: Present results showed that lower doses of vanadate (0.2 mg/ml) could be used in combination with TSP to effectively in normalization of altered metabolic parameters and GLUT4 without any harmful side effect.

P206

Effects of Hawthorn on HbA1C and lipids levels in diabetic patients (Type2)

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The present study was designed to investigate the effects of supplementation of Hawthorn on HbA1C and lipids levels among type 2 diabetics. The samples consisted of 55 subjects with type 2 diabetes and the doses of Hawthorn were equally administered orally in the form of capsules each capsules contain (500 mg), with breakfast, lunch and dinner. The doses were given for 12 weeks. Blood samples were taken on the starting day of the experiment and at the end of 12 weeks. The fasting blood glucose and lipids levels of type 2 were determined, from the results obtained the mean value of fasting blood glucose levels for Hawthorn doses on the starting day, was found to be 223.6 mg/dl and the mean values of HbA1C was 8.5% and for lipids were triglyceride (235.5 mg/dl), total cholesterol (310 mg/dl), low-density lipoprotein (LDL) (155.2 mg/dl) and high density lipoprotein (HDL)(52.4 mg/dl). When the diabetic individuals used the doses of Hawthorn for 12 weeks, their mean fasting blood glucose level dropped to 186.34 mg/dl, HbA1C 7.2, triglycerides (160 mg/dl), total cholesterol (187.6 mg/dl), LDL (115.5 mg/dl) and increase HDL (69.2 mg/dl) The reduction in the blood glucose and lipids levels were significant at $p < 0.05$, $p < 0.001$ and respectively.
Keywords: Hawthorn, HbA1C, blood glucose, lipids level, type 2 diabetes.

P207

Continuous intraperitoneal insulin infusion (CIPII) in a diabetic child with little subcutaneous fat tissue and recurrent skin infections

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Objectives: We report our experience with a continuous intraperitoneal insulin infusion in a 9 year old dystrophic boy with diabetes mellitus type 1 (T1DM) and severe cerebral palsy.

In November 2013 this boy had a AccuChek Diaport system® (Roche) implanted and his insulin therapy switched from continuos subcutaneous insulin infusion (CSII) to CIPII for the lack of subcutaneous fat tissue and recurrent skin infections at the catheter sites. We have looked at the metabolic control and arising issues in the daily care of his intraperitoneal catheter during 6 months on CIPII therapy. So far CIPII has only been used in very few (about 7 children worldwide).
Method: Case report.
Results: HbA1c was stable (7.5% before CIPII start vs. 7.7% 3 months later). The frequency of hypoglycaemic events has come down from 20/month to 5–6/month. Diurnal blood sugar variation are reduced. There were no reports of severe events of hypoglycaemia and diabetic ketoacidosis after start of CPII. Insulin requirement shows only a mild difference (0.92 U/kg CIPII, 0.97 U/kg CSII). His BMI has increased from 10.7 kg/m^2 to 11.2 kg/m^2 No problems were reported with catheter malfunctioning. Problems with local wound infection and granulomatous tissue around the catheter are not solved yet. Overall his parents see a great gain in quality of life for the boy and the family.
Conclusions: CIPII treatment has been a feasible and beneficial alternative to subcutaneous insulin treatment in this particular patient with very little subcutaneous fat tissue due to severe dystrophy and recurrent catheter site infections. It has resulted in a more stable glycemic control (less blood sugar variations, less hypoglycaemic events) and weight gain. Despite problems with local wound healing the parental treatment satisfaction is high.

P208

Insulin pump at the onset of type 1 diabetes: an expensive toy or a wise choice?

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Introduction: Most of diabetes guidelines do not consider the use of insulin pumps at disease onset. At moment, the introduction of

continuous subcutaneous insulin infusion (CSII) is recommended only after onset and with others specific conditions (i.e. poor metabolic control with good compliance, recurrent severe hypoglycaemia, recurrent ketoacidosis). We think that diabetes onset is a perfect time to learn every concepts for diabetes selfcare: its the imprinting time. Early learning of CSII way is important for an appropriate use of this device, to increase metabolic control and improve the quality of life.

Objectives: To valuate differences of metabolic control, beta cells reserve and quality of life between prepubertal diabetic children, someone with CSII started within one month after onset and some other who choose multiple daily injections (MDI).

Methods: At onset, 11 prepubertal children (6M, 5F) started with CSII therapy (group A), and 10 (4M, 6F) with MDI (group B). HbA1c (in 2nd day of diabetes and after one year of treatment), C peptide (at one month and after one year of disease onset) and number of severe hypoglycaemias during treatment were measured. After one year of therapy all of them had continuous glucose monitor for six days, in order to calculate the mean amplitude glycaemic excursions (MAGE) index. Their parents had the EQ-5D-Y quality of life questionnaire.

Results: At onset there is a statistically difference in HbA1c between groups (group A lower than B; Table 1). No difference in C peptide were evaluated. After one year there was no difference in HbA1c and C peptide, but MAGE index and quality of life were better in group A. Any severe hypoglycaemic episodes were detected.

Conclusions: The use of CSII since diabetes onset doesnt seem to improve the glycaemic control and the beta pancreatic reserve, but it seem to be better for reduction of microvascular damage and to improve the quality of life of diabetic children.

Table Differences between gr. A and gr.B

	Group A (11) - CSII	Group B (10) - MDI	p
HbA1c (mmol/mol) at onset - mean/DS	99.23/2.62	121.85/−3.16	0.03
C peptide (ng/ml) at onset - mean/DS	0.32/0.18	0.22/0.10	>0.05
HbA1c after 1 year m/DS	63.03/−0.72	63.93/−11.58	>0.05
C peptide after 1 year - m/DS	0.27/0.15	0.33/0.29	>0.05
MAGE index (mg/dl) - m/DS	157.25/26.26	183.63/24.79	0.01
EQ-5D-Y (some problems)	5/11	8/10	

P209

Does frequent use of an automated bolus advisor improve glycemic control in adolescent patients treated with insulin pump therapy? First results of the BABE study

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Objective: Rapid biological, cognitive and emotional changes often challenge adolescent diabetes patients and their caregivers in achieving optimal glycemic control. The Bolus Advisor Benefit Evaluation (BABE) study, a single-center, retrospective cohort study, showed that frequent use of an automated bolus advisor (BA) over 6 months was associated with significant improvements in glycemic control, more therapy changes and no increase in hypoglycemia in 104 pediatric type 1 diabetes patients (age >0 to <18 years) on insulin pumps therapy. We further assessed the impact of frequent, extended BA use in a subgroup of adolescent study patients.

Methods: Sixty-two patients, >12 to <18 years, were included in our sub-analysis: 33 high frequency (HF) users (≥50%); 29 low frequency (LF) users (<50%). Mean (SD) baseline HbA1c for HF users was 7.6 (1.0)% vs. 8.1 (1.1) for LF users, p = 0.0828. Mean baseline characteristics for age 16.0 (3.1) years, diabetes duration 65.0 (44.9) months, and 62.9% female were similar. ANCOVA controlled for baseline differences in HbA1c, diabetes duration and age.

Results: At 12 months, HbA1c values among HF users were lower than LF users: 7.8 (0.2)% vs. 8.5%(0.2)%, p = 0.0149. There was no between-group difference in percentage of hypoglycemia values (<60 mg/dl) within 30 days prior to 12-month visit: 5.1 (0.7)% vs. 4.5 (0.7)%, p = 0.5285. HF users had lower blood glucose (180.2 [9.6] vs. 205.6[9.9] mg/dl, p = 0.0827) and less glycemic variability than LF users as assessed by standard deviation (84.9 vs. 99.9, p = 0.0159). More HF than LF users received therapy parameters change at 12 months (64.3% vs. 26.9%, p = 0.0075).

Conclusions: Frequent BA use was associated with improved glycemic control over time and was achievable in adolescent type 1 diabetes patients. Availability of the BA may have encouraged clinicians to make more therapy parameters changes, which likely contributed to the HbA1c improvements seen.

P210

The use of continuous glucose monitoring systems in a pediatric population with type 1 diabetes mellitus in real-life settings: the awesome study group experience

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Aims: (a) To compare, during one year in a real life setting, glycemic control in pediatric patients with type 1 diabetes mellitus (T1DM) who used a continuous glucose monitoring system (RT-CGMS) to that of those who performed self monitoring blood glucose (SMBG) only.

(b) To assess compliance and to define parameters associated with compliance and glycemic control.

Methods: One hundred and forty-nine youth with T1DM (52.3% females), mean ± SD age 11.8 ± 3.6 years, 83 in the CGMS group and 66 in the SMBG group, were followed prospectively for 12 months. Glycemic control parameters and compliance to RT-CGMS were assessed at 3 month intervals.

Results: Glycemic parameters did not differ significantly between the groups at 3, 6, 9 and 12 months follow up. The time spent with RT-CGMS decreased during the follow up period and only 38% used it for more than 75% during the 12 months (consistent users). Mean HbA1c decreased by 0.27% in consistent users and increased by 0.21% among intermittent users (used RT-CGMS less than 75% of time) p = 0.013. Consistent users were younger 10. 6 ± 4.2 vs.

12.5 ± 3.6, p = 0.07, and had higher frequency of SMBG at baseline than did intermittent users, 10.6 ± 4.9 vs. 6.3 ± 2.8, p = 0.011.
Conclusions: The adoption of RT-CGMS was low, even in a healthcare system that funds its use. Caregivers should consider patient characteristics and motivation when recommending RT-CGMS use. RT-CGMS use improved glycemic control only among those who used it for more than 75% of time.

P211
Insulin pump treatment in children aged 3.0–6.0 years in Bulgaria. Sustaining of the optimal control

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Introduction: 12 children/6 girls/with type 1 diabetes aged 3.0–6.0 years were started on insulin pump treatment in June 2010/a 6-months Medtronic project, Veo pumps/, with duration of diabetes 25.2 ± 19.4 months. All the children attended a kindergarten for children with diabetes. At the start and during the 3-year follow up body height, weight, HbA1c /NycoCard/ were evaluated. After the end of the project 11 of the children continue their insulin treatment with the pumps.
The Aim: We investigate the level of the metabolic control, the proportion for basal/bolus insulin dose and the ratio of total daily insulin dose/kg.body weight 3 years after the start of the pump treatment.
Results: HbA1c decreased from 8.5% to 7.30 ± 0.89% after 1 year and is sustaining 3 years later - 7.30 ± 0.72%. The basal dose is 46.0 + 5.52% of the TDD. TDD/kg.b.w. is 0.718 + 0.05 at the end of follow-up, compared to 0.84 ± 0.19 at the start of the pumps.

During the 3-year follow -up there was 1 episode of DKA. No insulin infusion site reactions have been manifested for now.
Conclusions: The sustaining of the optimal control 3 years after the end of the project shows the advantages of the pump treatment in the group of very well educated and motivated patients and families.

The average part of the basal insulin dose is a little bit less than 50% in this age group.

The lower insulin dose/kg.b.w. on pump treatment 3 years after its initiation, despite that the patients are growing in age and increasing the duration of the disease is of great advantage of the pump against the over insulinisation of the patients with diabetes. The lowest possible exogenous insulin dose with the pump affects the body weight and possibly the evolution of the complications of the disease.

P212
The results of using insulin pump therapy in young children in the Samara region

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Objective: To evaluate the effectiveness of insulin pump therapy with daily monitoring of blood glucose among young children.
Materials and Methods: Estimated results of the use of insulin pump therapy in 30 children aged 1–6 years after the year of therapy. All patients had an insulin pump with the daily blood glucose monitoring. The control group consisted of 15 patients aged 2–6 years, who received insulin with injection pens. Analyzed level of HbA1c, the frequency of acute complications of diabetes, satisfaction with treatment. All parents are trained in the school of self-control and school -based insulin pump therapy in the Samara City Children′s Clinical Hospital No. 1.
Discussion: The analysis of the regularity of use of daily monitoring on an ongoing basis it was used only 6 people (20%) with the most volatile over of diabetes - 1 group, the majority, 18 people (60%) was used periodically - group 2, 6 people (20%) not used at all - 3 group. In addition, all patients monitoring blood sugar with measuring by glucometer from 2 to 8 times a day. The level of HbA1c in group 1 – 7.6 ± 0.8%; in group 2 – 7.8 ± 1.2%; group 3 – 8.4 ± 1.0% (p1, 2 < 0.05) in the control group – 8.7 ± 1.4% (p1, 2 < 0.05). In the groups on the pump during the year there were no cases of hospitalization with diabetic ketoacidosis, severe hypoglycemia. In the control group - one hospitalization with ketoacidosis. When we analysed the treatment satisfaction on a scale of 10 points on the pump it complies with 7 ± 2 points. In the control group - 6 ± 2 points. Problems of patients with pumps: need to place the catheter and the sensor on the small areas of the body surface, the need for additional fixing the transmitter.
Conclusions: The young age of the child is indication for insulin pump therapy, the use of glucose monitoring improves disease compensation. Increased satisfaction with treatment is possible due to the introduction of modern tech sensors and catheters.

Poster Tour 27: Diabetes Education IV

P213

Successful development and implementation of a standardized approach to initiating continuous glucose monitoring in a multicenter pediatric trial

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Objective: To evaluate a standardized approach to education and device setting options for continuous glucose monitoring (CGM) in children and adolescents with type 1 diabetes (T1D) starting pump therapy with simultaneous or delayed CGM initiation.

Method: All participants are part of the CGM TIME Trial, a multicenter 5-site randomized controlled trial of pump naïve 5–18 year olds with T1D >1 year who were randomized to simultaneous initiation of pump (Medtronic Veo) and CGM (Enlite) or to standard pump therapy with delayed CGM introduction 6 months later. Diabetes educators at the 5 participating centers critically reviewed published and unpublished education materials and approaches to initiating CGM.

Results: A standardized approach to CGM education and settings was developed and implemented study-wide. All sites utilized the standardized CGM settings and education materials, resulting in a consistent and step-wise approach to initiating CGM simultaneously with pump therapy or 6 months later with the 144 subjects participating in the trial. Analysis of CGM adherence and effectiveness, the relationship of the stepwise approach for settings to frequency of alarms, and use of the standardized settings by study participants will begin in July 2014.

Conclusion: The CGM TIME Trial successfully developed and implemented a standardized step-wise approach to CGM education and settings. The trial's conclusions will enhance our understanding of optimal CGM settings for simultaneous and delayed CGM initiation, and offer guidelines to support other centers in best practices to improve CGM adherence and effectiveness.

P214

Impact of iSCREEN electronic diabetes dashboard on knowledge and implementation of care guidelines

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Objectives: Knowledge and effective application of current practice guidelines is important in diabetes management, particularly for optimizing care of diabetes related complications and comorbid conditions. The iSCREEN Diabetes Electronic Dashboard was designed to display clinical data, laboratory investigations, and results of screening tests in one place and to guide appropriate timing of investigations. We sought to evaluate this application as a clinical tool in three domains:

(1) increasing clinician knowledge of guidelines,
(2) improving access to patient information, and
(3) facilitating guideline adherence.

Methods: Data were gathered by clinician questionnaire and retrospective chart review. The questionnaire assessed knowledge of CDA Guidelines and ease of access to patient information (ex. lab reports, consultations, paper and electronic documents). Questionnaires were collected prior to and six months following launch of the iSCREEN Dashboard. Objective evaluation of guideline adherence is being assessed by chart review.

Results: 52 surveys were collected (28 prior to and 24 after launch of the iSCREEN Dashboard). Respondents included pediatric endocrinologists, fellows, residents, students, dieticians and nurses. There was a clear trend towards improved knowledge of CDA guidelines among all team members ($p = 0.09$). There was a similar score improvement seen among physicians (8% improvement) and allied health professionals (7%). There was also a trend towards increased ease of access to guidelines in all groups ($p = 0.2$). There was no change in utility of other sources of patient information used (ex. paper chart, nursing evaluation, existing electronic tracker). Assessment of adherence to guidelines is in process.

Conclusions: Preliminary data suggests an improvement in health professionals knowledge of and access to guidelines with the addition of an electronic dashboard in a pediatric diabetes clinic. Additional data will assess guideline adherence.

P215

Using an electronic tablet to survey patient satisfaction in an adolescent transitional diabetes clinic at York, UK

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Objectives: To assess patient satisfaction with the existing transitional diabetes clinic service. Our transitional diabetes clinics (for 14–19 year olds) are run monthly by a multi disciplinary team comprising of a consultant, nurse and dietician each, from both adult and paediatric diabetes teams.

Methods: An electronic tablet with the pre-programmed survey was handed out to 42 young people while they were waiting to be seen in clinic.

Results: 39 young people completed the survey, giving a response rate of 92.8%. 51% were males and 69% were aged 16–17 years. 73% and 27% were on insulin injections via pen and pump respectively. 82% were transferred from paediatric services. Overall, young people rated their experience of moving into the transitional clinic very highly. Clinic venue and timing (4–6 pm) were considered suitable by 90% and 94% of participants respectively. 52% reported to have waited for at least 15–30 minutes to be seen by one of the team. Around 80% received information regularly on achieving better glycaemic control, treating complications and managing diabetes around sports, exercise, alcohol and school/university. However, 43% were unaware of the availability of psychology support within the service. Around 40% met with the doctor or the nurse at each clinic visit. However, 74% could only meet the dietician at their request. 71% met the professional on their own. Nearly all (97%) found the diabetes team to be open and honest, accessible, supportive and knowledgeable in diabetes care. Around 90% felt that the service prepared them well in moving to the adult services.

Conclusions: Using an electronic tablet for feedback can prove really successful in improving participation among young people who have greater technology awareness. Although we received a very positive

feedback on the transitional diabetes service, it could be improved further by reducing waiting time as well as providing better access to dietetics and psychology services.

P216

Training program for diabetes educators and mental health professionals in behavior change, psychosocial support techniques & family dynamics: assessment tools & intervention strategies

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Objective: In this study 6 diabetes educators (RN′s and RD′s) and 2 mental health professionals (a psychologist & a social worker) were trained in developing new assessment and intervention strategies in the area of behavior change and family dynamics that would help them to feel and become more effective at understanding the link between dysfunctional family coping and poor diabetes control as well as helping them develop more effective intervention strategies based on this new insight. Given the scarcity of training tools for educators in this area it also sought to develop a set of edited training videos with voice over narration and graphics to be used as a teaching tool for other diabetes educators and health care professionals.

Methods: The study took place in the outpatient diabetes clinic at Alberta Children′s Hospital (ACH) in Calgary, Alberta, Canada. Educator training sessions were conducted in the context of the regular clinic and specifically assigned one-way mirror consultation and observation rooms, which were outfitted with audio and video DVD recording to record the 1 hour live supervision family sessions. Live family consultation and HCP training sessions were approximately 1 hour in length, with a trainer observing from the one-way mirror observation room. Trainees included 3RN′s, 3 RD′s, 1 psychologist, 1 social worker. Qualitative data was generated by means of pre-and post questionnaires to the educators.

Results: Qualitative data at study end shows educators reported improved sense of clinical competence and role satisfaction. Edited set of training tapes were developed.

Conclusions: The study provided the diabetes educators with new tools that have enabled them to make more relevant psychosocial coping assessments and interventions for families and patients as well as feeling more professionally competent. This study identifies and provides a new, powerful and effective training tool for diabetes educators in the area psychosocial issues.

P217

Association between glycemic control and clinic visits in type 1 diabetes patients - a tertiary center experience

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Background: ISPAD guidelines recommend that type 1 diabetes (T1D) patients visit the multidisciplinary clinic every 3–4 months as part of ongoing outpatient care consultations.

Objectives: (1) To determine the association between the number of annual clinic visits and glycemic control (HbA1c)

(2) To assess the influence of socio-demographic and diabetes-related parameters on clinic attendance (number of visits & rate) and glycemic control.

Research design and methods: Historical cohort study of 528 T1D patients followed during 2011 at a single tertiary diabetes center were divided into pediatric cohort [(age ≤19 years, n = 267 (50.5% males)] and young adult cohort [(age >19 years, n = 261 (54.4% males)] and sub-divided according to number of clinic visits (1–2, 3–4). Attendance rate was calculated (number of clinic visits/number of scheduled appointments).

Results: In the pediatric cohort (mean age 13.6 ± 3.5 years, 22.5% pre-pubertal), patients with 3–4 vs. 1–2 clinic visits were characterized by: younger age ($p = 0.032$), younger age at diagnosis ($p = 0.006$), closer proximity to the clinic ($p = 0.026$) and higher attendance rate ($p < 0.001$). In the young adult cohort (mean age 23.6 ± 3.5 years), patients with 3–4 vs. 1–2 clinic visits were characterized by: younger age ($p = 0.011$), higher unemployment rate ($p = 0.014$) and a higher attendance rate ($p < 0.001$). In both the pediatric and the young adult cohorts a significant correlation was found between lower HbA1c and higher attendance rate ($R = -0.280$, $p < 0.001$ and $R = -0.211$, $p = 0.001$ respectively).

Conclusions: Our findings suggest that the number of clinic visits is influenced by socio-demographic parameters. The attendance rate, rather than the number of clinic visits, is the key factor in attainment of better glycemic control.

P218

Redefining diabetes education: the application of experiential learning philosophy to the traditional health education paradigm

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Background: Diabetes education is a fundamental component of chronic illness therapy, largely focused on self-management behaviour modification. Unfortunately, the processes of education and the application of effective, age-appropriate, engaging teaching practices are often absent within the clinical education setting. This is especially true within transition and young adult-care clinics; a time when nearly 1/3 of patients disengage with their diabetes healthcare teams.

Objectives: The following project investigates a redefined diabetes education paradigm with a focus on the process of education as a key driver for success among patients with diabetes. Specifically, it examines the role that experiential learning philosophy plays in the achievement of specific health outcomes for both patients and healthcare professionals. The key area of focus is on care and education practices for patients immediately following their transition from the paediatric care system.

Methods: The experiential learning philosophy has been implemented in the non-clinical diabetes education practices by the Canadian charity and diabetes education group, Connected in Motion, since 2008. Through the application of the experiential learning cycle, patients are able to apply the lessons learned in traditional clinical settings to their regular daily activities. Safe and supportive environments are created to provide patients with concrete experiences.

Results and conclusions: Participation in experiential diabetes education programs has led to greater patient engagement with healthcare teams, feelings of empowerment as a patient, greater perceived self-management efficacy and overall improved quality of life among patients living with Type 1 diabetes.

P219

Do diabetes teams give consistent advice? Yorkshire paediatric diabetes network (UK) survey on target setting for self-management of type 1 diabetes

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Objectives: Targets set by a diabetes team for children with type 1 diabetes have an impact on their glycaemic control. Our objective was to identify if there is a consensus between and within teams in Yorkshire (UK) on the glycaemic targets specified to children and families.

Methods: An online survey was sent to all members of the 20 paediatric multidisciplinary diabetes teams in our clinical network. Each member was requested to respond independently on the advice given to families about self-management. This was considered for various patient groups: children under 5 years (<5 years) and over 5 years (>5 years) on multiple daily injections (MDI) and those on insulin pump therapy (CSSI).

Results: Within the network 19 centres (95%) responded with a 51% response rate (55/108) from the individual members. The response rate within each team varied from 14% to 100%. Responses included specialist nurses (40%), dieticians (24%), senior doctors (29%) and junior doctors (7%). For children <5 years, only 78% of the network advised a target HbA1C of ≤ 58 mmol/mol (7.5%). There was better consensus in the HbA1c target for >5 years and CSSI group (96% ≤ 58 mmol/mol). Within individual units consistency in the above HbA1C target was demonstrated in 54%(<5 years), 85%(>5 years) and 85%(CSII). The pre-meal blood glucose targets varied significantly with 34%, 49% and 51% in the respective groups advising a target of 4 to 7 mmol/l. The maximum variation was seen in <5 years and pre-bed targets. For all age groups consistency within each team for pre-meal and pre-bed glucose targets was observed only in 43% and 18% of the teams respectively.

Conclusion: There was lack of consensus among the paediatric diabetes units in Yorkshire (UK) on various targets especially for the <5 years age group and pre-bed targets. The inconsistency was seen both within the network and within each unit. We believe this emphasises the importance of teams having written targets.

P220

Pre insulin pump dietetic competencies

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Objectives: Kaufman (2001) competencies scale recommends that carbohydrate (CHO) management should be assessed with 8 other areas in Diabetes care before starting pump therapy. However there is no validated tool in the UK. Our objective was to develop a tool to assess CHO management in children.

Methods: We developed a competency questionnaire tool to assess CHO management prior to commencing an insulin pump. The questionnaire was designed to include all aspects of CHO counting including: literacy and numeracy skills to interpret food labels; ability to use different insulins; CHO ratios (ICR) to work out insulin doses; ability to use insulin sensitivity factor (ISF) to work out corrections.

We administered the questionnaire to 19 children and young people (CYP) with type 1 diabetes on multiple daily injections who already had teaching on CHO counting and wanted an insulin pump; and to their parents.

Their answers were discussed on completion; and further training was offered if they were unable to complete the questionnaire.

Results: 19 consecutive CYP were assessed from May 2012 to June 2013, age range 5–18 (Median age 13). Parents were assessed if the CYP was <10 years of age. 15 children were able to CHO count but used individual methods to achieve this. 12 used visual aid books to work out CHO for take-outs rather than weighing. 17 knew what drinks were suitable to drink. 15 knew their ISF enabling them to correct high blood glucose results. All CYP could identify CHO-rich foods.

Two different methods were used to calculate CHO/100 g using yoghurt labels: 4 doubled the pot size; the remainder needed a formula for calculating CHO. 17 knew to inject pre meals.

Conclusion: The tool was effective at capturing all aspects of carbohydrate management. This is now used for all children wanting to commence on an insulin pump. 15 participants are now on a pump. Our plan is to validate the tool in a larger population.

Poster Tour 28: Regimen-Based Innovations IV

P221

Pharmacokinetic and prandial pharmacodynamic properties of insulin degludec/insulin aspart in children, adolescents and adults with type 1 diabetes

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Objectives: To compare PK and PD responses of IDegAsp - a soluble co-formulation of insulin degludec (IDeg) and insulin aspart (IAsp) - in children, adolescents and adults with type 1 diabetes (T1D).
Methods: Open-label, Ph 1 study in children (6–11 years; n = 12), adolescents (12–17 years; n = 13) and adults (18–65 years; n = 13) with T1D ≥12 months. Subjects received a dose of IDegAsp 0.5 U/kg with a standard meal.
Results: Estimated ratios (ER) for total exposure ($AUC_{0-\infty}$) and peak concentration (C_{max}) of IDeg (in IDegAsp) were: children/adults, 1.42 [95% CI 0.94; 2.16] and 1.38 [95% CI 1.09; 1.76]; adolescents/adults, 1.23 [95% CI 0.96; 1.58] and 1.16 [95% CI 0.95; 1.42]. ERs for exposure ($AUC_{0-12\ h}$) and C_{max} of IAsp (in IDegAsp) were: children/adults, 1.69 [95% CI 1.02; 2.80] and 1.66 [95% CI 1.10; 2.51]; adolescents/adults, 1.14 [95% CI 0.76; 1.69] and 1.16 [95% CI 0.84; 1.61] (see figure for plasma glucose [PG] profiles). There were no apparent differences between groups in prandial glucose-lowering effect ($AUC_{0-6\ h}$), maximum PG excursion (ΔPG_{max}) or concentration (PG_{max}) after a standard meal.
Conclusions: IDegAsp prandial and basal glucose-lowering effects observed due to the co-formulation of basal and bolus insulin analogues in adults are preserved in children/adolescents. Exposure to IDeg and IAsp seemed to be higher vs. adults, but no differences were observed in prandial glucose-lowering effect. IDegAsp could be a simple, effective therapy in children and adolescents with diabetes.

Mean plasma glucose profiles after standardised meal in children, adolescents and adults following a single dose of IDegAsp 0.5 U/kg

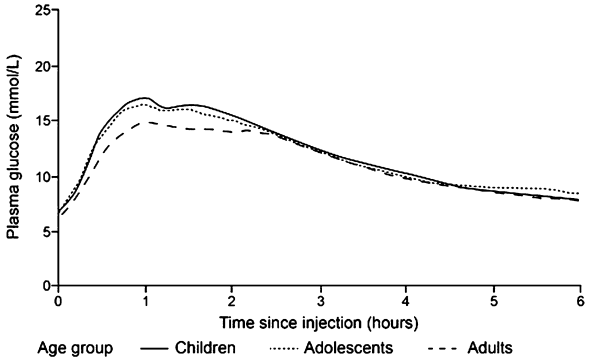

Figure 1.

P222

Changes in glycaemic control and BMI SDS following insulin regime change from Mixtard 30 to either Humalog 25 or Humulin M3

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Objective: We investigated differences in glycaemic control and body mass index (BMI SDS) following a change in insulin regime from Mixtard 30 to Humalog 25 (HM25) or Humulin M3 (HM3) at the clinicians discretion.
Methods: A retrospective case note review was carried out recording HbA1c and BMI SDS in children who were previously on Mixtard 30 over a 12 month period between January 2011 and June 2012. Data was recorded at the time of change (0), 6 months after change (t=+5–7 months) and 12 months after change (t=+11–13 months). Student t-tests were carried out to analyse data with p-values <0.05 considered statistically significant.
Results: Sixty nine patients were identified (33M: 36F) with a mean age of 10.5 years (range: 5–16.1 years). 55 patients (25M: 30F) were changed to HM25 and 14 (8M: 6F) to HM3. Changes in HbA1c and BMI SDS over the 12 month period are shown in Table 1.

An increase in HbA1c in the HM25 group 6 months after baseline was significant (p = 0.03) however this was not sustained at 12 months. No significant differences were found in HbA1c between the 2 groups at 12 months and baseline. In addition there was no difference in BMI SDS within or between the groups over the 12 months.
Conclusion: An increase in HbA1c was found with HM25 after 6 months compared to baseline, however this was not sustained at 12 months. There were no other differences identified in HbA1c and BMI SDS over a 12 month period following change in insulin regime to HM25 or HM3. Both HM25 and HM3, as well as Mixtard 30, have similar effects on glycaemic control and BMI.

Table 1 HbA1c and BMI SDS over 12 months

	Age at baseline	Baseline		6 months		12 months	
Insulin regime	Years mean (SD)	HbA1c (%) mean (SD)	BMI SDS mean (SD)	HbA1c (%) mean (SD)	BMI SDS mean (SD)	HbA1c (%) mean (SD)	BMI SDS mean (SD)
Humalog Mix 25	10.3 (2.3)	8.4 (1.1)	0.619 (1.1)	8.8 (1.5)	0.583 (1.1)	8.5 (1.2)	0.682 (1.1)
Humulin M3	11.1 (3.1)	8.2 (1.3)	0.515 (1.5)	8.2 (1.6)	0.667 (1.5)	8.1 (1.2)	0.604 (1.3)

P223

Physicians' perceptions of the value of insulin pump therapy for pediatric type 1 diabetes

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Background: Technologies, such as insulin pumps for children with type 1 diabetes, have been broadly adopted despite equivocal evidence about long-term effectiveness. Understanding how physicians, who play a critical role in adoption processes, value this technology is critical to understanding why pumps are being broadly adopted.
Objective: To characterize physicians perceptions of how pumps are valued. This will be used to inform policy about funding of technologies and to encourage reflective clinical practice.
Methods: We conducted open-ended semi-structured interviews with 16 physicians from a provincial pediatric diabetes network in Ontario, Canada, where pediatric pumps and supplies are publicly funded. Data analysis was done using a qualitative descriptive approach and themes exhausted by these 16 interviews.
Results: Although respondents recognized the potential for pumps to facilitate good glycemic control, they felt that most users do not do the hard work required and acknowledged that pumps are reliant on support from a broad network of care. Pumps were valued in several ways; for their status as new technologies, which were seen to have inherent appeal as the best way to manage diabetes, or as a promise of development of future technology. Pumps were valued for their role within the therapeutic relationship, between physicians, patients, and the families who support them in managing a life-long chronic condition.
Conclusion: Given the recognition of the need for a network of care to support pumps, policy makers should consider what makes a technology effective and prioritize investments accordingly. Innovations are often costly and excessive enthusiasm for their use may eclipse a more thoughtful process of adoption. As the number of technologies for diabetes increases, policy makers and clinicians will have to consider how technologies are valued as they grapple with whether and how best to adopt them into practice and the healthcare system.

P224

Steel needle infusion set breakage in pediatric insulin pump therapy: a cause for concern?

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Background: Infusion set failure is one area of vigilance for patients as it can affect acute metabolic control. While teflon catheters may be associated with in-situ kinking, this is less likely in steel needles but breakage was occasionally reported. To understand the breadth of the problem we conducted telephone interviews to determine the frequency of steel needle breakage including unreported events and investigated possible sequela.
Methods: Retrospective telephone survey and animal testing with magnetic resonance imaging (MRI) and histology.
Results: Between 1/2011 and 8/2013 a total of 305 patients received prescriptions for steel needles in our care. A survey of 292 (96%) of these patients (age 13 (1–23) years, median (range)) revealed 4 occurrences of in-situ breakage (4 boys, 8–20 years, buttocks or thigh, during insertion, wear or removal), and 7 occurrences of ex-situ breakage (4 boys, 3 girls, 2–21 years, all locations, during wear or removal). In two instances needles were surgically removed. In two other cases, more than one needle was identified by x-ray remaining in situ without any symptoms. Only two of these events were actually reported during the outpatient visits and reported to the manufacturer All events happened in 2012 or before. We partnered with industry to perform animal testing of steel needle cannula in-situ exposed to 1.5 T MRI. Needle fragments showed no migration with CT spatial resolution. Cannula temperature increase was max +1.88°C to a Max of 40°C (patient risk at ≥43°C), and histology exams revealed no biologically significant tissue damage due to heating or tearing.
Conclusion: The fault was been identified by the manufacturer and corrective measures have been initiated. Low occurrence of breakage combined with little tissue damage or migration provide confidence that there is no major patient safety concern. In the event of in-situ breakage leaving the needle in place is preferable to surgical removal.

P225

Persistently high glycemic patterns in young children with type 1 diabetes (T1D)

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Objectives: To characterize glucose levels and variability at different times of the day in young children with T1D and to evaluate the relationship between HbA1c and levels of glycemia.
Methods: 144 children ages 4–10 diagnosed with T1D prior to age 8 were recruited from 5 DirecNet centers. Subjects used a continuous glucose monitor (CGM) every 3 months during an 18 month study. 135/144 subjects with a minimum of 48 hours of CGM data at >4 out 7 visits were included for analysis.
Results: The mean age (±SD) of subjects was 7.0 ± 1.7 years and 47% were female. The mean HbA1c during the study was 7.9 ± 0.7%. CGM metrics for different times of day are shown in the Table. 50%

Table CGM Indices in T1D Participants (*N* = 135)

	Overall	Daytime (6 am–8 pm)	Late Evening (8 pm–12 am)	Overnight (12 am–6 am)
	Median	Median	Median	Median
Hours of CGM reading/pt	943	541	159	244
% ≤70 mg/dl	4.6%	4.2%	4.1%	6.0%
% 71–180 mg/dl	45%	44%	46%	43%
% >180 mg/dl	50%	51%	48%	48%
% >250 mg/dl	25%	26%	25%	21%
Glucose Coefficient of Variation (SD/Mean)	43%	42%	40%	38%
MAGE	159	152	103	80
Mean glucose (mg/dl)	191	196	192	184

of subjects had hyperglycemia (CGM >180 mg/dl) ≥50% of time. MAGE was lowest overnight (12 am–6 am). The %CGM within 71–180 mg/dl and mean glucose correlated with HbA1c at all visits. There were no differences in CGM glucose distribution or coefficient of variation between the age groups of 4-<6, 6-<8 and8- < 10.

Conclusions: Suboptimal glycemic control as reflected by elevations in mean HbA1C and sensor glucose levels are commonly observed in young children with T1D. Remarkably, there was frequent hyperglycemia with glucose levels exceeding 250 mg/dl on average for 6 hours per day. New approaches to reduce postprandial glycemic excursions and increase time in the normal range for glucose in young children with T1D are critically needed. Glycemic targets in this age range should be revisited.

P226

Multiple insulin injections versus insulin pump therapy to diabetes mellitus type 1 in the same patient. Which one is better? A cross sectional study

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Aims: To compare multiple insulin doses (MID) and continuous insulin infusion therapy (CIIT) as treatment for type 1 diabetes.

Methods: 40 patients with type 1 diabetes (21 female) with ages between 10 to 20 years (mean = 14.2) and mean time of diabetes of 7 years used MID for at least 6 months and after that, CIIT for at least 6 months. Each one of the patients have used MID and CIIT. For analysis of HbA1c, mean glycated hemoglobin (mGH) was obtained during each treatment period (MDI and CIIT).

Results: Although mGH levels were lower during CIIT the difference was not statistically significant. During MDI, 14.2% had mGH values below 7.5%, versus 35.71% CIIT demonstrating better glycemic control with the use of CIIT. During MDI, 15/40 patients have severe hypoglycemic events versus 5/40 CIIT. No ketoacidosis were recorded.

Conclusions: As we know, this is the first study with this design comparing MDI and CIIT showing better metabolic control and reduction of severe hypoglycemic events with CIIT.

P227

A comparison of differences in HbA1c and insulin requirement relative to different insulin treatments in children and adolescent with type 1 diabetes?

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Introduction: The aim of the study was to explore current differences between different insulin regimen types and their effect on A1C, insulin requirement (u/kg/d) and a frequency of overweight and obesity.

Methods: Retrospective cohort study was conducted involving children and adolescents with type 1 diabetes (T1D) (n = 332, M174, average age 11.5 ± 3.7) attending a single tertiary centre. Information regarding HbA1c, insulin requirement (u/kg/d), weight and height were collected from the patients over a period of 1 year. The results were compared between the following treatment groups: BD [insulin injection 2/day, n = 74), TDS (3/day, n = 63), QDS/MDI (multiple daily injection or 4/day, n = 46) and CSII (continuos subcutaneous insulin infusion, n = 149) users. To summarize the % of patients with obesity (>98 centile) and overweight (>91 centile) individual BMI growth charts were used.

Results: The median A1C in whole group (n = 332) was 7.7%. CSII group had significantly lower A1c than BD: t (221) = 2.95, $p < 0.05$, TDS t (210) = 4.7, $p < 0.001$, and MDI t (55.7) = 2.54, $p < 0.05$ groups. CSII had significantly lower insulin requirement comparing to BD t (97,8) = 2.49, $p < 0.05$ and TDS t (87,9) = 6.08, $p < 0.001$. 22 patients were obese, 46 overweight (20% of all study group). In the BD group 38% patients were overweight (n = 20) and obese (n = 8). In CSII overweight and obese patients were least frequent, $p < 0.05$.

Conclusions: There is a significant correlation between insulin treatment and A1C, insulin requirement, and frequency of overweight and obesity. It suggests that T1D patients using insulin pumps have the lowest A1c, dose the lowest amount of insulin and are least obese and/or overweight.

Table Differences between insulin treatment

	A1C (median, av., SD)	u/kg/day (median, av. SD)	Obese x > 98 centile (n, % of the group)	Overweight 91 < x < 98 (n, % of the group)
BD (n = 74)	7.85% (7.95 ± 1.2)	0.83 (0.89 ± 0.4)	8 (11%)	20 (27%)
TDS (n = 63)	8% (8.1 ± 0.8)	0.98 (1.01 ± 0.3)	8 (13%)	8 (13%)
MDI (n = 46)	8% (8.03 ± 1.1)	0.8 (0.81 ± 0.4)	3 (6%)	6 (13%)
CSII (n = 149)	7.6% (7.58 ± 0.7)	0.77 (0.77 ± 0.2)	3 (2%)	12 (8%)
Summary (n = 332)	7.7% (7.82 ± 0.9)	0.81 (0.85 ± 0.3)	22 (7%)	46 (14%)