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POSTER SESSIONS

Chronic Complications

P/001/WED

Study of coronary artery calcification risk in Egyptian adolescents with type 1 diabetes

M.A.K. Salem[1], E.M. Sherif[1], A.A.M. Adly[1] & K. Essamet[1]
[1]*Ain Shams University, Cairo, Egypt*

Objective: To assess coronary artery calcification (CAC) among adolescents type 1 diabetics and to determine its relation with C-reactive protein (CRP), dyslipidaemia, glycaemic control and microvascular complications.
Methods: The study included 60 type 1 diabetics. Their ages ranged from 12 to 18 years and their diabetes duration ranged between 10 and 15 years. Patients were compared with 60 healthy subjects served as controls. Clinical examination and laboratory investigations were done for evaluation of glycaemic control and presence of microvascular complications. Lipid profile, CRP and Multislice Spiral Computed Tomography were done.
Results: CRP, total cholesterol, triglycerides and low density lipoproteins levels were significantly higher in diabetics compared to controls ($P < 0.001$). Twelve diabetics (20%) had positive CAC. The mean calcium score was significantly higher in diabetics compared to controls ($P < 0.05$). Smoking significantly affects CAC as 50% of smoker diabetics had evidence of CAC compared to 9.1% of non-smokers ($P < 0.001$). Fifty percent of diabetics on angiotensin converting enzyme inhibitor (ACEI) had evidence of CAC compared to 0% of patients without history of ACEI therapy ($P < 0.001$). Diabetics with CAC had significantly higher mean glycosylated haemoglobin, and CRP compared to patients without ($P < 0.05$). Blood pressure percentiles, albumincreatininne ratio and serum lipids were significantly higher in patients with CAC compared to those without ($P < 0.001$). All diabetics with severe retinopathy had positive CAC compared to 0% with normal fundus ($P < 0.001$). All diabetics with overt nephropathy had positive CAC compared to 13.3% and 0% in micro- and norm-albuminuria patients ($P < 0.001$).
Conclusion: Young diabetics have evidence of CAC. Smoking, microvascular complications and dyslipidaemia might contribute to this risk.

P/002/WED

Visual evoked potentials in children and adolescents with type 1 diabetes mellitus

M.H. El Samahy[1], R.M. Matter[1], A.M. Nassef[2] & A.F. Osman[1]
[1]*Ain Shams University Cairo, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University Cairo, Neurology, Cairo, Egypt*

Background: Visual evoked potentials (VEP) assessment is a simple, sensitive and objective technique used to evaluate visual pathways.
Objectives: To evaluate visual evoked potentials in type 1 diabetic children and adolescents, and to correlate VEP with age, duration of diabetes, glycemic control, peripheral neuropathy and other diabetic microvascular complications (MVC).
Methods: Pattern reversal visual evoked potential (VEP), sensory and motor nerve conduction velocities of median and common peroneal nerves were performed in 40 type 1 diabetic children and adolescents (20 with evidence of MVC (aged 14 ± 1.82 years) and 20 without evidence of MVC (aged 12.55 ± 2 years) from Diabetes Clinic, Children's Hospital, Ain Shams University, Cairo, Egypt and twenty healthy age and sex matched children were included as a control group (aged 12.8 ± 2.16 years).
Results: Presence of VEP abnormalities (abnormal P100 amplitude and latency in right and left eyes) were significantly higher ($P < 0.001$) in diabetic patients (50%) than controls (0%) and in patients with MVC compared to patients without MVC ($P < 0.001$). There was a positive correlation between right eye VEP latency and mean HbA1c in diabetic patients ($r = 0.43$, $P = 0.006$). A positive correlation was detected between VEP amplitude and age of onset ($r = 0.4$, $P < 0.01$) and also between patients' VEP latency and both motor and sensory common peroneal nerve latency ($r = 0.534$, $P < 0.001$, $r = 0.546$, $P < 0.001$). VEP abnormalities were detected more frequently in diabetic patients with visual symptoms and with diabetic retinopathy compared to those without. 47% of patients with normal fundus showed VEP abnormalities.
Conclusions: Visual evoked potential abnormalities are common in type 1 diabetic children and adolescents particularly in patients with MVC. VEP affection is related to age of onset of diabetes and glycemic control. VEP may detect abnormalities in the visual pathway early prior to any visual symptoms or changes in fundus examination.

P/003/WED

Predictors of cognitive impairment in children and adolescents with type 1 diabetes mellitus

M.H. El Samahy[1], S.M. Farid[1], H.M. Azzam[2] & S.M. Sayed[1]
[1]*Ain Shams University, Paediatrics, Cairo, Egypt,* [2]*Ain Shams University, Neuropsychiatry, Cairo, Egypt*

Background: A decline in cognitive function has been reported in type 1 diabetes, but the relation of neurocognitive function to different disease factors such as hypoglycemic events, peripheral neuropathy and retinopathy is controversial.
Aim of the study: This study aims to assess the neurocognitive function in children and adolescents with type 1 diabetes mellitus and to define its relation to sociodemographic factors and different diseases and laboratory parameters.
Patients and methods: Neurocognitive function was assessed in 60 children and adolescents with type 1 diabetes mellitus as well as in 30 healthy controls well matched in age, gender and education level to the diabetic patients. A written consent was taken from the parents of both patients and controls.
Results: Diabetic patients showed statistically significant lower score in categories-completed, preservative response, block design, comprehension and digit span tests compared to control. Also; patients showed significantly lower verbal IQ,

performance IQ and total IQ test results compared to control. We found a negative correlation between cognitive function and both HbA1c and the frequency of DKA and a positive correlation between cognitive function with SES. While no correlation was found between any of the cognitive function tests and the frequency of hypoglycemia, age of onset and disease duration.

Conclusion: Patients with type 1 diabetes mellitus have neurocognitive deficits. The most common cognitive deficits identified in patients with type 1 diabetes are slowing of information processing speed, defective cognitive ability and concept formation. Increased glycated Hb, recurrent DKA attacks and low SES are important risk factors for cognitive impairment in diabetic patients.

P/004/WED

Increased prevalence of neurophysiological abnormalities in children and adolescents with type 1 diabetes (T1DM)

M. Louraki[1], M. Katsalouli[2], C. Karayanni[1], K. Anyfantakis[3], N. Kafassi[4], E. Tsouvalas[1], A. Papathanasiou[3] & K. Karavanaki[1]

[1]*University of Athens, 'P&A Kyriakou' Children's Hospital, Second Pediatric Department, Athens, Greece,* [2]*'Aghia Sofia' Children's Hospital, Neurologic Department, Athens, Greece,* [3]*'P&A Kyriakou' Chilrdren's Hospital, Department of Pediatric Endocrinology, Athens, Greece,* [4]*'Laiko' General Hospital, Department of Immunology, Athens, Greece*

Objectives: To study the prevalence of impaired vibration sensation thresholds (VSTs) and sensory and motor nerve conduction velocity (NCV) in children with T1DM, as early indices of peripheral diabetic neuropathy (PDN). We studied 55 children and adolescents with T1DM, aged 14.3 ± 3.8 years, with mean diabetes duration 6.2 ± 4.2 years and 31 age and sex-matched controls, aged 13.5 ± 1.9 years.

Methods: Vibration sensation threshold was measured by a biothesiometer in the thumb, index finger, toe and hallux of the patients and controls. Nerve conduction velocities were recorded in patients in the upper (medial nerve) and lower limbs (sural and peronial nerve), using an electromyograph. The growth and pubertal status were recorded and metabolic control was assessed using HbA_{1c}.

Results: T1DM children had significantly higher VSTs compared to controls in all sites (P = 0.001). Among them 8/55(14.5%) had abnormal VSTs in the upper, 2/55(3.6%) in the lower limbs, 14/55(25.5%) in both upper and lower limbs, while 31/55(56.4%) had no VST abnormality. NCV studies were performed in 20/55 T1DM patients. Among them 7(35%) had normal NCV, 9 (45%) abnormal and 4/20 (20%) marginally abnormal (NCV abnormality group). Among the latter 13 patients, 11 had sensory abnormality, one motor abnormality and one both sensory and motor abnormality. Moreover 12/13 had NCV impairment in the lower limbs and one in both upper and lower limbs, without clinical symptoms of PDN. The NCV abnormality group, in comparison with the rest of the patients, was predominantly pubertal [11/13(84.6%) vs. 4/7 (57.1%), P = 0.290], while patients with NCS or VST abnormality did not differ from the rest of the study group in age, height, T1DM duration and HbA_{1c}.

Conclusions: T1DM patients, mainly adolescents, although asymptomatic, had increased prevalence of impaired VST and sensory NCV, mainly in the lower limbs, independent of diabetes duration and glycaemic control. These findings suggest the possible appearance of early signs of subclinical PDN, which need a regular follow-up.

P/005/WED

Possibly promising methods in detecting early signs of peripheral diabetic neuropathy in young patients with type 1 diabetes mellitus

J.C. van der Heyden[1], P. van der Meer[2], E. Birnie[3], G.H. Visser[2], I.F.M. Coo[4], H.J. Veeze[1], H.J. Aanstoot[1] & J.H. Blok[2]

[1]*Diabetes, Rotterdam, Netherlands,* [2]*Erasmus Medical Centre, Clinical Neurophysiology, Rotterdam, Netherlands,* [3]*Erasmus Medical Centre, Institute of Health Policy and Management, Rotterdam, Netherlands,* [4]*Erasmus Medical Centre, Pediatric Neurology, Rotterdam, Netherlands*

Despite overall reduction in long-term complications in children and youth with type 1 diabetes mellitus (T1DM), studies show an increase in the prevalence of peripheral diabetic neuropathy (PDN). An appropriate test for the detection of early signs of PDN is lacking. We analysed amplitude and nerve conduction velocity (NCV) of the superficial peroneal nerve (SPN) and the suralis nerve (SN). A sine-wave transcutaneous electric stimulator was used on the peroneal nerve to determine the Current Perception Threshold (CPT) at 2000, 250 and 5 Hz. Changes in motor axonal excitability of the extensor digitorum brevis muscle were assessed by the compound muscle action potential scan (CMAP scan). Fourteen appropriately regulated T1DM patients (AR, median 13 years), 17 poorly regulated T1DM patients (PR, median 18 years), and age-sex matched peers without T1DM were included. In some PR-patients no sensory response could be evoked in the SPN (11.8%) and SN (23.5%). Median amplitude of the SPN in the remaining PR-patients was significantly lower relative to their peers and AR-patients (7.3mV IQR 4.8–10.1 vs. 10.2 mV IQR 6.8–13.3, P 0.03; and 8.9mV IQR 7.4–14.7, P 0.03). No differences were found in SPN NCV or NCV and amplitude of SN. CPT at 250 Hz was significantly increased in PR-patients compared to their peers (159 mA IQR 130–195.5 vs. 134 IQR 113.3–139.8 mA, P 0.03). CMAP scans showed increased stimulation thresholds for S5 (29.2 mA IQR 22.1–38.6 vs. 12.8 mA IQR 10.5–18.3), S50 (33.4 mA IQR 20.5–59.5 vs. 14.6 mA IQR 13–22.1) and S95 (47.4 mA IQR 26.5–79 vs. 18.4 mA IQR 16.5–28.5) for PR-patients (all $P < 0.01$) and for S5 for AR-patients (26.1mA IQR 14.6–31.9 vs. 15.6 mA IQR 11.6–21.3, P 0.03), all relative to their peers. In conclusion, nerve conduction study of the SPN rather than SN and amplitude rather than NCV might be more sensitive in detecting early PDN. Determination of the CPT and the CMAP scan might be promising methods in detecting early sensory and motor nerve damage in PDN.

P/006/WED

Cystopathy in children and adolescents with type 1 diabetes mellitus

S.A. Elhabashy, S.A.K. Mona, S.S. Hassan, H.M.A. Hosama, T.N. Dalia & H.A. Elkafy

Ain Shams University, Cairo, Egypt

Background: Urinary bladder dysfunction is a major complication of diabetes mellitus and its mechanism has been attributed to autonomic and/or peripheral neuropathy.

Objectives: Evaluation of the effect of diabetes mellitus and diabetic neuropathy on the urinary bladder dynamics in children and adolescents with type 1 diabetes mellitus.

Patients and methods: The study included 80 children and adolescents with type 1 diabetes of 5 years or more; 60 patients had manifestations of autonomic and/or peripheral neuropathy and 20 patients were free of neuropathy. Diagnosis of neuropathy was based on clinical examination, cardiac

autonomic reflexes and nerve conduction velocity. Cystopathy was assessed by means of uroflowmetry and cystometry.
Results: All patients with diabetic neuropathy were found to have abnormal urodynamic test results of variable types with bladder hypercompliance as the most frequent abnormality. Other urodynamic abnormalities were found in both diabetic patients' groups with no significant difference. Regarding the *uroflowmetry* results, the mean values of maximum flow rate, average flow rate and voiding time were slightly higher in patients with neuropathy than in patients without. Meanwhile, the mean value of *voiding volume* was significantly higher in patients with neuropathy than in patients without neuropathy. The duration of diabetes was found to be significantly related to the ultrasound (U/S) estimated bladder wall thickness and residual urine volume.
Conclusions: Diabetic neuropathy is strongly related to the presence of urodynamic abnormalities, particularly the bladder hypercompliance.

P/008/WED

Pilot study into the efficacy of a novel, non-invasive approach to studying the affects of acute hyperglycemia on cognitive and psychosocial variables in adolescents

V. Mc Darby[1], C. Costigan[1] & S. Carroll[2]
[1]*Our Lady's Children's Hospital Crumlin, Dublin, Ireland,* [2]*Trinity College Dublin, Dublin, Ireland*

Objective: Studies that have examined the effects of acute hyperglycemia on cognitive and/or psychosocial variables in children and adolescents have generally used one of two approaches.
(1) An insulin-glucose clamp is used to manipulate blood-glucose level while dependant cognitive/psychosocial variables are measured.
(2) Dependent cognitive/psychosocial variables are measured repeatedly at varying time points during which blood-glucose levels are also measured.
The present study aimed to investigate the efficacy of using a novel, non-invasive approach whereby blood-glucose levels are maniplulated by controlling the insulin administration and food intake of adolecents using continuous subcutaneous Insulin Infusion (CSII) within a clinic setting.
Methods: Eleven male adolescents with T1DM (aged 12–18 years) using CSII participated in a repeated-measures, single-blind design. The non-invasive protocol was used to create two distinct blood glucose conditions, euglycemia and hyperglycemia. Participants were randomly placed into both conditions (seperated by a period of 12 weeks) during which tests of cognitive functioning were completed as well as mood state and belief-based questionnaires.
Results: Using the novel, non-invasive protocol it was possible to induce and maintain euglycemic and hyperglycemic states of sufficient duration to assess cognitive and psychosocial variables. Of the cognitive and psychosocial variables examined using the present protocol higher blood-glucose levels were found to be associated with lower scores on tests of verbal ability and lower levels of reported vigour. In addition, participants were found to be inaccurate estimators of their blood glucose, particularly when their blood glucose level was higher.
Conclusions: The novel, non-invasive protocol devised in the present study is an effective approach to investigating the affect of acute hyperglycemia on cognitive and psychosocial variables in dolescents.

Diabetic Ketoacidosis

P/009/FRI

Epidemiological pattern of diabetic ketoacidosis, in national institute of diabetes and endocrinology (NIDE), Cairo, Egypt

A. Bassyouni, I. El Ebrashy, M.H. El Hefnawy & M.H. Mahfouz
National Institute for Diabetes & Endocrinology, Pediatric, Cairo, Egypt

Background: Diabetic ketoacidosis (DKA) is the most serious acute metabolic complications of diabetes. Unfortunately, there is a dearth of published data on this entity from Egypt. The aim of our work was to determine the clinical characteristics, precipitating causes and mortality rate of patients with diabetic ketoacidosis in national institute of diabetes and endocrinology (NIDE).
Methods: Our work is a retrospective study in which we reviewed and analyzed the data of all patients (1297 diabetics: 85.8% type1 and 14.2% type2 diabetics, 59.6% females and 40.4% males) who admitted to NIDE in Cairo, Egypt with diagnosis of DKA over the last three years.
Results: DKA among our study diabetics was attributed to non-compliance (45.5%), infection (27.2%),myocardial infraction (6.4%), and *new-onset type 1 diabetes* (20.9%).Respiratory infection (46.9%), urinary tract infection (36.3%), gastroenteritis (9.7%),diabetic foot (2.5%) and abscess (4.6%) were the most frequent infection in the our patients. *The patient's age, weight, blood pressure, pulse, serum creatinin, duration for recovery from DKA, type of DM and presence of coma were associated with mortality in these patients. Logestic regression revealed that duration for recovery from DKA was the only independent risk factor for mortality among diabetics with DKA.*
Conclusion: Most of diabetics with DKA are young females and have type1 DM. Non-compliance and infection were the leading precipitating causes for DKA among type1 and type 2 respectively. Recurrent admission for DKA and delayed diagnosis of new onset type1 DM are frequent and may indicate inadequate education. Respiratory and urinary tract infections accounted for the majority of infections in these patients. Mortality was infrequent finding among our diabetics with DKA.

P/010/FRI

Increasing prevalence of ketoacidosis in children diagnosed with diabetes, Colorado, 1978–2009

A. Rewers, G. Klingensmith & M. Rewers
University of Colorado, Aurora, USA

Background: Diabetic ketoacidosis (DKA) is a life-threatening, but preventable complication. At diagnosis of diabetes, DKA affects disproportionally younger, poorer and uninsured children as well as those from population with low awareness and incidence of diabetes.
Methods: This study examined the prevalence of DKA at diagnosis in Colorado children during 1998–2001 and 2006–2009 and compared the rates to historical data. Using electronic patient record database of the Barbara Davis Center for Childhood Diabetes in Denver, we ascertained children aged <18 and diagnosed with type 1 diabetes (T1D) in Colorado, during 1998–2001 (n = 603) and 2006–2009 (n = 1054). Medical records of 88% of the patients were reviewed for DKA at diagnosis (venous pH < 7.3 or bicarbonate < 15 mmol/l, in presence of hyperglycemia and ketosis).
Results: Over the past 12 years, the age-adjusted prevalence of Colorado children presenting in DKA has increased by more than 40% (P = 0.0014). The current rate of 40.4% is slightly higher than that previously reported by the Colorado IDDM Registry (38%), using the same criteria, among children diagnosed in 1978–1982.This change from 29% in 1998–2001 to 40.4% in 2006–2009 was partially explained by a higher proportion of uninsured patients and those of Hispanic ethnicity among children diagnosed more recently.
Conclusions: The apparent increase in the severity of presentation of T1D in Colorado children over the past 12 years points to a major setback in the community awareness of symptoms and signs of diabetes and in the access to care. The rates of DKA in Colorado children, previously declining, have returned to the1980's level and are now twice as high as those in Europe.

P/011/FRI

Primary prevention of DKA: a campaign to raise awareness of diabetes symptoms in the community

D.H. Jelley[1], C.G. Marra[2] & J. Paul[3]
[1]*University of Oklahoma School of Community Medicine, Harold Hamm Oklahoma Diabetes Center, Tulsa, USA,* [2]*Vanderbilt University, Biomedical Engineering, Nashville, USA,* [3]*University of Oklahoma School of Community Medicine, Pediatrics, Tulsa, USA*

Objectives: Diabetic ketoacidosis (DKA) is the leading cause of death in children with diabetes. We initiated a public awareness campaign to raise awareness of the symptoms of diabetes with the goal of reducing the incidence of DKA in children newly diagnosed with diabetes.
Methods: The campaign began in January 2009 with a media blitz on local television and a personal interest story about a child with new onset DM in the regional newspaper. Informational posters were placed in high traffic areas in the public schools and remained up throughout the year of the campaign. A symptom recognition postcard was mailed to all primary care physicians at the 6 months point in the campaign. All newly diagnosed diabetes patients referred to the Diabetes Center at the University Of Oklahoma School Of Community Medicine-Tulsa from 2007–2009 were included in the study.
Results: In the two years prior to the awareness campaign, 60 out of 193 children newly diagnosed with diabetes presented in DKA (prevalence = 29.9%). The prevalence rate varied from a low of 27% to a peak of 35% for any given 6 months period between January 2007 and December 2008. In the first 6 months after starting the awareness campaign, 6 of 45 patients presented with DKA (prevalence = 13.3%). During the subsequent 6 months, 17 of 55 patients were in DKA (prevalence = 30.9%), yielding an overall prevalence of 23% for 2009.
Conclusions: The prevalence of DKA during the six months following the diabetes awareness campaign was significantly lower than during any other period of observation (c^2, P = 0.05). This was temporally associated with the media and newspaper media blitz. The rate of DKA returned to baseline after six months, even though information posters remained in schools and a postcard was sent to area primary care physicians urging early recognition and diagnosis. The total cost of the campaign was $1100, compared to the estimated cost savings of $85,000 for DKA related hospitalizations.

P/012/FRI

Diabetic ketoacidosis management safe and simple

W.J. van IJperen Sr[1], E. Peeters[2] & W.J. van IJperen[2]
[1]*NHS Grampian, Department of Paediatric Diabetes, Elgin, UK,* [2]*Universiteit Antwerpen, Antwerp, Belgium*

Diabetic ketoacidosis (DKA) is a complication of T1DM with a substantial mortality. It is caused by a lack of insulin. Dehydration and electrolyte disturbances follow hyperglycemia and deranged cell metabolism. Recovery has to be done carefully to avoid further disruption and complication.

Methods: The Elgin Protocol gives resuscitation fluids (10–20 ml NaCl 0.9% per kg body weight in first hour), followed by IV insulin and rehydration plus maintenance fluids. Insulin regime is calculated according to body weight and serum glucose level (0.050 Unit per kg body weight per hour for glucose between 10 and 15 mmol/l with a modified sliding scale: 0.055 and 0.060 U/kg/hour for glucose between 15 and 20 and above 20; 0.045 and 0.040 U/kg/hour if glucose between 5 and 10 and below 5 respectively). After resuscitation IV fluid Glucose 5% per NaCl 0.45% with K^+ 40 mmol/l is given. This is calculated for 48 hours. Glucose and ketones are monitored hourly as long as insulin is given IV. Blood gas analysis is done 4-hourly until pH > 7.3. Electrolytes are measured 4-hourly as long as fluids are given IV.

Results: A total of 92 patients were treated with this regime between 2001 and 2010. All patients recovered uneventfully. Average pH on admission was 7.148 (6.815–7.296) with average glucose of 21.3 mmol/l (9.5–32.3). All patients reached pH > 7.3 within 12 hours. There were no severe hypoglycaemic episodes (lowest 2.2 on three occasions) and no electrolyte disturbances. There was no case of cerebral oedema.

Conclusions: The choice for 0.05 Unit/kg/hour IV insulin with sliding scale, with glucose and K^+ in the IV fluids directly after resuscitation, in a protocol with regular monitoring of glucose, ketones, blood gases and electrolytes has proved to be efficient (recovery within 12 hours) and safe (no complications). This regime is suitable for a general paediatric department with a dedicated staff.

P/013/FRI

Evaluation of capillary β-hydroxybutyrate measurement in diabetic ketoacidosis

M.H. El Hefnawy[1], A.A.M. Bassyouni[2] & I. Emara[3]
[1]*National Institute for Diabetes & Endocrinology, Pediatric, Cairo, Egypt,* [2]*National Institute for Diabetes & Endocrinology, iNT.mED, Cairo, Egypt,* [3]*National Institute for Diabetes & Endocrinology, Biochemistry, Cairo, Egypt*

Background: Current criteria for the diagnosis of diabetic ketoacidosis (DKA) are limited by their nonspecificity (serum bicarbonate [HCO_3] and pH) and qualitative nature (the presence of ketonemia/ketonuria). A new method is now available to measure capillary levels of β-hydroxybutyrate (β-0HB). It is a quantitative and enzymatic test that uses the same equipment as for home capillary blood glucose determination but with specific strips.

Aim of the work: The aim of this study was to evaluate the use of measurement of capillary B-hydroxybutyrate (β-OHB) during the diagnosis and follow up of type 1 diabetic patients with DKA.

Subjects and methods: This study was conducted on 40 type 1 diabetic patients presented to (NIDE) with DKA and who were aged 4–20 years and half of them was males. 140 capillary blood samples were tested for β-hydroxybutyrate using blood β-OHB test strips. Measurement of serum bicarbonatre (HCO_3), blood glucose and urine acetone and estimation of venous blood pH and anion gap had been done for all patients.

Results: Linear regression revealed highly significant correlation between capillary β-OHB levels and all indices of acidosis but no significant correlation between acetone in urine and serum bicarbonate. Using regression to predict values of HCO_3, pH and anion gap from β-OHB levels revealed that levels of β-OHB of 1.4, 1.9, 2.7, 3.5 and 4.0 mmol/l corresponded to HCO_3 levels of >18, 15–18, 10 to <15, 5 to <10 mEq/l.

Conclusions: The measurement of capillary β-OHB levels is easy and give rapid and objective results. Capillary β-OHB levels are more predictable than urinary acetone for degrees of acidosis and severity of DKA and can be used at diagnose and follow up of type 1 diabetic patients with DKA to improve their management.

Keywords: Acetoacetic acid (ACAC), B-hydroxybutyrate (β-OHB), Diabetic Ketoacidosis (DKA), bicarbonate (HCO_3) and National Institute of Diabetes & Endocrinology, (NIDE).

P/014/FRI

Multicentric study of diabetic ketoacidosis in pediatric units in Argentina

M. Ferraro[1], B. Ozuna[2], C. Mazza[2], O. Ramos[3], P. Evangelista[2], C. Mannucci[3], M. Gandolfo[3], Y. Camiser[2], R. Varela[4], A. Figueroa Sobrero[5], S. Gonzalez[6], F. Palacios[7], S.M. Lopez[8], M. Ropolo[9], L. Caratcoche[10], L. Trifone[10], M.L. Eandi[2], G. de Freijo[11], D. Fernandez[12], M.E. Pianesi[13] & E. Scaiola[14]
[1]*Hospital Pedro de Elizalde, Nutrition and Diabetes, Buenos Aires, Argentina,* [2]*Hospital Juan P. Garraham, Buenos Aires, Argentina,* [3]*Hospital Pedro de Elizalde, Buenos Aires, Argentina,* [4]*Hospital Pediátrico Dr. Humberto Notti, Mendoza, Argentina,* [5]*Hospital San Roque, Parana, Argentina,* [6]*Hospital Regional Castro Rendón, Neuquen, Argentina,* [7]*Hospital Nacional Profesor Alejandro Posadas, Pvcia de Buenos Aires, Argentina,* [8]*Hospital Infantil Municipal de Córdoba, Cordoba, Argentina,* [9]*Hospital de Niños de la Sma. Trinidad, Cordoba, Argentina,* [10]*Hospital Gutierrez, Buenos Aires, Argentina,* [11]*Hospital de Niños ``Niño Jesús de Praga'', Salta, Argentina,* [12]*Hospital Enrique Vera Barros, La Rioja, Argentina,* [13]*Hospital Pvcial. de Pediatría 'Dr Fernando Barreyro', Misiones, Argentina,* [14]*Hospital Regional Ushuaia, Usuahia, Argentina*

Diabetic Ketoacidosis (DKA) is the unbalancing of Diabetes Mellitus frecuent in childhood that shows up with hyperglycemia, ketonuria, glucosuria, metabolic acidosis and dehydration.

Objective: Compare the time of recovery considering the pH at the beginning of the treatment, the bicarbonate administration and the means of insulin administration in a group of patients treated in different peadiatric centers in Argentina.

Methods: Multicentric, descriptive and analytic study. Patients treated for DKA between October 2007 and March 2008 in diferente peadiatric centers of the country were included.

Results: Hundred and eleven patients, 60.2% women, 47.1% without social security were included. The average age of admission was 11.2 ± 4 (r = 0.9–18 years of age). In 42.6% the DKA was the first appearance of the disease and in the patients with previus diagnosis the most frequent cause was insulin omission. At the beginning of the treatment the average pH was 7.09 ± 0.08 (CI: 95% 7.07–7.11). The time of treatment until a pH of 7.30 (T1) was reached was of 9.14 hours (IC 95% 8–10.7). An inverse relation was observed, statistically significant between pH at the beginning of the treatment and the time required for its normalization (r = 0.31, P 0.03). The bicarbonate administration did not influence on the improvement. Significant differences in T1 according to via of insulin administration were not observed (IV, subcutaneous, IM) (P 0.71). Severe complications as cerebral edema 1.8% and death in a 1.8% were registered.

Conclusion: The bicarbonate administration and the different means of insulin delivery do not influence on the evolution of

the patients. Initial ph is the main marker of seriousness and it was significantly related with the time of recovery.

P/015/FRI

Diabetic ketoacidosis in North India

S. Kalra, B. Kalra & A. Sharma
Bharti Hospital, Karnal, India

Objectives: This paper highlights the features of diabetic ketoacidosis in an endocrine centre in north India.
Methods: Records of 100 patients admitted with ''large'' or ''moderate'' ketonuria over a three year period were reviewed.
Results: Of these, 36 had clinical evidence of acidosis, and 20 were in altered sensorium, with six not responding to pain. Blood ketones were positive in 8/24 patients. HbA1c, done in 38 patients, varied from 9.9% to 21.8%. Eighty percent were male, with the commonest age groups being 11–20 and 41–50 years. Precipitating causes were omission/ inadequate dose of insulin (48%), excessive alcohol intake (10%), acute gastroenteritis (10%), tuberculosis/lung abscess (10%), pregnancy (5%), and newly diagnosed diabetes (12%). Symptoms included asthenia (90%), abdominal pain (55%), muscle cramps (45%), difficulty in breathing (36%), altered sensorium (20%), low blood pressure (20%), and oliguria (10%). The average insulin requirement for all patients was 115.53 U (14–410 U) or 3.6 U/kg (0.53–14.6 U/kg). Excluding five outliers, the average dose, including SC insulin, was 48–146 U or 1.2–3.8 U/kg till ketone-free state. Fluid requirement varied from 1.5 to 17 l (25–607 ml/kg) (mean 128 ml/kg). After excluding 5 outliers, the range was 2l–9l (35–300 ml/kg). Potassium supplement was 60–100 mEq/24 hours. All but three patients survived, with admission ranging from 24 hours to 9 days. The two patients whom we lost were a 13 years old boy (HbA1c 15%) with intra-cerebral abscess, a 15 year old girl with meningitis, and an untreated 5 years old boy weighing 12 kg, who died within minutes of reaching the hospital.
Conclusion: This paper shares unique experiences in managing DKA in a resource-challenged setting, and should be of interest to other physicians practising in similar environments.

P/016/FRI

Frequency and clinical characteristics of ketoacidosis at onset of childhood type 1 diabetes mellitus

M.D. Jesic[1], S. Sajic[1], V. Zdravkovic[1], V. Bojic[1], M. Nikolic[1] & M.M. Jesic[2]
[1]*University Children's Hospital, Endocrinology, Belgrade, Serbia,*
[2]*University Children's Hospital, Neonatology, Belgrade, Serbia*

Objective: To determine the frequency, and to describe the clinical characteristics of ketoacidosis at initial diagnosis of childhood type 1 diabetes mellitus (T1DM) at University Children's Hospital in Belgrade, Serbia.
Methods: We retrospectively analyzed the hospital records of 549 children below 18 years diagnosed with childhood T1DM between January 1995 and December 2009. Diabetic ketoacidosis was defined as glucose >250 mg/dl, pH < 7.3 or bicarbonate < 15 mmol/l and ketonuria.
Results: At diagnosis 151 (27.5%) children presented with diabetic ketoacidosis at the onset of their illness, 91 (60.3%) were females and 60 (39.7%) were males. Most of the ketoacidosis was mild to moderate (77.5%), while 34 (22.5%) children had the severe type. Sixty-three (41.7%) children were in the younger age group (from 6 months to 6 years), 38 (25.2%) were in the middle age group, and 50 (33.1%) were in older age group (from 12 years to 18 years). Altered consciousness was present in 10 (6.6%) children and all of them were from the severe type of ketoacidosis.
Conclusion: The frequency of ketoacidosis at onset of childhood diabetes mellitus at our hospital is significant. In particular, children <6 years and girls face an increased risk. Prevention of diabetic ketoacidosis and reduction of its frequency should be a goal in managing children with diabetes. Rising standards of medical information and general awareness can contribute to this.

P/017/FRI

The impact of diabetic ketoacidosis and age on behavior six months post-diagnosis in children with type 1 diabetes

S.E. Scratch[1], C. Nadebaum[1], E.A. Northam[2,3], F.J. Cameron[4] & Diabetic Ketoacidosis and Brain Injury Study Group
[1]*Murdoch Children's Research Institute, Child Neuropsychology, Melbourne, Australia,* [2]*Royal Children's Hospital, Department of Psychology, Melbourne, Australia,* [3]*University of Melbourne, Department of Psychology, Melbourne, Australia,* [4]*Royal Children's Hospital, Department of Endocrinology and Diabetes, Melbourne, Australia*

Objectives: Children with type 1 diabetes mellitus (DM1) may be at increased risk of psychosocial and adjustment difficulties. We examined behavioral outcomes six months post-diagnosis in a group of children with newly diagnosed DM1.
Methods: This study formed part of a larger longitudinal project examining pathophysiology and neuropsychological outcomes in diabetic patients with or without diabetic ketoacidosis (DKA). Participants were 61 children (mean age 11.8 years, SD 2.7 years) who presented with a new diagnosis of DM1 at the Royal Children's Hospital, Melbourne. Twenty-three (11 female) presented in DKA and 38 (14 female) without DKA. Parents completed the behavior assessment system for children, second edition six months post-diagnosis.
Results: There was a non-linear relationship between age and behavior. Internalising problems (i.e. anxiety depression, withdrawal) peaked in the transition from childhood to adolescence; children aged 10–13 years had elevated rates relative to the normal population ($t = 2.55$, $P = 0.018$). There was a non-significant trend for children under 10 to display internalising problems ($P = 0.052$), but rates were not elevated in children over 13 ($P = 0.538$). Externalising problems were not significantly elevated in any age group. Interestingly, children who presented in DKA were at lower risk of internalising problems than children without DKA ($t = 3.83$, $P < 0.001$). There was no effect of DKA on externalising behaviors.
Conclusions: Children transitioning from childhood to adolescence are at significant risk for developing internalising problems such as anxiety and lowered mood after diagnosis of DM1. Somewhat counter-intuitively, parents of children presenting in DKA reported fewer internalising symptoms than parents of children without DKA. These results highlight the importance of monitoring and supporting psychosocial adjustment in newly diagnosed children even when they seem physically well.

P/018/FRI

Outpatient blood ketone monitoring: a Scottish perspective

C.J. Stutchfield, K. Noyes & L. Bath
NHS Lothian, Paediatric Endocrinology, Edinburgh, UK

Objectives: To assess the acceptability of blood versus urinary ketone testing in the outpatient setting in children under 11 with type 1 diabetes and to identify the degree of morning ketonaemia. Secondly, to determine current practice regarding

outpatient ketone meter use and sick day advice in all Scottish paediatric diabetes centres.

Population and methods: Between April and May 2009 all patients with type 1 diabetes <11 years attending the diabetes clinic at Edinburgh's Royal Hospital for Sick Children, Scotland (n = 16) were educated in the use of and provided with a blood ketone meter. Daily waking ketone readings were recorded over 4 weeks. Blood and urinary ketone levels were recorded over a 3 months period if the child became unwell or had a blood glucose >15 mmol/l for more than 4 hours, with written advice on sick day management provided. Questionnaires were completed by parents at next clinic appointment or via telephone interview. Each Scottish endocrine centre (n = 10) completed a questionnaire regarding their current outpatient ketone meter practice.

Results: Ninety-three percent of families felt confident using and acting upon the results of the blood ketone meter. Seventy-five percent of families preferred testing blood ketones compared to urinary ketones, with greater accuracy and increased ease and speed to obtain a sample cited as the most common reasons. The range of fasting ketonaemia was 0.0–0.7 mmol/l. Currently, most Scottish endocrine centres only provide blood ketone meters for younger children or those on insulin pumps. Considerable variability exists between centres regarding advice on sick day management and blood ketone levels.

Conclusions: Provision of blood ketone meters with education in their use is an effective aid to sick day management and should be offered to all children with type 1 diabetes. Differences in sick day guidance between Scottish paediatric diabetes centres in relation to blood ketone readings would be eliminated by introducing a common protocol.

Macroangiopathy and Type 2 Diabetes

P/019/WED

Carotid artery intima-media thickening and biochemical markers of cardiovascular risk in obesity and type 1 diabetes in children and youngs

M.E. Andres, O. Ramos, A. Franchello, P. Marino, S. Barbeito, I. Strasnoy, C. Mannucci & M. Ferraro
Hospital de Elizalde, Nutrition and Diabetes Unit, Ciudad Autonoma de Buenos Aires, Argentina

Introduction: Cardiovascular Disease is a serious Public Health burden. Is well known that nutritional and metabolic events in early childhood may impact in cardiovascular risk later in life. Obesity, Insulin resistance and Type 1 diabetes affects adult morbidity and mortality. Nowadays there are non invasive studies to measure endothelial dysfunction and carotid intimae-media thickness (CIMT) by eco Doppler. Our purpose is to describe the measure of CIMT as a cluster of endothelial damage in three groups of children: Obese, Type 1 diabetes and control subjects analyzing the association between thickness of intimate and plasma markers of endothelial dysfunction.
Methods: Study observational, cross sectional, descriptive. We recruited children 10–20 years of age were attended at Nutrition Unit Elizalde's Hospital since June 2007 to May 2008.
Results: Hundred and fifty-one children were included, 54 (35, 5%) with diabetes, 86 (57%) with obesity and 11 (7.3%) control subjects. The average value of CIMT was of 0.57 mm (CI: 95% 0.55–0.59). There were no statistically significant differences in CIMT between the analyzed groups, although we observed significant differences in the mean plasma values of C Reactive Protein (CRP) and in Apolipoprotein A (Apo A). None of the analyzed markers of endothelial dysfunction was associated with CIMT in linear regression models. Nevertheless, the levels of Apo A showed an inverse relation with CIMT (r 0.24; P 0.02).
Conclusions: (1) There were no significant differences in CIMT between the different groups.
(2) The identification of changes in mean plasma values of Apo A and CRP associated with CIMT give to account the early cardiovascular risk in obesity and diabetes.

P/020/WED

Macroangiopathy risk factors in well-controlled adolescents with type 1 diabetes – the impact of sex

L.J. Machnica[1], G. Deja[2], J. Polanska[3] & P. Jarosz-Chobot[2]
[1]*Upper Silesia Child Health Center, Department of Pediatrics, Endocrinology and Diabetes, Katowice, Poland,* [2]*Medical University of Silesia, Department of Pediatrics, Endocrinology and Diabetes, Katowice, Poland,* [3]*Silesian University of Technology, Faculty of Automatic Control, Electronics and Computer Science, Gliwice, Poland*

Objectives: The aim of the study was to evaluate the distribution of the macroangiopathic risk factors in well-controlled adolescents with type 1 diabetes in relation to sex.
Design and methods: The group consisted of 52 young patients (19 girls and 33 boys) in mean age 14.07 ± 3.03 years, with mean diabetes duration 5.13 ± 2.18 years and mean HbA1c 7.18 ± 1.04%. Fasting blood lipids (TC – total cholesterol, HDL, LDL, TG – triglycerides), markers of endothelium dysfunction (sICAM-1, sVCAM-1, E-selectin, IL-6, TNF-α) as well as 24-hour blood pressure monitoring were performed in all subjects.
Results: No significant differences between the group of boys and girls in terms of age, BMI, HbA1c, insulin requirement and the duration of diabetes were present. Girls had significantly higher concentrations of total and HDL cholesterol than boys (TC: 193.37 ± 43.49 vs. 168.81 ± 24.50 mg/dl, $P < 0.05$; HDL: 65.19 ± 11.55 vs. 57.74 ± 13.16 mg/dl, $P < 0.05$). There was a tendency towards higher concentrations of TG and LDL cholesterol in girls (TG: 81.00 ± 23.51, LDL: 110.59 ± 35.05 mg/dl) comparing with boys (TG: 78.63 ± 26.13, LDL: 97.29 ± 22.88 mg/dl), $P > 0.05$. No significant differences regarding parameters of endothelium damage in relation to sex were noted in the study group. However, girls presented with significantly higher values of mean diastolic blood pressure during the night, as well as during the whole period of BP measurement when compared to boys (respectively: 60.35 ± 4.44 mmHg and 67.75 ± 2.74 mmHg vs. 56.75 ± 3.70 and 65.50 ± 4.95 mmHg), $P < 0.05$.
Conclusions: Even in well-controlled adolescents with diabetes some risk factors of macroangiopathy can be noticed. Girls seem to have a tendency to higher concentrations of blood lipids and higher values of blood pressure.
The study was supported from the KBN grant: NN 402279134.

P/021/WED

Is exercise a therapeutic tool for improvement of cardiovascular risk factors in adolescents with type 1 diabetes mellitus? a randomised controlled trial

M. Salem[1], M. Abo-ElAsrar[1], N. Elbarbary[1], R. El-Hilaly[2] & Y. Refaat[1]
[1]*Ain Shams University, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University, Physical Medicine & Rehabilitation, Cairo, Egypt*

Background: T1DM is associated with a high risk for early atherosclerotic complications especially risk of coronary heart disease.
Objective: To evaluate the impact of regular physical activity (RPA)on glycemic control, plasma lipids values, blood pressure, severity and frequency of hypoglycemia, anthropometric measurements and insulin dose in a sample of adolescents with T1DM .
Research design and methods: A total of 196 type 1 diabetic patients participated in the study. They were classified into three groups: Group (A) did not join the exercise program (n = 48), group (B) attended the exercise sessions once/week (n = 75), group (C) attended the exercise sessions three times/week (n = 73). Studied parameters were evaluated before and six months after exercise program.
Results: Regular physical activity improved glycemic control by reducing HbA1c values in exercise groups ($P = 0.03$, $P = 0.01$ respectively) and it increased in those who were not physically active ($P = 0.2$). Higher levels of HbA1c were associated with higher levels of cholesterol, LDL-c, and triglycerides ($p < 0.001$ each). In both group B and C frequent RPA improved dyslipidemia and reduced insulin requirements significantly ($P = 0.00$ both), also a reduction in BMI ($P = 0.05$, $P = 0.00$ respectively) and waist circumference ($P = 0.02$ $P = 0.00$ respectively) was noticed. Patients in group C experienced more attacks of hypoglycemia (4 ± 4.75 to 5 ± 5.8) than those in group B (attacks 4.8 ± 5.3 to 4.5 ± 3.7) though hypoglycemia was not severe enough to cause seizure or loss of consciousness. Reduction of blood pressure was statistically insignificant a part from the diastolic blood pressure in group C ($P = 0.04$).
Conclusion: Exercise is an indispensable component in the medical treatment of patients with T1D as it improves glycemic control and decreases cardiovascular risk factors among them.

P/022/WED

Obesity and body fat in type 1 diabetic children and adolescents

A. Szadkowska[1], A. Gadzicka[1], L. Ostrowska-Nawarycz[2], T. Nawarycz[2], B. Mianowska[1], K. Włodarczyk[1] & I. Pietrzak[1]
[1]*Medical University of Lodz, Department of Pediatrics, Oncology, Hematology and Diabetology, Łódź, Poland,* [2]*Medical University of Lodz, Department of Biophysics Chair of Basic and Pre-clinical Science, Łódź, Poland*

Objective: In the last two decades the prevalence of overweight and obesity in pediatric population has increased. That problem also concerns type 1 diabetic youths. The aim of the study was to estimate the prevalence of obesity, central obesity and body fat excess in type 1 diabetic children and adolescents.
Methods: Hundred and ninety-two patients, aged 9.5–18 years, with diabetes duration 0.5–15 years were included into the study. The height, weight and waist circumference were measured. Overweight was defined as body mass index (BMI) from the 85th to <95th percentile for age and sex and obesity defined as ≥95th percentile. Moreover the cut off points for BMI of international obesity task force was used to recognize obesity (BMI > IOTF 30 kg/m^2) and overweight (BMI > IOTF 25 kg/m^2). Central obesity was defined as waist circumference above 90th percentile for sex and age and as waist/height rate (WHtR) >0.5. Local BMI and waist circumference percentiles charts were used. Body fat was measured by bioimpedance. 85th percentile was used to define overfat.
Results: According to WHO criteria overweight was found in 19 girls, obesity – in four, together in 28%. Among boys, 13 were overweight and 10 obese, together 20.9%. According to IOTF overweight was recognized in 21 girls, obesity – in one, together in 29.3%. In boys overweight was observed in 21, obesity – in eight, together in 26.4%. According to percentiles charts central obesity was recognized in 21 girls (25.6%), and in 18 boys (16.4%), together in 20.3% patients. Using WHtR abdominal obesity was found in seven girls (8.5%), and in 13 boys (11.8%), together in 10.3% children. Overfat was observed in 27 girls (33.3%) and in 26 boys (26.4%), together in 27.6%.
Conclusions: Irrespective of the applied criteria overweight/obesity was found in every fourth type 1 diabetic child. The prevalence of central obesity depends of the criteria used. According to local waist circumference percentiles charts the abdominal obesity was recognized twice as frequent as using WHtR.

P/023/WED

More atherogenic cardiovascular disease risk profile in females than males who exceed A1c goals

R.P. Wadwa, F.K. Bishop, J.K. Snell-Bergeon, G.L. Kinney & D.M. Maahs
Barbara Davis Center for Childhood Diabetes, University of Colorado, Denver, Pediatrics, Aurora, USA

Cardiovascular disease (CVD) is the leading cause of mortality in type 1 diabetes (T1D) with an increased relative risk for CVD in women with T1D. While controversy exists on how early and aggressively to treat CVD risk factors in adolescents with T1D, glycemic control is an important step to lower CVD risk. Our aim was to determine whether CVD risk factors differed between non-diabetic (non-DM) and T1D youth at or above the ISPAD A1c goal (<7.5%) and to determine if sex differences existed.
Youth with and without T1D (n = 317) ages 12–19 years and T1D duration >5 years had fasting labs during a study visit. Differences between non-DM and T1D subjects at or above A1c goal were tested and then t-tests were used to compare by sex. T1D youth with A1c ≥7.5% had higher TC, LDL, and DBP than non-DM or T1D subjects at A1c goal. Among those above the A1c goal, T1D females compared to T1D males had higher A1c (0.6%, P = 0.002), BMI (1.5 kg/m^2, P = 0.005), TC (20 mg/dl, P < 0.0001), LDL (14 mg/dl, P = 0.0002), CRP (1.4 mg/dl, P = 0.0008), and SBP (2 mmHg, P = 0.02), but higher HDL (5 mg/dl, P = 0.0002) and lower DBP (3 mmHg, P = 0.02).
In conclusion, adolescents with T1D who meet A1c goal had a similar CVD risk profile as non-DM youth, but T1D youth who did not meet goal had a more atherogenic profile. Among those not meeting A1c goal, T1D females had a more atherogenic CVD profile than T1D males suggesting that sex-based differences in CVD risk in T1D may begin in adolescence.

*P < 0.05 Non-DM vs. T1D (<7.5%) **P < 0.05 Non-DM vs. T1D (≥7.5%) ***P < 0.05 T1D (<7.5%) vs. T1D (≥7.5%)	Non-DM n = 66	T1D, A1c <7.5% n = 39	T1D, A1c ≥7.5% n = 212
Age, year	15.4 ± 1.9	15.0 ± 2.0	15.5 ± 2.1
Sex, % male	44%	56%	51%
BMI, kg/m^2	22.1 ± 4.4	22.6 ± 3.7	22.9 ± 3.9
Total cholesterol, mg/dl**,***	148 ± 28	145 ± 22	159 ± 35
Triglycerides, mg/dl***	89 ± 47	71 ± 29	88 ± 52
HDL-c, mg/dl	49 ± 9	50 ± 8	51 ± 11
LDL-c, mg/dl**,***	81 ± 21	81 ± 19	91 ± 27
SBP, mm/Hg*,***	109 ± 7	113 ± 8	113 ± 8
DBP, mm/Hg**,***	64 ± 6	66 ± 6	69 ± 7

[Cardiovascular Disease Risk Factors by T1D and A1C]

P/024/WED

Glycated haemoglobin A1c (HbA1c) in children with long type 1 diabetes (T1DM) duration

A. Gawron[1], J. Polanska[2], M. Chumiecki[3], B. Echolc[4], A. Chobot[4] & P. Jarosz-Chobot[5]
[1]*Central Clinical Hospital of the Medical University of Silesia, Katowice, Poland,* [2]*The Silesian University of Technology, System Engineering Group, Gliwice, Poland,* [3]*Upper Silesian Center of Child's Health, Katowice, Poland,* [4]*Clinical Hospital No1, Zabrze, Poland,* [5]*Medical University of Silesia, Katowice, Poland*

Objectives: T1DM requires constant HbA1c control, which reflects the treatment ecacy. The study aim was to assess HbA_{1c} values in children with long T1DM duration.
Methods: From the database of the upper silesian center of child's health, Katowice, Poland (637 T1DM patients in years 2002–2009) for this study only children with T1DM duration >2 years, who had ≥4 HbA1c measurements (mean 12.2 ± 5.2/patient) until 10 years of disease duration were chosen. 4911 results from 471 patients (253 ♂) with mean age at onset 8.0 ± 3.64 years and T1DM duration 7.8 ± 2.65 years were analyzed. For each patient a linear trend model was created and HbA1c mean and SD z-scores (HbA1c Z and SD Z respectively) as well as HbA1c coefficients of variation (HbA1c CV) were calculated.
Results: The groups mean HbA1c for the whole observation time was 7.6 ± 1.15%. Patients' individual linear trend models showed no significance. Mean HbA1c was positively related to age at T1DM onset. Positive correlation of HbA1c Z and age as well as T1DM duration at HbA1c measurement (both P < 0.001)

was observed. HbA1c CV was related to mean HbA1c ($P < 0.001$) – better glycaemic control showed less variability, which increased when HbA1c outcomes were poorer. Also HbA1c CV and age at T1DM onset ($P < 0.001$) were positively correlated. Gender and mean number of measurements/patient/1 observation year (2.7 ± 0.64) were associated neither with mean HbA1c nor with HbA1c CV. There was a significant ($P < 0.001$) influence of the season on HbA1c Z – lower values observed in spring.

Conclusions: HbA_{1c} values in long-standing T1DM tend to increase with time of disease duration, however, the dynamics of observed changes is very low. Variation of HbA_{1c} results is relatively small, but increases with poorer outcomes, age at disease onset and T1DM duration. Long term glycaemic control results may be affected by seasonal changes.

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P/025/WED

Pediatric patients with clinical type-2-diabetes – what does the presence of b-cell-antibodies mean? data from the Austrian/German DPV register

E. Schober[1], T. Meissner[2], S. Wiegand[3], A. Thon[4], P. Beyer[5], T. Reinehr[6], W. Awa[7], A. Dost[8], J. Rohayem[9] & R. Holl[7]

[1]*Medical University of Vienna, Pediatrics, Vienna, Austria,* [2]*University Children's Hospital, Duesseldorf, Germany,* [3]*Charite Children`sHospital, Berlin, Germany,* [4]*Medical School Hannover, Hannover, Germany,* [5]*Evang Hospital Oberhausen, Oberhausen, Germany,* [6]*Children's Hospital Datteln, Datteln, Germany,* [7]*University of Ulm, Ulm, Germany,* [8]*Friedrich Schiller University, Jena, Germany,* [9]*Children's Hospital, Dresden, Germany*

Objectives: Type-2-diabetes with a pediatric onset is a new and rare disorder in European Caucasians. Therefore, insights can be accumulated from longitudinal multicenter registers. The presence of B-cell-antibodies in young patients with clinical type-2 diabetes according to WHO criteria has been reported previously. The aim of the present report is to compare B-cell - antibody-positive and B-cell antibody-negative patients classified as type-2, with diabetes onset <20 years.

Methods: Three hundred and thirty specialized diabetes centers contributed to the longitudinal multicenter DPV register. SQL was used for central data aggregation and SAS9.2 for statistical analysis. Comparisons were performed by Kruskal-Wallis-test with Holm-adjustment for multiple comparisons.

Results: Between January 2000 and December 2009, 26,978 newly diagnosed patients with onset of diabetes prior to age 20 were registered. 26,326 were clinically classified as type 1 and 652 as type-2. Type-2-patients were significantly older at onset (13.7 vs. 9.1 years), more often female (60% vs. 47%) and more overweight (BMI-SDS + 2.4) compared to type-1 patients (BMI-SDS + 0.48). At least one positive B-cell-AB was present in 33% of type-2 patients (vs. 87% in type 1). No difference between B-cell-AB positive and B-cell-AB negative patients with type-2 diabetes was detected with respect to age at onset (13.9 vs. 14.2 years), gender (43% male vs. 37%), anthropometry (BMI-SDS: 2.19 vs. 2.29), metabolic control (HbA1c 7.7% vs. 7.6%), insulin requirement (48% vs. 47%) and concomitant risk factors (hypertension: 42% vs. 45%, dyslipidemia: 48% vs. 53%).

Conclusion: With 2.4% of pediatric diabetes manifestations during the last decade in Germany and Austria, type-2 diabetes is still rare in central Europe. While the phenotype is clearly different from type-1 diabetes, no relevant difference between B-cell-AB positive and B-cell-AB negative patients with a clinical diagnosis of type-2 diabetes was found.

P/026/WED

Type 2 diabetes in Peruvian children: a case series

M.E. Pinto[1] & H.M. Manrique[2]

[1]*Cayetano Heredia Hospital, Endocrine Service, Lima, Peru,* [2]*Arzobispo Loayza Hospital, Endocrine Service, Lima, Peru*

Objective: To describe five cases of children with type 2 diabetes in two general hospitals in Lima, Peru.

Methods: We describe the clinical and laboratory details at presentation, the clinical evolution, and the long-term treatment.

Results: We report five children (four girls and one boy, mean age 13.4 years, mean Tanner scale 3.25) which developed type 2 diabetes. At presentation, all patients were obese (mean BMI of 30.2), with acanthosis nigricans, 60% had family history of type 2 diabetes, and 40% had previous history of dyslipidemia. The initial mean glucose was 360 mg/dl (±222), and HbA1c were 12% (±4.17). One case, developed severe diabetic ketoacidosis at presentation. Further work-up, showed that anti-GAD and anti-IA2 antibodies were negative. In three cases, mean C-peptide was 4.56 ng/ml (±3.65). The initial treatment included insulin (60%), metformin, and glibenclamide. Intensive life style change was started at the Diabetes Clinics of both hospitals, and after a follow-up of 3–12 months, the mean HbA1c was 6.2% (±1.28), and 60% were treated with metformin, one child with glibenclamide, and one child with metfromin plus NPH insulin.

Conclusion: Type 2 diabetes has traditionally been viewed as a disorder of adults. However, as the prevalence of obesity in youth is increasing, type 2 diabetes is now occurring in children and adolescents. This problem falls disproportionately on African and Hispanic children. Currently, Peru is passing through its epidemiological transition, were infectious disease are coexisting with chronic diseases like obesity, diabetes, and cardiovascular diseases. In the long-term, these children have higher risk of developing complications at early ages.

P/027/WED

Difference in glycosylated albumin (GA)/HbA1c ratio as a glycemic index between children with type 1 and type 2 diabetes

K. Komiya[1], T. Urakami[2], A. Yoshida[2], J. Suzuki[2], M. Ishige[2], H. Saito[2], S. Takahashi[2] & H. Mugishima[2]

[1]*Tokyo Metoropolitan Bokutoh Hospital, Pediatrics, Tokyo, Japan,* [2]*Nihon University School of Medicine, Pediatrics, Tokyo, Japan*

Objective: Glycosylated Albumin (GA) is known to be a glycemic marker for a shorter period as compared with HbA1c. The GA/HbA1c ratio is considered to be a sensitive indicator to reflect a change of glycemic control during a short period. We examined GA, HbA1C and the GA/HbA1c ratio in children with type 1 diabetes (T1D) and those with type 2 diabetes (T2D) to know the clinical significance of these glycemic markers.

Methods: Study subjects consisted of 52 children with T1D and 27 children with T2D. GA and HbA1c were simultaneously examined in the patients at our outpatient clinic. HbA1c was measured by a HPLC method (normal: 3.3–5.8%), and GA was measured by an enzyme method (normal: 12.4–16.3%).

Results: (1) The mean values of HbA1c and GA in children with T1D were 7.3 ± 1.1% and 23.4 ± 4.7, respectively. Those in children with T2D were 6.8 ± 1.3% and 17.5 ± 3.9%, respectively. Both of the glycemic markers were significantly higher in T1D than in T2D; $P < 0.001$, $P = 0.189$, respectively.
(2) The GA/HbA1c ratio in T1D was 3.2 ± 0.3 and that in T2D was 2.6 ± 0.4. This ratio is significantly elevated in T1D as compared with in T2D; $P < 0.001$.

(3) There were no significant differences of the mean values of these markers in the patients' age and gender.
Conclusions: We found a higher value of the GA/HbA1c ratio as well as higher values of GA and HbA1c in children with T1D than in those with T2D. This finding might demonstrate that children with T1D tend to have more fluctuations of blood glucose than those with T2D despite of intensive insulin therapy. On the other hand, children with T2D generally exhibit more stable glucose profiles than T2D. The GA/HbA1c ratio seems a useful marker to reflect changes of glycemic control for a short period in children with diabetes.

Cohorts and Countries

P/028/FRI

Comparative evaluation of glycemic balance in children and adolescents with diabetes mellitus type-1 after the implementation of self-monitoring tests distributed through the national program in Romania

R. Giurescu[1], I. Micle[1], M. Marazan[1], E. Pop[2], M. Costescu[2] & N. Kundnani[2]

[1]*University of Medicine and Pharmacology, Pediatric Diabetes, Timisoara, Romania,* [2]*Emergency Children Hospital 'Louis Turcanu', Pediatrics, Timisoara, Romania*

Aim: Comparative evaluation of glycemic balance in children and adolescent with diabetes mellitus type 1 (DMT1) before and after the implementation of the National Diabetes Program concerning self-monitoring glycemic tests.
Material and method: Fifty-nine children and adolescents with DMT1 aged 4–19 years registered in 1st Pediatric Clinic, Timisoara until 1st January 2008.Glycosylated haemoglobin (HbA1c) was evaluated quarterly. The duration of study was 12 months.
Results: Characteristics of study lot: mean age 15.59 ± 2.85 years, duration of evolution of DMT1 5.97 ± 2.65 years. Initial values of HbA1c were in the range of 6.4–15.48% with an average of 9.83 ± 2.31%. With the periodic distribution of self-monitoring tests (100 per month) through the National Diabetes Program the value of HbA1c, at the time of distribution, was 8.01 ± 1.35%. Quarterly determination of HbA1c revealed an oscillating evolution with a significant decrease ($P < 0.05$) at first evaluation and after another 3 months the values were 7.76 ± 0.28%. After 6 months there has been a significant increase of HbA1c 8.9 ± 1.94%. Only a small number of children (6/59) – 10.1% had improved value of HbA1c after 6 months. More than half of the children (33/59) – 60% did not respect the diet recommendations and were unable to adapt to insulin therapy results by self-monitoring glycemic tests in fact explains the lack of supervision of children in the family. Teenager, in general, followed a free diet. School stress, problems and fear from the professional prospective were reported to be the factors of metabolic imbalance in 76.1% (45/59) of children.
Conclusion: Glycemic balance has multifactorial determinants. Implementing the National Diabetes Program concerning the distribution of self-monitoring tests has not yet reached the desired objectives i.e. improving the glycemic balance in patients; the metabolic imbalance being influenced by individual, familial and social factors.

P/029/FRI

Initiative for quality improvement and epidemiology in children and adolescents with type 1 diabetes in Belgium (IQECAD): Results of first data collection

K. Doggen[1], N. Debacker[1], V. Van Casteren[1] & IQECAD Scientific Steering Committee

[1]*Scientific Institute of Public Health, Public Health and Surveillance, Brussels, Belgium*

Objectives: A national audit of Belgian hospital-based multidisciplinary pediatric diabetes centres, aimed at local quality promotion through benchmarking, was performed. The audit was guided by the centres, assembled in the IQECAD Scientific Steering Committee. The proportions of patients receiving recommended care processes and reaching therapeutic targets are reported.
Methods: Centres (n = 12) were asked to provide demographic and clinical data from a systematic sample of 50% of type 1 diabetic patients <19 years treated in 2008. Patients were sampled by increasing age, and stratified by gender and centre. HbA1c measurements were not centralized and methods for retinopathy screening differed.
Results: Data from 974 patients were collected (34–169 patients/centre representing 44% of total centres' population). Median age was 13 years, diabetes duration 4 years, HbA1c 7.7%, and 53% were boys. Most patients had data on HbA1c (98%) and BMI (95%). For patients >11 years and diabetes duration >2 years (ISPAD criterion for complication screening), single blood pressure (BP) measurements were reported for only 64%, with considerable variability among centres. In the same patients, screening for microalbuminuria was performed in 94% and for retinopathy also in 94%. Rates for these microvascular complications were low (3% for microalbuminuria and 1% for retinopathy). Proportions of patients with HbA1c <7.5% (only including patients with diabetes duration >1 year), normal weight (IOTF criteria) and systolic/diastolic BP <90th percentile were 43%, 74% and 70% per 89% respectively.
Conclusions: Compared to international studies, a significant number of Belgian type 1 diabetic children reached an HbA1c <7.5%. Centre variability in missing data, especially for BP, may represent differences in delivery of care or in reporting, and warrants further evaluation. Annual audits will be necessary to demonstrate whether this approach improves quality of care in Belgian diabetes centres.

P/030/FRI

Implementation of Australian pediatric endocrine group (APEG) clinical management guidelines: are we doing enough?

K.L. Hatherly[1], J. Overland[2], L. Smith[1], C. Johnston[3], L. Brown-Singh[3], D. Waller[3] & S. Taylor[1]

[1]*University of Sydney, Faculty of Pharmacy, University of Sydney, Australia,* [2]*Royal Prince Alfred Hospital, Diabetes Centre, Camperdown, Australia,* [3]*University of Western Sydney, School of Education, Bankstown, Australia*

Objectives: The aim of this study was to develop a profile of care provided to a broad-section of young people with Type 1 diabetes living within NSW and the ACT, Australia, and to benchmark this profile against current APEG clinical practice guidelines[1].
Methods: In 2006, 158 children and young people with Type 1 diabetes, aged 8–19 years, were recruited independent of their source of care as part of a three year longitudinal study. At annual visits, data was gathered regarding the type of specialist and health-care services attended, as well as demographic, health-care and self-care information. Capillary sample was also taken for HbA1c determination.
Results: The mean HbA1c of participants rose from 8.6 ± 1.4% to 8.8 ± 1.2% across the 3 years study period. As shown below, benchmarking our data against current clinical guidelines identified a major short fall in the standard of care young people received.
Conclusions: Wide dissemination of treatment guidelines is meaningless unless adequate resources are available to ensure that the guidelines are implemented. The current study raises considerable concerns about the level of care accessed and

received and has important implications for funding and planning of future diabetes services.

(1) APEG. Clinical practice guidelines: Type 1 diabetes in children and adolescents. 2005

Recommendation	Year One (n = 158)	Year Two (n = 154)	Year Three (n = 145)
HbA1c <7.5%	13.3%(21)	10.1% (16)	10.3% (15)
Seen by multidisciplinary team *	24.7% (39)	12.9% (20)	13.8% (20)
Received diabetes education	85.4% (135)	75.8% (116)	72.4% (105)
Attend 3–4 clinic visits/year	36.0% (57)	29.2% (45)	n/a**
Annual nutrition review	68.4% (108)	58.9% (89)	42.8% (62)
Annual psychological care	29.1% (46)	20.8% (32)	20.7% (30)
Annual complications screening	Not collected	30.2% (48)	40.0% (58)
Insulin pump therapy	27.8% (44)	44.8% (69)	49.6% (72)

[Proportion receiving recommended healthcare]

*endocrinologist, diabetes educator, dietician and psychologist and/or social worker

**data not available

P/031/FRI

Structure of Pediatric Diabetes Care in Germany 1998–2008: Increased Centralization and Qualification of Multidisciplinary Teams

K. Lange[1], A. Gocz[1], T. Danne[2], A. Neu[3] & on behalf of the German Working Group for Paediatric Diabetes (AGPD)

[1]*Hannover Medical School, Medical Psychology, Hannover, Germany,* [2]*Kinderkrankenhaus auf der Bult, Hannover, Germany,* [3]*Universitätsklinik für Kinder- und Jugendmedizin, Tübingen, Germany*

Current German paediatric diabetes guidelines recommend an integrated in- and outpatient paediatric diabetes care through a multidisciplinary team.

Objectives: To analyze the recent changes in structure and process quality of multidisciplinary paediatric diabetes care.

Methods: Three surveys in 1998, 2003 and 2008 via standardized questionnaire mailed to all paediatric units in Germany. Data with respect to personnel for diabetes care, educational programs, number of children in out- and inpatient paediatric diabetes care for the respective year were collected.

Results: The response rate in 2008 was 80% (n = 268 units) (1998: 79%; 2003: 80%), 225 of these units cared for patients with diabetes. In 2008 a total of 2.534 newly onset patients were reported. While in 1998 only 44% of the newly onset patients were treated by a team with a certified paediatric diabetologist and a certified diabetes educator, this was the case in 64% in 2003 and in 72% of the patients in 2008. Such a team was present in 52 units (1998), in 94 units (2003) and in 111 units (2008). 86% of the new onset patients were treated by a team with a psychologist, 79% with a social worker. In 1998 71% of the children were followed in outpatient units with more than 60 patients in long-term care. In 2008 this increased to 88% of the 16.827 reported patients. An outpatient team of certified paediatric diabetologist, certified diabetes educator, psychologist and other allied health professionals took care of 57% of the reported patients in 1998, of 73% in 2003 and of 81% in 2008. On average the patients were seen 5.5 times per year. Compared to inpatient teams there were fewer psychologists (71% of patients) and social workers (58%) in outpatient teams due to deficient funding.

Conclusion: The survey related on 2008 shows nearly a doubling in the number of paediatric diabetes units with a structure quality according to the national guidelines within ten years.

P/032/FRI

Chronic complications of type 1 diabetes mellitus (DM) in pediatric based on the UCDR in Ukraine

Y. Globa[1] & N. Zelinska[1]

[1]*Ukrainian Center of Endocrine Surgery, Kyiv, Ukraine*

The aim of this study was to determine the frequency of chronic diabetes complications in children of different age group in Ukraine.

Methods: Ukraine Children Diabetes Register (UCDR) developed from 2004, it includes such information: sex, age, diabetes duration, chronic complications (cataract (DK), retinopathy (DR, according classification of 3 stages: DR1 – nonproliferative, DR2 – preproliferative, DR3 – prolifetative), nephropathy (DN, according classification by C. Mogensen – 5 stages), peripheral neuropathy (DNp), angiopathy of legs (DA), steatohepatosis (DS), lypodistrophy (DL), hairopathy (DH) and others), acute complications (frequency of DKA and hypoglycemias), daily dose and type of insulin, HbA1c level. We analyzed the frequency of chronic complications and HbA1c at children 0–17 years old.

Results: In Ukraine 7760 children 0–17 years old with T1DM were registered in 2008. The frequency of DK was 0.94%, DR 7.56% (DR1 – 7.09%, DR2 – 0.45%, DR3 – 0.01%), DN 10.69% (DN2 – 0.03%, DN3 – 10.09%, DN4 – 0.52%, DN5 – 0.04%), DNp – 18.67%, DA – 15.42%, DS – 11.5%, DL – 3%, DH – 7.5%, Moriak syndrome – 1.26%, Nobekur syndrome – 1.42%. Frequency of children without complication was 52.32%. Mean level of HbA1c was 9.1 ± 0.7%.

Conclusions: The frequency of chronic diabetes complications in Ukraine less then Europe, perhaps by insufficient it revealing.

P/033/FRI

Follow-up survey of all participants at the first and second juvenile diabetes summer camp in japan in 1963 and 1964

Y. Uchigata[1], T. Otani[1,2], T. Kasahara[1,3], H. Takaike[1], H. Maruyama[4] & Y. Iwamoto[1]

[1]*Tokyo Women's Medical University, Diabetes Center, Tokyo, Japan,* [2]*Saitama Memorial Hospital, Internal Medicine, Saitama, Japan,* [3]*Jyosai Hospital, Internal Medicine, Tokyo, Japan,* [4]*Matsudo Clinic, Chiba, Japan*

Child-onset T1DM is well known to have very low incidence in Japan, with over 100 cases reported between 1955 and 1964. The first summer camp for children with diabetes in Japan was held in Tokyo in 1963. This camp was the only one in Japan until 1968. Ten children attended either the first or second one (1964). This report is the first to document the status of all 10 participants as of December 31, 2008, who had consulted the Diabetes Center through the Department of Pediatrics of TWMU. All of them had DKA at onset and insulin treatment was started immediately. Age at onset was 3–10 years, and age at the time of the participation was 6–13 years. As two participants had died (one in a traffic accident at about 27 years old, not related with hypoglycemia;

and the other found dead in bed at 52 years old after having a heavy smoking habit for 30 years), this report discusses the remaining eight participants (M:F = 1:7). Age range was 52–58 years with diabetes duration of 46–52 years and mean HbA1c was 6.8–9.1% (normal range, 4.3–5.8%). All of them had a smoking of 10 pieces per day with at least 10 years. No Achilles' tendon reflex sign was seen. Two patients showed no retinopathy (no history of photocoagulation), three had simple retinopathy with a history of photocoagulation, and the other three had proliferative retinopathy (1 patient was blind in 1 eye). Three had no micro-albuminuria, three had microalbuminuria, and one had overt nephropathy (proteinuria >1 g/day), but none were on hemodialysis. None of six patients in whom ABI was determined showed abnormalities and 1 in 6 patients for whom IMT was determined by carotid ultrasonography showed slight abnormality. Four of 6 patients (66.7%) for whom PWV was determined displayed elevated values. All subjects continue to function as adults in society. This suggests that the vasculature itself in these may be less susceptible to damage due to chronic hyperglycemia under an integrated management system under a multidisciplinary team.

P/034/FRI

An estimation of metabolic compensation level and prevalence of diabetes complications in Russian children's and adolescent's population

E.A. Andrianova[1], T.Y. Shiryaeva[1], I.I. Alexandrova[1], T.L. Kuraeva[1] & Y.I. Suntzov[2]
[1]*Endocrinology Research Center, Diabetology, Moscow, Russian Federation,* [2]*Endocrinology Research Center, Epidemiology, Moscow, Russian Federation*

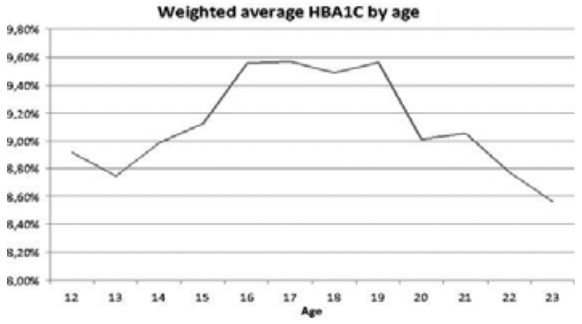
Objectives: To estimate the metabolic compensation level and its influence on prevalence of diabetes complications of type 1 diabetes mellitus (T1DM) in children and adolescents.
Methods: Two thousand nine hundred and eighty-four patients with TDM1 – 1532 children under 14 years old and 1452 adolescents from 15 to 17 years old – from 20 different regions of Russian Federation were examined in the course of screening programs during 5-year period from 2002 till 2007. A population of T1DM patients was formed using a random normal numbers method. The level of HbA1 and microalbuminuria (MAU) were measured on Bayer DCA 2000 + analyzer. The ophthalmoscopy was performed by direct view method. The technique of neurologist examination was standardized.
Results: Average level of HbA1c was 9.77 ± 2.3%. Among the children the HbA1c level was significantly lower than in adolescent's population: 9.48 ± 2.19% and 10.13 ± 2.37% respectively ($P < 0.01$). 21.1% of children and 15.1% of adolescents had a metabolic compensation (HbA1c < 7.5%), the difference between this groups was statistically significant ($P < 0.01$). The prevalence of diabetes complications in adolescents was significantly higher than this one in children's group. The non-proliferative stage of diabetes retinopathy was determined in 15.8% of adolescents and 3.3% of children ($P < 0.01$), diabetes cataract – in 11.5% and 4.6% respectively ($P < 0.01$), MAU was detected in 30.9% of adolescents and 10.2% of children ($P < 0.01$), distal neuropathy – 15.3% and 6.9% respectively ($P < 0.01$). Maximal prevalence of distal neuropathy and MAU was registered among the children and adolescents who had the duration of T1DM more than 10 years.
Conclusions: The adolescents had poor metabolic control as compare to children's group. The prevalence of microangiopathies was significantly higher in adolescents group.

P/035/FRI

Metabolic control in Danish adolescents. Is transition the problem?

J. Thomsen[1], P.-E. Kofoed[1], C. Thomsen[1] & J. Kolding Kristensen[1]
[1]*Kolding Hospital, Paediatrics, Kolding, Denmark*

Objectives: It is well known that maintaining good metabolic control in adolescents is difficult. Transition from paediatric to adult clinics is experienced as a difficult challenge. Most adolescents are transferred when they are between 15 and 18 years old. But is the process of transition the problem?
Method: All diabetes patients from Vejle County who in 2004 were 15–25 years of age were included in an observational study.
The individual patients average HbA1c for each year were calculated from 1998 to 2007. A comparison was made between patients with onset in paediatric (G1) and adult clinics (G2), respectively using unpaired *t*-test.
Results: A total of 128 patients were included. The overall average HbA1c was for the G1-patients 9.2% vs. 8.7% for the G2-patints ($P = 0.014$, unpaired *t*-test).



Conclusion: Neither patients from G1 nor from G2 meet the demands of HbA1c <7.5%. Patients who had not been through transition (G2) were fairly better controlled than G1-patients, but this could be due to a shorter average diabetes-duration. Therefore, the poor metabolic control is probably related to the age-group rather than the difficult transition-process, with the age-group 13–22 years having most difficulties coping with diabetes, leading to higher HbA1c values as seen in the curve. More studies are needed to look into how to improve HbA1c in adolescents in general and not only focusing on the transition.

P/036/FRI

Efficacy and feasibility of multiple insulin injections regimen in a cohort of Tanzanian children with type 1 diabetes mellitus (T1DM)

E.S. Majaliwa[1], V. Iotova[2], K. Ramaiya[3] & K. Muze[1]
[1]*Muhimbili National Hospital, Paediatrics and Child Health, Dar es Salaam, Tanzania, United Republic of,* [2]*UMHAT 'St. Marina, Clinic of Paediatric Endocrinology, Varna, Bulgaria,* [3]*Hindumandal Hospital, Dar es Salaam, Tanzania, United Republic of*

Objective: The purpose of this study was to assess the efficacy and feasibility of multiple insulin injections regimen in the Sub Saharan setting.
Research design and methods: This demographic and clinical survey included 50 children aged between 2 and 18 years inclusive attending Muhimbili National Hospital Clinic for

Diabetes. Between October 2008 and June 2009, a prospective interventional cohort study was carried out. A structured questionnaire to evaluate Bio-data was used at the beginning and end of the study. HbA1c was done at the beginning, on the 3rd and 6th months of the study as well as the Lipid profile, thyroid function and celiac disease screening.

Results: The mean age was 12.6 ± 3.7 years. There was no difference in age between the two groups. There were 20 males and 25 females. The mean HbA1c was 11.9 ± 2.3, with the multiple insulin therapy having high HbA1C the difference which was statistically significant 12.6 ± 3.1% vs. 10.9 ± 2.5 for the conentional insulin therapy group. At the end of the study there was a remarked fall in HbA1c for the multiple insulin therapy group with the HbA1c of 11.14 ± 2.72% compared to 10.9 ± 2.20% for the conventional insulin therapy group. Similarly the blood glucose profile for the multiple insulin group substantially improved from 9.43 ± 3.21 at the beginning of the study to 8.93 ± 3.43, at the end of the study. There were no reported side effects like hypoglycaemia in both the groups. Both groups were negative for coeliac disease and had normal thyroid function.

Conclusions: In summary, these data clearly demonstrate that multiple insulin therapy is associated with improvement of glycaemic control; this study further highlights the feasibility of Multiple Insulin therapy in Sub Saharan Africa despite lack of frequent self monitoring of blood glucose.

P/037/FRI

Pandemic influenza A H1N1 in Italian children and adolescents with type 1 diabetes

I. Rabbone[1], A. Scaramuzza[2], D. Iafusco[3], R. Bonfanti[4], F. Lombardo[5], V. Cherubini[6], S. Toni[7], G.V. Zuccotti[8], G. Tuli[1] & F. Cerutti[1]

[1]*University of Turin, Pediatrics Department, Turin, Italy,* [2]*University of Milan, Pediatrics Department, Milan, Italy,* [3]*Second University of Naples, Pediatrics Department, Naples, Italy,* [4]*Scientific Institute Hospital San Raffaele, Vita – Salute University, Department of Pediatrics, Milan, Italy,* [5]*University of Messina, Department of Pediatric Sciences, Messina, Italy,* [6]*Polytechnic University of Marche, Salesi Hospital, Department of Pediatrics, Ancona, Italy,* [7]*Anna Mayer Children's Hospital, Juvenile Diabetic Center, Florence, Italy,* [8]*University of Milan, Department of Pediatrics, Milan, Italy*

Objective: We evaluated the vaccine coverage in a large series of children with type 1 diabetes throughout Italy; moreover, we evaluated the number of diabetic patients hospitalized because of pandemic influenza, and their complications.

Patients and methods: The study involved seven pediatric diabetologic centers in Italy. Each centre reviewed charts of all patients regarding sex, age, disease duration, glycated hemoglobin, insulin therapy, daily number of self monitoring blood glucose data, influenza A H1N1 vaccination state, hospitalization due to influenza A H1N1 and related complications; data was analyzed only regarding patients aged 18 or younger during the period November 1, 2009 to February 28, 2010.

Results: A total of 1461 charts have been reviewed (788 M and 673 F, ages 13.0 ± 4.1 years, with a disease duration of 6.0 ± 4.8 years). Their mean HbA1c was 7.9 ± 1.2%, with no difference between multiple daily injections or continuous subcutaneous insulin infusion (7.70 ± 0.97 vs. 7.89 ± 1.10%, P = NS, respectively). A total of 428 patients (29.3%) have been vaccinated. According to WHO diagnostic criteria, 351 patients reported symptoms of influenza A H1N1 (51 vaccinated and 300 not vaccinated, P = 0.0001); only 0.54% of patients has been hospitalized because of metabolic deterioration.

Conclusions: In our population of well-controlled children and adolescents with type 1 diabetes we observed a 29% vaccination coverage; however only 31% of not vaccinated patients reported symptoms of pandemic influenza. In our opinion, when well-controlled a child or adolescent with type 1 diabetes is not at increased risk to have pandemic influenza and a revision of vaccination recommendation is suggested.

P/038/FRI

Documenting and improving the structure, process and outcome of pediatric diabetes care: 15 year experience from the Austrian/German DPV initiative

B. Rami[1], S. Bechtold-Dal Pozza[2], O. Kordonouri[3], B. Schenk[4], N. Treptau[5], A. Hungerle[6] & R.W. Holl[6]

[1]*Medical University Vienna, Pediatrics, Vienna, Austria,* [2]*Medical University Colegium Medium Jagiellonian Munich, Munich, Germany,* [3]*Medical School Hannover, Hannover, Germany,* [4]*HELIOS Klinikum Schwerin Klinik für Kinder – und Jugendmedizin, Schwerin, Germany,* [5]*Elisabeth-Krankenhaus Essen, Essen, Germany,* [6]*University of Ulm, Ulm, Germany*

Objectives: Multiprofessional cooperation, educating all members of a diabetes team, and the use of new pharmaceutical and technical means are prerequisites for improving the outcome of pediatric diabetes care. However, in addition, a monitoring system is required to continuously document the process of care, as well as the short- and intermediate outcome in our patients. Repetitive use of the Plan-Do-Check-Act-cycle (PDCA) will demonstrate strengths and weaknesses of each institution, and therefore continuously improve the results of our care.

Methods: The computer based, standardized DPV documentation and quality control initiative was started in 1995 on a nationwide basis. Until March 2010, 210 specialized pediatric diabetes care providers (seven from Austria) participate in this initiative. Data are anonymized and aggregated locally and transferred for centralized comparison. The feed-back is provided twice yearly, including histograms, trend charts and bivariate and multivariate plots. Both anonymized as well as open versions are available, as well as separate charts for Austrian centers or participants in a quality circle discussion group.

Results: For 15 years, the DPV initiative monitors the type and quality of pediatric diabetes care. During this time-span dramatic changes are evident: the use of insulin pumps increased from below 1% of patients in 1995 to 31% in 2009. On average, pediatric patients performed 24.5 SMBG measurements/week in 1995, increasing to 35 in 2009. The completeness of eye exams has increased form 39.3% to 54.5% of patients (yearly measurement of urine albumin excretion: from 29.1% to 72.2%). During recent years, adjusted mean HbA1c and rate of severe hypoglycemia have decreased significantly.

Conclusion: The DPV initiative demonstrates the nationwide use of quality management in pediatric diabetology for 15 years, and visualizes important changes in pediatric diabetes care as well as improvements in process and outcome.

Endocrinology and Diabetes

P/039/WED

Serum osteocalcin, zinc nutritive status and bone turnover in children and adolescents with type1 diabetes mellitus

M. Aboelasrar[1], S. Farid[1], M. El Maraghy[2] & A. Mohamedeen[1]
[1]*Ain Shams University Cairo, Pediatric, Cairo, Egypt,* [2]*Ain Shams University Cairo, Clinical Pathology, Cairo, Egypt*

Background: Patients with DM have various bone disorders, including osteopenia or osteoporosis.
Objective: This study aimed to examine the relationship between zinc dietary intake and osteocalcin level as a biochemical marker of bone turnover in patients with type1 DM.
Methods: Serum osteocalcin was assayed by ELISA and serum zinc was assayed using direct colorimetric method in 60 children and adolescents with type 1 diabetes. The results were compared with 40 healthy controls well matched in age, gender and pubertal staging. Participants recorded their dietary intake for 3 days, Zinc content was determined with the diet analysis program (version1, 1995).
Results: Diabetic patients showed significantly lower serum osteocalcin compared to control (P = 0.00), while there was no significant difference between patients and control as regards serum zinc and daily dietary zinc intake (P = 0.78 and P = 0.94) respectively. There was no effect of gender on serum osteocalcin, serum zinc and daily dietary zinc intake (P = 0.92, P = 0.15 and P = 0.39) respectively. Patients with HbA1c >7.5 (poor metabolic control) showed significantly lower serum osteocalcin level compared to patients with HbA1c <7.5 (good metabolic control) (P = 0.014). Patients with positive history of boneache showed significantly lower serum zinc and daily dietary zinc intake (P = 0.03 and, P = 0.046), respectively, while there was no significant difference as regards serum osteocalcin (P = 0.37). Serum osteocalcin was positively correlated with serum zinc (P = 0.01), daily dietary zinc intake (P = 0.003) and it was negatively correlated with HbA1c (P = 0.01).
Conclusion: Reduced serum osteocalcin could be used as a measure to detect early metabolic bone changes in patients with type 1 diabetes. Optimization of blood sugar together with good zinc dietary intake may help to improve osteoblasts activity and prevent bone complications.

P/040/WED

Bone maturation in 1788 children and adolescents with diabetes mellitus type 1

A. Dost[1], T. Rohrer[2], J. Fussenegger[3], C. Vogel[4], B. Schenk[5], M. Wabitsch[6], B. Karges[7], C. Vilser[1], R.W. Holl[8] & Initiative DPV Science and German Competence Network Diabetes
[1]*Friedrich Schiller University, Pediatrics, Jena, Germany,* [2]*University of the Saarland, Pediatrics, Homburg, Germany,* [3]*Children's Hospital, Dornbirn, Austria,* [4]*Children's Hospital, Chemnitz, Germany,* [5]*Helios Klinikum, Pediatrics, Schwerin, Germany,* [6]*University of Ulm, Pediatrics, Ulm, Germany,* [7]*RWTH Aachen University, Pediatrics, Aachen, Germany,* [8]*University of Ulm, Institute of Epidemiology, Ulm, Germany*

Diabetes mellitus type 1 might interfere with pubertal development. Particularly, longterm metabolic control and intensity of insulin treatment have been reported to contribute to a delay in pubertal onset. Data on somatic development in diabetic children are conflicting; therefore we studied bone age in 1788 children from Germany and Austria with type 1 diabetes. Bone age was retarded by −0.27 ± 1.1 years in the whole group, but particularly in the adolescents at the end of puberty (>16 years; −0.76 ± 1.29 years). Bone age delay was more pronounced in boys, and in children with longterm median HbA1c levels of 7.5–9.0%. No associations were found with current HbA1c levels or the intensity of insulin treatment. Bone age determinations in diabetic children should only be performed when clinical signs of impaired somatic development are present. In addition, the potential influence of diabetes on bone development needs to be considered in the interpretation of carpograms.

P/041/WED

Ovulation rate in adolescents with type 1 diabetes mellitus and its association with metabolic control

F.C. Eyzaguirre[1], R. Román[1,2], G. Iñíguez[1], P. López[1,2], F. Pérez-Bravo[3], I.M. Torrealba[4], F. Cassorla[1] & E. Codner[1]
[1]*Univ. of Chile/ Inst. of Maternal & Child Research, Santiago, Chile,* [2]*Hospital Clínico San Borja-Arriarán, Santiago, Chile,* [3]*University of Chile, Nutrition Department, Santiago, Chile,* [4]*Hospital Roberto del Río, Santiago, Chile*

Objective: To study ovulation in type 1 diabetes (T1D) adolescents and the effect of hemoglobin A1c (HbA1c) levels on ovulatory function.
Methods: Non-hyperandrogenic adolescents with T1D (n = 31) and healthy girls (n = 52) were studied. They were recruited if less than 6 months had elapsed since menarche, or if they were close to reaching the second or third year post-menarche. Ovulation was assessed through the measurement of salivary progesterone (days 13, 18, 23 and 28 of each cycle). Metabolic control was defined as optimal if HbA1c was <7.5%.
Results: A total of 168 and 281 menstrual cycles were studied in T1D and Control girls, respectively. The number of cycles followed in each T1D and C girls were 5.4 ± 2.3 and 5.4 ± 2.3, respectively. The proportion of ovulatory cycles was similar in the TID and Control groups (34.5 and 36.3%, respectively). The proportion of girls who did not have any ovulatory cycle was similar in both groups (19.4 and 19.2% in T1D and C girls, respectively). Regression analyses showed that the presence of T1D did not have a significant effect on ovulatory rate.
More ovulatory cycles were observed in girls with T1D with optimal compared to those with insufficient metabolic control (51.3 vs 29.4%, P = 0.042), even after adjustment for gynecological age. However, when HbA1c was considered as a continuous variable, no correlation with the rate of ovulation was observed, as reflected by the fact that some girls with high HbA1c levels still had a considerable proportion ovulatory cycles.
Conclusion: T1D did not affect the rate of ovulation in young adolescents. A higher ovulatory rate was observed in girls with optimal control compared with those with insufficient metabolic control, but a substantial proportion of ovulatory cycles were still observed in patients with higher HbA1c levels. These data highlight the importance of pregnancy prevention in all adolescents with T1D, regardless of their metabolic control.
(Fondecyt 1050452)

P/042/WED

Plasma Ghrelin level in children and adolescents with type 1 diabetes mellitus

R.M. Matter[1], S.M. Farid[1], M.M. Abdel Aziz[2] & S.A. Hamza[1]
[1]*Ain Shams University Cairo, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University Cairo, Clinical Pathology, Cairo, Egypt*

Background: Ghrelin is the most powerful orexigenic hormone in human. However, the exact implication of this peptide in type1 diabetes is not yet known.
Objectives: To investigate plasma Ghrelin level in type 1 diabetic children and adolescents in relation to glucose level, insulin therapy, metabolic control, body mass index and pubertal development.
Methods: Plasma Ghrelin level was assayed using ELISA in 40 children and adolescents with type 1 diabetes mellitus; 10 newly diagnosed patients (aged 9.48 ± 1.73 years), 15 with mean HbA1c <7.5% (optimal glycemic control) (aged 10.96 ± 2.19 years), and 15 with mean HbA1c >7.5% (suboptimal glycemic control) (aged 9.38 ± 2.53 years). The results were compared to those of 20 healthy controls (aged 9.12 ± 2.49 years).
Results: Diabetic patients showed significantly lower ghrelin levels compared to controls ($P < 0.01$). Newly diagnosed patients had significantly higher ghrelin level compared to other patient groups ($P < 0.01$), patients with mean HbA1c <7.5% had significantly higher mean ghrelin level compared to those with mean HbA1c >7.5% ($P = 0.005$). Ghrelin level was correlated negatively with age ($r = -0.37$, $P = 0.02$), duration of diabetes ($r = -0.65$, $P = 0.0001$) and body mass index ($r = -0.43$, $P = 0.006$). Prepubertal diabetic patients showed significantly higher ghrelin level compared to pubertal patients ($P = 0.02$) with no significant difference in males and females ($P = 0.87$).
Conclusions: Decreased ghrelin level in type 1 diabetic patients may indicate its potential involvement in glucose homeostasis and the persistent low level may reflect a defensive mechanism against hyperglycemia. The reduction in ghrelin level could be involved in regulation of body mass index in children with type 1 diabetes.

P/043/WED

Must we look for cushing disease (CD) in obese glucose-intolerant children and adolescents?

L.L. Levitsky, E. Savgan-Gurol & M. Misra
Mass General Hospital for Children/Harvard Medical School, Pediatric Endocrine Unit, Boston, United States

Objectives: We examined whether it was reasonable to worry about CD in children and adolescents who present with obesity and glucose intolerance.
Methods: We reviewed the literature as well as our series of 16 children and adolescents with CD, to examine whether CD should continue as a clinical consideration in obese children and adolescents with glucose intolerance.
Results: Four large series of patients with CD have been published in the last 20 years. Of the 157 children and adolescents to age 19 with CD, none were reported to have glucose intolerance. Many had obesity and hypertension, components of the metabolic syndrome, and an increasingly common problem in all pediatric endocrine and diabetes referral centers. All 16 of our children, (mean age 12.4 ± 0.84 years, range 7–17 years) were obese and had hypertension. The mean documented blood glucose before treatment (fasting or random) in this group was 82 ± 3 mg/dl (4.56 ± 0.17 mM/l). No child had elevated fasting or random glucose.
Conclusions: Twenty-five to 75% of adults diagnosed with Cushing Disease (CD) have glucose intolerance or frank diabetes. In addition, 1–5% of adults with obesity and diabetes have been reported to have CD. In adults with glucose intolerance and CD, both insulin resistance and failure of adequate insulin release is reported. It is traditional for a diagnosis of CD to be considered in obese children and adolescents who present with glucose intolerance, yet large series of children with CD do not include glucose intolerance as a finding. There are no data to support concern for missing the diagnosis of CD in children and adolescents who present with glucose intolerance and other signs or symptoms of metabolic syndrome.

P/044/WED

Hormonal and metabolic response during physical exercise of different intensity in healthy controls and adolescents with type 1 diabetes

P. Adolfsson & B. Lindblad
Institute of Clinical Sciences, Sahlgrenska Academy at University of Gothenburg, Göteborg, Department of Pediatrics, Gothenburg, Sweden

Objective: The aim was to compare the maximal work capacity and the counter-regulatory metabolic and hormonal responses during physical exercise of different intensities between adolescents with type 1 diabetes mellitus (T1DM) and healthy controls.
Methods: Twelve individuals with T1DM (6 boys and 6 girls), aged 14–19 with diabetes duration 6.3 ± 4.4 years and HbA1c 7.9 ± 1.0 did participate together with 12 healthy controls matched for age, gender, BMI and amount of regular physical activity. The individuals with diabetes were all asked to strictly avoid hypoglycemia 24 hours prior to the test. All participants performed three different workloads during three days: maximal, endurance and interval. All tests were carried out using a stationary Ergometer Cycle (Monark 839E) where the workload is computerized and the workload as well as heart rate is registered on-line. Measurements were performed before, during and after each workload. Glucose was measured with CGM as well as in blood together with insulin. Counter-regulatory hormones and metabolites were also measured in parallel to this.
Results: The level of maximal physical capacity was similar in the groups: diabetes and control (49.8 ± 9.9 vs. 50.7 ± 12.0 ml/min x kg). There were no significant differences regarding the different counter-regulatory hormones in accordance to peak value, time for peak value, or area under the curve.
Conclusions: Given that adolescents with diabetes have a good glycemic control before a physical strain, normal physical fitness is preserved. The ability to maintain a good glycemic control in physical activity by hormonal counter-regulation is similar to a group of healthy peers.

P/045/WED

Thyroid function and anti-thyroid antibodies in Portuguese children and adolescents patients with type 1 diabetes mellitus: influence of age, sex and duration of the diabetes

C.S.F. Costa[1], C. Castro-Correia[1], I. Carvalho[1] & M. Fontoura[1,2]
[1]*Hospital São João, Paediatric, Porto, Portugal,* [2]*Faculty of Medicine, Porto, Portugal*

Introduction: Type 1 diabetes mellitus (T1DM) is associated with an autoimmune reaction to thyroid antigens including thyroid peroxidase (anti-TPO) and thyroglobulin (anti-Tg).
Aims: We investigated in children and adolescent with T1DM the prevalence of positive anti-thyroid antibodies and the relationship to potential risk factors, including age, gender and duration of diabetes.
Material and methods: Retrospective study of 288 children and adolescents with T1DM. Their age was 13.5 ± 4.3 (mean ± SD) years, and duration of diabetes was 6.1 ± 2.8 years. Male gender (55%). Anti-thyroid antibodies were determined using luminescence method.

Results: The prevalence rates of anti-thyroid antibodies among the children with T1DM in our study were: anti TPO (17.4%), anti-Tg (12.8%) and of both anti-thyroid antibodies (11.1%). The presence of serum anti-thyroid antibodies was positively associated with age (14.7 years in those with positive tests vs. 13.2 years in those with negative tests); duration of diabetes (7.8 vs. 5.7 years). The presence of both anti-thyroid antibodies was associated with male gender (19 M vs. 13 F). Subclinical autoimmune thyroiditis was present in 24% of the patients with positive anti-thyroid antibodies and was associated with female gender (8F vs. 4M).

Conclusions: Thyroid auto immunity was associated with male gender, increasing age and long diabetes duration, but the presence of subclinical autoimmune thyroiditis was associated with female gender. The prevalence is high, so the annual screening of antibodies is recommended in all patients with T1DM, while serum TSH level should be measured in patients with detected thyroid antibodies. The authors raise the hypothesis that treatment for subclinical autoimmune thyroiditis might influence metabolic control but further studies are required to confirm this hypothesis.

Obesity I

P/046/FRI

Insulin resistance is associated with 3-fold increased risk for prothrombotic state in obese youngsters

A. Galli-Tsinopoulou[1], I. Kyrgios[1], I. Maggana[1], E.Z. Giannopoulou[1], E.P. Kotanidou[1], C. Stylianou[1], E. Papadakis[2], I. Korantzis[2] & G. Varlamis[1]
[1]*Medical School, Aristotle University of Thessaloniki, 4th Department of Pediatrics, Thessaloniki, Greece,* [2]*Papageorgiou General Hospital, Haemostasis Unit, Thessaloniki, Greece*

Objective: Prothrombogenic factors levels are reported to be elevated and strongly related with atherothrombosis in obese adults. The aim of this cross sectional study was to evaluate the levels of these factors in obese children and adolescents.
Methods: A group of 313 obese children and adolescents, aged 3–16 years (148 boys, 165 girls), admitted to the 4th Pediatric Department, Papageorgiou Hospital, Thessaloniki, were enrolled. Obesity was defined as BMI above the 95th percentile for age and sex. The following factors were determined: plasminogen activator inhibitor-1 (PAI-1), von Willebrand factor (vWF), fibrinogen, fasting glucose, insulin and lipids levels. Insulin resistance (IR) was estimated using HOMA index. Independent *t*-test, spearman correlations, chi square and linear regression analysis were used.
Results: Increased levels of PAI-1, vWF and fibrinogen were found in 79.9%, 8.0% and 14.7%, respectively of all obese children and adolescents. Significant higher levels of PAI-1 ($P < 0.001$), vWF ($P = 0.003$) and fibrinogen ($P = 0.046$) were found in patients with IR. Boys presented higher PAI-1 levels compared with girls ($P = 0.024$) while no significant difference was observed between pre-pubertal and pubertal individuals. PAI-1 levels were positively correlated to BMI ($r = 0.189$, $P = 0.012$), triglycerides ($r = 0.330$, $P < 0.001$), fasting insulin ($r = 0.421$, $P < 0.001$), glucose levels ($r = 0.189$, $P = 0.013$) and HOMA-IR ($r = 0.424$, $P < 0.001$), while a negative correlation with HDL cholesterol was noted ($r = -0.220$, $P = 0.003$). IR patients are at 2.78, 3.52 and 2.53 times greater risk for high levels of PAI-1, vWF and low levels of HDL cholesterol compared with NIRs, respectively.
Conclusions: Elevated prothrombogenic factor levels in the obese population may be associated with increased risk for early development of atherothrombosis, already from childhood. Early detection and therapeutic intervention for eliminating aggravating factors such as insulin resistance are strongly recommended.

P/047/FRI

Risk of impaired glucose tolerance in obese children and adolescents

M. Kocova, E. Sukarova-Angelovska & S. Spasevska
University Pediatric Clinic, Skopje, Macedonia, the Former Yugoslav Republic of The epidemic of childhood obesity during the last few decades had an impact on the impaired glucose tolerance (IGT) and type 2 diabetes (DM2).

Objective: To assess the incidence of IGT in obese children and to establish criteria for screening.
Methods: A total of 207 obese children (97 girls), at the age 6–18 years were analyzed. Obesity was assessed according to CDC criteria. Risk factors such as DM2, hypertension, hyperlipidemia, PCOS and/or obesity were recorded for the first degree relatives. Standard OGTT accompanied by 4 points of insulinemia was performed. HOMA index was calculated according to the standard formula. HbA1c was measured in children with peak glycemia >7.8 mmol/l. Continuous glucose monitoring system (CGMS) was applied in the same cohort.
Results: Thirty-eight children (24% of the total cohort) (16 girls) at the age of 12.3 ± 3.2 years average (range 6–18 years), had glucose intolerance. BMI was 31.3 ± 3.6 kg/m^2 (range 26.7–43.3 kg/m^2). All children with IGT (100%) had at least one risk factor in the immediate family member compared to the total group of obese children with a risk of 52% ($P < 0.001$). Only five children had higher HbA1c (6.6–6.8%). Peak glycaemia was 9.2 ± 1.2 mmol/l (7.9–11.1 mmol/l). HOMA index was 4.76 ± 3.53, and peak insulinemia was 117.4 ± 28.2 mIU/dl average (10.7–300.0 mIU/dl). There was no correlation between the fasting glycaemia and peak insulinemia with the peak glycaemia on OGTT. Body mass index correlated well with insulinemia ($P < 0.001$), but not with the peak glycaemia ($P = 2.4$). Peak glycaemia was in correlation with the HOMA index ($P = 0.04$). Three children developed overt DM2 within a year of follow up (1.9%), all at the age >11 years. CGMS profiles showed hyper and hypoglycemia in six children.
Conclusions: All children with obesity should be screened for glucose intolerance. The risk for IGT is higher in children from families with risk factor/s. HbA1c and CGMS can help for earlier diagnosis of T2DM.

P/048/FRI

Hepatic and pancreatic fat and associated metabolic parameters in overweight youth

C. Syme, G. Wells, G. Detzler, H. Cheng, B. McCrindle & J. Hamilton
Hospital for Sick Children, University of Toronto, Toronto, Canada

Introduction: Pancreatic and hepatic steatosis may influence insulin, glucose and lipid metabolism. Few studies have assessed metabolic outcomes associated with hepatic fat (HF) and pancreatic fat (PF) in youth.
Methods: Twenty-five overweight youth (BMI > 85th percentile; eight female; aged 8–18 years) were recruited. Transverse, T1-weighted in-and out-of-phase spoiled gradient-echo imaging of the abdomen was performed on a 1.5T Signa GE scanner. HF was calculated as $HF_{in/out} = (SI_{in}\text{-}SI_{out})/(2 \times SI_{in})$, where SI is signal intensity. Pancreatic fat (PF) was similarly assessed. Intra-abdominal fat (IAF) relative to subcutaneous abdominal fat (SAF) was estimated at L4/L5. Fasting blood work was collected (glucose, insulin, triglycerides, LDL, HDL cholesterol, and liver enzymes) and a 2-hour oral glucose tolerance test was performed with sampling of glucose and insulin every 30 minutes. Area-under-the-curve (AUC) insulin, HOMA-IR and whole body insulin sensitivity index (WBISI) were calculated.
Results: HF_{spec} ranged from 4% to 38%. $HF_{in/out}$ and $PF_{in/out}$ correlated ($r = 0.47$, $p = 0.02$). Only HF correlated with IAF/SAF ($r = 0.46$, $P = 0.02$); neither HF nor PF correlated with BMI z-score. HF correlated with HOMA-IR ($r = 0.52$, $P = 0.01$), while PF correlated with AUC insulin ($r = 0.43$, $P = 0.04$). HF correlated positively with triglycerides ($r = 0.83$, $P < 0.001$) and negatively with HDL-cholesterol ($r = -0.47$, $P = 0.02$). BMI z-score correlated negatively with WBISI ($r = -0.46$, $P = 0.03$), while IAF did not correlate with any of these metabolic parameters.
Discussion: PF was associated with increased insulin secretion suggesting that PF deposition does not lead to decreased insulin secretion during early stages of metabolic disturbances. Findings relating HF to insulin resistance and triglycerides are in agreement with other studies in obese youth. The lack of

associations between IAF or BMI z-score and metabolic parameters highlights the importance of discriminating between fat distribution rather than fat quantity alone.

P/049/FRI

YKL-40 is a marker of obesity and insulin resistance in obese prepubertal children

A. Galli-Tsinopoulou[1], I. Kyrgios[1], E. Papakonstantinou[2], A.-B. Haidich[3] & C. Stylianou[1]

[1]*Medical School, Aristotle University of Thessaloniki, 4th Department of Pediatrics, Thessaloniki, Greece,* [2]*Medical School, Aristotle University of Thessaloniki, 2nd Department of Pharmacology, Thessaloniki, Greece,* [3]*Medical School, Aristotle University of Thessaloniki, Department of Hygiene, Thessaloniki, Greece*

Objective: YKL-40 is a newly recognized marker of inflammation, endothelial dysfunction and diabetes in adults. It has also been implicated as an independent predictor of overall and cardiovascular mortality. Its role in childhood obesity has not been evaluated yet. The study aimed to measure serum YKL-40 (sYKL-40) levels and examine possible associations with obesity, insulin resistance, inflammation and liver damage in children.

Methods: Forty-one obese prepubertal children admitted to the 4th Pediatric Department, Papageorgiou Hospital, Thessaloniki, and 41 age- and sex-matched controls were included. Obesity was defined as BMI above the 95th percentile for age and sex. BMI below the 85th percentile was used to define the controls. Insulin resistance was estimated using HOMA index. Blood pressure (BP), body fat mass (BFM), white blood count (WBC), CRP, fasting glucose, insulin, lipids, fibrinogen, SGOT, SGPT levels were assessed. Paired and independent t-test, spearman correlations and linear regression analysis were used.

Results: Obese children had higher sYKL-40 levels compared with controls (50.7 vs. 41.0 ng/ml, $P = 0.006$). Insulin resistant individuals showed higher sYKL-40 compared with non-insulin resistants after adjusted for age (59.2 vs. 42.7 ng/ml, $P = 0.002$). sYKL-40 levels were positively correlated with age ($r = 0.391$, $P = 0.001$), BMI ($r = 0.416$, $P < 0.001$), BFM ($r = 0.398$, $P = 0.001$), fasting glucose ($r = 0.358$, $P = 0.002$) and insulin ($r = 0.490$, $P < 0.001$), systolic BP ($r = 0.497$, $P < 0.001$) and WBC ($r = 0.283$, $P = 0.02$). No other significant correlations were observed. After adjustment for age, BMI, WBC and systolic BP, HOMA index remained significantly associated with sYKL-40 levels ($r^2 = 0.398$, $P < 0.001$).

Conclusions: The study suggests that sYKL-40 levels are elevated in obese youth and an independent marker of insulin resistance even in childhood. Prospective studies are needed to determine whether children with high sYKL-40 levels are indeed at higher risk for future pathology.

P/050/FRI

Level of physical activity among children of 6–18 years of age – contributing factors to the level of physical activity and associated outcome in terms of glycemic control and body mass index

P. Adolfsson & B. Lindblad

Institute of Clinical Sciences, Sahlgrenska Academy, Department of Pediatrics, Göteborg, Sweden

Objective: To describe contributing factors to different levels of physical activity (LPA) and the association between different LPA and glycated Haemoglobin A1c level (A1C), respectively body mass index (BMI).

Methods: Using a questionnaire and the data from ordinary visits at seven different diabetes centers, data from 756 children and adolescents in the age interval 6–18 years were analyzed. Comparisons were made between different LPA and contributing factors, A1C and BMI.

Results: Overall 34% of the participants are physically active <2 times a week. Contributing factors to higher LPA are membership in sports clubs, $P < 0.001$ and number of lessons with school gymnastics, $P < 0.001$. Membership in sports clubs is also strongly associated with improved A1C, $P < 0.001$, and lower BMI, $P < 0.05$.A1C was lower in the group with regular LPA at least 3 times a week 7.8 ± 1.2, compared to the two most inactive groups 8.4 ± 1.3 respectively 8.2 ± 1.1, $P < 0.05$.No difference was seen regarding LPA and BMI SDS.

Conclusions: In a pediatric population, lower LPA is associated with impaired glycemic control. We demonstrate that the sport movement and the amount of lessons with school gymnastics have a positive impact on the level of physical activity. Furthermore, membership in sports clubs is strongly associated with improved glycemic control and lower BMI. Physical activity should be recommended in pediatric patients with type 1 diabetes and further efforts should be made within the society to stimulate physical activity.

P/051/FRI

Type 2 diabetes risk reduction for obese hispanic children: a pilot study

A.M. Delamater[1], E. Pulgaron[1], A.M. Patino-Fernandez[1], F. Jacquez[2], M. Villa[3], J. Hernandez[1] & J. Sanchez[1]

[1]*University of Miami Miller School of Medicine, Pediatrics, Miami, USA,* [2]*University of Cincinnati, Psychology, Cincinnati, USA,* [3]*Nova Southeastern University, Psychology, Davie, USA*

Objectives: Hispanic children have increased risk of obesity (OB) and type 2 diabetes (T2D). Reducing the weight of at-risk children (OB children with a family history of T2D) in order to decrease their risk of T2D is critical. We examined parental feeding styles (with the Child Feeding Questionnaire) in addition to anthropometric and cardio-metabolic risk data in a randomized intervention study of children at high risk for T2D.

Methods: The study sample consisted of 26 (intervention n = 13; control n = 13) OB (Mean zBMI = 2.01) Hispanic 3rd and 4th grade children (M age = 9.4 years) at two schools in low income neighborhoods. The majority of children (58%) were males and caregivers (94%) were mothers. Schools were randomized to either a 13-session family-based behavioral weight control intervention that was also designed to modify parental feeding style or a control condition consisting only of medical feedback and written health promotion materials. Both groups received baseline and follow-up assessments 6 and 12 months later, as well as a letter from the study physician reporting child medical results.

Results: ANOVA showed significant (1-tailed tests) treatment group x time interaction eects for less pressure to eat ($P < 0.02$), increased monitoring of eating ($P < 0.04$), and less concern about child weight ($P < 0.04$) over time for the intervention group. Results also revealed several changes for both groups over time: improved zBMI ($P < 0.05$), waist to height ratio ($P < 0.005$), total cholesterol ($P < 0.01$), LDL ($P < 0.04$), HDL ($P < 0.005$), and blood glucose ($P < 0.005$). Both groups had a significant decrease in fasting insulin and HOMA ($P < 0.01$) at the 6 month follow-up, but increased back to baseline at 12 months.

Conclusions: Results indicate the intervention improved parental feeding practices. However, improved health outcomes in both groups suggest that continued monitoring by a study team including medical feedback and health promotion materials may help reduce risk for T2D.

P/052/FRI

Relationship between body mass index and blood pressure among Nigerian children aged 6–18 years

J. Elusiyan[1] & A.S. Adegoke[1]
[1]*Obafemi Awolowo University, Paediatrics and Child Health, Ile-Ife, Nigeria*

Background: Studies have reported a linear trend of increase in Blood Pressure with age in children and young adults but there is no recent work done correlating blood pressure with the Body Mass Index in school children in Ile-Ife, Nigeria. This work was undertaken to study the relationship between blood pressure and body mass index in children and adolescents.
Methodology: The study was a school-based cross-sectional survey and it employed a multi-staged random sampling method. Seven hundred and twenty school students aged between 6 and 18 years old selected from primary and secondary schools were included in the study.
Results: Twenty (2.8%) subjects were overweight, while two (0.3%) were obese. Twenty-three (3.2%) had elevated blood pressure, ten males and 13 females. Three of the 20 overweight subjects had hypertension and they were all females. There was a positive correlation between BMI and systolic (r = 0.528) and diastolic (r = 0.412) blood pressures.
Conclusion: This shows that there is a strong linear association between BMI and blood pressures. The study also has reinforced the notion that hypertension may begin in childhood particularly in overweight children. Therefore, strategies for preventing and controlling hypertension at this level of development should be evolved.

P/053/FRI

Association of lower serum magnesium with overweight and insulin resistance in children and adolescents

V. Jain[1], B. Jose[1] & N.K. Vikram[2]
[1]*All India Institute of Medical Sciences, Pediatrics, New Delhi, India,* [2]*All India Institute of Medical Sciences, Medicine, New Delhi, India*

Background: Magnesium containing ATPases are cofactors for enzymes of carbohydrate metabolism. Magnesium deficiency has been shown to decrease cellular glucose uptake, impair action of insulin at receptor level and inhibit tyrosine kinase activity. Adult studies show that serum magnesium is lower in obese compared to normal weight people and lower serum magnesium is associated with insulin resistance and type 2 diabetes.
Objective: To compare the serum magnesium levels in overweight and normal weight children and adolescents and to assess the relationship between serum magnesium and insulin resistance.
Methods: This cross-sectional comparative study was conducted at All India Institute of Medical Sciences, New Delhi. 55 overweight (BMI ≥ 85th centile for age and gender as per CDC 2000 charts) and 53 normal weight children aged 5–14 years were enrolled. Estimation of serum magnesium (by flame atomic absorption spectroscopy), fasting insulin (RIA), lipid profile and dietary magnesium intake (using validated food frequency questionnaire) was done in all and compared between the groups. Correlation of serum magnesium with fasting insulin, waist circumference and blood pressure was studied.
Results: The characteristics and results in the two groups are presented in Table 1.
Serum magnesium had an inverse correlation with fasting serum insulin (rho −0.28, P < 0.005), waist circumference (rho −0.61, P < 0.001), systolic BP (rho −0.36, P = 0.001) and diastolic BP (rho −0.31, P = 0.0009).
Conclusion: Serum magnesium was lower in overweight children compared to those with normal-weight and had an inverse correlation with fasting insulin levels.

Characteristic	Overweight (n = 55)	Controls (n = 53)	P
Gender (M/F)	44/11	37/16	
Age (years)	10.6 ± 2.7	10.2 ± 2.1	0.36
Waist circumference (cm)	85 ± 8.9	58.3 ± 6.8	<0.001
Serum magnesium (mg/dl)	2.12 ± 0.33	2.56 ± 0.24	<0.001
Dietary magnesium (mg/Cal)	0.23 ± 0.05	0.24 ± 0.05	0.71
Serum insulin (μIU/ml)	6.5 (4.1–11.9)	3.2 (2.2–5.6)	<0.001

[Table 1]

P/054/FRI

Eating behavior: do adolescents with diabetes eat differently compared to healthy adolescent?

C. de Beaufort[1], M.T. Damsgaard[2], N. Ahluwalia[3], M. Rasmussen[2], B. Holstein[2], K. Lange[4], C. Skinner[5], P. Swift[6], P. Due[2], H. Mortensen[7] & HBSC Group and Hvidoere Study Group
[1]*Clinique Pédiatrique/CH de Luxembourg, DECCP, Luxembourg, Luxembourg,* [2]*University of Copenhagen, Department of Public Health, Copenhagen, Denmark,* [3]*HBSC Study, Toulouse, France,* [4]*Childrens Hospital auf der Bult, Psychology, Hannover, Germany,* [5]*Combined Universities Centre for Rural Health University of Western Australia, Geraldton, Australia,* [6]*Leicester Royal Infirmary Children's Hospital, Leicester, UK,* [7]*Glostrup University Hospital, Pediatrics, Copenhagen, Denmark*

Objective: Comparison between eating habits of 11 and 15 years healthy adolescents and adolescents with type 1 diabetes in 18 countries worldwide.
The Health Behaviour in School-age children (HBSC) study, a WHO collaborative cross-national study, (www.HBSC.org) has started to evaluate different aspects of health of adolescents world wide since 1983. As the diet is one of the corner stones of the treatment of diabetes, the Hvidoere study group has investigated whether eating habits in adolescents with type 1 diabetes (T1DM) differ from their healthy peers, in using the same questions as developed by the HBSC study.
Methodology: Questionnaires were obtained in 18 countries by both HBSC and HSG. Details on data collection for both groups have been reported previously (1, 2). Results are given in age standardized prevalences (percentages) by study and by sex as well as age adjusted odds ratios between the two populations.
Results: In absolute numbers, 94387 healthy and 1483 adolescents with T1DM provided answers to the HBSC questions. Significant differences were observed between the countries as well between the healthy and the population with T1DM with respect to the frequency of breakfast, fruit intake, sweets and soft drinks. Vegetables intake was not significantly different between adolescents with and without diabetes, however between countries important differences were reported.
Conclusion: Within countries, adolescents with T1DM report a healthier approach towards food intake compared with their non diabetic peers. Between countries very important differences exist. These may play a role in diabetes outcome.
(1) www.HBSC.org
(2) Continuing Stability of Center Differencesin Pediatric Diabetes Care: Do Advances in Diabetes Treatment Improve Outcome? The Hvidoere Study Group on Childhood Diabetes.Diabetes Care 2007

Obesity II

P/055/WED

Body fat distribution in overweight and obese children: what predicts best hormonal, metabolic and inflammatory profiles in children?

C. de Beaufort[1], H. Samouda[2], U. Schierloh[1], J. Jacob[2], V. Bocquet[2], F. Dadoun[2] & OSPEL
[1]*Clinique Pédiatrique/Centre Hospitalier de Luxembourg, DECCP, Luxembourg, Luxembourg,* [2]*Centre de Recherche Publique – Santé, Luxembourg, Luxembourg*

Objective: To analyze the additional effect of body fat distribution anthropometric indexes to BMI Z Score for assessing hormonal, metabolic and inflammatory profiles amongst overweight and obese children.
Research designs and methods: Two hundred and three overweight and obese children (7–17 years, 106 girls, 97 boys) from the OSPEL study participated in anthropometric and biological assessment with personal and parental informed consent.
Results: After adjustment for sex and age, prediction of fasting insulin, HOMA IR, QUICKI, triglycerides, HDL cholesterol, CRP and adiponectin was improved when combining Waist to Hip Ratio Z Score with BMI Z Score. Likewise, fasting insulin, triglycerides, HDL Cholesterol, SBP Z Score, CRP and adiponectin were best predicted by the conicity index-BMI Z score association. Anthropometric prediction of fasting insulin, HOMA IR, QUICKI, triglycerides, HDL cholesterol and resistin was also improved when the Kahn index and the BMI Z Score were associated. WHR Z Score, Conicity and Kahn indexes were independently and significantly associated to the multivariate prediction models. According to metabolic syndrome (MetS) definition used [IDF (1) vs. Cook/Ford (2)], the increase by one unit of WHR Z Score (respectively the increase by 0.1 unit of Conicity index) multiplies the risk for developing MetS, from 2.4 to 8, for comparable BMI Z Score values.
Conclusions: Body fat distribution, beyond overweight and obesity, should be taken into account to predict cardiovascular risk profile in children and adolescents.

P/056/WED

Genetic association of FTO, ENPP1 and APMI gene polymorphisms with obesity and related parameters in Chinese children and adolescent

Z. Zheng[1], F. Luo[2], L. Cao[3], Y. Yang[3] & S. Shen[2]
[1]*Children's Hospital of Fudan University, Endocrinology, Shanghai, China,* [2]*Children's Hospital of Fudan University, Shanghai, China,* [3]*Pediatric Institute of Fudan University, Shanghai, China*

Objective: To investigate the role of FTO, ENPP1 and APMl gene SNP on obesity and relative parameters in Chinese children and adolescents.
Methods: Four hundred and forty-four obese/overweight Han children and adolescents and 223 controls aged 6–18 years were recruited. Body height, weight, serum fasting plasma glucose (FPG), fasting insulin (Fins), triglyceride (TG) and cholesterol (TC) were measured and body mass index (BMI), HOMA-IR were calculated. Taqman-MGB probe was used to determine the gene polymorphism.
Results: (1) The fasting plasma glucose, insulin, TG, HOMA-IR were significantly higher than that in control group.
(2) The AA genotype frequency of FTO rs9939609 (2.7%) in obesity group and in overweight group (0.4%) existed significant difference compared with normal control group (P = 0.048, OR = 1.437). The CC genotype frequency of FTO rsl421085 in obesity group (2.7%) and in overweight group (0.9%) were significantly different from normal control group (P = 0. 076, OR = 1. 388). There was significant difference in BMI when the rsl421085 TC+CC and rs9939609 TA + AA genotypes respectively compared with their wild TT genotype. However, FPG, Fins, TG, TC, HOMAIR and QUICKI showed no significant difference between the above genotypes.
(3) The frequency of K allele and Q allele in ENPP1 gene had no differences among the three groups (P = 0.4171).
(4) The G allele frequency of SNP276 of AMP1 gene did not exist significant difference compared with obesity and overweight groups (P = 0.678).
Conclusions: FTO gene rs9939609 and rs 81421085 SNP was firstly reported to be associated with obesity and BMI in Chinese Han children and adolescents, but there existed no significant statistical association among the SNPs and obesity related metabolic parameters. APMI gene SNP276 and ENPP1 K121Q SNP were not associated with BMI and their metabolic parameters in Chinese obesity children, which suggested that APMl and ENPP1 gene polymorphism may exist ethic difference in its relation with obesity and metabolic syndrome.

P/057/WED

Stability of metabolic syndrome in Chilean school children: a cohort study

A.I. Godoy[1], R.D. Bancalari[1], C. Fardella[2], C. Campino[2], M. Aglony[1], A. Martinez[1], P. Arnaiz[1] & H. García[1]
[1]*Pontificia Universidad Católica de Chile, Pediatría, Santiago, Chile,* [2]*Pontificia Universidad Católica de Chile, Endocrinología, Santiago, Chile*

Metabolic Syndrome (MS) in children are increasingly in our population. It precedes the onset of Diabetes Mellitus and subclinical atherosclerosis, increasing the risk of future cardiovascular events. It is known the impact of individual components of MS in different populations but it is unclear how these change over time.
Objective: To evaluate the effectiveness of changes in lifestyle (CLS) in reducing and preventing MS in hypertensive Chilean school children and to know the stability of the various components of the MS over time.
Method: We analyzed the presence of MS in a cohort of 32 children with hypertension of 13.2 ± 1.2 years old examined in 2006 and 2009, which were treated exclusively with non-pharmacological measures. We determined the various components of metabolic syndrome using Cook's modified criteria, considering SM with three or more criteria. We evaluated the persistence, emergence or disappearance of SM in the observed time.
Results: 10/32 (31%) children tested in 2006, presented SM, while the year 2009, only 4/32 (12.5%) had SM (P < 0.05). Of these, three children remained the same diagnostic criteria, and only one had not previously SM. The median number of MS components declined significantly between 2006 and 2009 (*: P < 0.01).
Conclusions: There was a decrease in the prevalence of MS in our cohort, suggesting that the CLS is an effective measure in the treatment and prevention of MS in children with risk factors. Children who persist with the SM maintain the same initial diagnostic criteria, which would allow a targeted therapy to these factors.

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Number of components	2006	2009
0	0	7*
1	2	13*
2	20	8*
3	6	2*
4	4	2*

[MS components]

P/058/WED

How body mass index and body fat mass correlate with physical activity in urban Belarusian school children

Y. Vainilovich[1], L. Danilova[1], M. Lushchyk[1] & Z. Sretenskaya[1]
[1]*Belarusian Medical Academy for Postgraduate Education, Endocrinology Department, Minsk, Belarus*

Objectives: Regular physical activity (PA) decreases adiposity in children and benefit cardiopulmonary system.
Aim of this study: To estimate frequency, duration and intensity of PA and the sedentary time outside school in Belarusian school children from urban area and to analyze their correlation with body mass index (BMI) and percent of body fat mass (%FM).
Methods: The study was conducted in two randomly selected schools. Body weight and %FM were measured using foot-to-foot bioimpedance analyser Tanita. The level of PA and sedentary time outside school was assessed by a self-administered questionnaire. General sedentary time was estimated as screen time (spent at TV, computer) and time for home work and other sedentary activities.
Results: Three hundred and eighty-five children and adolescents aged 10–17 years, M/F 165/220 with completed anthropometric data and questionnaires were included in analysis. Mean age (13.1 ± 1.85 years) and mean BMI (19.89 ± 3.34 kg/m^2) were not statistically different between males and females, males had significantly lower %FM (P = 0.02). Th13% of children reported undertaking PA every day, males more often than females (17% vs. 10%). 25% of children exercised more than 60 minutes per section (38% males vs. 16% females). Totally 6% of children reported recommended level of PA: every day and more than 60 minutes per section (11% males vs. 2% females). 33% of children had screen time more than 3 hours per day (35% males vs. 31% females) and 63% reported general sedentary time more than 4 hours per day. BMI and %FM showed weak positive correlation with screen time (r = 0.151, P = 0.003 and r = 0.104, P = 0.041, respectively), %FM in addition demonstrated weak negative correlation with frequency (r = −0.112, P = 0.028) and duration (r = −0.144, P = 0.005) of PA.
Conclusion: Our study showed that level of PA did not influence BMI, however higher frequency and duration of PA decreased adiposity (%FM) in children. Generally Belarusian school children, especially girls, reported low levels of PA.

P/059/WED

Higher metabolic risk for overweight/obese children aborting therapy to loose weight

U. Schierloh[1], H. Samouda[2], C. de Beaufort[1], J. Jacobs[2], J.F. Vervier[3], V. Bocquet[2], G. Gilson[4] & OSPEL Study Group
[1]*Centre Hospitalier de Luxembourg, Children's Hospital, Luxembourg, Luxembourg,* [2]*Centre de Recherche Publique – Santé, Luxembourg, Luxembourg,* [3]*Centre Hospitalier de Luxembourg, Service de Pédopsychiatrie, Luxembourg, Luxembourg,* [4]*Centre Hospitalier de Luxembourg, Department of Clinical Biology, Luxembourg, Luxembourg*

192 children and adolescents with overweight vs obesity (age range 7–17 years; F: 53.6%) participated in a 4 months lasting study with two arms (group therapy, GT, vs. individual treatment, IT) in order to loose weight.
Methodology: Randomization to one of the two treatments occured after signing personal and parental informed consent. The study was approved by the National Medical Ethical Committee. Group therapy was an intensive outpatient treatment, twice a week, including sessions with the participants and their parents. This therapy offered multidisciplinary sessions with a dietician, a sport teacher and psychological counselling. In the individual treatment the participant and his family got an individual counselling on healthy lifestyle with less frequent consultations. Dietary advice and psychological support was offered. At onset Family Affluence Scale (FAS), anthropometric parameters, glucose and fat metabolism were tested and repeated at the end of the study.
Results: Drop out of therapy amounted to 14.5% in both groups, without difference. Identical FAS score was observed in the two treatment groups. But a significantly higher BMI Z-score at onset could be identified in those patients who dropped out prematurely compared to those participants who finished the study. (P = 0.0001; 2.85 ± 0.45 vs 2.48 + 0.58). Drop-outs also showed higher insulin and HOMA levels, higher triglycerides and higher fibrinogen levels.
Discussion: Those children and adolescents with overweight or obesity who dropped out of this specially developped multidisciplinary outpatient program to loose weight where those who present higher risk factors for insulin resistance and cardiovascular pathology as well as for a higher BMI. To better address the needs of this group alternative programs should be sought.

P/060/WED

Prevalence of and associated factors of childhood obesity among high school children of Pakistan

J. Ahmed
Isra University, Community Medicine, Hyderabad, Pakistan

Introduction: Childhood obesity is now a global problem and the epidemic is increasing in the developing world. It has also become an important public health problem among Pakistani children due to rapid urbanization, inequitable development and changes in life style in last few decades.
Methods: This cross sectional study was conducted on 501 students selected through simple random sampling from 10 high schools of an urban setting. We used the age and sex specific BMI cut off points of W.H.O to estimate Obesity. Interviews were conducted to inquire about food frequency, physical activity and other factors.
Results: Prevalence of overweight and obesity was 23% and 15%, in boys; and 16% and 8% respectively in girls. Children spent a mean of 20 hours on media on a typical week, 60% of them travelled inactively to schools, 50% schools did not have facilities for sports and 44% of the schools did not offer classes on physical education. In multivariate analysis girls were 77% protected against obesity, OR = 0.33 (CI = 0.16–68) and children in middle socioeconomic tertile were 3.43 times more likely to be obese. Rating oneself as poor athlete meant 5.5 times more likelihood of obesity and eating fruit more than 4 times a week meant 55% (OR = 0.45 CI = 0.22–0.91) less likelihood of obesity. Those who wanted to loose weight had 7.75 times more likelihood of obesity.
Conclusions: Childhood obesity is determined by the factors in the home, school and society and a multidisciplinary approach is needed to prevent this rising epidemic in developing countries.

P/061/WED

The usefulness of using OGTT in the follow-up of SGA children treated with GH on the various clinical conditions in Japanese children

K. Kobayashi[1,2], S. Amemiya[3], K. Kobayashi[4], J. Akatsuka[3], T. Saito[1], M. Hoshino[3], K. Kobayashi[1], A. Ohtake[3], K. Ohyama[1] & N. Matsuura[5]
[1]*University of Yamanashi, Pediatrics, Chuo, Yamanashi, Japan,* [2]*Yamanashi Kosei Hospital, Pediatrics, Yamanashi, Japan,* [3]*Saitama Medical University, Pediatrics, Saitama, Japan,* [4]*Nishisaitama-Chuo National Hospital, Pediatrics, Saitama, Japan,* [5]*Seitoku University, Department of Early Childhood Education, Chiba, Japan*

Objectives: Glucose tolerance can be predicted by the disposition index (DI) derived from Matsuda Index (MI) with OGTT in small for gestational age (SGA) children treated with GH.

Methods: Nine SGA children without catch-up growth underwent OGTT from the start of GH treatment and the subsequent periods. They were assessed by DI using with a whole body insulin sensitivity index (WBISI) and an insulinogenic index (II) as acute insulin response. For the reference of DI derived from MI, children with twenty-three non-obesity, 26 obesity, 14 impaired glucose tolerance and 41 type 2 diabetes were used in comparison with SGA children. We also evaluated the relationship between IGF-I and data by MI.

Results: While medium of DI in glucose tolerant subjects (NGT) was 4.35 (3.10–6.08), that in SGA children tended to be lower of 3.85 at the start of GH. During subsequent GH treatment, SGA children showed decreasing WBISI with respectively increasing II, resulting in the same DI as NGT. On the other hand, IGT and diabetic subjects were revealed to have low DI due to low II. The relationship between WBISI and IGF-I had significantly negative correlation (R2 = 0.467).

Conclusions: Our Japanese SGA children did not show any allostatic effect even with increasing insulin resistance due to subsequent GH treatment. Thus so far Japanese SGA children can be safely treated with GH. On the other hand, we remain carefully to evaluate SGA children regarding a possible decrease in DI, since we had experienced a SGA child with diabetes resulted from a low DI due to an insufficient increase in II following GH treatment as seen in IGT or diabetic children. We suggest that insufficient increment of IGF-I might result in the glucose intolerance during GH treatment.

P/063/WED

Frequency of occurrence of obesity among children of megalopolis samara

A. Kulyashova & E. Michailova
Samara State Medical University, Samara Children's Hospital 1, Samara, Russian Federation

Obesity is an illness of a civilized society. Epidemic of this disease extends among children and teenagers with menacing rates. In European countries the overweight is observed at 11–14% of teenagers, obesity at 3–5%.

Objective: Our research is directed to specification of frequency of occurrence overweight and obesity among children's population of Samara.

Methods: Wholly 960 children (437 boys and 523 girls) at the age from 11 to 17 years had been examined. Among all teenagers the questioning was spent. The questionnaire was included passport, anamnesis data, results of anthropometrical measurements, questions about their food and physical activity.

Results: Among all teenagers excess weight is registered at 9.2%, and obesity at 4.3%. Research has shown prevalence of excess weight and obesity at boys, than at girls. In Samara the excess weight of a body at boys is revealed in 9.7% of cases, and obesity in 4.4%, accordingly at girls – 8.8% and 4.2%. The maximum rate (8.6%) of excess weight of a body is decreased from 11–14 years to 17 years; obesity is registered at 15.2% of teenagers in 11 years, and at 1.0% at 16–17 years. Obesity is multifactorial disease. The most important factors of developing of obesity are wrong character of meal and low level of physical activity. Analysing the facts we had seen that only 26% of teenagers are engaged in sports activity. Walks on fresh air take part from 1.1 till 2.5 hours per day, and TV viewing, computer games and study at school take part more than 12 hours per day. According to questionnaire teenagers take a food regularly enough – 3–4 times a day (in 78%), the others (16%) only 1–2 times a day and 4% is 5 and more time a day. Visiting of a café of fast-food are rare – in 66%, but many children visit them regularly.

Conclusions: 13.5% of the Samara's teenagers have overweight and obesity. The epidemiological situation of obesity at Samara is comparable to the European data in each age group.

Education I

P/064/FRI

'Carol's got diabetes': another step towards achieving regular schooling for children with diabetes

M.C. Marin[1], V. Salaverría[1], I. Lorente[2] & A. Lorenzo[3]
[1]*Fundación para la Diabetes, Madrid, Spain,* [2]*Asociación Navarra de Diabéticos, Pamplona, Spain,* [3]*Asociación de Diabéticos de Alava, Vitoria, Spain*

Introduction: Studies conducted by Spain's Fundación para la Diabetes show that discrimination against schoolchildren with diabetes is far from uncommon. To avoid this:
(1) Parents and students demand school staff be properly informed about diabetes.
(2) Teachers demand more information about this condition and about any potential emergency scenarios.
Objectives: (1) To ensure equal schooling opportunities for children with diabetes.
(2) To increase social awareness, regarding childhood diabetes.
Materials and methods: We created materials for teachers and students to better understand diabetes, particularly in schools with students who have this condition:
(1) 6-minute flash animated film.
(2) Animated teaching units on: physiological functionality, daily diabetes scenarios and values needed in avoiding discrimination.
(3) Student pdf worksheets, adapted to all 3 Primary Education cycles: classroom worksheets, for teachers, dealing with a range of diabetes-related aspects and perspectives.
Spanish children with diabetes (ages 6–12) are handed this material at paediatric hospitals.
Results: Twenty thousand English–Spanish interactive CDs were printed, containing:
(1) Short film
(2) Animated teaching units
(3) Student worksheets (also in Catalan, Euskera and Galician) endorsed by the Spanish Society of Paediatric Endocrinology.
Families were given materials by paediatric endocrinologists and diabetes educators at Spain's 131 specialized centres, for schoolteachers to use in class.
The distribution network also involved diabetic associations and both national and regional Education, Health and Social Services departments.
Conclusions: This new paediatric endocrinology centre-based strategy provides diabetes education material both for children and teachers, the aim being to contribute to normalised schooling – for children with diabetes – and to increase social awareness as to the problems they face. Future studies will determine whether we have achieved this.

P/065/FRI

DAWN youth survey: role of schools for youth with diabetes in India

D.G. Dalal[1], S. Kalra[2], A.K. Jhingan[3], S.K. Singh[4], V. Garg[5] & N. Agrawal[6]
[1]*Consultant Diabetologist and Cardiologist, Mumbai, India,* [2]*Bharti Hospital, Endocrinology, Karnal, India,* [3]*Delhi Diabetes Research Centre, New Delhi, India,* [4]*Consultant Endocrinologist and Diabetologist, Endocrinology, Patna, India,* [5]*Novo Nordisk, Medical, Bangalore, India,* [6]*G.R. Medical College, Medicine, Gwalior, India*

Aims: The DAWN (Diabetes Attitudes, Wishes and Needs) Youth survey assesses the challenges and issues faced by young people living with diabetes, their families & others who support them.
Methods: The present study reports findings from 11 Indian centers in a survey amongst young people aged 18–25 years (n = 172) with diabetes. The survey comprised of 21 questions, of which five were India specific. The forms were filled at DAWN Youth camps and clinics by 98 (56%) male and 74 female youth with type 1 and 2 diabetes.
Results: Teachers and school friends knew about the diabetes status of 68% and 41.30% of youth respectively, whereas it remained hidden from all in 25%. Only 4.1% and 6.4% of youth had told the canteen staff and bus drivers respectively about their condition.
Similarly, teachers (88%) and school friends (21.5%) were able to help young individuals with diabetes in time of need. Unfortunately, in 25% instances, respondents felt that nobody could assist them at school. Only 8.7% and 3.5% patients felt they could talk to teachers or school nurses respectively about their feelings.
The survey also reports that youth do not find school/college or classmates very supportive of their diabetes (18.02% and 20.35% respectively). Only 16.30% of times do they get information about diabetes from library/books. Respondents felt the need for improvement in activities about diabetes in school (20.30%), and more diabetes related activities such as camps and group activities. The youth (25%) often found their diabetes state as a cause of concern/inhibitor in seeking a career opportunity later in life.
Conclusions: This survey highlights the importance of support at school level for young people with diabetes. Teachers/friends can play a major role in reducing anxiety and stigma associated with diabetes. Education activities and school camps might be a useful tool to address this gap and help improve future prospects for diabetes youth in India.

P/066/FRI

Carol's corner: a worldwide site on diabetes at school

M.C. Marin & V. Salaverría
Fundación para la Diabetes, Madrid, Spain

Background: According to recent studies – conducted by the Fundación para la Diabetes (FD) – diabetes-related discrimination is quite common, in schools. In an attempt at engaging the problem, FD created 'Carol's Got Diabetes': a project comprising a whole range of teaching-aids and audiovisual material, whose purpose it is to tell teachers and students – who have children with diabetes, at school – the simple truth about diabetes.
Why: Internet is, today, the world's foremost information channel: transversal, flexible, interactive and low-cost. 55% of all Spanish homes have it and Spain's Internet user population just keeps growing; which is why, in addition to 'Carol's Got Diabetes' (CGD), FD created 'Carol's Corner' – accessible via www.fundaciondiabetes.org.
Objectives: (1) To make CGD teaching-aids readily available to users, worldwide
(2) To allow for diabetic child-related school-experience exchanges
(3) To foster full, equal and safe participation for children with diabetes, at school
(4) To boost social awareness of infant diabetes

Materials and methods: 'Carol's Corner' opened in November, 2009, at www.fundaciondiabetes.org, with the following sections:
(1) CGD teaching-aid downloads: short film, animations and worksheets
(2) Project assessment: teacher and parent surveys
(3) Making of CGD
(4) 'Tell Carol': forum and letters
(5) Surveys
(6) Ideas born from the CGD project
Results: Between November, 2009 and April 30, 2010, ''Carol's Corner'' pages have recorded 67,215 hits. There have, also, been thousands of teaching-aid downloads:
(1) Worksheets: 22,106 downloads (16,828 in Spanish, 4,658 in Spain's regional languages and 593 in English)
(2) Carol's Got Diabetes, the film, has been viewed 6,425 times on YouTube (6,271 times in Spanish and 154 in English)
Conclusions: This site fills a need for information and experience-exchange among the people it was designed for, as proven by the vast number of user-visits.

P/067/FRI

Development of a web-based support intervention for parents of teenagers with type 1 diabetes: what is needed?

A.M. Goutbeek, M. de Wit & F.J. Snoek
VU University Medical Center, Medical Psychology, Amsterdam, Netherlands

Objectives: Parents of teenagers with type 1 diabetes are faced with unique challenges daily, while receiving little or no professional support. The present study aims to develop a web-based parent support intervention to help cope with the parenting stress. As a first step, we conducted a questionnaire survey and focus group discussions on parents' needs and preferences. Here we report on findings of the focus group discussions.
Methods: Parents of teenagers aged 12–19 were recruited via the Dutch Diabetes Patient Association. Two age groups were formed (12–15/16–19 years) including 28 parents in six focus group discussions. The focus group interviews aimed to explore
(1) diabetes-specific parental stressors and
(2) preferences concerning the content and design of a support website.
Results: (1) Findings confirm the psychological pressure diabetes exerts on parental daily functioning – both practical and emotional. Having to cope with the child's diabetes impacts both the partner-relationship and the parent–child interaction. Parents also report stress around the emotional impact of the diabetes on siblings. Furthermore, participants indicated that school is an important stressor over time, due to difficulties in communication and lack of knowledge of school staff. Parents generally do not feel supported in all afore mentioned areas.
(2) Participants expressed clear preferences about the content and use of a support website. It should offer concrete information on both practical and psychological topics, specified for younger and older teenagers. Most frequently stated is a need for recognition and acknowledgement of their feelings and experiences. Parents expressed a strong wish for peer-to-peer support, e.g. by a forum.
Conclusions: Results from these focus group discussions demonstrate a need for easy accessible parenting support and advice for parents of teenagers with type 1 diabetes. We are currently in the process of developing such a web-based intervention.

P/068/FRI

A visual educational tool for people with literacy and numeracy difficulties caring for children with type 1 diabetes

L. Andrews & D. Cody
Our Lady's Children Hospital Crumlin, Diabetes and Endocrinology, Dublin, Ireland

Introduction: Studies suggest that a quarter of the adult population in Ireland are functionally illiterate with unknown innumeracy levels. The rates of illiteracy in the Irish travelling community, an indigenous ethnic minority group, are estimated to be 80%. We devised a Diabetes educational instrument to aid a travelling family with significant literacy and numeracy problems.
Discussion: A boy of 7 months from consanguineous Traveller parents was admitted to our hospital in DKA. On improvement he was placed on subcutaneous insulin and formal diabetes education was commenced. Both parents had significant difficulty with both literacy and numeracy. They could read numbers but had no comprehension of numerical sequence i.e. whether 17 was greater than 3 (and thus the relevance of the blood sugar).
Method: A visual aid tool was created to help the parents recognize the baby's blood sugar results and the appropriate treatment required (Table 1). The intervention was assessed with a pictorial quiz administered to the parents to evaluate different blood sugar scenarios. The intervention was effective with good reproducibility. The baby was discharged with the visual aid tool and literacy classes were organised locally.

Table 1.

Blood sugar		Intervention
Lo 1 2 3 4	↓	GIVE A BOTTLE. 
5 6 7 8 9 10	√	
11 12 13 14 15 16	↑	 Recheck
17 18 19 20 21 22 23 24 25 26 27 HI	↑↑	CHECK KETONES  ? phone team

Conclusion: In the unusual scenario of illiteracy/innumeracy in parents of children with diabetes a pictorial aide could prove to be helpful in the initial management. This tool can be easily adapted for other families who may present with such difficulties.

P/069/FRI

Education in insulin dose adjustment/carbohydrate counting techniques in children with type 1 diabetes: a pilot UK survey

S. Slegtenhorst[1,2], S. Waldron[3] & C.L. Acerini[2,4]
[1]*Addenbrooke's Hospital, Nutrition and Dietetic Department, Cambridge, UK,* [2]*Institute of Metabolic Science, Cambridge University Hospitals Foundation Trust, The Weston Centre, Cambridge, UK,* [3]*Barts and the London NHS Trust, Department of Paediatrics and Endocrinology, London, UK,* [4]*University of Cambridge, Department of Paediatrics, Cambridge, UK*

Introduction: Carbohydrate (CH0) counting for insulin dose adjustment purposes is now considered standard practice for children and young people with Type 1 Diabetes Mellitus (T1DM). Effective education in CHO counting techniques is essential for calculating the correct dose of insulin to be delivered with food. Limited information exists on the current education approaches used to teach these skills.
Objective: To determine current approaches to teaching insulin dose adjustment/CHO counting in children and adolescents with T1DM.
Methods: A pilot questionnaire sent by email to UK Paediatric Diabetes Dietitians
Results: Seventeen dietitians from different areas of the UK responded. Sixty five percent adjusted rapid acting insulin (RAI) and kept carbohydrate in multiples of 10 g portions, using a standardised dose of 1 unit RAI:10g CHO, regardless of age; 29% kept insulin at 1 unit RAI and adjusted carbohydrate in grams and individualized per child and meal; 6% provided no information. Ratios for the latter method were calculated as: total daily CHO divided by total RAI or total CHO per meal divided by RAI. Large variability was found in the education on RAI for snacks. Dietitians used one or more of the following approaches: inject for all snacks (12%); discourage snacks due to weight issues (6%); if snack <2 hours prior to meal incorporate CHO into meal (24%); if snack >2 hours prior to meal inject RAI (18%); 10–30 g CHO allowed as snack before injecting RAI (70%); RAI for snacks is given dependent on pubertal stage (6%).
Conclusions: Great variation exists in the approach to teaching insulin: CHO ratios and the use of extra RAI for snacks. This, together with the use of standardized insulin: CHO ratios in children and adolescents are a concern. A consensus on the effective evidence-based approach to the principles of insulin and carbohydrate management in T1DM needs to be established.

P/070/FRI

Helping children with type 1 diabetes at kindergarden and schools: a French regional training program for health care professionals (HCP)

A.M. Bertrand[1], L. Vincent[1], B. Mignot[1], C. Ballot[1], M. Vias[2], M. Cahane[2] & J.J. Robert[2]
[1]*Chu Saint Jacques, Pediatrie1, Besancon, France,* [2]*AJD, Paris, France*

Objective: To provide a proper and safe management to the children with diabetes attending at kindergarden and schools (3–17 years old) on a regional scale.
Background: Schools are playing a key role in helping children to manage their diabetes. School HCP have to be aware of these children's needs in order to keep them medically safe and must be trained to diabetes management tasks. In France, despite an official written care plan, wide variations in support are observed leading to some exclusion and suboptimal diabetes treatment.
Methods: A full day educational program, helded by a diabetes education nurse and a paediatrician, was tested at first in two schools and then extended to the Franche Comté region, in collaboration with local hospital professionals, in a network frame. All the school nurses and doctors were recruited .The program was designed according to their prioritary themes including updates on basic knowledge and new insulin therapy, blood glucose monitoring, injection techniques, hypo and hyper glycaemias, nutrition, physical activity, psychology, trips. Educational tools promoted interactivity and exchanges with, working groups, brainstorming, daily problem solving and technical training. It was a first step, hoping a secondary transmission of messages to physical trainers and teachers.
Results: Eight sessions permitted to train 314 HCP in two years. Evaluation showed a high satisfaction level among health care professionals and educator team. Families gave a positive feedback on observed changes. Maintenance with communication and proactive approach is necessary to sustain childs, parents and school HCP's demands.
Conclusion: Implementation of training programs for health care providers in kindergarden and schools should be effective to provide a more supportive environment to children with diabetes. An effective daily care should improve their metabolic balance and their quality of life.

P/071/FRI

Evaluating the effect of a blended learning programme to improve consultation skills of paediatric diabetes clinic staff (the DEPICTED study)

J. Gregory[1], M. Robling[2] & DEPICTED Study Group
[1]*Wales School of Medicine, Cardiff University, Child Health, Cardiff, UK,* [2]*Wales School of Medicine, Cardiff University, Primary Health Care, Cardiff, UK*

Objectives: To develop a health-care communication training programme to help diabetes health-care professionals (HCP) counsel their patients more skilfully, particularly in relation to behavior change.
Methods: A blended learning programme was informed by a systematic review of the literature, telephone & questionnaire surveys of professional practice, focus groups with children & parents, experimental consultations and 3 developmental workshops involving a stakeholder group. The programme focused on agenda-setting, flexible styles of communication (particularly guiding) and a menu of strategies using web-based training and practical workshops. The HCP training was assessed using a pragmatic, cluster-randomised controlled trial in 26 UK services with effects on HbA1c, quality of life & costs measured in 693 children aged 4–15 years and families after 1 year (95.3% follow-up).
Results: Trained staff showed better skills than controls in agenda setting and consultation strategies which waned from 4 to 12 months. There was no effect on HbA1c ($P = 0.5$). Patients in intervention clinics experienced a loss of confidence in their ability to manage diabetes whereas controls showed surprisingly, reduced barriers ($P = 0.03$) and improved adherence ($P = 0.05$). Patients in intervention clinics reported short-term increased ability ($P = 0.04$) to cope with diabetes. Parents in the intervention arm experienced greater excitement ($P = 0.03$) about clinic visits and improved continuity of care ($P = 0.01$) without the adverse effects seen in their offspring.
Conclusions: Diabetes HCPs can be trained to improve consultation skills but these skills need reinforcing. Over 1 year, no benefits were seen in children unlike parents who may be better placed to support their off-spring. Further modification of this training is required to improve outcomes

which may need to be measured over a longer time to see effects.

P/072/FRI

Pilot study of a novel structured self management education program for adolescents with type 1 diabetes

B. Knight[1], H.D. McIntyre[1,2], D. Harvey[3], V.L. Haggar[3], J. Hickleton[3] & S. Cole[4]

[1]*Mater Health Services, Queensland Diabetes Centre, South Brisbane, Australia,* [2]*University of Queensland, Mater Clinical School, Brisbane, Australia,* [3]*Diabetes Austalia-Victoria, Health & Education Services, Melbourne, Australia,* [4]*Frankston Hospital, Diabetes Education, Frankston, Australia*

Teens empowered and actively managing type 1 diabetes (TEAM T1) is a novel 4 days outpatient structured self management education program, adapted from the adult DAFNE program and piloted across three Australian centres.

Objective: To evaluate changes in self management practices in adolescents with T1DM after participation in the TEAM T1 program.

Methods: Selection criteria were: type 1 diabetes of more than 1 year duration, age 14–18 years, HbA1c 7–14%, able to dose insulin up to 5 times/day and test blood glucose ≥4 times/day. Adolescents attended the 4 days program (9–2 pm) and one or both parents participated in a separate 1 day education program. Variables were compared at baseline and post course at 3 months.

Results: Nineteen adolescents participated in the program and 17 completed pre and post course follow up. Mean age and diabetes duration were 15.9 and 6.5 years respectively.

Normally distributed variables (‡) are displayed as mean (SD) and remainder as median (IQR). Paired *t*-tests (†) were used for normally distributed change variables and Wilcoxon Matched Pairs test for the remainder.

Other variables measured include patient reported BG targets for each meal, weight, and frequency of hypoglycaemia, none of which changed significantly.

Conclusions: Following participation in the TEAM T1 program, adolescents have demonstrated increased knowledge and improvements in self management practices alongside improvements in metabolic control and quality of life.

Variables	N	Pre course	Post course	P-value
HbA1c (%)‡	17	9.4 (1.7)	8.5 (1.2)	0.004
Total daily dose insulin (U/day)‡	12	72 (14)	59 (18)	0.003†
Self Efficacy‡	17	4.3 (0.6)	4.6 (0.4)	0.001†
Problem Area in Diabetes‡	13	19 (16)	10 (13)	0.017
Knowledge‡	17	4.6 (1.9)	7.6 (2.5)	0.001
Hypo treatment (grams of carbohydrate)	17	34 (20–40)	22 (15–25)	0.05†
BG tests performed in 2 weeks	16	56 (40–56)	57 (39–74)	0.21†
BG tests recorded in 2 weeks	13	9 (0–56)	52 (29–71)	0.009

[TEAM T1 study outcomes n = 17]

P/073/FRI

Randomized nutrition education intervention to improve carbohydrate counting accuracy in adolescents with type 1 diabetes

G. Spiegel[1], A. Bortsov[2], F.K. Bishop[1], G.J. Klingensmith[1], D. Owen[1], E.J. Mayer-Davis[3] & D.M. Maahs[1]

[1]*Barbara Davis Center for Childhood Diabetes, University of Colorado, Denver, Pediatrics, Aurora, USA,* [2]*University of South Carolina, Center for Research in Nutrition and Health Disparities, Columbia, USA,* [3]*University of North Carolina, Chapel Hill, Departments of Nutrition and Epidemiology, Chapel Hill, USA*

Data indicate that youth with type 1 diabetes (T1D) do not count carbohydrates (CHO) accurately, yet it is part of their recommended daily care. No research has been done on whether a nutrition education intervention improves adolescents' CHO counting accuracy. Our aims were to assess CHO counting accuracy in adolescents with T1D and whether a nutrition education intervention would improve CHO counting accuracy and HbA1c. We screened 101 youth with T1D to identify those with poor CHO counting accuracy, using a previously developed CHO counting accuracy test covering commonly consumed foods and beverages that included some pre-measured foods, with or without nutrition labels, and some self-serve foods. Eligible subjects (n = 66, age = 15 ± 3 years, 62% male, T1D duration = 6 ± 4 yrs, HbA1c = 8.3 ± 1.1%) received a brief review (5 minutes) of CHO content of foods and nutrition education resources. The intervention group attended a 90 minutes class with a RD/CDE and twice kept 3-day food records, which were reviewed for CHO counting accuracy and insulin adjustments by phone. They also received measuring cups, a food scale and reference book to help with CHO counting. At baseline, subjects significantly overestimated the CHO content of 16 of 43 foods and underestimated the CHO content of 5 of 43 foods. When foods were presented as meals subjects either significantly over or underestimated 6 of the 13 meals and snacks. After 3 months of follow-up, HbA1c decreased in both the intervention and control groups by −0.34 ± 0.14% (P = 0.02) and −0.15 ± 0.13% (P = 0.27) respectively; however, the overall intervention effect was not statistically significant (P = 0.33). There was no significant change in CHO counting accuracy on the CHO counting test from baseline to final visit in either group. More intensive intervention may be required to improve adolescents' CHO counting accuracy and dietary management of T1D. Further research is needed to translate nutrition education into improved health outcomes.

Education II

P/074/WED

Communication skills of healthcare professionals in a paediatric diabetes centre: evaluation by adolescent patients

M. Dejonghe, W. Asscherickx, M. van Houten, E. Goethals & K. Casteels
University Hospital Leuven, Leuven, Belgium

It is well known that good communication between healthcare professionals and patients results in better care and patient outcome. This has also been demonstrated in diabetic patients. Most healthcare professionals in paediatric diabetes services try to discuss the various aspects of diabetes with their patients (at various ages) and their parents. It is however known that half of all professionals have not received a specialist training in communication. The aim of this study was to evaluate how adolescents perceived the communication with their diabetes team. Thirty-eight adolescents (12–18 years old) were given a questionnaire during consultation. All questionnaires were filled in by the patients themselves and the data were analyzed anonymously. Adolescents reported they were satisfied with the attention given in the consultation room: most patients reported they always had enough space and time to ask their questions or talk about their worries (20/34). Adolescents noted that both parents and patient were involved in the consultation with the nurse, the dietician and the doctor whereas the consultation with the psychologist was more focused on the patient himself. When asked whether specific items such as alcohol, smoking and dating were addressed, 24 in 38 patients said these items were never addressed. However, when focused on these adolescents that did go out, smoked and drank alcohol, 9 in 12 said these items were discussed (1/12 always, 1/12 often and 7/12 sometimes). In conclusion, these data show that adolescents are generally satisfied with the communication between them and their health care team. Specific adolescent items, such as smoking, alcohol and dating were not often discussed in general but were discussed in 75% of those adolescents who were confronted with this behavior.

P/075/WED

Diabetes education in the electronic era: what do our patients and families want?

L.S. Youde
Royal North Shore Hospital, Paediatric Diabetes and Endocrinology, Sydney, Australia

Introduction: The ''Traffic Light Guide to Food'' (TLG) is a unique food and diabetes resource, published in 1975 in book format with six subsequent editions. The ''TLG'' anecdotally had a reputation as a practical and valuable resource, widely used throughout the Australian diabetes community. To confirm and improve the reputation of the ''TLG'' and meet the needs of consumers in the emerging and diverse media environment it was essential to consult our consumers.
Objective: To establish via consumer consultation whether the TLG:
(1) Was meeting consumer needs (specifically to reflect on content, relevance to diabetes needs, usefulness for self management);
(2) Utilised the most effective format (portability, format useability including consideration of web based tools, e-books and other interactive media.)
Methods: Qualitative methodology was used to canvass the views of people with type 1 diabetes and their families during three focus groups, conducted by two independent facilitators. Groups comprised of parents of children with type 1 diabetes, adolescents and adults with type 1 diabetes.
Results: All participants reported the resource was relevant and trustworthy. 66% of participants agreed the content was a useful aid to manage their diabetes/ or child's diabetes – indicating the resource is meeting consumer need. 66% of all participants and 100% of adolescents agreed the use of electronic media would encourage more frequent use and make the ''TLG'' more accessible. Participants suggested a smaller format and information about more foods.
Conclusions: Consumer feedback has been used to develop a suite of ''Traffic Light Guide to Food'' resources, including a separate pocket sized carbohydrate counter and companion information books entitled ''Type 1 Diabetes'' and ''Type 2 Diabetes & Gestational Diabetes'' in the traditional book format. An interactive e-book, 'Traffic Light Guide to Food' website and an iPhone application are in development.

P/076/WED

Group Treatment for Teens with Type 1 Diabetes and Caregivers

C.E. Munoz[1], L.K. Fisher[2,3], Y. Cespedes-Knadle[1] & M. Carson[1,3]
[1]*Childrens Hospital Los Angeles, USC UCEDD/Mental Health, Los Angeles, USA,* [2]*Childrens Hospital Los Angeles, Endocrinology & Metabolism and Diabetes, Los Angeles, USA,* [3]*University of Southern California, Pediatrics, Los Angeles, USA*

This study examines the impact of a psychoeducational and skills-based group intervention on levels of depression in teens with Type 1 diabetes (DM1) and caregiver stress.
Participants: 78 diabetic teens and caregivers.
Intervention: The framework of the group intervention is based on cognitive-behaviorial theory, which has been used effectively to treat people with DM1. Group sessions start with an unstructured mealtime in which participants engage in diabetes management within a controlled setting. The teen group aims to increase use of effective coping strategies, promote positive body image and self-esteem to facilitate reduction in depressive symptoms. An adult diabetic mentor participates to address concerns about living with diabetes and reinforce appropriate diabetes management. The parallel caregiver group aims to promote stress management by providing social support, psycho-education, and problem-solving. Inclusion of bilingual/bicultural facilitators affords bilingual or monolingual Spanish-speaking caregivers the opportunity to dialogue freely.
Measures: Teens completed the Children's Depression Inventory (CDI) and questionnaires to assess attitudes towards DM1 and feelings about group behavior goals. Parents completed the Parenting Stress Index (PSI). Measures were administered during the first and last group sessions.
Analysis: Independent sample t-tests were used to assess for group differences in key outcome variables (depression and caregiver stress).
Results: Abstract results represent the analysis of the first 65 participants' data: 34 diabetic teens, seven English-speaking caregivers, 26 Spanish-speaking caregivers, and 10 bilingual caregivers. Results reveal an overall reduction in levels of adolescent depression (CDI Total Score mean decrease 51.2–44.7) as well as in levels of parental stress (PSI Total Score mean

decrease 90.0–83.0). Results suggest this group intervention has positive effects on parental stress and adolescent depression.

P/077/WED

Effect of Diabetes Self Management Education (DSME) on Glycemic Control (HbA1c) in Children Suffering from Type 1 Diabetes mellitus in a Local Hospital of Karachi, Pakistan

A.A. Qayyum, J. Raza, S. Amir, M. Ibrahim & I. Atta
National Institute of Child Health, Department of Pediatric Diabetes and Endocrinology, Karachi, Pakistan

Objective: To evaluate the effect of diabetes self management education (DSME) on glycemic control (HbA1c) in children suffering from type 1 diabetes mellitus in a local hospital of Karachi.
Study design: Quasi experimental.
Patients and methods: This study was conducted at the diabetic OPD of National Institute of Child Health, Karachi from April to Sep 2009. Sixty children with a mean age of 10 years with T1DM were selected conveniently from the OPD. The children along with their parents/guardians attended a modular series of DSME programs. Customized according to the local needs, the program was designed to educate children about self management of TIDM. It included general information about the disease, basic insulin therapy, planning for special needs, basic nutritional management and was conducted by a multidisciplinary pediatric diabetes team including an endocrinologist, general paediatrician, nutritionist and diabetic nurse. The educational sessions were followed by monthly revision exercises. HbA1c levels were measured at baseline and after 3 months.
Result: Out of 60 children, 50 completed the trial. The study population comprised 45.8% males and 54.2% females. Forty four children had a positive family history of diabetes. Forty-Eight children were on B.D insulin dose (regular + NPH) and12 were on basal bolus (regular + NPH). No changes were made to the insulin regime and average dose during the study period. There was a significant decrease in the HbA1c levels after the DSME program. The mean pre and post intervention HbA1c levels were 9.67 ± 0.65 and 8.49 ± 0.53 respectively. Mean difference in HbA1c was 1.174 (0.684–1.66) P-value < 0.001.
Conclusion: We concluded that in pediatric diabetic care, practical information and skills training in the form of DSME helps to improve metabolic control and should be an integral part of patient treatment in all diabetic setups country wide. However, further studies are warranted to determine long term effects.

P/078/WED

Diabetes Education Program in Patients with Type 1 Diabetes mellitus

M.H. Elsamahy[1], A.A. Abdelmaksoud[1] & H.E. Azzam[2]
[1]*Ain Shams University, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University, Psychiatry, Cairo, Egypt*

Background: Education is the corner stone of diabetic therapy and vital to the diabetics in the society.
Aim of the study: To determine the effect of diabetes education on metabolic control, complications, knowledge, and psychosocial outcomes.
Patients and methods: Sixty patients with type 1 diabetes mellitus joined a designed educational program for 2 months. We evaluated patients one year before the study and 1 year after the education program as regards their demographic data, disease history, clinical and laboratory aspects of metabolic control and diabetic complications, as well as assessment of their diabetes knowledge and psychosocial status using a validated questionnaire.
Results: There was a marked reduction in mean RBS, mean HbA1c ($P < 0.0001$), improved levels of cholesterol and LDL ($P = 0.00$), decreased insulin doses and complications of injections with improved home monitoring skills, decreased frequency of hospital admissions, DKA and hypoglycemic attacks ($P < 0.01$) with increased knowledge score, total psychiatry score, general health score ($P < 0.01$) and confidence score ($P < 0.001$). Furthermore, there was marked improvement in patients' self dietetic management ($P < 0.001$).
Conclusion: Effective diabetes education for patients with type1 diabetes mellitus improves their knowledge, skills with better metabolic control, less complications and better general health.

P/079/WED

Quality incentive scheme: to improve glycaemic control in children and young people with diabetes

L. Terrett[1], Y. Oade[2], A. Oversby[1], R. Hagreen[2], H. Taylor[1], N. Harrison[2], S. Schorah[1], M. Whiteley[1] & L. Davies[1]
[1]*Calderdale and Huddersfield Foundation Trust, Paediatrics, Huddersfield, UK,* [2]*Calderdale and Huddersfield Foundation Trust, Paediatrics, Calderdale, UK*

Background: It is well recognised that frequent contact with young people with diabetes improves their diabetic control. Over 75% of the young people in our diabetes clinic had a suboptimal HbA1c and therefore greater risk of developing complications.
Objectives: To support young people with diabetes on an individual basis to improve their diabetic control.
Methods: Funding was provided by the local Quality Board to target young people with an HbA_1c of greater than 9%. This provided additional paediatric diabetes dietician time and two empowerment coordinators to support the children and adolescents with poor diabetic control. Support was initially targeted at those with the poorest control and later offered anyone in clinic that required extra help. The empowerment coordinators offered face to face, telephone, text and email contact. They arranged teaching sessions, individual and family support, accessed appropriate medical professionals and teachers and although they had a good understanding of diabetes, this was not the sole focus of the contacts.
Results:

Date	04/09–06/09	07/09–09/09	10/09–12/09	01/10–03/10
Total Number	157	165	169	161
No. HbA1c <7%	19	27	34	34
No. HbA1c <8%	59	71	89	95
No. HbA1c <9%	96	103	114	118
% HbA1c <9%	61.1	65.5	69.5	76.6

[HbA1c results]

Conclusions: Increased contact with the diabetes team does improve diabetic control. The empowerment coordinators were able to address an individuals needs, both with diabetes and other aspects of their life, or help them access any other help they required. The coordinators enabled the paediatric diabetes specialist nurses and dietician to focus on more structured new patient teaching, increased pump-starts, and more ongoing support and teaching programmes.

P/080/WED

Exploring the health-related quality of life (HRQOL) experiences of children and adolescents with cystic fibrosis related diabetes (CFRD)

S. Barrett[1], S. Carpenter[2], M.R. Frank[1,3], A. Newcombe[1], M. Solomon[2,3] & L. Taylor[2,3]

[1]*SickKids Hospital, Endocrinology, Toronto, Canada,* [2]*SickKids Hospital, Respiratory Medicine, Toronto, Canada,* [3]*University of Toronto, Toronto, Canada*

Objectives: Due to the challenging medical management of children and adolescents with CFRD, collaborative clinics were initiated between CF and Diabetes interprofessional teams at a Tertiary Academic Health Sciences Centre. Prompted by this clinical practice and an existing gap in the literature, this pilot project aims to explore how the diagnosis and management of CFRD affects the HRQOL in this patient population. A descriptive exploratory design was employed to conduct this mixed methods study.

Methods: A convenience sample was utilized from an outpatient population known to study investigators. Nine youths were eligible to participate and eight consented to take part. The quantitative component of the study involved completion of validated generic and disease-specific HRQOL questionnaires. The qualitative component involved individual semi-structured interviews. Descriptive statistics were used to compare the participants' HRQOL scores to reported questionnaire norms. Qualitative content analysis identified overarching themes from transcribed interviews.

Results: In comparison to norms reported by the generic and disease-specific PedsQL (Varni et al., 2003) and CFQ-R (Modi & Quittner, 2003) questionnaires our sample had slightly lower HRQOL scores, however, a small sample size prevented the ability to determine statistical significance. The three major themes that emerged from participants' interviews were: I know what it means to live with CF; diabetes is a new blow; and I am learning to live with diabetes.

Conclusions: Being diagnosed with diabetes is a very distinct experience for this population and our sample did not view it as an extension of their CF condition. Children and adolescents with CFRD may have lower HRQOL than children who have Type 1 Diabetes or CF alone. Future research plans to explore such differences in comparison groups followed at the same centre.

P/081/WED

Telephonic patient support: the didi (elder sister) project

N. Agrawal[1], S. Kalra[2], B. Kalra[2] & S. Agrawal[1]

[1]*G R Medical College, Gwalior, India,* [2]*Bharti Hospital, Karnal, India*

This work reviews a telephonic support intervention for young people with diabetes at two diabetes OPDs in India. This intervention is for support, rather than education. Education is delivered on a regular basis during OPD visits. The study group of 34 children/youth (73.5% boys), age 5–25, were given the contact of a diabetes educator (DE), also called didi (sister) or bhaiya (brother). The DE called the patient weekly, and patients were encouraged to phone in case of need. The control was 20 children (60% girls), who refused to participate, citing lack of perceived efficacy, family opposition, or possible loss of confidentiality. Frequency of patient-initiated phone calls was 3.59 ± 1.98/month (range 1–8), and duration ranged from 1 minute to 1 hour. Topics discussed were dose adjustment, calorie counting, eating out, hypoglycaemia, stress related to academics, forthcoming marriage or finance, and over-the-counter remedies for common ailments. From 2008 September to 2010 January, no study patient had ketoacidosis/major infection. Controls experienced 8 (40%) admissions for ketoacidosis (1 gastroenteritis, 2 lung abscess). Frequency of OPD visits was statistically similar (study group: 6.35 ± 2.80, controls: 4.80 ± 1.55 visits annually).

27 (79.41%) subjects had HbA1c <8%, while only 6 (30.00%) controls were able to achieve this target. No study group patients, and 10 (50.00%) controls had HbA1c >10%. Mean WHO-5 score was 4.76 ± 0.48 in the study group, and 3.60 ± 0.52 in controls ($P < 0.05$) Communication with physicians was better in the study group (3.47 ± 0.80) than in controls. (2.3 ± 0.67) ($P < 0.05$). All three DEs involved experienced professional satisfaction, and wanted to continue the project. This highlights the gender disparity in acceptance of telephonic support in northern India. It reveals the improvement in HbA1c, quality of life, patient–physician communication, and reduced admission rate, that can be achieved with this support intervention.

P/082/WED

Coaching improves the metabolic control in teenagers with continuously high glycosylated hemoglobin – a pilot study

P.-E. Kofoed[1,2], J. Thomsen[2] & J. Ammentorp[1]

[1]*University of Southern Denmark, Unit of Health Services Research, Kolding, Denmark,* [2]*Kolding Hospital, Department of Paediatrics, Kolding, Denmark*

Objectives: In the paediatric diabetes clinics different strategies can help ensuring a good metabolic control in most patients. However, all members of diabetic teams have experienced, that for a minor group of teenagers with very high HbA1c levels all efforts are in vain. A different approach is therefore needed. We decided to perform a pilot study to examine whether personal coaching could improve the teenagers self-efficacy and their metabolic control.

Methods: Nine adolescents with continuously very high HbA1c values were offered ten personal coaching sessions by three highly qualified professional coaches with very little knowledge of diabetes. Following a five hour common introduction, the patients received individual coaching sessions each lasting approximately 1½ hours. HbA1c was routinely measured at all visits at the diabetes clinic which were separated from the coaching sessions. An interim analysis was made comparing the HbA1c values measured the previous year (HbA1c-1), just before inclusion (HBA1c-2) and approximately halfway through the sessions (HBA1c-3). Paired t-test was used.

Results: One patient had to postpone his last visit at the diabetes clinic, and as the last HbA1c thus was missing he was excluded from the analyses. No difference was found between HbA1c-1 and HbA1c-2 (mean HbA1c was 10.91% and 10.91%, respectively, $P = 1.00$), whereas HbA1c-3 was significantly lower than HbA1c-2 (mean HbA1c was 10.1% and 10.91%, respectively, $P = 0.0497$).

Conclusion: In spite of these teenagers having a good knowledge of diabetes they do not manage to obtain an acceptable metabolic control. Often these young patients have other problems or objectives in their lives not leaving space for managing the diabetes. The interim analysis of this pilot study indicates that personal coaching focusing on the problems of the patients helps them manage their diabetes. Whether this effect can be maintained is still not known.

P/083/WED

Education Program and Formal Training of Pediatric Diabetic Patients Using the Bolus Calculator with Continuous Subcutaneous Insulin Infusion (Paradigm 522 or 722, Medtronic Inc. and Accu-Check® Aviva Combo Meter, Roche)

L. Perrenoud[1], C. Bussien[1], M. Dirlewanger[2], G. Cimarelli[1], M. Castellsague-Perolini[1], V. Schwitzgebel[2]
[1]*Hôpitaux Universitaires de Genève, Direction des Soins, Genève, Switzerland,* [2]*Hôpitaux Universitaires de Genève, Unité d'Endocrinologie et Diabétologie Pédiatriques, Genève, Switzerland*

In our hospital the pumps have been used since 1993, today more than 60% of our pediatric patients are benefiting from this treatment. They are educated to use the Functional Insulin Therapy based on current blood glucose, target blood glucose, carbohydrate-to-insulin ratios, total grams of carbohydrate in meals and insulin sensitivity factors.

Objectives: Develop an education program and formal training to teach how to use the Bolus Calculator. Ensure that the insulin pump user's (according to their age) and their parents acquire the necessary skills to allow them to handle a bolus calculator correctly. Be sure that they program and adjust the treatment as accordingly.

Methods: Literature about the use of bolus calculator was studied, data gathered and analyzed. This review formed the basis of the program. We invited pump users, onset diabetes since at least 6 months, and their parents to an information meeting and we gave them the choice to participate to the program.

Results: The program lasted 6 hours, took place in the Outpatient Pediatrics' department. It has been designed to combine both the theoretical and the practical issues. It consisted of four key elements: evaluating and adapting the knowledge and practice of functional insulin therapy. Introduction of the Bolus calculator, practical skills and home training. Theoretical and practical skills in handling the Bolus calculator. Evaluation of theoretical and practical skills. Upon completion of the program, patients and parents were able to: handle a Bolus calculator, understand and control the bolus proposition, adjust the bolus proposed according to the physical activity and the illness and refuse the bolus proposed if there was a doubt.

Conclusions: The education program for the Bolus calculator has been developed and implemented so far for 12 insulin pump users' and their parents. The next step of the program will be the evaluation of the impact on metabolic control and the level of satisfaction of the user's of the Bolus calculator.

P/084/WED

Diabetes mellitus type 1: knowledge about insulin injection and glucose monitoring

E.B.C. Damiao[1], L.A. Kaneto[2], C.F. Antunes[2], M.S. Queiroz[3] & M. Nery[3]
[1]*University of Sao Paulo. School of Nursing, Departamento ENP, Sao Paulo, Brazil,* [2]*University of Sao Paulo. School of Nursing, Sao Paulo, Brazil,* [3]*University of Sao Paulo. School of Medicine, Diabetes Outpatient Clinic, Sao Paulo, Brazil*

This study aimed to verify the knowledge about insulin injection and glucose monitoring in children/adolescents with diabetes and their families. Study methodology was quantitative and descriptive. Data were collected through three questionnaires. Scores were assigned to the mixed and non-mixed insulin injection and to glucose monitoring. The absolute and percent frequencies were calculated. The score less than 50% was considered *insufficient*; between 50% and 69%, was middling, and more than 69% was sufficient. Results were achieved from the data collected of 24 children/adolescents, 13 (54%) girls. The majority (70.83%) were adolescents. Mean HbA1c was 10.35%. The *monitoring questionnaire* showed the following results: *insufficient*: 1 (4%); *middling*: 10 (42%) e *sufficient*: 13 (54%). The highest error occurred in the item 'lancet change': 3 patients (12.5%) single use; 9 (37.5%) once a day; 3 (12.5%) once a week, and 9 (37.5%) other frequencies. The *insulin injection questionnaire* pointed the scores: *insufficient*: 2 (8%); *middling* 9 (38%) and *sufficient* 13 (54%). The common errors for the children who mix insulin were 'not inject the air into bottles' (70%), and 'not rotate the sites' (70%). Otherwise, the children who do not mix the insulin has the following errors: ''not wash the hands'' before the procedure (57%); ''not swab with alcohol wipe the top of the insulin bottle'' (42.9%), and ''not inject the air into the bottle'' (42.9%). Conclusion was although most of the patients had sufficient scores for insulin injection and glucose monitoring, the frequency of errors is high, mainly in those children who have to mix insulin as part of their treatment. In spite of the small number of participants, the present study raised some very important issues that deserve further investigation and also can carry out educational program for the children with diabetes and their families, looking at the excellence in treatment for our patients.

Psychosocial I

P/085/FRI

Psychological state of the families with obese children

A. Solnceva[1] & M. Vishnevskaya[2]
[1]*Belarusian State Medical University, 1st Department of Children's Disease, Minsk, Belarus,* [2]*Belarusian State Medical University, Minsk, Belarus*

There are limited numbers of studies concerning family education as a risk factor for obesity in children. We aimed to examine the relationship between a children's weight and family/psychosocial factors, to establish gender differences in eating behavior in obese children.

Methods: This cross-sectional study involved 65 obese children (m/f = 33/32, mean age 13.5 ± 0.5 years) and 65 mothers. Obesity was defined as BMI scores at or above the 97th percentile for age and gender. Psychological examination was conducted by Eidemiller test of family education and IEG-Kind test. All the analyses were performed with the Statistics 6.0 software, P-value < 0.05 was accepting as statistically significant. ANOVA test was used for unpaired data.

Results: Significant gender differences (P < 0.05) were observed on the criteria: food remedy against the emotional stress, food as a problem; food restriction, fear of weight gain. In the girl's group at the early puberty stage were revealed a negative correlation with BMI criteria: power and dependency needs for food (r = −0.36); importance and influence of foods (r = −0.41); forcing parents (r = −0.45). In older age girls a correlation BMI and points of IEG-Kind were observed: food as a remedy against stress (r = 0.41); strength and the need for food (r = 0.38); dissatisfaction with their figures (r = 0.45) noted increased correlation BMI and coercion by parents (r = −0.78). Two tests correlation analysis found differences depending on the stage of pubertat stage: in early puberty marked by a strong relationship between parents and the child's body weight (r = 0.53), increased fear of its increasing (r = 0.56). Before pubertat group increased importance of food as a remedy against stress, excessive demands by the parents, satisfaction of requirements. Correlation between body's dissatisfaction and lack of child care parents were observed (r = 0.71).

Conclusions: Findings indicated on the sex and age differences regarding its own body, restriction of food in children with obesity.

P/086/FRI

Explaining treatment adherence by risk and health behaviors in adolescents with type1 diabetes; role of parent–child conflicts

J.A. Malik[1], A.M. Delamater[2] & H.M. Koot[1]
[1]*VU University, Developmental Psychology, Amsterdam, Netherlands,* [2]*University of Miami, Miller School of Medicine, Miami, USA*

Aims: This study aims to test risk and health behaviors and their associations with parent–child conflicts to explain treatment adherence. Following alternate scenarios were tested: (i) the mediating role of conflicts in the relation between risk and health behaviors and treatment adherence; (ii) the mediating role of risk and health behaviors in the relation between conflicts and treatment adherence.

Methods: The study included a total of 437 adolescents (54.8% girls; age range 11–19 year; mean ± S.D diabetes duration 6.13 ± 3.78 years). Adolescents and their family members completed questionnaires. The model was constructed based on the study hypotheses and was tested using Mplus version 5.1.

Results: Controlling for the effects of age, gender, diabetes duration, and SES, generic risk behaviors predicted parent–child conflicts (β = 0.31, P = 0.05), conflicts predicted diabetes-specific risk behaviors (β = 0.34, P = 0.01) which in turn predicted treatment adherence (β = −0.42, P = 0.01), whereas health behaviors independently predicted adherence (β = 0.44, P = 0.01). The model explained a total of 47% of the variance in treatment adherence. The model was verified by a parent-reported measure of conflict as well by a dyadic measure of agreement and disagreement on parent–child conflicts.

Conclusion: Parent–child conflicts mediate the effect of generic risk behaviors on treatment adherence, whereas diabetes-specific risk behaviors mediate the effect of parents–child conflicts on treatment adherence.

P/087/FRI

The PedsQL in type 1 diabetes: reliability and validity of the pediatric quality of life inventory generic core scales and type 1 diabetes module

P. Sand[1], M. Kljajic[2] & G. Forsander[1]
[1]*The Institute of Clinical Sciences at the Sahlgrenska Academy, University of Gothenburg, The Queen Silvia Children's Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden,* [2]*The Department of Psychology, University of Gothenburg, Gothenburg, Sweden*

Background: It is well known that psychosocial factors among children and adolescents with type 1 diabetes have significance for the diabetes management. Quality of Life is considered being an important factor to measure since it often correlates with children's and adolescents' perception of having diabetes, diabetes-related conflicts within the family, depression and glycemic control.

Objectives: The PedsQL 4.0 Generic Core Scales are child self-report and parent proxy-report scales developed by professor James Varni. The generic core measure is to be integrated with the PedsQL disease-specific modules. The PedsQL 4.0 Generic

Core Scales, Swedish version, has been standardized by Petersen (2008). Cronbach's alfa showed satisfactory values. The PedsQL 3.0 Type 1 Diabetes Module was designed to measure diabetes-specific HRQOL in children aged 2–18 years. The overall aim of the study has been to determine the reliability and accomplish a limited validation of the PedsQL 3.0 Diabetes Module, Swedish version.

Methods: Hundred and thirty families from four diabetes centres accepted to participate. The Diabetes Module was administered to 108 children with type 1 diabetes and 130 parents.

Results: Internal consistency reliability for the Diabetes Module scales (average alpha = 0.90 child, 0.91 parent-report) was acceptable for group comparisons. The parents in our study experienced that their children had lower diabetes related Quality of Life compared to the children themselves, $P < 0.01$. The parents also experienced that their children were more anxious and having more difficulties following diabetes treatment compared to the children themselves, $P < 0.01$. The girls (females) in the study experienced their psychological functioning and adherence lower compared to the boys (males), $P < 0.05$.

Conclusions: The overall impression was that both the Generic Core Scale and the Diabetes Module showed high alpha figures. PedsQl is a valuable tool for measuring QoL in pediatric diabetes families.

P/088/FRI

Health-related quality of life and metabolic control in children with type 1 diabetes mellitus

H. Tahirovic[1], A. Toromanovic[2] & E. Tahirovic[3]
[1]*University Clinical Center Tuzla, Department for Research and Education, Tuzla, Bosnia and Herzegovina,* [2]*University Clinical Center Tuzla, Department of Pediatrics, Tuzla, Bosnia and Herzegovina,* [3]*Clinical Center University of Sarajevo, Heart Center Sarajevo, Sarajevo, Bosnia and Herzegovina*

Objective: To evaluate health-related quality of life (HRQOL) in children with type 1 diabetes mellitus (DM) in relation to metabolic control.

Methods: The cross-sectional study included 65 children with type 1 DM (aged 5–18 years) and their parents cared for in pediatric diabetes clinic at University Clinical Center Tuzla. The children were invited to participate if they had been diagnosed with diabetes at least 6 months before the study (median diabetes duration 3.8 years). HRQOL was evaluated by the PedsQL 3.0 Diabetes Module. The children were assigned to one of two groups according to metabolic control. Metabolic control was assessed by a single HbA_1c at the time of the visit.

Results: Children with lower HbA1c reported that their HRQOL on several domains was better than that of children with poor metabolic control.

By self-report, children with better metabolic control reported that they had statistically significant better HRQOL scores for the diabetes symptoms, treatment barriers, treatment adherence and worry subscales in comparison to the children with worse metabolic control. Also, by parent proxy-report, children with lower HbA1c differ significantly in the same diabetes related subscales from children who have poor metabolic control. The only exception is the communication subscale of the child and parents report where there is no difference between the groups.

Conclusions: In our study, children with better metabolic control report better QOL. Therefore, assessment of these factors is important in developing therapeutic strategies for children with type 1 diabetes.

P/089/FRI

Preference and ease of use of NovoTwist® versus conventional screw-thread needles among children and adolescents with diabetes

S.K. Lilleøre[1] & G. Ter-Borch[2]
[1]*Novo Nordisk A/S, Global Medical Affairs, Virum, Denmark,* [2]*Novo Nordisk A/S, Clincal Operations, Modern Insulin and Devices, Søeborg, Denmark*

Objective: To investigate the preference and usability of the novel NovoTwist® insulin pen needle versus conventional screw-thread needles, when used with FlexPen®, in children and adolescents with diabetes.

Methods: This open-label, randomized, crossover study enrolled children (aged 6–12 years; n = 15) and adolescents (aged 13–17 years; n = 15) with diabetes who were self-injecting with an insulin pen. After instruction, participants attached the needle to FlexPen®, made an injection into a foam cushion and detached the needle – this process was repeated three times with both NovoTwist® and the participant's current screw-thread needle (or NovoFine® needle) in a random order. Responses to questions on user experience with each needle were recorded on a 6-point scale (1 = very difficult; 6 = very easy). Parents of children who required assistance when injecting rated the likelihood of allowing their children to attach NovoTwist® on a scale of 1 ''unlikely'' to 6 ''very likely''.

Results: A significantly higher proportion of children and adolescents (77%) indicated overall preference for NovoTwist® versus screw-thread needles ($p = 0.005$). NovoTwist® was preferred by most children and adolescents for overall ease of use (77%), ease of needle attachment (87%) and detachment (83%), and appropriateness for daily injections (73%; $p < 0.05$ for all). Most parents of children (7/8) who required assistance stated that they would be ''very likely'' to allow their child to attach NovoTwist®. Most children and adolescents (60%) rated NovoTwist® as the ''safest needle to handle''.

Conclusion: Most children and adolescents with diabetes preferred NovoTwist® to conventional screw-thread needles. NovoTwist® was rated as easier to use, easier to attach/detach, safer to handle and more appropriate for daily injections, by most children and adolescents with diabetes. These factors may promote confidence and trust in this needle, and thus in self-injecting, among younger patients and their parents.

P/090/FRI

DAWN youth survey: family and community support for diabetes in India

A.K. Jhingan[1], D.G. Dalal[2], S. Kalra[3], R. Shetty[4], V. Garg[4] & A. Juneja[5]
[1]*Delhi Diabetes Research Centre, New Delhi, India,* [2]*Dalal Clinic, Mumbai, India,* [3]*Bharti Hospital, Endocrinology, Karnal, India,* [4]*Novo Nordisk, Medical, Bangalore, India,* [5]*Wockhardt Hospitals, Endocrinology, Mumbai, India*

Aims: The DAWN (Diabetes Attitudes, Wishes and Needs) Youth survey assesses the challenges and issues faced by young people living with diabetes, their families & others who support them.

Methods: The present study reports the findings from 11 Indian centers in a survey of young people (n = 172) with diabetes aged 18–25 years. The survey comprised of 21 questions including five India specific questions (e.g. influence of diabetes on social life like marriage and career prospects) & was filled at DAWN Youth camps & clinics by 98 (56%) male and 74 (44%) female youth with type 1 and 2 diabetes.

Results: Many patients felt they were not successful in following parameters of diabetes management: coping with diabetes

(47.67%), control of blood sugar (40.61%), blood sugar monitoring (42.44%) & management of high and low blood sugars (46.51%). The survey reports that most youth (69.80%) discuss their feelings with parents whenever they feel frustrated or unhappy about living with diabetes. Other members whom they can interact with comfortably are their diabetes doctor (34.90%), GP/Family doctor (25%), siblings (26.70%) & friends (25.60%). Patients find parents (82.60%) very supportive of their condition while siblings (47.09%), friends (25.58%) & spouse (20.35%) constitute other supportive members. Interestingly, India specific questions revealed that 55.80% of respondents perceive diabetes as a major/moderate financial burden on family/guardians. 47.10% youth agree that their financial situation limit their ability to tackle diabetes.

Conclusions: Our results confirm that young Indians with diabetes, like their peers worldwide, struggle with diabetes management. The survey highlights the strong influence that family and community exerts in diabetes care in our country. Hence, family & community should be involved in the routine management of diabetes.

P/091/FRI

Exploring the risk factors for eating disturbances in young people with type 1 diabetes (T1D): dysfunctional perfectionism, parental eating disturbances and parental criticism

E.L. Smith[1], S. Coker[1], C. Wilson[1], I. Hobbis[1], V. Datta[2] & C.L. Acerini[3]
[1]*University of East Anglia, Norwich, UK,* [2]*Norfolk & Norwich University Hospital, Norwich, UK,* [3]*University of Cambridge, Department of Paediatrics, Cambridge, UK*

Objectives: Young people with T1D are at an increased risk for developing eating disturbances compared to the general population. Models of eating disorder psychopathology suggest that both individual and familial factors are important. This study explores eating disturbances and glycaemic control in adolescents with T1D and their associations with dysfunctional perfectionism (DP), parental eating disturbances and parental criticism.

Method: Fifty adolescents with T1D aged 14–16 and their primary care giver were investigated. Eating disturbances in adolescents were assessed using a semi-structured interview (cEDE) adapted for T1D and HbA1c levels were obtained as a measure of glycaemic control. Adolescents' ratings of DP were assessed using two subscales from the MPS questionnaire and primary caregivers completed an eating disorder measure (EDE-Q). Five-Minute Speech Samples were used to measure frequencies of critical (CC) and positive comments (PC) made by parents about their child.

Results: Eating disturbances in adolescents with T1D were associated with poorer glycaemic control. DP was positively correlated with dietary restraint and heightened weight concerns but not with glycaemic control. Associations were found between adolescents' weight concerns and parents' shape and weight concerns, the latter of which remained significant after controlling for both adolescent and parent BMI. Frequencies of CCs made by parents were not related to either eating disturbances or glycaemic control in their children. However, lower frequencies of PCs were related to poorer glucose control.

Conclusions: This exploratory investigation lends support for DP as an associated risk factor for weight concerns in adolescents with T1D. Although the findings in regard to parental criticism are less clear, the associations found between parent and child eating disturbances require further research to investigate the possibility of a modelling pathway underlying these relationships.

P/092/FRI

Psychological and medical characteristics associated with disordered eating in Australian adolescents with type 1 diabetes

H. d'Emden[1], L. Holden[2], B. McDermott[3], M. Harris[1], K. Gibbons[4], Y. Liu[4], A. Gledhill[1], T. Sadler[3] & A. Cotterill[1]
[1]*Mater Health Services, Queensland Diabetes Centre, Brisbane, Australia,* [2]*Griffith University, School of Medicine, Brisbane, Australia,* [3]*Mater Health Services, Kids in Mind Research, Brisbane, Australia,* [4]*Mater Health Services, Mater Research Support Centre, Brisbane, Australia*

Objective: This study describes the association between psychological and medical characteristics and disordered eating behavior and cognitions in Australian adolescents with type 1 diabetes.

Method: In this cross-sectional descriptive study, adolescents aged 13–18 years attending the diabetes outpatient clinic were invited to complete three self-administered questionnaires, the Eating Disorder Inventory 3 Risk Composite (EDI-3 RC), the Youth Eating Disorder Examination Questionnaire (YEDE-Q) and Strengths and Difficulties Questionnaire (SDQ). Frequencies and nonparametric correlation tests were used to analyse the results.

Results: Participation rate was 92% (130/141) and 88% (124/130) provided useable data. Average age of participants was 14.9 years (SD 1.53) and 53.2% were female. Disturbed eating behaviors were prevalent (33.1%), and twice as common in females. Higher BMI and being female were significantly correlated with all scores on the EDI-3RC and YEDEQ ($P \leq 0.04$). HbA1c was positively correlated with the EDI-3RC Score and subscales ($P \leq 0.02$) but the relationship with the YEDEQ scores did not reach significance. There was no correlation with insulin regimen or age, except age and YEDEQ shape concern ($P = 0.03$). Trends were seen with duration of diabetes in both eating disorder screening tools, although only the EDI-3 RC, EDI-3 Bulimia and YEDEQ Shape Concern scale showed significance. Emotional and behavioral concerns (SDQ) were significantly correlated with all scores on the EDI-3RC and YEDEQ ($P \leq 0.04$). Multivariate analysis is to be conducted.

Conclusion: Disturbed eating behaviors were prevalent and often associated with unsatisfactory diabetes control and more pervasive psychological problems. Although these findings need to be confirmed, this combination of negative factors makes identifying youth with disturbed eating behaviors a high priority in adolescent type 1 diabetes management.

P/093/FRI

Dietary Behaviour of Adolescents with Type 1 Diabetes

L. Buysens & H. Dorchy
University Children's Hospital Queen Fabiola, Diabetology Clinic, Brussels, Belgium

Objective: The aim of this study was to measure the daily nutrient intake of diabetic adolescents educated in the same way by the same team.

Methods: The study included 63 type 1 diabetic patients (12–18 years old), 32 girls and 31 boys. The mean diabetes duration was 6.5 years. An intensive dietary education was provided at diabetes onset. The dietary enquiry was collected by anamnesis with support of a picture book. The results were compared with national guidelines.

Results: The average protein (16.5% of total daily energy intake) and fat (36.5%) intakes were too high. The animal-to-vegetable protein ratio (1.9) stood above the upper limits (i.e. 1). The polyunsaturated fat intake (4%) was insufficient, the saturated fat (13%) intake was too high, while the monounsaturated fat (13%) corresponded to the recommended amounts. Complex carbohydrate intake was too low (31%), while simple carbohydrate intake too high (14%). The mean fibre consumption was 16 g/day, i.e. 45.7% below the recommended level. Sodium, potassium and phosphorus intakes were largely higher than the recommendations, while calcium and magnesium intakes were too low. Iron intake corresponded to the recommendations. For vitamins, only vitamin D intake was insufficient.
Conclusions: The Belgian diabetic adolescents do not reach present dietary recommendations.

P/094/FRI

The Malay version of revised summary of diabetes self-care activities (SDSCA) is reliable and valid for use in Malaysian children

M.Y. Jalaludin[1], F. Zain[2], M.H. Mohd Hussain[1], J.Y.H. Hong[2], Z. Hussein[3], F. Ismail[4], A. Bujang[5] & J. Haniff[5]
[1]*University of Malaya, Department of Paediatrics, Kuala Lumpur, Malaysia,* [2]*Putrajaya Hospital, Paediatrics, Putrajaya, Malaysia,* [3]*Putrajaya Hospital, Medicine, Putrajaya, Malaysia,* [4]*Selayang Hospital, Paediatrics, Selayang, Malaysia,* [5]*Kuala Lumpur Hospital, Clinical Research Centre, Kuala Lumpur, Malaysia*

Introduction: Self-care plays an important role in diabetes management. One of the tools used to evaluate self-care in diabetic patients is the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire in English version. A validated instrument in Malay language is needed to assess self-care practice among diabetic patients in Malaysia.
Objective: To translate the revised version of SDSCA questionnaire into Malay language and evaluate its reliability and validity.
Methodology: Translation and back-translation were used. An expert panel reviewed the translated version for conceptual and content equivalence. The final version was then administered to paediatric patients with diabetes mellitus from Ministry of Health and university hospitals between August 2006 and September 2007. Reliability was analysed using Cronbach's alpha while validity was confirmed using construct validity.
Result: A total of 117 patients (92 T1DM) aged 10–18 years were enrolled from eight hospitals. Both male and female gender was equally represented and the ethnic composition closely resembled that of Malaysian population. The reliability of overall core items was 0.735 while the reliabilities of the four domains were in the range of 0.539–0.838. Core item number four was found to be a problematic item, and as such was substituted with item 5A (from the expanded version) to suit local dietary education and practice. Following that, the reliabilities of overall core item and the four domains improved to 0.782 and 0.620–0.838 respectively. When the ten core items of the Malay version were loaded into the four domains i.e. diet (items 1, 2, 3, 5A), exercise (items 5, 6), blood sugar testing (items 7, 8) and foot care (items 9, 10), the factor loadings were higher than 0.4 and accounted for the total variances explained of 73%.
Conclusion: The Malay translated version of revised SDSCA is reliable and valid, and can be used in Malaysian children with diabetes.

P/095/FRI

Self-care in children with type 1 diabetes: clarification and development of a self-evaluation tool

J. Pélicand[1,2], D. Charlier[1] & I. Aujoulat[1]
[1]*Université Catholique de Louvain, Institut Research Health and Society (IRSS), Bruxelles, Belgium,* [2]*Hopital Necker – Enfants Malades, Paris, France*

The aim of health promotion is to enable people to be the actors of their own health. In the context of type 1 diabetes, patient education contributes to the health promotion of people, because it enables children and parents to manage the disease and treatment, for a daily basis and within the family, with the collaboration of health professionals. To take care of oneself by oneself contributes to enhancing the quality of life. Our study aimed to clarify and operationalize the concept of self-care in children and adolescents with type 1 diabetes, in the view of developing a self-evaluation tool determining the level of self-care in children and adolescents. Two methodologies were used: (i) a review of the literature (1999–2009) which included 26 articles about self-care in children with type 1 diabetes; and (ii) in-depth interviews with children and adolescents (15) and their parents (17). The interviews were transcribed verbatim and thematic content analysis was applied. From the result, the concept of self-care was operationalized in 3 dimensions: (i) To take care of one's psychosocial life; (ii) to take care of one's health and (iii) to take care of one's diabetes. Some specific behaviors were identified in each dimension. Moreover, in the three dimensions, specific interactions between the child, the parents and the health professionals were identified as contributing to the child's empowerment to self-care. Our results enabled us to develop a self-evaluation tool to assess (both quantitatively and qualitatively) the level of self-care. Our tool is adapted from SeiQoL (O'Boyle et al, 1992). It is currently in the process of validation. We will present and discuss the use of our tool during the medical and educational follow-up of the children and their families.

Psychosocial II

P/096/WED

Association of family structure and nationality with processes and outcomes of care of children and adolescents with type 1 diabetes in Belgium

K. Doggen[1], N. Debacker[1], V. Van Casteren[1] & IQECAD Scientific Steering Committee
[1]*Scientific Institute of Public Health, Public Health and Surveillance, Brussels, Belgium*

Objective: To investigate the association of family structure and parents' nationality with the processes and outcomes of care of type 1 diabetic children and adolescents.
Methods: Demographic and clinical data of type 1 diabetic patients (<19 years, n = 974, 44% of total population), treated by all Belgian pediatric diabetes centres, were collected retrospectively. Family structure was defined as: both biological parents vs. single-parent or blended family; parents' nationality was Belgian or non-Belgian.
Results: Patients had mean ± SE age of 12.2 ± 0.1 years, diabetes duration of 5.0 ± 0.1 years and 53% were boys. Seventy-seven percent of patients lived with both biological parents and 78% had at least one Belgian parent, with large variability among centres (range 46–97%).
After adjustment for centre differences, neither family structure, nor parents' nationality were associated with variations in delivery of care (routine follow-up measures, screenings, number of visits).
Patients from single-parent or blended families were older (12.7 ± 0.2 vs. 11.9 ± 0.2 years, $P < 0.01$), tended to have longer diabetes duration (5.4 ± 0.3 vs. 4.9 ± 0.1 years, $P = 0.08$) and received a higher insulin dose (1.01 ± 0.02 vs. 0.94 ± 0.01 IU/kg/day, $P < 0.05$). These patients had significantly higher HbA1c (8.1 ± 0.1 vs. 7.7 ± 0.1%, $P < 0.01$, not centrally measured), even after adjusting for age, duration and dose. This group also had more admissions for ketoacidosis (7 vs. 3 per 100 patient-years, $P < 0.05$), while hypoglycemia rates (loss of consciousness, convulsions, or parenteral treatment) were similar (30 vs. 28 per 100 patient-years, $P > 0.05$). By contrast, parents' nationality was not associated with any of these outcomes.
Conclusions: This cross-sectional study shows that Belgian type 1 diabetic children and adolescents from single-parent or blended families had poorer outcomes, despite similar care. Parents' nationality *per se* was not associated with outcomes, indicating that related aspects, such as language problems, might be more important.

P/097/WED

The efficacy of a group therapy program for adolescents with elevated Ha1c levels: maintenance of improvements in glycemic control at 1-year follow-up

L.A. Kaminsky & M.N. Watts
Alberta Children's Hospital, Diabetes Clinic, Calgary, Canada

This study evaluates the efficacy of an 8 week group therapy program for adolescents with elevated Ha1c levels and maintenance of improvements in glycemic control one year following group participation. Thirty-one adolescents (16 males and 14 females) 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 = 3.5) and had a mean Ha1c level of 11.05 (SD = 1.58) prior to their attendance in the group. Adolescent's self-reports regarding, self-efficacy, quality of life, family support and symptoms of depression were collected prior to their participation in the group, at the end of eight weekly group sessions and at two months follow-up. Ha1c levels were obtained prior to group participation, 2–3 months following participation and 1 year following completion of the group program. Results indicated that adolescents' self-efficacy regarding their diabetes care increased from pre-group to the end of the group sessions [$t(29) = -4.33$, $P < 0.001$]. Participants had a significant decrease in HA1c levels from pre-group to follow-up 2–3 months after the end of the group sessions [$t(28) = 2.42$, $P = 0.022$]. Adolescents improvements were maintained at 1 year follow-up with teens continuing to have a significantly lowered HA1c levels at 1 year post-group compared to Ha1c levels prior to group participation [$t(18) = 2.70$, $P = 0.016$]. One year follow-up data will be available for the full sample by the date of the presentation.

P/098/WED

Differences in personal resources between insulin pump users and multiple daily injection (MDI) users: a pilot study in adolescents with type 1 diabetes

J.P. Yi-Frazier[1,2], E. Alving[3], K. Farquharson[2], E.J.B. Buscaino[2], S.L. Semana[2], M. Yaptangco[2], R.C. Bittner[2] & C. Pihoker[1,2]
[1]*University of Washington, Pediatrics, Seattle, USA,* [2]*Seattle Children's Research Institute, Center for Clinical and Translational Research, Seattle, USA,* [3]*Seattle Children's Hospital, Endocrinology, Seattle, USA*

Objectives: Much has been written about the benefits of insulin pumps in adolescents with diabetes in terms of glycemic control (Paris et al., 2009), quality of life (Pouwer & Hermanns, 2009), and parental anxiety (Muller-Godeffroy et al, 2009). However, little is known about the personal and psychosocial resources that may be associated with insulin regimen. This pilot study explored the association between insulin regimen and personal resources in adolescents with type 1 diabetes (T1D).
Methods: Fifty adolescents with T1D completed measures of optimism, self-mastery, self-esteem, self-efficacy, trait anger, depression, coping, and quality of life; parents completed a survey of parental anxiety. Clinical measures including HbA1c and insulin regimen were collected by medical record review.
Results: Mean age was 15.6 ± 1.7 years, mean diabetes duration = 5.8 ± 3.6 years, 50% were female, 61% reported household income ≥$75K, 78% had commercial insurance, 56% (n = 28) used the insulin pump and 44% (n = 22) used MDI. Pump users had lower HbA1c and higher quality of life (P's < 0.05), and lower parental anxiety among caregivers ($P < 0.01$). Multivariable linear regression models controlling for age, sex, duration, and insurance status found pump users reported lower trait anger ($P < 0.05$), lower depression ($P < 0.01$), higher self-esteem ($P < 0.05$) and higher optimism ($P = 0.06$). There were no differences in coping, self-mastery, or self-efficacy.
Conclusions: Our results confirm those of previous studies showing insulin pump users have more optimal HbA1c, quality of life, and parental anxiety than MDI users. We also found that key personal resources differ between the groups. Because many clinics have selection criteria for transitioning patients from MDI to the insulin pump, differences in personal resources may be important considerations. Psychosocial

interventions to bolster personal resources may be an important step in preparing a patient for the insulin pump.

P/099/WED

Capillary glucose monitoring in type 1 diabetes mellitus with children and adolescent does it effect metabolic control?

G. Demir[1], D. Gökşen[1], G. Asar[1], Ö. Korkmaz[1] & S. Darcan[1]
[1]*Ege University, Pediatric Endocrinology and Metabolism, Izmir, Turkey*

Objectives: To assess the impact of capillary blood glucose monitoring (CBGM) on metabolic control and to investigate the relationship between parental behaviors and CBGM and glycemic control in type 1 diabetes mellitus (DM).
Methods: In a cross sectional study 100 (52 male 48 female, aged 2.5–22 years) type 1 diabetic patients followed up for at least one year were included. Patients and the families completed a questionnaire about frequency of home blood glucose monitoring, living quarters and educational status. All of the glucometers were uploaded and the distributions of hypo and hyperglycemia were determined.
Results: Number of CBG negatively correlated with age ($P = 0{,}007$, $r = -0.26$) and duration (5.0 ± 3.5 years) of diabetes ($P = 0.04$, $r = -0.21$). 15% of the patients living in the city center and 26% of the patients living in the village had hypoglycaemia ($P = 0.01$). CBGM, distribution of hypo and hyperglycemia was not different between patients who checked blood glucose themselves or who checked with a parent. HbA1c values were significantly different in patients who measured blood glucose with their mothers' than fathers' ($P = 0.01$). As CBGM increased HbA1c decreased ($P = 0.02$, $r = -031$). 66% of the patients were on intensive insulin therapy and 34% were on CSII. CBGM, HbA1c and distribution of hypo and hyperglycemia according to insulin therapy is given in the table 1. When adjusted for CBGM, HbA1c is insignificant between the two groups ($P = 0.6$).
Conclusions: Young age and diabetes duration were predictors of more frequent sampling, seldom CBGM deteriorated metabolic control. Metabolic control is better in CSII therapy because of frequent sampling.
[Table1]

	n	Duration (years)	Age (years 9)	HbA1c (%)	CBG (n/3 month)	CBG <80 mg/dl (%)	CBG >161 mg/dl (%)	CBG 81–160 mg/dl (%)
Intensive insulin therapy	66	4.4 ± 3.3	13.4 ± 4.5	7.6 ± 1.3	182.7 ± 118.4	42.3 ± 18.3	17.4 ± 8.7	35.5 ± 16.8
CSII therapy	34	6.2 ± 3.8	13.2 ± 4.9	6.9 ± 0.9	247.5 ± 92.8	38.2 ± 14.9	16.8 ± 10.6	42.0 ± 18.1
p		0.007	0.9	0.006	0.008	0.24	0.67	0.06

P/100/WED

Parent-reported health-related quality of life in children with diabetes: validity and reliability of the Spanish KINDL-r questionnaire

M. Beléndez[1] & M.C. Marín[2]
[1]*University of Alicante, Department of Communication and Social Psychology, Alicante, Spain,* [2]*Fundación para la Diabetes, Madrid, Spain*

Objectives: The KINDL-R questionnaire consists of 24 items which are grouped into six subscales: physical well-being, emotional well-being, self-esteem, family, friends and school functioning with and additional disease-specific subscale (six items). A proxy KINDL-R version is available for parents. The aim of this work was to test the reliability and validity of the Spanish KINDL-R questionnaire among parents of children and adolescents with diabetes.
Methods: Data were collected from 168 parents (103 mothers and 65 fathers) of children and adolescents with type 1 diabetes. Parents completed the Spanish version of the KINDL-R questionnaire (Rajmil et al., 2004), the WHO-Well Being Index, the Coping Strategies for Diabetes Care questionnaire (Beléndez et al., 2009) and a treatment adherence scale (Mora et al., 2004).
Results: Reliability values (Cronbach's alpha) for the KINDL-R questionnaire sub-scales were acceptable. Regarding concurrent validity, more positive parents' report of their child's quality of life (24 items-total score) was associated with less frequent use of expressing negative emotions (mothers, $r = -0.39$, $P < 0.001$; fathers, $r = -0.25$, $P < 0.05$), adherence (mothers, $r = 0.43$; fathers, $r = 0.39$, $P < 0.001$) and higher levels of well-being (mothers, $r = 0.35$; fathers, $r = 0.45$, $P < 0.001$). A similar pattern of correlations was found between KINDL-R scores (diabetes module) with well-being index (mothers, $r = 0.29$, $P < 0.01$; fathers, $r = 0.57$, $P < 0.001$), adherence (mothers, $r = 0.36$; fathers, $r = 0.45$, $P < 0.001$) and coping scores (mothers, $r = -0.37$, $P < 0.001$).
Conclusions: Findings showed support for the reliability and validity of the Spanish KINDL-R questionnaire (parent version) for using in research and clinical settings.

P/101/WED

Growing up with type 1 diabetes: exploring the specific factors which impact on the perceived quality of life in different age groups

J. Pélicand[1,2] & M. Cahané[2]
[1]*Université Catholique de Louvain, Institut Research Health and Société, Bruxelles, Belgium,* [2]*Aide aux Jeunes Diabétiques (AJD), Paris, France*

Therapeutic education is an important part of the long-term follow-up of children and adolescents with type 1 diabetes. Identifying the specific factors and life situations which impact most on the children's perceived quality of life (QoL) is an important step toward defining appropriate educational objectives in the medical relationship. Our study aims to explore to what extent the perceived QoL in paediatric patients is influenced by factors that are specific to different age-groups.1080 children aged 5–18 years who attended 24 diabetes summer camps in France in 2004 were asked to rate their perceived QoL, as either good, bad, or neither good nor bad. The children were presented with a simplified tool of three faces (smiling, hostile or neutral) which has been found to correlate well with the results of PedQoL in another study (Robert, personal communication, 2010). The young patients were consequently asked to explain the reasons for their choice. Methods of content analysis were used to analyse the results, both qualitatively and quantitatively, according to different age-groups (5–8, 9–12, 13–15, 16–18 years). The emotional and glycaemic stability correlated significantly with the perceived QoL independently of the respondents' age ($P < 0.01$). The age-specific factors are presented hereafter: In children aged 5 to 8 ($n = 58$), the perceived QoL correlated most with the constraints of treatment and the level of personal decision (NS). In the 9–12 years ($n = 523$), the most important factor was the level of personal decision ($P < 0.01$), while, in the13–15 years ($n = 377$), it was the level of satisfaction in pursuing hobbies and meaningful activities ($P < 0.01$). In the 16–18 years ($n = 122$), the quality of friendships was the most important factor ($P < 0.01$). Our results offer us a better understanding of age-specific factors which impact on the perceived QoL of paediatric patients with type 1 diabetes. We will discuss the implications of our results for the practice of patient education.

P/102/WED

Effects of mental health, family environment and diabetes age-of-onset on adrenal response to psychosocial stress in adolescents with type 1 diabetes mellitus

D.J. Korczak[1,2], S. Madigan[1], K. Manassis[1,2] & D. Daneman[2,3]
[1]*The Hospital for Sick Children, Psychiatry, Toronto, Canada,* [2]*The University of Toronto, Toronto, Canada,* [3]*The Hospital for Sick Children, Pediatrics, Toronto, Canada*

Objectives: To investigate the relationships between cortisol responsivity to stress and
(1) diabetes-specific factors
(2) depression and anxiety symptoms and
(3) family functioning, in a pilot sample of adolescents with type 1 diabetes mellitus (T1DM).
Method: Seventeen adolescents (mean age = 15.6 years) with T1DM were exposed to the trier social stress test for children. Salivary cortisol was sampled at baseline and at six 10-minute intervals following the stress procedure. Participants completed interviewer-administered and self-report measures of depression, anxiety and family functioning. Multiple regression analyses were conducted to determine predictors of cortisol stress response and diabetes control (HbA1c). Stress response was examined by computing area under the curve (AUC).
Results: Female subjects with early age of diabetes onset and increased years of diabetes demonstrated a blunted cortisol stress response compared with subjects with later age at diabetes onset and fewer years of diabetes [$F(3.13) = 3.50$, $P < 0.05$] and [$F(3.13) = 3.49$, $P < 0.05$], respectively. Depressive symptoms and increased family dysfunction were the strongest independent predictors of cortisol stress response [$F(3.13) = 4.88$, $P < 0.02$]. Increased anxiety symptoms and increased family dysfunction were the strongest independent predictors of diabetes control [$F(3.13) = 5.19$, $P < 0.01$].
Conclusions: This study suggests that a relationship between cortisol reactivity, diabetes control and depression/anxiety exists. Psychological symptoms and family dysfunction influence both HPA-axis functioning and diabetes control. Diabetes diagnosis at a young age may predispose girls to increased anxiety and cortisol dysregulation in response to stress.

P/103/WED

Insulin *plus* education in type 1 diabetes children in India: transforming helpless *insulin beggars* to productive and self supporting citizens of the nation???

S. Geetha Rao[1], P. Krishnamurthy[1], U. Rangaraj[1], B. Naik[1], T. Deepak[1], A. Sharda[1] & S. Srikanta[1], Samatvam Endocrinology Diabetes Center – Diabetes Collaborative Study Group
[1]*Jnana Sanjeevini Medical Center, Diabetes Nursing Education Research, Bangalore, India*

Since 1994, Samatvam Trust, has tried to support 600 plus children through the charity ''Project DISHA'' and ''Insulin Lifeline'' Program (Karnataka State total population 53 million) – FREE Childhood Diabetes Clinic, FREE insulin and syringes, health education counseling, health recreation camps etc. Despite our best efforts, due to several factors [e.g. SHBGM unavailable till recently; HbA1c unaffordable; TSH measured only on strong clinical suspicion; non-existent governmental programs; inconsistent public philanthropy], the overall health care was substandard. In 2008, a self-audit of our program, painfully questioned the justification of ''prolonging the misery of these children, just to let them succumb helplessly few years later'': PSEUDOALTRUISM OR REAL JUSTICE? Adding the second focus of formal EDUCATION, along with INSULIN, appeared to be the only solution. Thus, funded by the same anonymous insulin donor, Project DISHA has now started providing full support [financial, counseling, monitoring] towards school and college education. Employment placement services through good samaritans [including employers themselves having type 1 diabetes] are being facilitated [special emphasis on the girl child]. In several independent surveys on their professional aspirations, these children have reconfirmed the following rank order: ''doctor'' = 80%; ''diabetes doctor'' = 2%; ''diabetes scientist'' = 1%; ''nurse/ health care'' = 2%; ''police, military, law, administration'' = 5%, ''artist, sports, music'' = 2%; others. Provision of FREE insulin alone [beggars for life] will not adequately improve the long term lives and well being of children and youth with type 1 diabetes. Combined with good quality education, the ''Insulin Lifeline'' program can transform, the thus far marginalized youngsters, into productive, self supporting and proud citizens of the nation.

P/104/WED

Reliability and validity of the Malay translated version of diabetes quality of life (DQoL) questionnaire

M.Y. Jalaludin[1], F. Md. Zain[2], M.H. Mohd Hussain[1], J.Y.H. Hong[2], Z. Hussein[3], F. Ismail[4], A. Bujang[5] & J. Haniff[5]
[1]*University of Malaya, Department of Paediatrics, Kuala Lumpur, Malaysia,* [2]*Putrajaya Hospital, Paediatrics, Putrajaya, Malaysia,* [3]*Putrajaya Hospital, Medicine, Putrajaya, Malaysia,* [4]*Selayang Hospital, Paediatrics, Selayang, Malaysia,* [5]*Kuala Lumpur Hospital, Clinical Research Centre, Kuala Lumpur, Malaysia*

Introduction: Many studies reported poorer quality of life (QoL) in patients with diabetes. One of the tools used is the Diabetes Quality of Life (DQoL) questionnaire in English language. A validated instrument in Malay language is highly needed to assess patient's perception of QoL in Malaysia.
Objective: To translate the DQoL questionnaire into Malay language and to determine its reliability and validity.
Methodology: Translation and back-translation were used. An expert panel reviewed the translated version for conceptual and content equivalence. The final version was then administered to paediatric patients with type 1 diabetes mellitus (T1DM) from Ministry of Health and university hospitals between August 2006 and September 2007. Reliability was analysed using Cronbach's alpha while validity was confirmed using concurrent validity (HbA1c and self-rated health score).
Result: A total of 82 T1DM patients (38 males) aged 10–18 years were enrolled from eight hospitals. The reliability of overall questionnaire was 0.91 while the reliabilities of the three domains were between 0.73 and 0.86. HbA1c was positively correlated with worry ($P = 0.03$) i.e. patients who were more worried about their disease had higher HbA1c. Self-rated health score (an item in the DQoL where higher score indicates better health) was found to have significant negative correlation with ''satisfaction'' domain ($P = 0.013$) and ''impact'' domain ($P = 0.007$) (where higher score indicates poorer QoL). This showed that patients with higher self-rated health scores had better satisfaction with life, and that diabetes had lower impact on their life. Four items (sleep, feels good about oneself, being teased, frequent toilet visits) in the ''impact'' domain had corrected item to total correlation lower than 0.2.
Conclusion: The Malay translated version of DQoL was reliable and valid at the domain level. However, further work is needed to improve the ''impact'' domain so that the overall validity can be improved.

P/105/WED

Measuring HbA1c in the diabetes outpatient clinic

P-E. Kofoed[1,2], J. Thomsen[2] & P. Jørgensen[3]
[1]*University of Southern Denmark, Unit of Health Services Research, Kolding, Denmark,* [2]*Kolding Hospital, Department of Paediatrics, Kolding, Denmark,* [3]*Kolding Hospital, Department of Clinical Biochemistry, Kolding, Denmark*

Objectives: HbA1c is used in the evaluation of the metabolic control in diabetes clinics. Patients mail a blood sample to the laboratory before the control visit or alternatively the HbA1c is measured at the clinic. We examined whether the results were influenced by the time it took to mail the sample and if the results measured on the DCA 2000 + (Diabetes Care Analyzer, Siemens Medical Solutions Diagnostics, Dublin) corresponded to the laboratory results.
Method: A total of 17 capillary blood samples were analysed on a DCA and simultaneously diluted samples were stored at room temperature in 2, 4 and 6 days, respectively before being analysed on Tosoh equipment (Tosoh Bioscience, Tokyo). In the second part 19 capillary blood samples were analyzed on the DCA, and simultaneously diluted samples were sent to the local laboratory and the national reference laboratory at Glostrup Hospital, both using Tosoh equipment. The results were compared using paired *t*-test.
Results: No differences were found in the HbA1c values measured on the same sample on day 2, 4 and 6 (8.46%, 8.47%, and 8.44%, $P > 0.05$ for all comparisons), whereas a non-statistically significant higher value was found on the DCA (8.62%, $P > 0.05$ for all comparisons). In the second part the mean values measured on the local laboratory was 8.44%, in Glostrup 8.51% and on the DCA 8.61% ($P > 0.05$ for all comparisons). The small non-significant difference was due to one out-layer. Excluding this the mean HbA1c values were 8.58%, 8.58% and 8.52%, respectively.
Conclusion: The HbA1c values are not influenced be the mailing time. The results by the Tosoh methods at the two different laboratories were identical. The DCA method is less robust though the values are acceptable with a difference of maximum −0.6% and 0.5%, not considering the out-layer. HbA1c remains an important parameter; both having the patients mail the blood samples to the laboratory and measuring the HbA1c on a DCA 2000 at the clinic can be recommended.

P/106/WED

Pre and post marital problems in people with type 1 diabetes in India

D. Yagnik[1], R. Shukla[2], B. Mohan[3], S. Bajpai[4] & R. Saxena[4]
[1]*Yagnik Diabetes Care Centre, Medicine, Kanpur, India,* [2]*Regancy Hospital, Endocrinology, Kanpur, India,* [3]*Brij Medical Centre, Medicine, Kanpur, India,* [4]*Regancy Hospital, Kanpur, India*

Aim: Study the impact of Type 1 diabetes among married couple in India. The comparison was done between routine clinic patients vs. those who have under gone regular counseling programs.
Introduction: In India most of the marriages are arranged where consent of family members and socioeconomic status plays a significant role. This issue may be taken care of with appropriate intervention.
Material and method: Twenty-seven married people with Type 1 DM (MF 10/17) were surveyed, mean ages of male 37 and female 32, mean duration of diabetes 18/15 (M/F) years and mean duration of marriage 8/6 (M/F) years. Out them nine underwent regular education program and get-togethers, which included regular briefing about their future marriage .The mean duration of follow-up was 9 years. Comparison was done with clinic follow up patients, who had only basic briefing of diabetes management. Comparative study was done on different parameters.
Result: Most of the marriages were arranged (18/9 – arranged/love). The negative thoughts about getting married was in majority (16 of 27). Out of 27, five persons did not disclose their diabetes before marriage. Total number of patients who faced rejection in arranged marriage was 16 of 27. Majority of them had negative thoughts after the rejection in arranged marriage, however, two out of them had suicidal tendency and two had extreme stress. Negative feelings were more with spouse of females than male (f/m-4/17 vs. 1/10).Among the intervention group (9 of 27), there were more love marriages (6/9), however the negative thoughts and rejections (5/9 and 7/9) were the same. None of them had extreme stress or suicidal tendency. The recovery from negative thoughts of rejection was easier compared to other group.
Conclusion: Marriage of people with Type1DM is a big problem especially with females in India. They need regular counselling regarding marriage and relationships. Support groups play a very significant role in overcoming negative thoughts especially after being rejected.

Psychosocial III

P/107/FRI

Over 10 program for teens with persistently poorly controlled type 1 diabetes: ongoing challenges and future considerations

R. Slater[1], M. Frank[1], M. Small[1], A. Newcombe[1] & D. Daneman[2]
[1]*SickKids Hospital, Toronto, Canada,* [2]*University of Toronto and Sick Kids, Toronto, Canada*

Aims: To describe the metabolic outcome, theoretical principles and evolution of the Over 10 program for teens with persistently poorly controlled diabetes.
Methods: Thirty adolescents, aged 12 to 17 years, with Type 1 DM for at least 1 year, and A1c levels greater than 10% for at least 6 months, participated in the over 10 program for 12 to 24 months. After initial evaluation by the over 10 team (nurse specialist, social worker, and psychologist), teens and their families were invited to monthly individual and/or family treatment sessions aimed at exploring and understanding intrapersonal and interpersonal barriers to improved blood sugar control. A1c was measured every 6 months for this study, up to 24 months post baseline.
Results: Mean A1c declined from 11.0% (SD = 1.9; n = 30) at baseline to 10.2% (SD = 1.7; n = 26) 12 months later, at which time 15/26 subjects improved in A1c by at least 0.5%, 6 deteriorated, and 5 remained unchanged. At 24 months mean A1c was 10.3% (SD = 1.7), but the reduced sample size (n = 18) limits interpretation.
Conclusions: Though not statistically significant, the improvement in A1c is clinically meaningful. We document improved metabolic control in a group of high risk teens at a time when most adolescents experience worsening control. The over 10 program, which is now called ''ACCESS'', has been sustained for 5 years, and has served almost 100 patients. It is a key service offered by our diabetes team. Increasingly, motivational interviewing provides a framework for this program that includes approaches based on family systems, cognitive–behavioural theory, social cognitive theory, stages of change, and an ecological perspective. Future directions could include more attention to the larger social context, in keeping with developments in self-management theory.

P/108/FRI

Family functioning (cohesion and adaptability), emotional competences and glycaemic control in a sample of type 1 diabetics children

M.F. Housiaux[1], J. Zurstrassen[1], O. Luminet[1,2] & H. Dorchy[3]
[1]*Université Catholique de Louvain, Psychology, Louvain-la-Neuve, Belgium,* [2]*Belgian National Fund for Scientific Research (FNRS-FRS), Louvain-la-Neuve, Belgium,* [3]*Université Libre de Bruxelles, Pediatric Diabetology, Bruxelles, Belgium*

Aim: In order to replicate and extend previous findings (Meunier & et al. 2008, Housiaux & et al. 2007), this research assessed both parental and child family functioning' perception and emotional competences and explored the links between these variables and glycaemic control in young type 1 diabetics.
Methods: The study included 50 type 1 diabetic children aged from 8 to 14 years (23 girls, 27 boys). Sociodemographic and medical information were supplemented. HbA1c values (glycosylated haemoglobin), number of severe hypoglycaemias and of hospitalizations for hyperglycaemia were collected for the previous 12 months. Parents and child perception of the family functioning were assessed with the family adaptability and cohesion scale (Olson et al. 1985). Emotional competences in parents were measured by means of the Toronto alexithymia questionnaire (Bagby et al. 1994). Emotional competences in children were collected with the emotional awareness questionnaire (Rieffe et al. 2007).
Results: Correlations analyses confirmed that parental difficulties identifying emotions were associated with worse glycaemic control (higher number of hospitalizations for severe hyperglycaemia: HYPER), that some emotional competences of the child were associated with better glycaemic control (Differentiating Emotions & Verbal Sharing of Emotions: fewer HYPER; Bodily Awareness of Emotions: lower HbA1c mean value; Attention to Others' Emotions: fewer episodes of severe hypoglycaemias), and that the perception of a higher cohesion within the family (parents or child perception) was also associated with a better glycaemic control (fewer HYPER).
Conclusion: The present findings confirm that family cohesion and emotional competences are important variables to consider in order to create tailored interventions to achieve glycaemic control.
Keywords: Type 1 diabetes, Emotional competences, Glycaemic control, Family functioning, Diabetic children.

P/109/FRI

The effect of consulting via internet on fear of hypoglycemia and metabolic control in adolescents with type 1 diabetes

N.S. Celasin[1], Z. Basbakkal[2], G. Demir[3], D. Göksen[3] & S. Darcan[3]
[1]*Celal Bayar University, School of Health, Manisa, Turkey,* [2]*Ege University, School of Nursing, Izmir, Turkey,* [3]*Ege University, Pediatric Endocrinology and Metabolism, Izmir, Turkey*

Objectives: To assess the effects of nurse practitioner consultations by e mail on fear of hypoglycemia and metabolic control in adolescents with type 1 diabetes.
Methods: A total of 86 type 1 diabetic patients aged 12 to 17 years followed up for at least 1 year and had an internet access were randomly assigned to an intervention (n = 43) or a control group. The intervention group was invited to a 3 month program with a nurse practitioner helping them by the help of internet (e-mails). Patients and the families completed Children's Hypoglycemia Fear Survey and State-Trait Anxiety Inventory for Children (STAIC-Form II) at the beginning and on the third month of study.
Results: There was no significant difference between the sociodemographic characteristics of the patients in both of the groups. Duration of diabetes, insulin regimen, frequency of capillary blood glucose monitoring, hypoglycemia episodes and last HbA1c was similar in both of the groups at the beginning of the study. Fear of hypoglycemia score decreased (46.4 ± 11.5 vs. 37.48 ± 9.50) significantly in the intervention group at the end of 3 months with the program whereas did not change in the control group (51.11 ± 14.21 vs. 51.04 ± 13.79) ($P < 0.05$). There was no significant decrease in HbA1c at the end of the third month in both of the groups (intervention group; 8.03 ± 6.3 vs. 7.9 ± 9.3, control group; 7.84 ± 1.45 vs. 7.96 ± 1.55).
Conclusion: Nurse practitioner consultation by the help of emails decreases fear of hypoglycemia and HbA1c.

P/110/FRI

The opinion of African children with diabetes about the support they obtain from their families

F.P.R. de Villiers & M.C. Segoe
MEDUNSA Campus, University of Limpopo, Paediatrics and Child Health, Pretoria, South Africa

Coping with diabetes control is difficult for newly diagnosed and experienced patients alike; the former because of the complex technical requirements they face suddenly, the latter because of constant repetition of testing, insulin administration and dietary vigilance. In a previous study we showed that where the patients measured the insulin, only 28% of the mothers checked the dosages. Fully 80% of the patients gave their own injections. In only 25% of patients between 11 and 15 years who measured and administered insulin themselves were the dosages checked by an adult. The conclusion of the study was that younger children seem not to be sufficiently supported by their family.

Objectives: To establish whether children with diabetes feel that the support that they enjoy from their families is adequate or not.

Methodology: Focus groups were held with children in our diabetes clinic based on their age groups. Informed consent was obtained. The groups had freedom of expression. The initial question was: ''How much do you feel that your family is helping you cope with your diabetes?'' The facilitator was alert to the mechanics of injection and of home blood glucose monitoring, psychological support when the child is ill or feeling depressed, perceived criticism with regard to dietary or other infringements, amongst other aspects.

Results: The eight and nine year old do their own injections under supervision. Adolescents feel that they are independent in managing their diabetes. Children with diabetes eat wrongly quite often; frequently culprits are potato chips and fruit juice. They are most unhappy with the idea of injecting, and they frequently dread the next injection.

Conclusions: Children with diabetes need support from their families. They receive criticism when they deviate from their diabetic meal plan. By and large they are loyal to their families, saying that they are sufficiently supported.

P/111/FRI

Relationship between psychosocial health, health related quality of life, HbA1c and no shows in adolescents with type i diabetes mellitus

J.J.A. van Leendert[1,2,3], E.A. Boogerd[4], J.A.E.M. van Alfen-van der Velden[3,5], M.C.C.H. Steeghs[2,3], E.E. Hartman[1]& C.M. Verhaak[4]
[1]*Tilburg University, Department of Psychology, Tilburg, The Netherlands,* [2]*Canisius Wilhelmina Hospital, Department of Psychology, Nijmegen, The Netherlands,* [3]*Children's Diabetes Center Nijmegen, Nijmegen, The Netherlands,* [4]*Radboud University Nijmegen, Medical Center, Department of Medical Psychology, Nijmegen, The Netherlands,* [5]*Radboud University Nijmegen, Medical Center, Department of Pediatrics, Nijmegen, The Netherlands*

Objectives: We investigated adolescents' psychosocial health status and quality of life in relation to HbA1c and number of no shows. We were particularly interested in differences between younger adolescents (aged 12 to 14) and older adolescents (aged 15 to 18).

Methods: Participants were 65 adolescents with T1DM, aged between 12 and 18 years (M = 14.65, SD = 1.56). All participants received medical care at the Children's Diabetes Center Nijmegen (CDCN). Patients' HbA1c and no shows were derived from their medical files. Questionnaires were used to assess adolescents' psychosocial health (SDQ) and quality of life (PedsQL 3.0). Data were analysed by means of Pearson correlation coefficient and Students' *t*-test.

Results: The younger group showed lower levels of HbA1c ($t = -2.46$, SD = 0.02) and better overall disease-specific quality of life ($t = 2.44$, SD = 0.02) than the older group. They also experienced less treatment barriers ($t = 2.67$, SD = 0.01) and worries about the disease ($t = 1.93$, SD = 0.06). High HbA1c levels were in the younger group associated with more problems regarding emotions ($r = 0.50$, $P < 0.001$), treatment adherence ($r = 0.38$, $P < 0.05$) and self-management ($r = -0.37$, $P < 0.05$) but better communication about T1DM ($r = 0.40$, $P < 0.05$). Also, higher no show rate in younger adolescents was associated with more problems regarding emotions ($r = 0.46$, $P < 0.001$), treatment barriers ($r = 0.35$, $P < 0.05$), self-management ($r = 0.43$, $P < 0.01$) and T1DM symptoms ($r = 0.38$, $P < 0.05$).

Conclusions: Although the younger adolescents with T1DM showed better quality of life and better glycemic control than their older counterparts, they also showed different psychosocial problems and problems regarding adherence and self management when glycemic control decreased. Subsequently, the younger adolescents with worsened glycemic control, seemed to miss appointments with their medical team. This study shows the importance of regarding early adolescence and late adolescence as two different phases in life that need different approaches.

P/112/FRI

Poor dietary patterns in adolescents with and without type 1 diabetes

F.K. Bishop[1], D.M. Maahs[1], G. Spiegel[1], E.J. Mayer-Davis[2] & R.P. Wadwa[1]
[1]*University of Colorado Denver, Barbara Davis Center for Childhood Diabetes, Aurora, CO, USA,* [2]*University of North Carolina, Chapel Hill, Departments of Nutrition and Epidemiology, Chapel Hill, USA*

Nutrition is a fundamental aspect of care in type 1 diabetes (T1D), but nutrition goals are rarely met. Moreover, scant data exist on eating behaviors of T1D adolescents compared to a non-diabetic (non-DM) control group. The American Academy of Pediatrics recommends eating three balanced meals per day, eating breakfast daily, and limiting sugary beverages and energy dense foods. Eating three meals a day is an ISPAD nutritional management aim for T1D children.

Data in 256 T1D adolescents and 63 non-DM controls were collected. T1D subjects were patients at a regional T1D center in the USA and non-DM subjects were recruited from the general population. Nutrition data (frequency of eating out, meals per day, snacks per day, and weekly consumption of sugary beverages, breakfast, fruit and vegetables, sweets, and fried foods) was collected for all subjects during an in-person study visit using an interviewer administered questionnaire. Overall, no significant differences in diet were found between adolescents with and without T1D however the data trend toward T1D subjects consuming less sweets and sugary beverages (Table 1). BMI and A1C (within T1D) did not correlate with any of the nutrition variables, but sample size could be an issue. Adolescents with and without T1D have similar poor dietary patterns despite T1D adolescents receiving dietary education and support through their diabetes care team. Improving diet in T1D adolescents to improve health remains an unmet need.

Table 1. Nutrition variables in T1D and non-DM

Variables	T1D (n = 256)	non-DM (n = 63)	P-value
Age, years	15.5 ± 2.1, 52%,	15.4 ± 1.9, 44%,	0.90, 0.24,
% male HbA1c, %	9.0 ± 1.6	5.3 ± 0.3	<0.0001
No. of meals per day	3.03 ± 0.56	2.95 ± 0.82	0.47
Breakfast* (Times per week*)	5.42 ± 2.26	5.48 ± 2.27	0.85
Vegetables*	4.60 ± 2.14	4.95 ± 2.24	0.24
Fruit*	4.78 ± 2.14	4.81 ± 2.38	0.93
Eating out*	1.79 ± 1.53	1.71 ± 1.48	0.72
Fried foods*	2.67 ± 1.74	2.52 ± 1.63	0.55
Dessert/sweets*	2.83 ± 1.92	3.44 ± 2.31	0.06
Sugary beverages*	3.31 ± 2.47	3.96 ± 2.46	0.06

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Impact of individual factors and family environment on metabolic control of children with type 1 diabetes mellitus

F. Demirel[1], D. Tepe[1], I. Esen[1], N. Buber[1] & H. Boztepe[2]
[1]*Ankara Child Disease and Hematology Oncology Training Hospital, Pediatric Endocrinology Department, Ankara, Turkey,* [2]*Hacettepe University, Nursing School, Ankara, Turkey*

Objectives: Type 1 diabetes mellitus (T1DM) is one of the most frequent chronic diseases in childhood. Several studies have shown not only treatment regimen but also individual, familial, social, and economic factors affect metabolic control and progression of diabetes. A questionnaire is arranged to define the personal and familial environmental factors that can affect the metabolic control of children with T1DM following up in our pediatric endocrinology department.
Methods: Ninety three patients aged 3 to 19 years (mean 13.4 ± 3.5 years) were evaluated. Children and parents were invited to complete a questionnaire about their socioeconomic, educational level and family environment. According to glycosylated hemoglobin (HbA1c) levels, metabolic control was classified as a good control (HbA1c < 7.6%), fair control (HbA1c between 7.6% and 8.9%) and poor control (HbA1c > 9%). The three groups contained 31 (33%), 37 (40%) and 25 (27%) patients, respectively.
Results: Mean HbA1c level was found 8.2%. The older age and longer diabetes duration were associated with significant higher levels of HbA1c ($P < 0.05$). In patients who were more successful at their schools and get their controls regularly have been found lower HbA1c levels than the others ($P < 0.05$). Of the patients with poor metabolic control, were found to come less frequently to their endocrine appointments and hospitalization for acute complications have been found higher than in the other groups ($P < 0.05$). Familial factors as young maternal age, high paternal education level, less number of sibling had good effects on HbA1c levels and metabolic control ($P < 0.05$).
Conclusion: We determined our patient's sociodemographic characteristics, individual and familiar conditions, and those effects on metabolic controls in this study. The results will allow us to make an early determine of having poor progression of diabetes and to develop support strategies that will help these children to improve their metabolic control.

P/114/FRI

The significance and consequence of living with type 1 diabetes: perceptions of children and their parent's

M. Marshall
Royal Manchester Children's Hospital, Paediatrics, Manchester, UK

Aim: To explore and describe the ways in which children and their parents experience the meaning of living with type 1 diabetes.
Background: Type 1 diabetes is a psychologically and behaviourally demanding chronic condition that requires positive self-care behavior to reduce the complications associated with the condition. The research evidence available from children and parents on how the meanings they align to living with diabetes influence diabetes self-care behavior is limited.
Method: This phenomenological study used conversational interviews with a purposive sample of fourteen children (aged 4–17 years) living with type 1 diabetes and their parents. Participants were from different ethnic backgrounds, and at differing lengths of time since diagnosis. Data were thematically analysed over several cycles utilizing van Manen's phenomenology.
Results: The ways in which children and parents live with and self manage type 1 diabetes are influenced by the crucial elements of ''significance'' and ''consequence''. Children focus more on the ''significance'' of the condition and less on the ''consequence'', while parents focus more on the ''consequence'' of the condition and less on the ''significance''.
Conclusion: Significance and consequence are not fixed linear entities they are dynamic, responsive and reactive. Although both elements are experienced by children and parents it is their individual focus that causes dissonance between them. Understanding how children and parents create meaning from their different experiences and how these different meanings influence diabetes self-care behaviour is important if the provision of healthcare is to be effective in meeting their individual needs. The challenge facing healthcare professionals involved in diabetes care is to explore in detail the influence ''significance'' and ''consequence'' has on the day to day lives of children and parents and the impacts this has on their diabetes self management.

P/115/FRI

Stress in the mothers of children with early onset type 1 diabetes and learning difficulty

R. Hannonen[1], J. Komulainen[2], R. Riikonen[3] & T. Ahonen[4]
[1]*Kymenlaakso Central Hospital, Department of Child Neurology, Kotka, Finland,* [2]*National Institute for Health and Welfare, Helsinki, Finland,* [3]*University of Kuopio, Kuopio, Finland,* [4]*University of Jyväskylä, Jyväskylä, Finland*

Objectives: Parents of the children with diabetes experience stress over their child. Stress also increases when the child has learning problems, which children with early onset diabetes (EOD) have a higher risk for. This study aims to compare stress in the mothers of children with EOD, without diabetes and with or without learning difficulty (LD) and to evaluate stress over different areas of life.
Methods: The mothers of 63 children with diabetes onset before 5 years of age (EOD group) and the mothers of 86 children without diabetes (C group) evaluated their life stress on a 4-point Likert scale with 25 statements, divided into subscales: 1. Work,

2. Home,
3. Parents' personal/marital issues,
4. Child's health and behaviour.

Learning of the children was evaluated with the tests of reading and spelling in the 3rd grade at school (aged 9–10 years). Reading was measured with the tasks of text and non-word text reading, single non-word reading and word list reading. Spelling was assessed with spelling words and non-words. LD was defined as performance ≤10% of the control group's performance. The children were divided into 4 groups according to diabetes and LD. ANOVA was used in group comparisons in the levels of maternal stress.

Results: Group differences were significant in maternal stress over the child [$F(3.148) = 10.40$, $P < 0.001$) and parents' personal/marital issues [$F(3.148) = 3.19$, $P < 0.05$). Mothers' stress over the child was significantly lower in C group than in the other groups. Mothers in EOD + LD group had significantly higher stress over parents' personal/marital problems than the groups without LD. The level of stress was similar in the other subscales.

Conclusions: Child related stress in the mother increases when the child has diabetes or learning difficulties, but there is no increase in stress over other areas of life. However, if the child with diabetes has learning difficulties, wellbeing and cohesion of the parents may also be affected.

P/116/FRI

Psychometric properties of the Spanish version of the diabetes family conflict scale for parents of children and adolescents with diabetes

M. Beléndez[1], M.C. Marín[2] & G. Topa[3]
[1]*University of Alicante, Department of Communication and Social Psychology, Alicante, Spain,* [2]*Fundación para la Diabetes, Madrid, Spain,* [3]*National University of Distance Education, Madrid, Spain*

Objectives: This study describes the adaptation and validation of a Spanish version of the Diabetes Family Conflict Scale (parent version) for assessing the level of family conflict related to diabetes management.

Methods: Data were collected from 154 parents (96 mothers and 58 fathers) of children and adolescents with type 1 diabetes (7–17 years). Parents completed an adapted and expanded version (22 items; 5-point Likert scale) of the Diabetes Family Conflict Scale (DFCS, Hood et al. 2007), the Coping Strategies for Diabetes Care questionnaire (Beléndez et al. 2009), the Spanish version of the Blood Glucose Monitoring Communication questionnaire in which parents were asked to report their emotional responses to high and low blood glucose (Beléndez et al. 2009; Hood et al. 2004), and a treatment adherence scale (Mora et al. 2004).

Results: The DFCS had adequate internal consistency (Cronbach's alpha = 0.92). Regarding validity, parents' report of family conflict showed relationships with negative affect around blood glucose monitoring (mothers, $r = 0.45$; fathers, $r = 0.55$, $P < 0.001$), more frequent use of expressing negative emotions (mothers, $r = 0.33$; fathers, $r = 0.28$, $P < 0.05$) and lower levels of adherence (mothers, $r = -0.60$; fathers, $r = -0.70$, $P < 0.001$). No significant differences between mothers and fathers conflict mean scores were found.

Conclusions: The findings offered support for the reliability and validity of the Spanish DFCS, a useful measure for assessing potential problems of parent-child/adolescent partnership in diabetes care.

P/117/FRI

Disease perception by people with type1 diabetes

R. Shukla[1] & D. Yagnik[2]
[1]*Regancy Hospital, Endocrinology, Kanpur, India,* [2]*Yagnik Diabetes Care Centre, Medicine, Kanpur, India*

Aim: Disease perception and role of social support group (Non government) in mind set of people with Type1 diabetesIntroduction- Life with T1DM is tough and different.Some patients are depressed and dejected as against many who are motivated and encouraged.This was a short duration camp (4 hours) which started from get together, education and followed by snacks and drinks. They were all regular clinic patients and had been attending similar program organized by support group.

Material and methods: Total participants were 25, M/F-10/15, age 7–26 years, Duration of diabetes 2–17 years. Two persons were excluded (<7 years). At the end of camp they were asked to share their perception with diabetes which are as follows-

(1) Why do I have diabetes but my brother is normal (Ishita 12/F)
(2) Had insulin been not there we had not been living (Sohi 16/F)
(3) Diabetes is not good thing as it increases problems of my parents (Ajai 20/m)
(4) Diabetes is not a disease (leela 18/f)
(5) I got aim of my life after I became diabetic (mohan 15/m)
(6) It is a bliss as I feel I am different from others (Priyanka 21/f)
(7) It is difficult to live with diabetes but we can win (Ruchi 25/F)
(8) Diabetes is not the end of life (Sonam 18/f)
(9) I was never bothered about my future before I developed diabetes which encouraged me to think more positive about my career (Fauzia 17/f).

Result: Living with diabetes as expected is negative happening but it also creates encouragement and zeal to do better things in life. This was possible by the active role played by support group.

Conclusion: Life with diabetes is tough and challenging for patient, family and clinician but with regular get together and motivation mind set may be changed.

Onset of Diabetes

P/118/WED

Clinical characteristics at presentation of type 1 diabetes in children aged under 15 years in croatia

G. Stipancic[1], L. La Grasta Sabolic[1], A. Radica[2], V. Skrabic[3] & S. Severinski[4]
[1]*University Hospital 'Sestre Milosrdnice', Zagreb, Croatia,* [2]*University Hospital Zagreb, Zagreb, Croatia,* [3]*University Hospital Split, Split, Croatia,* [4]*University Hospital Rijeka, Rijeka, Croatia*

Objective: To describe the clinical presentation at onset of type 1 diabetes in children aged under 15 years, with special attention to diabetic ketoacidosis (DKA), and possible changes in clinical presentation during the 9 years follow-up.
Methods: The demographic and clinical data of all children with newly diagnosed type 1 diabetes have been collected using a standardized questionnaire from January 1, 1995 to December 31, 2003. Method of logistic regression and Cochran–Mentel–Haenszel test were used to analyze factors with potential influence on DKA incidence. Trend of DKA incidence in the nine year period was assessed using the Cochran–Armitage trend test. Characteristics from the onset of the disease were evaluated using the one way analysis of variance (ANOVA).
Results: A total of 692 children were diagnosed with type 1 diabetes, out of which 323 girls and 369 boys. Duration of symptoms prior to diagnosis of type 1 diabetes was less than 3 weeks. Polyuria, polydipsia and weight loss were the leading symptoms. The incidence of DKA at the disease onset was 36.6% regardless of age and gender, but regional differences were noted with highest incidence of DKA in Central Croatia (41.7%) which was significantly higher than in Southern Croatia (31.28%), ($\chi^2 = 4.41$; $P = 0.0357$). Number of children who have had DKA at diagnosis of Type 1 diabetes was decreasing during the nine year period from 41.67% to 33.33%, with statistical significance ($Z = 1.68$; $P = 0.046$). Negative family history, meaning disease free first line relatives, increased by 2.4 times the chance of DKA being the first presentation of Type 1 diabetes ($\chi^2 = 5{,}89$; $P = 0.015$).
Conclusions: The number of children who presented with DKA at disease diagnosis was decreasing during the nine year period, but was still high. That is why in every, especially younger, acutely ill child at diagnosis of unclear disease, one should evaluate the possibility of Type 1 diabetes to avoid DKA.

P/119/WED

Does initial glycated haemoglobin A1c (HbA1c) influence further glycaemic control in type 1 diabetes (T1DM) children?

A. Chobot[1], J. Polanska[2], A. Gawron[3], M. Chumiecki[4], B. Echolc[1] & P. Jarosz-Chobot[5]
[1]*Clinical Hospital No1, Zabrze, Poland,* [2]*The Silesian University of Technology, System Engineering Group, Gliwice, Poland,* [3]*Central Clinical Hospital of the Medical University of Silesia, Katowice, Poland,* [4]*Upper Silesian Center of Child's Health, Katowice, Poland,* [5]*Medical University of Silesia, Katowice, Poland*

Objectives: HbA1c is a gold standard of glycaemic control assessment in diabetes. The aim was to estimate whether HbA1c of the initial period of T1DM duration influences patients' further glycaemic control.
Methods: From the database of the Upper Silesian Center of Child's Health, Katowice, Poland for the study purposes we selected children with T1DM duration >2 years, who had ≥4 HbA1c measurements (mean 12.2 ± 5.2/patient) until 10 years of disease duration (471 patients, 218♀). First HbA1c result during the initial 6 months of disease duration (HbA1c I), mean HbA1c ≤6 months (HbA1c II) after diagnosis, mean HbA1c for 0.5–2 years after diagnosis (HbA1c III) and mean HbA1c for the following 8 years of disease duration were estimated (HbA1c IV).
Results: HbA1c I and II was available for 330 (148♀) patients – age at onset 8.7 ± 3.6 years, T1DM duration 6.8 ± 2.0 years; HbA1c III for 422 (196♀) children – age at onset 8.5 ± 3.6 years, T1DM duration 6.8 ± 2.3 years. HbA1c IV was assessed separately for both groups. HbA1c I, II and III correlated positively with respective HbA1c IV ($P < 0.01$, $P < 10e\text{-}6$, $P < 10e\text{-}9$ respectively). Linear prediction models could be created: HbA1c IV = $a_i + b_i \bullet$HbA1c i, i = I, II or III). They showed that the impact of HbA1c I, II and III on HbA1c IV increased with time ($b_I = 0.06$, 95% CI 0.01÷0.11; $b_{II} = 0.14$, 95% CI 0.07÷0.20; $b_{III} = 0.73$, 95% CI 0.67÷0.80).
Conclusions: Initial HbA1c influences further glycaemic control in children with T1DM. Its values 0.5–2 years after diagnosis seem to have greater influence than the ones observed in the first months after diagnosis. Further mean HbA1c values for the patient can be predicted based on his initial results.
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Onset forms in type 1 diabetes mellitus during 10 years of follow up in a pediatric diabetes unit

M.E. Andrés, M. Ferraro, P. Taberner, V. Jimenez, I. Strasnoy, S. Barbeito, A. Franchello & O. Ramos
Pedro de Elizalde's Chlidren Hospital, Nutrition and Diabetes Unit, Ciudad Autónoma de Buenos Aires, Argentina

Introduction: Diabetic ketoacidosis (DKA) is one of the Type 1 Diabetes onset forms. Delayed diagnosis of the illness and therefore the admission in Hospital for DKA involves some factors such us: socioeconomic ones, low education level, lack of social security and dificulties to access to hospital and medical factor: difficulties for the prior diagnosis of the pathology from the general practioner and the pediatrician.
Objectives: (1) To analise the evolution in the frequency of episodes at the begining of Diabetes with and without DKA.
(2) To analise the evolution in the frequency of episodes at the begining or not of the illness from January 1, 1994 to December 31, 2003.
(3) The onset forms were related with poverty line in the GBA population.
Results: (1) In the type 1 Diabetes onset group between 1996 and 2002 it was shown a statistic significative increase in those patients with DKA as a form of onset ($P = 0.00008$) being the year 2002 the period o the highest risk of DKA presentation.
(2) In the whole patients admitted for DKA between 1994 and 2003 it was observed a statistics significative increase in those patients with DKA as a form of onset ($P = 0.013$ X2 = 6.11)
(3) The comparision with the evolution of the population under the poverty line shows a significative association with the series 1994–2003 on the patients admittes in Hospital for the DKA onset with r Pearson value 0.79 ($P = 0.006$)
Conclusions: (1) On analizing the patients with type 1 DM it was shown an increased in the presentation in DKA.
(2) On analizing the whole patients admitted in Hospital for DKA the same trend was shown.

(3) Type 1 DM onset in DKA has a positive and significative correlation with the increase of the population under poverty line.

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Does income inequality explain geographical differences in key diabetes indicators in childhood?

D. Daneman
University of Toronto and SickKids, Pediatrics, Toronto, Canada

The organization for economic co-operation and development (OECD) annually publishes key health indicators in the world's wealthiest countries. Among the child health indicators are infant mortality, low birth weight, and childhood overweight and obesity. Furthermore, Wilkinson and Pickett (authors of ''The Spirit Level'') have shown a close linear correlation between social determinants of health and the magnitude of income inequality in these countries (defined by the difference between highest and lowest income earners in that country). The aims of this study were to determine

(1) Whether two key diabetes indicators (namely, frequency of DKA at diabetes onset (%DKAo) and mean A1c level) in these countries correlate with other child health indicators (OECD); and

(2) Whether the diabetes indicators correlate with income inequality (Wilkinson and Pickett).

%DKAo was determined by literature review of either population-based or large clinic-based data. A1c was derived from the 2005 Hvidore study group (HSG) database of 21 clinics in 19 countries. %DKAo was available for 13 of the OECD countries and A1c for 17. %DKAo (15–47%) correlated with income inequality ($r = 0.58$, $P < 0.05$), but not with any of the other indicators. A1c (7.7–9.3%) was not significantly correlated with income inequality or any of the child health indicators. Given the small numbers of countries/centres involved and the nature of data collection, these results must be interpreted with caution. However, they are provocative given the implication that DKA frequency at onset may be associated closely with the social determinants of health, while the factors determining metabolic control are likely more complex and perhaps more amenable to medical intervention. Since the DKA data are largely population-based and the A1c data clinic-based, selective attendance of more compliant children at diabetes clinics may partially explain these differences.

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Low 1,25-dihydroxy vitamin D levels in teens with new-onset type 1 diabetes (T1D)

J.M. Drijvers[1], L.K. Volkening[1], B.M. Svoren[1,2], J.R. Wood[1,3] & L.M. Laffel[1]
[1]*Joslin Diabetes Center, Boston, USA,* [2]*University of Rochester Medical Center, Rochester, USA,* [3]*Childrens Hospital Los Angeles, Los Angeles, USA*

Objectives: Vitamin D has been linked to diabetes beyond its role in bone health. We assessed vitamin D levels and vitamin D inadequacy in youth with T1D.

Methods: In a cross-sectional study of 290 youth, we compared 25-hydroxy vitamin D (25[OH]D) and 1,25-dihydroxy vitamin D (1,25[OH]2D) in new-onset T1D patients, established T1D patients, and non-diabetic controls in two age groups: <10 and 10–18 years old. 25(OH)D was corrected for gender, season, race/ethnicity, and zBMI. 25(OH)D sufficiency, insufficiency, and deficiency were defined as ≥30, 20–<30, and <20 ng/ml, respectively.

Results: Within each age group, the corrected 25(OH)D levels and proportion of youths with sufficient 25(OH)D were similar between patients and controls (Table). However, twice as many children than teens were 25(OH)D sufficient (40–41% of children vs. 15–20% of teens, $P < 0.0001$). Teen new-onset patients had lower 1.25 (OH)2D levels than teen controls (50.8 vs. 62.1 pg/ml, $P = 0.002$). This difference remained significant after correcting for 25(OH)D level. However, in the younger group, 1.25 (OH)2D levels were similar in new-onset patients and controls (uncorrected and corrected).

Conclusions: Vitamin D inadequacy is very common in children <10 years old (~60% insufficient/deficient) and more common in teens 10–18 years old (>80% insufficient/deficient). 1.25(OH)2D levels were lowest in teen new-onset patients, suggesting a possible etiologic role through its influence on the immune system. T1D in the younger group likely has a greater genetic component; thus 1.25(OH)2D may not be a contributory factor in this group.

	Children (<10 years old)		Teens (10–18 years old)		
	New-Onset T1D (n = 68)	Controls (n = 29)	New-Onset T1D (n = 49)	Established T1D (n = 59)	Controls (n = 85)
Corrected 25(OH)D (ng/ml)	28.1 ± 7.7	29.6 ± 7.1#	26.2 ± 7.6	23.3 ± 7.7	23.1 ± 7.3
% Sufficient/Insufficient/ Deficient	40/53/7	41/55/3	20/69/10	15/61/24	15/49/35
Uncorrected 1,25(OH)2D (pg/ml)	55.1 ± 17.7	59.4 ± 15.0	50.8 ± 13.6ψ	55.5 ± 17.1	62.1 ± 17.4
Corrected 1,25(OH)2D (pg/ml)*	53.3 ± 16.5	56.8 ± 16.5	50.5 ± 16.1?	56.7 ± 16.3	63.8 ± 16.6

*Corrected for 25(OH)D; #Child controls vs. teen controls, $P = 0.0001$; ψTeen new-onset patients vs. teen controls, $P = 0.002$; ?Teen new-onset patients vs. teen controls, $P < 0.0001$. P-values adjusted for multiple comparisons.
[25(OH)D and 1.25(OH)2D levels]

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Revisiting the accelerator hypothesis: does the rate of weight development matter in children with genetic risk for type 1 diabetes (T1DM)?

B. Aschemeier[1], K. Semler[1], E. Keller[2], T. Danne[1] & O. Kordonouri[1], on behalf of the CrescNet -Team
[1]*Kinderkrankenhaus auf der Bult, Diabetes Centre for Children and Adolescents, Hannover, Germany,* [2]*CrescNet gGmbH, Leipzig, Germany*

Objective: An early accelerated weight gain is proposed as contributing factor to T1DM development. We investigated the relationship of genetic predisposition to T1DM and the weigth gain during the first 4 years.

Method: In a retrospective longitudinal study the BMI-SDS (mean SDS ± SD) was studied in 99 children with genetic predisposition (high-risk HLA group, HG), 99 children with positive family history, but without genetic predisposition (basic-risk group, BG) while 423 healthy children of identical age range without family history served as control (CG).

Results: Fifty-three (53.5%) boys and 46 girls of HG were born with a higher BMI-SDS of 0.52 ± 1.00 compared to the children of BG (56.6% ♂, SDS 0.39 ± 1.00; $P = 0.03$), but not to the CG (46.8% ♂, SDS 0.33 ± 1.06, $P = 0.10$). All groups showed a SDS reduction at 12 and 24 months. Between 24 and 48 months, there was a slight increase in BMI-SDS but without significant differences within and between the groups. Children of HG, who were overweight at 4 years (SDS ≥ 1.28, n = 5) showed noticeable weight changes compared to those of BG and CG ($P < 0.05$): baseline HG-SDS 0.70 ± 1.12 increased to 2.08 ± 2.04 (12 months), decreased to 1.00 ± 0.60 (24 months) and rose again to 1.76 ± 0.52 ($P > 0.05$) (48 months). By contrast, the SDS of overweight children of CG (n = 18) remained stable between 1.13 ± 0.8 and 1.87 ± 0.5 ($P < 0.05$) within the same period. Independent influences on the BMI-SDS at age 4 years were sex

(regression coefficient [RC] 0.208, P = 0.002), BMI-SDS at birth (RC 0.073, P = 0.025) and BMI at 2 years (RC 0.584, P < 0.001). No correlation to BMI development was found regarding week of gestation, genetic predisposition, diabetes-specific family history and breast feeding.

Conclusion: The weight development in early childhood differs between healthy children with and without diabetes specific predisposition, but not in terms of an accelerated weight gain. From this perspective a prevention of an excessive weight gain appears not necessary in this subgroup.

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No contribution from vitamin d on the increasing trend of type 1 diabetes

J. Svensson[1], S. Thorsen[2], H. Mortensen[1], M. Fenger[3], F. Pociot[4] & A. Linneberg[5]

[1]*Herlev University Hospital, Herlev, Denmark,* [2]*Copenhagen University, Copenhagen, Denmark,* [3]*Hvidovre Universitets Hospital, Hvidovre, Denmark,* [4]*Steno Diabetes Center, Gentofte, Denmark,* [5]*Forskningscenter for Forebyggelse og Sundhed, Glostrup, Denmark*

Objectives: Low level of Vitamin D has been suspected as an accelerator of the autoimmune process in type 1 diabetes (T1D). The objective of this study was to examine if falling levels of vitamin D may contribute to the increasing trend of type 1 diabetes.

Methods: Data were derived from a Danish population based registry of T1D including a biobank. A subset of children diagnosed from 1997 to 2008 with blood sampling less than 3 month after diagnosis and a random sample of siblings were studied for vitamin D and PTH. Linear regression was used to test factors associated with vitamin D level and logistic regression was performed to test for differences between patients and their healthy siblings.

Results: A total of 1862 children (937 patients and 925 siblings) were included in the study. We found a significant decrease in vitamin D levels with increasing age [(1.6% (0.3–2.2)%]; P = <0.0001) in the total cohort and significant seasonal variation with the lowest level from December to April. There was no significant decrease or increase in vitamin D levels from 1996 to 2008, but a significant decrease in PTH levels of 2.8% (1.1–4.4%); P = 0.001; the decrease was unaltered when only siblings were tested. The vitamin D level in patients compared to healthy siblings was not statistical different when age, gender and month of sampling were taken into account. The PTH level was app. 9% lower in patients compared to siblings even when vitamin D was included in the model −8.6% [−16.9–(−0.3)].

Conclusion: We found no support for a significant role of vitamin D at onset on the risk of developing diabetes though the control group may be overmatched since siblings are likely to have the same lifestyle and get equal supplementation of vitamin D as our patients. Furthermore we found no tendency towards a decrease in vitamin D levels. Interestingly, we found decreasing levels of PTH speaking against a role of vitamin D levels at onset in the increasing trend of type 1 diabetes in Denmark.

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Continuous rise in incidence of childhood type 1 diabetes in Montenegro

M. Samardzic[1] & N. Terzic[2]

[1]*University Children's Hospital, Podgorica, Montenegro,* [2]*Institute of Public Health of Montenegro, Podgorica, Montenegro*

Objective: To assess the incidence and trend in incidence of Type 1 diabetes (T1DM) in Montenegro from 1997 to 2006.

Research design and methods: Prospective population-based incidence study. Primary case ascertainment was from a diabetes register and secondary independent data source was from prescription data.Standardized incidence rates and 95% CI were calculated assuming the Poisson distribution. Trend of type 1 diabetes incidence was analysed using the Poisson regression model.

Results: There were 184 incident cases (90 boys and 94 girls) in the 10 years. Case ascertainment was 100% complete using the capture–recapture method. Mean age standardized incidence per 1 00 000 person-years was 13.4/1 00 000/year (95% CI: 11.5–15.5). The incidence increased on average by 4.6% (95% CI: −0.4–9.6%) a year over the period (P = 0.07). The time-period specific incidence rate from year 1997 to 2001 was significantly lower (10.8; 8.5–13.5) comapred with the second period from 2002 to 2006 (16.3; 13.3–19.7), (P < 0.0001). The age specific incidence for the 0–4-year age group was significantly lower (8.9; 6.3–12.3) than in 5–9-year age group (14.1; 10.8–18.1); and in the 10–14 year group (17.2; 13.7–21.3) per 100 000 children. The peak annual incidence was 34.4 per 1 00 000/year (95% CI: 14.9–67.8) in 10–14 year old boys in 2006. The sex specific incidence rates were: 12.6 per 1 00 000/year (10.1–15.5) in boys and 14.3 (11.6–17.5) in girls. There was no significant difference between the age standardised incidence in boys and girls (rate ratio = 0.89; 95% CI: 0.66–1.21; P = 0.446). At onset of diabetes, any degree of DKA (pH < 7.3) was present in 25% of subjects.

Conclusions: The incidence of childhood diabetes in Montenegro in the last 5–7 years is one of the higher in the Mediterranean area. The average annual increase in incidence is 4.6% and probably reflects changes in the lifestyle and environmental factors.

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Cold spot for diabetes incidence in Europe – 25 years follow up

M. Kocova, E. Sukarova-Angelovska, N. Angelkova, S. Spasevska & L. Kojic

University Pediatric Clinic, Skopje, Macedonia, The Former Yugoslav Republic of [[WILEY-BLACKWELL: Please provide complete details for this affiliation 'Republic of...']]

Macedonian population has one of the lowest incidences of T1DM in Europe. Although the incidence of type 1 diabetes has been studied by several international study groups, data from the region of the Balkans are still limited. Variations between countries in this region are reported. However, few long-term studies have been conducted to show the trends in the type 1 diabetes incidence.

Objective: To present the long-term trend of T1DM in children of the Republic of Macedonia where the lowest incidence in Europe has been previously reported.

Methods: Data were collected and analysed according to the EURODIAB methodology including the computer program for T1DM incidence follow up.

Results: The overall age-adjusted incidence of children 0–14 years old during the period 1985–2009 was 4.84/1 00 000 (95% CI 3.03–5.89). It is still the lowest in Europe. The overall incidence increased steadily, during the last 25 years reaching statistical significance (p for trend <0.001). Trend for type 1 diabetes incidence was different between different age groups. The incidence was very low in the age group of 0–4 years and it did change significantly during the last 10 years (1.50 vs. 2.89/1 00 000). For the age groups 5–9 and 10–14 years trend analysis showed increase. However, except for boys in the age group 5–9 years (P = 0.0014), it was not statistically significant. Thus, the increasing trend in overall incidence is mostly due to the boys in the groups 0–4 and 5–9 years.

Recent genetic HLA study did not confirm differences in the prevalence of susceptibility, neutral and resistant haplotypes in Macedonian population compared with other European populations.

Conclusions: Gradual increase in T1DM is confirmed in Macedonian children. However, it is still among the lowest in Europe. Further studies are needed to clarify the factors contributing to the very low incidence of type 1 diabetes in Macedonia.

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Relation between type 1 diabetes mellitus and atopy in childhood and adolescence: role of CD4 + CD25 + T Cells

M.H. El Samahy[1], R.M. Matter[1], M.M. Ismail[2] & M.S. El Sonbaty[1]
[1]*Ain Shams University, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University, Clinical Pathology, Cairo, Egypt*

Type 1 diabetes mellitus (T1D) is mediated by T helper 1 (Th1) cells whereas atopic diseases are characterized by a chronic inflammatory reaction mediated by T helper 2 (Th2) cells. We hypothesized that the prevalence in Th2-mediated disease would be lower in patients with Th1-mediated disease. CD4 + CD 25 + T regulatory cells modulate response to autoantigens and probably play a role in pathogenesis of T1D.

Objectives: To compare the prevalence of atopy in children and Adolescents with T1D and age-matched controls, associated risk factors and to assess role of peripheral blood CD4 + CD25 + T-cells.

Subjects and methods: Two hundred consecutive type 1 diabetic patients (aged 12.14 ± 4.25 years) were recruited from Diabetes Clinic, Children's Hospital, Ain Shams University, Cairo, Egypt and 150 sex-matched and age-matched non diabetic subjects (aged 12.01 ± 4.01 years) were screened for atopic symptoms including symptoms of bronchial asthma, allergic rhinitis and atopic dermatitis by special questionnaire. Investigations included mean random blood glucose, glycosylated Hb (HbA1c) and urinary microalbumin assay. Flow cytometric assessment of CD4 + CD25 + T regulatory cells was performed in randomly chosen 30 diabetics (15 atopic and 15 non-atopic) and 40 non diabetics (20 atopic and 20 non-atopic controls).

Results: Symptoms of atopy were reported less frequently in T1D compared to controls ($P < 0.001$). There was no significant difference between diabetics and either non diabetic atopic or non-atopic controls as regards the mean lymphocytes%, CD4/CD25% ($P > 0.05$). Mean CD25high% was significantly lower in diabetic patients compared to controls ($P < 0.001$) and in non atopic diabetics compared to other subgroups ($P < 0.001$).

Conclusions: These results indicate that patients with T1D have a lower prevalence of atopic symptoms, which is consistent with the Th1/Th2 polarization concept. The alteration in CD25 high T cell population may influence the pathogenesis of atopy in type 1 diabetes.

New Treatment Options

P/128/FRI

Flexible combination of rapid acting insulin analogue and regular insulin in prandial treatment of diabetes improves overall compensation

D. Neumann[1], J. Jones[2] & E. Mala[3,4]
[1]*University Hospital Hradec Kralove, Department of Pediatrics, Hradec Kralove, Czech Republic,* [2]*Royal Hospital for Sick Children (Yorkhill), Department of Child Health, Glasgow, UK,* [3]*University Hospital Hradec Kralove, Institute of Clinical Immunology and Allergology, Hradec Kralove, Czech Republic,* [4]*University Hospital Hradec Kralove, Department of Gerontology and Metabolism, Hradec Kralove, Czech Republic*

Objectives: Normal, square and dual-wave boluses delivered by insulin pumps for mixed meals are successful in improvement of an overall glycemic control. We assumed that similar effect could have flexible combination of rapid analogue and regular insulin, if used by educated subject using a patient friendly dual cartridge insulin applicator.
Methods: The hypothesis was studied on twelve (4 girls) lean type 1 diabetics aged 12–19 years, with 4.1 ± 2.4 years diabetes duration, after ethic committee approval and written informed consent.
Flexible combined prandial application of insulin aspart and regular insulin (CPIT) replaced a standard basal-bolus therapy, alternating three days of each, under provision of continuous glucose monitoring (CGM). Mixed-meals with high, high and low, and low glycemic index carbohydrates were covered using 3:1, 1:1 and 1:3 ratios of analogue to regular insulin, respectively. Average glycemia and areas under the curve of sample meals (donut, pizza, vegetable salad) were compared for CPIT and basal-bolus therapy. Six subjects extended CPIT treatment for next 3–4 weeks to compare A1c before and after the intervention.
Results: The average period of CGM was 100.3 hours. Mean glycemia differed between standard and experimental days by −1.9 mmol/l (10.1 ± 3.0 vs. 8.2 ± 2.6; $P < 0.001$). Duration of hyper- or hypoglycemia remained unchanged ($P = 0.14$ and $P = 0.35$, respectively). Postprandial areas under the curve for different sample meals were more favorable using experimental therapy ($P < 0.001$). Change in A1c was −0.4% of DCCT standard (8.3% vs. 7.9%, $P = 0.26$). A power analysis indicated a requirement of 46 subjects to confirm statistic difference for A1c.
Conclusions: Data show novel prandial insulin combination in line of effectiveness of an insulin pump injecting different prandial boluses. Technical construction of a dual cartridge insulin pen should be under debate.

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Development of insulin detemir/insulin aspart cross-reacting antibodies following treatment with insulin detemir in type 1 diabetes patients over 104 weeks

N. Thalange[1], A. Bereket[2], J. Larsen[3], L.C. Hiort[4] & V. Peterkova[5]
[1]*Norfolk & Norwich University Hospital, Jenny Lind Children's Department, Norwich, UK,* [2]*Marmara University School of Medicine, Division of Paediatric Endocrinology and Diabetes, Istanbul, Turkey,* [3]*Novo Nordisk A/S, Insulin Medical & Science, Soeborg, Denmark,* [4]*Novo Nordisk A/S, Soeborg, Denmark,* [5]*Institute of Paediatric Endocrinology, Endocrinological Research Centre, Moscow, Russian Federation*

Objective: To study the development of insulin detemir (IDet)/insulin aspart (IAsp) cross-reacting antibodies during 2 years IDet/IAsp treatment in children and adolescents aged 2–16 years with type 1 diabetes. To study glycaemic control, hypoglycaemic episodes and adverse events.
Methods: A 1 year controlled two-arm study comparing IDet/IAsp and NPH/IAsp was extended with a 1 year open-label, IDet/IAsp single-arm study. A total of 177 subjects were randomised for treatment and results are presented for the 146 subjects who continued in the extension arm for up to 2 years.
Results: The estimated level of cross-reacting antibodies increased during the first and decreased during the 2nd year of treatment. At end of study (EOS), the estimated antibody level (36.0% bound versus total (B/T) was slightly higher than at baseline (31.1% B/T) corresponding to a 9% increase from baseline. A similar pattern was seen for IDet- and IAsp-specific antibodies. At EOS no correlation was found between antibody level, HbA1c or insulin dose. From baseline to EOS mean HbA1c increased slightly from 8.43% to 8.74%, mean fasting plasma glucose decreased slightly from 8.18 to 7.71 mmol/l and median IDet dose increased from 0.41 to 0.61 U/kg. Median IAsp dose remained constant at ~0.48 U/kg. A total of 16 074 hypoglycaemic episodes were reported: Rate was 55.6 episodes per subject year of exposure. The majority were mild, daytime episodes. Six subjects reported 7 severe episodes and 28 reported 450 moderate episodes. A total of 714 adverse events were reported by 116 subjects. Seventeen severe adverse events were reported, four of which were assessed possibly or probably related to treatment.
Conclusion: In children and adolescents with type 1 diabetes two years of treatment with IDet/IAsp was associated with a slight increase and variation in cross-reacting and insulin-specific antibodies – increase in year-1 and decrease in year-2 – and no correlation to glycaemic control or insulin dose.

P/130/FRI

Effects of bay leaves on blood glucose and lipid profiles on the patients with type 1 diabetes

A. Aljamal
Zarqa Private University, Department of Faculty of Allied Medical Sciences, Zarqa, Jordan

Objective: The objective of this study was to determine if bay leaves may be important in the prevention and/or alleviation of type 1 diabetes.
Materials and methods: Fifty five people with type 1 diabetes were divided into two groups, 45 given capsules containing 3 g of bay leaves per day for 30 days and 10 given a placebo capsules.
Results: All the patients consumed bay leaves shows reduced serum glucose with significant decreases 27% after 30 days. Total cholesterol decreased, 21%, after 30 days with larger decreases in low density lipoprotein (LDL) 24%. High density lipoprotein (HDL) increased 20% and Triglycerides also decreased 26%. There were no significant changes in the placebo group.
Conclusions: This study demonstrates that consumption of bay leaves, 3 g/day for 30 days, decreases risk factors for diabetes and cardiovascular diseases and suggests that bay leaves may be beneficial for people with type 1 diabetes.
Keywords: Bay leave, Cholesterol, Diabetes, Triglycerides.

P/131/FRI

Beneficial effects of *Trigonella foenum-graecum* and its combination with sodium orthovanadate on preventing metabolite abnormalities in heart, muscle and brain of alloxan diabetic rat

P. Kumar, A. Taha, R.K. Kale & N.Z. Baquer
Jawaharlal Nehru University, Lab #215, School of Life Sciences, JNU, New Delhi, India

Objectives: Oxidative stress in diabetic tissues is accompanied by high level of free radicals and the simultaneously declined antioxidant enzymes status leading to cell membrane damage. In this study, the effect of sodium orthovanadate (SOV) and *Trigonella foenum-graecum* seed powder administration has been studied on blood glucose and insulin levels, antioxidant enzymes, lipid peroxidation, pyruvate kinase (PK), lactate dehydrogenate (LDH) and distribution of protein kinase C (PKC) in heart, muscle and brain tissues of the alloxan induced diabetic rats and to see whether the treatment with SOV and *Trigonella* is capable of reversing these effects.
Materials and 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.
Results: Blood glucose levels increased markedly in diabetic rats. Rats treated with combined dose of vanadate and *Trigonella* had glucose levels comparable to controls, similar results were obtained with the activities of PK, LDH, antioxidant enzymes and PKC in diabetic rats.
Conclusions: Our results showed that lower doses of vanadate (0.2 mg/ml) could be used in combination with *Trigonella* to effectively counter diabetic alterations without any toxic side effects. Therefore combined therapy can indeed be considered a better alternative to be explored further as a means of diabetic control.

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Appetite suppression with Caralluma fimbriata in patients with obese type 1 diabetes

B. Kalra[1], S. Kalra[1] & N. Agrawal[2]
[1]*Bharti Hospital, Karnal, India,* [2]*G R Medical College, Gwalior, India*

Caralluma fimbriata is a nutraceutical which contains various glycosides that reduce appetite, increase fat metabolism and reduce differentiation of fat cells. The herb has been used for centuries in India as an appetite suppressant.
This is a case series of four obese type 1 patients with poor appetite control, who were prescribed commercially available extract of Caralluma fimbriata to reduce appetite, and help achieve glycemic control. All four patients were girls aged 18 to 25 years, with duration of diabetes ranging from 4 to 16 years, who presented with poor glycemic control in spite of taking insulin in doses ranging from 0.6 to 1.0 U/kg body weight. Weight ranged from 54 to 68 kg, and body mass index from 22.47 to 28.33 kg/m^2. All volunteered a history of frequent dietary indiscretion, and complained that they were unable to control their food intake.
The patients were prescribed capsules containing Caralluma fimbriata 500 mg twice daily, 30 minutes before meals, for 2 months. All four patients had excellent reduction in appetite, as reported subjectively, as well as fall in number of dietary indiscretions, as reported objectively. There was a subjective lessening of craving for sweets and desserts. Weight reduction of 0.5 to 2.0 kg was noted over 2 months. Change in waist or hip circumference was not measured. Reversal of acanthosis nigricans was noted in one patient.
Glycemic control improved markedly in all four patients, with fasting plasma glucose falling by 18 to 38 mg%, and postprandial glucose by 58 to 120 mg%. HbA1c showed a reduction of 1.0% (from 9.9%) and 1.4% (from 12.4%) in the two patients it was done in at 2 months. No adverse events were reported. All patients wished to continue the medication. This abstract highlights the safety, tolerability and efficacy of Caralluma fimbriata as an appetite suppressant in poorly controlled type 1 diabetes. It's use is associated with improved glycemic control and weight loss.

P/133/FRI

Similar growth velocities in children with type 1 diabetes (T1D) treated with Glargine and NPH suggests lack of significant clinical effect of this insulin analog on the growth plate IGF-1 receptor

R. Román, V. Gallardo, P. Martínez, X. Gaete, F. Cassorla & E. Codner
University of Chile, Institute of Maternal and Child Research, Santiago, Chile

In vitro studies have shown that Glargine insulin has a higher affinity for the IGF-1 receptor than NPH, recently it has been subject of debate whether it can increase cancer risk in subjects with T2D.
Objective: We hypothesize that children receiving treatment with Glargine may exhibit higher growth velocity (GV) than children treated with NPH.
Methods: We studied GV during 1 year in 91 prepubertal children with T1D receiving treatment with Glargine or NPH as basal insulin. Children with genetic syndromes, coeliac disease, hypothyroidism and those receiving medications other than insulin or on honey moon were excluded from the study. GV was adjusted for age and gender based on Spanish standards and it is expressed as standard deviation scores (GV–SDS). The effect of the type of insulin treatment on GV–SDS, adjusted by gender, HbA1c, BMI and T1D duration, was determined by regression analysis. In addition, GV was evaluated in eight children who switched from NPH to Glargine and remained prepubertal (Wilcoxon's test).
Results: GV–SDS was similar in both groups. Regression analysis showed that adjusted for sex, HbA1c, BMI and years with T1D, Glargine did not have a significant effect on growth velocity. GV-SDS was inversely correlated with HbA1c in the Glargine group ($r = -0.4$, $P = 0.01$). In addition children who switched from NPH to Glargine, exhibited no change in GV–SDS (-0.1 ± 3.6 vs. -0.8 ± 3.2) and HbA1c level (%) (7.8 ± 0.5 vs. 8.3 ± 0.4).
Conclusion: Growth velocity is similar in children with T1D using NPH or Glargine insulin, suggesting that the *in vivo* effect of Glargine on the IGF-1 receptor does not appear to affect linear growth.

Table 1

Basal Insulin	N	Boys (%)	Age (years)	T1D duration (years)	Height (SDS)	BMI (SDS)	HbA1c (%)	Growth velocity (SDS)	Basal insulin dose (U/kg)
Glargine	38	63	8.9 ± 2.2	4.1 ± 2.7	-0.3 ± 1.1	0.6 ± 0.8	7.8 ± 0.9*	-0.2 ± 2.4	0.45 ± 0.2**
NPH	61	54	8.8 ± 2.2	3.3 ± 2.2	-0.1 ± 1.2	0.8 ± 1.0	8.3 ± 1.4	0.1 ± 2.0	0.62 ± 0.2

*P < 0.05, **P < 0.001.

P/134/FRI

Ease of use and acceptability of a new pen device for the administration of growth hormone therapy in paediatric patients

S. Mikkelsen[1], G.S. Fuchs[2], T.K. Knudsen[3] & A-M. Kappelgaard[4]
[1]*Novo Nordisk A/S, Prefilled Device Development, Hillerød, Denmark,* [2]*Novo Nordisk A/S, Insulin and Devices, Soeborg, Denmark,* [3]*Novo Nordisk A/S, PDS290 Development, Hillerød, Denmark,* [4]*Novo Nordisk A/S, Growth Hormone Scientific Marketing, Virum, Denmark*

Objectives: Human growth hormone (hGH) is used to treat several conditions associated with growth retardation and metabolic dysfunction. However, as many patients begin treatment at an early age, treatment adherence is a key concern. Therefore, it is vital that devices for hGH administration are simple to understand, easy to use, and well accepted by patients and their parents/guardians. This study assessed the usability and acceptability of a new device, Norditropin® FlexPro®, in paediatric patients with growth hormone deficiency (GHD).
Methods: Patients 10–18 years old, diagnosed with GHD and self-injecting hGH daily were included in the study. In total, 23% of the patients were left handed. A usability test in which patients used Norditropin® FlexPro® and NovoFine® needles to inject test medium into a foam cushion was conducted. After performing injections with two pens, patients were asked to assess their acceptance of the device by completing a questionnaire regarding pen performance before and during injection, ease of learning and comparison to currently used device.
Results: A total of 70 patients (mean age 14 years; 67% male) participated in the study. No differences between demographic characteristics (e.g. left-handed or right-handed) were found. Over 97% of patients found it ''easy'' or ''very easy'' to attach the needle, prime the device, dial up the dose and read the scale on the device. Almost all (98%) patients found it ''easy'' or ''very easy'' to inject their usual dose and a maximum dose (4 mg) and ''quite comfortable'' or ''very comfortable'' to push the dose button. All patients found it ''easy'' or ''very easy'' to learn how to use the pen and to hear the click while performing the injection. Overall, 64% of patients preferred Norditropin® FlexPro® over their current device; only 16% preferred their current device.
Conclusion: The Norditropin® FlexPro® is perceived as reliable and easy to use and is well accepted by children and adolescents with GHD.

P/135/FRI

The glycemic and peak incremental indices of honey, sucrose and glucose in patients with type 1 diabetes mellitus: effects on c-peptide level – a pilot study

M. Abdulrhman, M.H. El Hefnawy, R. Hussei & A. Abou El-Goud
National Institute for Diabetes & Endocrinology, Pediatric, Cairo, Egypt

Our study was a case-control cross-sectional study that was conducted on 20 children and adolescents suffering from type 1 diabetes mellitus and ten healthy non-diabetic children and adolescents serving as controls. The mean age of patients was 10.95 years. Oral sugar tolerance tests using glucose, sucrose and honey and measurement of fasting and postprandial serum C-peptide levels were done for all subjects in three separate sittings. The glycemic index (GI) and the peak incremental index (PII) were then calculated for each subject. Honey, compared to sucrose, had lower GI and PII in both patients ($P < 0.001$) and control ($P < 0.05$) groups. In the patients group, the increase in the level of C-peptide after using honey was not significant when compared with using either glucose or sucrose. However, in the control group, honey produced a significant higher C-peptide level, when compared with either glucose or sucrose. In conclusion, honey, because of its lower GI and PII when compared with sucrose, may be used as a sugar substitute in patients with type 1 diabetes mellitus.
Keywords: Honey, Diabetes, C-peptide.

Case Presentations

P/136/WED

Type 1 diabetes, sickle thalassemia in a toddler, case report in Saudi Arabia

S. El Kholy
King Fahad Military Complex, Paediatric, Dhahran, Saudi Arabia

Type 1 diabetes is exceeding rare in sickle cell disease patients and only few cases have been reported in literature. To date, no cases of type 1 diabetes have been reported in patients with thalassemia major. Diabetes secondary to haemosiderosis related to iron overload is recognised in long standing cases of chronic haemolytic anaemia after repeated blood transfusion and inadequate chelation of iron. We report Type 1 diabetes presenting as diabetic ketoacidosis in a 16-month-old female infant in the Eastern province of Saudi Arabia. The child is second in order of consanguineous parents and is known to have sickle thalassemia. There was positive family history of chronic haemolytic anaemia but no family history of diabetes in the family. On presentation, the child was sick, acidotic with pH of 6.5 and random blood glucose of 55 mmol/l. Physical examination revealed dehydration, acidotic breathing, but adequate growth parameters and no other signs of other systems involvement. She was admitted to paediatric intensive care and received insulin infusion then was transferred to paediatric ward then to our hospital for further care and diabetes education.

She was discharged well on insulin glargine once per 24–36 hours and meal time insulin analogues. Her carers were educated about management of hypoglycaemia including glucagon injection. The family was given psychological support to deal with diagnosis of diabetes on top of previous diagnosis of chronic haemolytic anaemia. The diabetes team was alerted to her multiple problems specially hypoglycaemia, possiblility of DKA and sickle crises and her challenging fluid management. In conclusion, we report for the first time, the co-existance of type 1 diabetes, and sickle thalassemia in such young age with aggressive presentation. The case presents challenges for management and long term care due to multiple morbidities, acceptance by family of multiple problems and compliance to many demanding disorders.

P/137/WED

Type 1 diabetes mellitus – insulin allergy – Crohn's disease

K. Nagy, P. Bódi & P. Sipos
Pandy Kalman County Hospital, Pediatric Department, Gyula, Hungary

Background and objective: Allergic reactions to insulin, though rare, can have serious consequences in children with type 1 diabetes mellitus. We report a case of insulin allergy in a 14-year-old child in whom insulin desensitization was accomplished using an insulin pump.During the diagnostic tests and laboratory investigations another autoimmune condition, an inflammatory bowel disease was recognized.

Methods and results: A 14-year-old boy with type 1 diabetes mellitus developed progressive allergic skin reactions to insulin on a basal-bolus insulin regimen. Similar skin infiltration developed after using other brands of insulin. He had eosinophilia and high total IgE level; inhalative and food specific IgE were negative. The Prick skin test, the Hungarian standard intradermal test, the full intradermal test with Novo allergy kits and the LTT were all negative. Consequently, we started to desensitize the patient by introducing a rapid acting insulin analogue regimen consisting of five small premeal bolus injections of insulin aspart. This resulted in some, but still unsatisfactory improvement, which prompted us to start insulin pump therapy. The small basal infusion rate served as a kind of"desensitization'' and the allergic skin reactions gradually disappeared.As an unexpected comorbidity, he developed periproctal abscess. The immunological investigations confirmed the suspected Crohn's disease and appropriate treatment was started.

Conclusion: Our case report demonstrated that continuous subcutaneous insulin infusion therapy with a portable insulin pump can be successfully used for insulin desensitization in selected children with serious skin allergy to insulin. The slow constant infusion rate provided by the pump may be an ideal means to achieve insulin desensitization. We also descibed a hitherto unreported association of type 1 diabetes, insulin allergy and Crohn's disease.

P/138/WED

An Egyptian case of congenital hyperinsulinism of infancy due to a novel mutation in KCNJ11 encoding Kir6.2 and response to Octreotide

E. Sherif[1], A. Abdelmaksoud[1], N. Elbarbary[1] & P. Njølstad[2,3]
[1]*Ain Shams University, Department of Pediatrics, Cairo, Egypt,* [2]*Haukeland University Hospital, Department of Pediatrics, Bergen, Norway,* [3]*University of Bergen, Department of Clinical Medicine, Bergen, Norway*

Introduction: Congenital hyperinsulinemia of infancy (CHI) is a rare disease characterized by inappropriate insulin secretion in the presence of hypoglycemia. Most cases are attributable to mutations in the pancreatic β-cell genes ABCC8 or KCNJ11 encoding the sulfonylurea receptor or potassium inward rectifier Kir6.2 subunits, respectively, of the KATP channel.

Case report: Our patient is a full term neonate of 1st cousin parents with a birth weight of 4000 g. In the first day of life, she became irritable with jitteriness and cyanosis, blood glucose level reached 20 mg/d, i.v. glucose administration and frequent feedings were necessary, bringing the glucose requirement to 16 mg/kg/min. Octreotide was initiated with gradual increase in dose up to 45 ug/6 hour. However, fluctuating BG persisted with values ≤20 mg/dl. Ultrasonography and MRI of the abdomen done at 2 weeks of age was unremarkable, apart from large size of pancreas for age. At one month of age, laparotomy and subtotal pancreatectomy with resection of tail and body of pancreas was done. Histopathology revealed islet cell hyperplasia. Post operatively, transient hyperglycemia was followed by persistent hypoglycemia so Octreotide was restarted at a dose of 10 ug/8 hour that stabilized the blood glucose level. Octreotide was discontinued at an age of 7 months, but hypoglycemic attacks relapsed 3 months later and re-administration of Octreotide at a dose of 10 ug/8 hour was warranted again followed by gradual withdrawal until subsided at 12 months old with no side effects noticed. Genetic screening revealed a novel mutation c.407 G > A [p.R136H] in KCNJ11 in the homozygous state. The parents were found to harbour the mutation in the heterozygous state. Our patient is now 14 months old thriving well with normal mental and motor milestones with current fasting glucose tolerance off octreotide ranging from 100–135 mg/dl. This is the first reported Egyptian case of CHI due to a mutation in KCNJ11.

P/139/WED

An Egyptian case with overlapping features of pigmented hypertrichotic dermatosis with insulin-dependent diabetes (PHID) syndrome and h syndrome due to a novel mutation in SLC29A3

M.A. Salem[1], N.S. Elbarbary[1], J. Molnes[2,3], E. Tjora[2,3], M.A. Habib[4] & P.R. Njølstad[2,3]
[1]*Ain Shams University, Department of Pediatrics, Cairo, Egypt,* [2]*Haukeland University Hospital, Department of Pediatrics, Bergen, Norway,* [3]*University of Bergen, Department of Clinical Medicine, Bergen, Norway,* [4]*Ain Shams University, Department of Dermatology, Cairo, Egypt*

Background: The SLC29A3 gene, encoding hENT3, a member of the equilibrative nucleoside transporter family (SLC29), has recently been found mutated in pigmented hypertrichosis with insulin-dependent diabetes mellitus (PHID) syndrome and H syndrome.
Case report: We describe a 19-year-old girl of consanguineous parents. At 5 years of age, she developed bilateral flexion deformity of interphalengeal joints. At the same time, she was diagnosed with insulin-dependent diabetes mellitus. At age 7 years, prominent, hyperpigmented patches appeared on the skin at lower limbs, genitalia, trunk, and lower back and upper chest. These patches increased slowly but steadily in size. On clinical examination, she had hepatosplenomegaly, generalized lymphadenopathy, heart dysfunction, hearing loss, hypogonadism, short stature and several characteristic dysmorphic features. Laboratory evaluation revealed hypergonadotropic hypogonadism. On pelvic sonogram there was hypoplastic uterus and no visible ovarian follicles. Her 15-year-old brother also had fixed flexion contractures of the feet, dysmorphic features, profound sensorineural hearing loss, but no diabetes. Sequence analysis revealed a homozygous mutation (c.300 + 1G > A) in the SLC29A3 gene in the girl.
Conclusion: This is to our knowledge the first reported Egyptian case with overlapping features of PHID and H syndrome and a mutation in SLC29A3.

P/140/WED

The Wolcott-Rallison syndrome: two new Moroccan cases

Z. Imane, S. Amhager, N. Bennani & A. Balafrej
University Children's Hospital, Rabat, Morocco

The Wolcott-Rallison syndrome is monogenic autosomal recessive diabetes involving neonatal diabetes and various features related to a mutation on the EIF2AK3 gene. HG born in October 1994 to consanguineous parents, was diagnosed with diabetes at 4 months. She was hospitalized in our formation for generalized osteoporosis at the age of 12 years. She presented a deformation of the lower limbs with impaired motricity and a severe growth failure (–3SD?) .Radiological assessment showed a diffuse bone dysplasia with generalized osteoporosis. Wolcott-Rallison syndrome was was based on the association of neonatal diabetes, osteoporosis and bone dysplasia, and confirmed by genetic testing (Molecular genetics Laboratory of Exeter, Pr Hattersley) which confirmed a mutation on the gene encoding EIF2AK3. KM was born in July 2005 to consanguineous parents, was admitted at the age of 6 months for diabetic ketoacidosis. The metabolic control is excellent under insulin. The evolution was marked by the occurrence of three episodes of hepatitis with acute liver failure of ontaneous regression. Given the association of neonatal diabetes and liver failure, the Wolcott-Rallison syndrome was discussed and confirmed by genetic study (Pr Hattersley laboratory, Exeter). These two observations demonstrate severity and polymorphism of WR syndrome and therefor could speak in favour of antenatal diagnosis in siblings.

P/141/WED

A case of infant with diabetes due to Kir6.2 mutation switching from CSII to oral sulfonylureas

N. Nagano[1], T. Urakami[1], Y. Mine[1], H. Watanabe[1], A. Yoshida[1], J. Suzuki[1], H. Saito[1], M. Ishige[1], S. Takahashi[1], H. Mugishima[1] & T. Yorifuji[2]
[1]*Nihon University School of Medicine, Pediatrics, Tokyo, Japan,* [2]*Kyoto University School of Medicine, Pediatrics, Kyoto, Japan*

Neonatal diabetes mellitus (NDM) may be caused by several different genetic disorders and can be transient (TNDM) or permanent (PNDM). Until recently, clinical management of most cases of PNDM required lifelong subcutaneous insulin treatment. However, some PNDM that are due to activating mutations in the genes that encode the K_{ATP} channel have been found to be amenable to oral sulfonylurea therapy. We describe a case of PNDM primary treated with insulin. The patient was a male with a birth weight of 2308 g, which is low for that gestational age. His blood glucose level rose to 705 mg/dl with ketoacidosis at 44 days after birth. We started CSII, and good glycemic control and adequate physical development could be achieved. We found that the patient had heterozygous activating mutations in KCNJ11, which encodes the Kir6.2 subunit of the K_{ATP} channel. It has been reported that an oral sulfonylurea is a useful treatment option in the management of NDM. We switched from CSII to oral glybenclamide therapy at 3 months after birth. A glybenclamide was started at 0.2 mg/kg/day in 3 divided doses while using CSII. As the glybenclamide dosage was increased, the frequency of the CSII bolus insulin administration was decreased. The target blood glucose concentration of 150–250 mg/dl was achieved with glybenclamide 0.8 mg/kg/day in 6 divided doses, and the CSII bolus insulin was no longer required. The patients had transitory diarrhea without any severe side effects from the sulfonylurea therapy. In our case, sulfonylurea therapy is considered to be safe in the short term for the early infant patient with diabetes caused by KCNJ11 mutations and could be more effective than insulin therapy. It is necessary to discuss which kind of sulfonylureas and how many times to take the medicine are most effective for the patient with NDM caused by Kir6.2 mutations. Also long-term follow up in glibenclamide treatment should be indispensable to evaluate the efficacy in the treatment.

P/142/WED

Epilepsia partialis continua (EPC) at presentation of type 1 diabetes mellitus with diabetic ketoacidosis (DKA) in a 1.5-year-old boy

V. Iotova[1], M. Zheleva[1], R. Ralcheva[1], V. Platikanov[2], B. Balev[3], W. Mladenov[1], M. Moskova[1] & B. Varbanova[1]
[1]*UMHAT, Department of Pediatrics, Varna, Bulgaria,* [2]*UMHAT, Department of Anesthesiology, Varna, Bulgaria,* [3]*UMHAT, Department of Radiology, Varna, Bulgaria*

Type 1 diabetes mellitus (DM) often segregates with other autoimmune diseases (autoimmune thyroiditis, celiac disease, etc.). Usually type 1 diabetes dominates and presents prior to the other diseases. One of the explored combinations is that with epilepsy which is equally frequent among children with and without diabetes. We present an extremely rare combination of EPC and type 1 DM in a 1.5-year-old boy. The disease debut is abrupt with a tonic-clonic seizure during the treatment of which initial DKA is diagnosed (C-peptide 129 pmol/l, HbA1c 9.3%). In the course of treatment seizures continued and the clinical

picture of EPC formed, with increasing epileptic status duration – up to 4–5 hours 2–3 times/24 hours, without antiepileptic gross therapy effect and with escalating right-hand site hemiparesis. At differential diagnosis and consulting with the international ISPAD network, the consensus about the etiology was reached as an autoimmune localized affect of the GABA-ergic neurons confirmed by the titer of GAD_{65} antibodies – 78.6 UI/ml. The prolonged treatment (>60 days) included i.v. Immunovenin, glucocorticoids, triple anticonvulsant therapy in maximal doses, incl. anti-GABA-ergics and adjuvant treatment. Insulin treatment was carried out with Glargin/Aspart due to the erratic feedings because of seizures and concomitant vomiting. Decisive for the cure was the long-term deep narcosis, after which the patient is free of epileptic symptoms. Hemiparesis is improving ever after and almost absent at the fourth month. The patient coped with a severe acute infection without seizure recurrence and reached partial remission. During the 6 months follow-up the boy had four short partial seizures, two of which coincided with low and two with high BGL. This patient demonstrates the complicated nature of the autoimmune diseases and the merits of the team approach to their treatment. The disease course underlines the importance of near-normoglycaemia for the normal brain functioning.

P/143/WED

CSII allows desensitization and diabetes treatment in a type 1 diabetic child with insulin allergy

C. Hasselmann[1,2], C. Pecquet[3], E. Bismuth[1], C. Raverdy[1], A. Sola-Gazagnes[4], J.-C. Carel[1] & N. Tubiana-Rufi[1]

[1]*Robert Debré University Hospital, APHP, Department of Endocrinology and Diabetology, Paris, France,* [2]*Tours University Hospital, Pediatric Diabetology Unit, Tours, France,* [3]*Tenon University Hospital, APHP, Department of Dermatology and Allergology, Paris, France,* [4]*Hôtel Dieu University Hospital, APHP, Department of Diabetology, Paris, France*

Objectives: Insulin allergy is a rare condition that can have serious consequences in patients with type 1 diabetes (T1D). We report a case of insulin allergy in a 7-year-old boy, whom we tried to desensitize by using continuous subcutaneous insulin infusion (CSII).

Case report: Three months after being diagnosed with T1D, a 7-year-old boy developed progressive skin reactions to insulin, small 1.5 cm-pruritic wheals at the injection sites that persisted for several days. Seven months after diagnosis, he experienced two episodes of generalized urticaria occurring a few seconds after his insulin injection. Intradermal skin tests were positive to protamine, glargine and lispro. Specific insulin IgE antibodies were present. He was started on a CSII protocol (very low basal rate, raised progressively, first boluses under medical supervision), which was perfectly tolerated for 4 months. After this period of time, the skin wheals reappeared localized on the infusion sites, without urticaria or any other generalized reaction. Intradermal skin tests were repeated and, again, positive. Blood glucose control remained fairly good (HbA1c 7.6%).

Conclusion: CSII can be used in insulin allergy to induce insulin tolerance and allow diabetes treatment, but insulin desensitization cannot always be fully achieved by using CSII.

Diabetes Genetics, Immunology

P/144/FRI

Mutational analysis in patients with a clinical maturity-onset diabetes of the young (MODY) phenotype

A. Salina, C. Aloi, E. Calandra, F. Lugani, G.M. Ghiggeri, G. d'Annunzio & R. Lorini
G Gaslini Istitute, Genoa, Italy

Background: MODY is a monogenic form of diabetes mellitus, metabolically and clinically heterogeneous. MODY has been estimated at less than 5% of patients diagnosed as type 2 diabetes in most white populations. At least six different genetic molecular defect in genes are responsible for the majority of MODY. Glucokinase (GCK/MODY2) mutations are the most common cause of MODY in southern European populations, while in northern Europe, Hepatocyte Nuclear Factor-1a (HNF1A/MODY3) variations play the major role.
Objective: The aim of this study was to determine the genotype of patients with clinical diagnosis of MODY, in order to establish the proper therapeutic intervention and to better define the epidemiological profile.
Population and methods: On a population of 39 families with MODY phenotype we considered: presence of mild elevated fasting plasma glucose, impaired glucose tolerance test, early onset (<25 years), family history with a vertical transmission, absence of β-cell autoantibodies. Twenty-eight families were screened respectively for glucokinase gene (GCK/MODY2) and 11 families for hepatocyte nuclear factor-1α (HNF1A/MODY3) gene by direct sequencing.
Results: GCK mutations were detected in 22 patients with clinical MODY diagnosis; six mutations were novel (c.1279_1358delinsTTACA, c.1103_1122_del_19nt, c.859 C > T, c.1111 T > C, c.1229 G > T; c.679 + 5G > C,). The deletion c.1027_1029del2 in HNF1A gene was detected in one family with clinical MODY3 diagnosis.
Conclusion: Genetic diagnosis is mandatory in young patients with MODY phenotype, in order to establish correct treatment program and genetic counselling. Our data showed the highest GCK/MODY2 prevalence (78.6%) never reported in other Italian studies, while HNF1A/MODY3 frequency was in agreement with other results on South European population.

P/145/FRI

Early onset of type 1 diabetes mellitus is associated with p53 codon 72 polymorphism

M.L. Manca Bitti[1], P. Saccucci[2], F. Capasso[3], S. Piccinini[1], F. Angelini[3], A. Petrelli[1], E. Bottini[2] & F. Gloria-Bottini[2]
[1]*Tor Vergata University, Pediatric Diabetology, Rome, Italy,* [2]*Tor Vergata University, Rome, Italy,* [3]*Tor Vergata University, Pediatric, Rome, Italy*

Objectives: In a recent study on children with Type 1 diabetes (T1D) (mean age at onset 13 years) it has been observed that p53 pathways are upregulated and that there is an increased susceptibility to apoptosis. Since arginine variant of p53 codon 72 polymorphism is a strong apoptosis inducer we have investigated a possible association of this polymorphism with age at onset of T1D.
Methods: A total of 270 children with T1D were studied in the Italian population of Rome. A control sample of 730 individuals from the same Italian population was also studied. p53 codon 72 polymorphism was evaluated by the restriction fragment lenght polymorphism polymorphism polymerase chain reaction method described by De La Calle-Martin.
Results: The table shows a significant increase of *Arg/*Arg variant in children with an early onset (≤6 years) of diabetes (P = 0.022). The streght of association is decreasing with age at onset and it is absent in subjects with an onset after 12 years.
Conclusion: The data suggest that *Arg/*Arg variant of p53 codon 72 polymorphism probably increases the susceptibility to T1D (OR = 1.74 C.I. 95% 1.09–2.78) in preschool children and that apoptosis may have an important role in early onset T1D.

Age at onset	*Arg/ *Arg	*Arg/ *Pro	*Pro/ *Pro	Total (n)	Comparison with controls	*Arg allele	Total (n)	Comparison with controls
≤6 years	62.4%	33.3%	4.3%	93	P = 0.022	79.0%	186	P = 0.006
>6 ≤ 12 years	57.3%	36.3%	6.5%	124	P = 0.132	75.4%	248	P = 0.047
>12 years	47.2%	39.2%	13.0%	53	P = 0.879	66.9%	106	P = 0.761
Controls	46.8%	40.3%	10.9%	730		68.9%	1460	

[p53 codon 72 polymorphism and age at onset of T1D.]

P/146/FRI

Identification of a novel mutation in five patients with Wolfram syndrome phenotype

C. Aloi[1], A. Salina[1], L. Pasquali[1], C. Russo[1], F. Lugani[1], G.M. Ghiggeri[1], S. Toni[2], R. Lorini[1] & G. d'Annunzio[1]
[1]*G Gaslini Istitute, Genoa, Italy,* [2]*Pediatric Hospital A. Meyer, Florence, Italy*

Background: Wolfram Syndrome (WS) is an autosomal recessive neurodegenerative disorder characterized by diabetes insipidus, diabetes mellitus, optic atrophy, and deafness. On the short arm of chromosome 4 is located the Wolframin gene (WFS1), which encodes a transmembrane protein and whose mutations are responsible of the syndrome. WS is a rare disease, with an estimated prevalence of 1/770.000 live births, and a carrier frequency of 1/354.
Objective: The aim of this study was to determine the genotype of WS patients in order to establish a genotype/phenotype correlation.
Population and methods: We longitudinally evaluated five children from five unrelated Caucasian families (3 males, 2 females). Basic criteria for WS clinical diagnosis were coexistence of insulin-treated diabetes mellitus and optic atrophy occurring before 15 years of age. Genetic analysis for WS was performed by direct sequencing of WFS1 gene.
Results: Mutational screening, conducted in our Laboratory during one year period, revealed four heterozigous compound variants and a homozigous one. All of them were located on the exon 8: eight were previously described and one, the c.2663 C > A that creates a truncate protein of 888 aminoacids, was novel.
Conclusions: Our study increases the spectrum of WFS1 mutations. A genotype/phenotype correlation is difficult, because the same mutation may cause different phenotypes. The male patient with the mutation [c.1060_1062delTTC] + [c.2663 C > A] showed the most severe phenotype: he showed diabetes mellitus at 4 yrs of age, and at 9 1/2 years optic atrophy (visual acuity 5/10), diabetes insipidus, deafness with deep auditory bilaterally 8000 Hz associated to reduced volume of neurohypophysis, optic nerves, and pons.

P/147/FRI

HNF1B gene mutations causing MODY 5 phenotype

G. d'Annunzio, A. Salina, C. Aloi, L. Pasquali, G.M. Ghiggeri, R. Lorini
G Gaslini Istitute, Genoa, Italy

Background: The HNF1B/MODY5 (Maturity-Onset Diabetes of the Young Type 5) is a clinical condition characterized by pancreatic b-cell dysfunction, renal malformations, and in some patients genital malformations. The disease has an autosomal dominant mode of inheritance and is characterized by mutations in the gene coding for the embryonic transcription factor HNF1B also called TCF2. Several molecular variants are described including missense, nonsense, splicing site mutations insertion and deletion. In addition, approximately 60% of patients with HNF1B/MODY5 clinical phenotype resulted negative at the direct sequencing analysis and showed extensive heterozygosity rearrangement of the gene, which are beyond the normal methods of gene screening.
Objective: The aim of our work was to characterize 4 patients (2 males and 2 females) with clinical phenotype of HNF1B/MODY5.
Methods: HNF1B gene was analyzed for mutations by direct sequencing. The presence of heterozygous deletion was detached by Multiplex Ligation-dependent Probe Amplification (MLPA).
Results: Two patients (case 1, a girl, and case 2, a boy) showed respectively a missense mutation N146K on the exon 2 and G239R on the exon 3. Both variations alter the DNA binding domain of the protein. The case 3, a girl, has a deletion of 4 bases in the intron 3 c.544 + 4delAAGT, altering the splicing process causing the exon skipping or other defects. Case 4, a boy, was negative at the direct sequencing; moreover MLPA analysis revealed a heterozygous deletion of the entire gene.
Conclusion: MODY5 clinical phenotype shows a wide spectrum including alterations of glucose metabolism and renal impairment. We underline that HNF1B gene molecular analysis must include detection of gene deletion by MLPA assay in order to define the complete and correct molecular diagnosis.

P/148/FRI

Newly diagnosed type 1 diabetes is associated to intrafamilial enterovirus infections

A. Salvatoni[1], G. Bianchi[1], G. Maccari[2], G. Federico[3], A. Baj[2] & A. Toniolo[2]
[1]*University of Insubria Medical School, Pediatric Endocrinology Unit, Varese, Italy,* [2]*University of Insubria Medical School and Ospedale di Circolo, Laboratory of Microbiology, Varese, Italy,* [3]*University of Pisa Medical School, Pediatric Endocrinology Unit, Pisa, Italy*

Objectives: The incidence of type 1 diabetes (T1D) is growing worldwide. Literature suggests that infection by different enteroviruses (EVs) may be linked to the early stages of T1D. EVs belong to the family of picornaviruses, over 100 EV serotypes are reported, and these agents are transmitted mainly through the fecal-oral route. We evaluated the possible intrafamilial spread of EVs at the time of clinical onset in 20 consecutive T1D cases.
Methods: Patients and consenting first-degree relatives have been investigated. EVs have been searched in blood by classical virology methods (virus isolation in cultured cell lines) and molecular methods aimed at amplifying genomic regions conserved among different types (5'UTR, 3'UTR, and 3D).Diabetes-associated autoantibodies (IA-2, GAD-65, insulin, ZnT8) were also determined.
Results: Low-level EV infectivity and genome fragments have been detected in the blood of over 80% of patients, and in at least 60% of first degree relatives. Partial genome sequencing indicated that EVs of the B species (echoviruses and coxsackie B viruses), as well as members of the C species (especially coxsackie A viruses) were present. Detection of these agents was confirmed by immunofluorescence using monoclonal antibodies directed to common epitopes of the VP1 capsid protein. In all cases, the same EV species were detected in diabetic children and their first-degree relatives. It is noteworthy that, in two families, diabetes developed also in siblings of the affected proband with a latency of 3 to 9 months.
Conclusions: These data do not prove a causal relationship between EVs and T1D. The results, however, document that EVs frequently spread within families at the time of diabetes onset and suggest that EV infections may represent a significant biomarker of early stage disease. Acknowledgments: We gratefully acknowledge support from CARIPLO Foundation (Milan, Italy) and Avv. Gianni Valcavi† (Varese, Italy).

P/149/FRI

C-peptide as surrogate therapeutic marker for a successful outcome

P. Pozzilli
Università Campus Bio-Medico di Roma, Roma, Italy

Numerous studies have highlighted the relevance of residual beta cell function measured by fasting and stimulated C-peptide in patients with Type 1 diabetes (T1D). In particular patients who maintained a C-peptide secretion >0.2 nM few years after diagnosis show better metabolic control as evaluated by HbA1c and a reduced risk of developing long term complications. Immune intervention soon after clinical diagnosis of T1D to protect residual beta cell function is therefore a field of great and increasing interest. Ongoing trials currently use C-peptide measurement as the main end point parameter for an effect of a given treatment. The absolute C-peptide levels reached as an indicator of residual B-cell function as well as the percentages of T1DM patients achieving a certain fasting and stimulated C-peptide endpoint 1 or 2 years after diagnosis vary considerably between studies. This is due to a number of critical factors including, among the most relevant ones, age at disease onset, basal and stimulated C-peptide response at diagnosis, genetics including human leukocyte antigen (HLA) genotype, sample size, severity of metabolic decompensation at diagnosis, presence of insulin resistance, insulin usage and whether near-normal glycemia (with HbA1c consistently <7%) is obtained with intensive therapy, which may strongly influence the outcome of the therapeutic intervention.
At present there are no definitive indicators that identify individuals with a slow versus a more rapid loss of insulin secretion over time and the factors that may predict these changes remain to be better investigated prospectively.
There is clearly the need to know more about the natural decline of C-peptide in T1D from diagnosis over the years in patients diagnosed at different age (before or after puberty) independently of any treatment.

P/150/FRI

Vitamin D insufficiency in a Brazilian type 1 diabetes mellitus pediatric population

R. Savoldelli, M. Ybarra, F. Fontan, T. Della Manna, H.C. Menezes-Filho, L. Steinmetz & D. Damiani
Pediatric Endocrinology Unit – Instituto da Criança – HCFMUSP, São Paulo, Brazil

Introduction: Low levels of vitamin D (VitD) may be associated with increased risk of fractures in patients with type 1 diabetes mellitus (T1DM) in adulthood.

Objective: To evaluate the adequacy of VitD in a pediatric and adolescent T1DM population.
Methods: Children and adolescents (n = 117) with T1DM followed up at an outpatient clinic were evaluated for 25OH VitD levels, PTH, urine calcium and HbA1c and compared regarding gender, age, metabolic control and duration of desease. Deficiency, insufficiency and sufficiency of VitD were characterized respectively by the concentrations of 25OHVitD < 10, 10–30, and >30 ng/ml. Non-parametric t test or chi square test were used when appropriated and $P < 0.05$ was considered significant.
Results: VitD insufficiency was found in 75% of patients. No VitD deficiency was diagnosed. Patients with VitD insufficient levels had higher mean age (11.9 years ± 6.0 vs. 9.9 ± 7.6, $P < 0.05$), longer disease duration (7.5 years ± 7.0 vs. 5.4 ± 5.8, $P < 0.05$) and higher levels of HbA1c (9.8 ± 4.34% vs. 8.7 ± 4.3%, $P < 0.05$) when compared with patients with sufficient levels of 25OHVitD. No significant differences were found in the other variables.
Conclusion: In this population we found 75% VitD insufficiency, which was associated with older age, worse metabolic control and longer duration of disease.

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High prevalence of vitamin D deficiency in a subgroup of adolescents with type 1 diabetes

Y. Yeshayahu[1,2], E.B. Sochett[1,2], S. Sud[1] & F.H. Mahmud[1,2]
[1]*The Hospital for Sick Children, Division of Endocrinology, Toronto, Canada,* [2]*University of Toronto, Toronto, Canada*

Objectives: To characterize the state of vitamin D in adolescents with T1D who live in Toronto – a multicultural city in northern latitude of 43°, and to determine whether our data compares to healthy Canadian adolescents.
Methods: Adolescents with T1D for at least 2 years, aged 12–18 years followed in our clinic were enrolled in the study between January and March 2010, and information including ethnicity and use of supplements was self reported by patients. Additional data including duration of disease was extracted from the charts. Serum levels of 25-hydroxyvitamin D (25-OHD) were obtained, and results were compared to the 2010 Statistics Canada publication of healthy adolescents.
Results: A total of 270 patients were enrolled, 50.2% males and 49.8% females, ethnic distribution was 56.2% Caucasian, 20.5% Black, 5.9% Asian, 9.1% south Asian, 5.8% Latin American, 2.7% mixed. Average 25-OHD was 59.9 nmol/l compared to 68.1 nmol/l in the healthy group ($P < 0.0001$). Prevalence of D deficiency (<37.5 nmol/l) was higher in the diabetes group (17% vs. 12%). 17% were deficient, 51% were insufficient (37.5 < 25-OHD<70) and 32% were sufficient (>70). Prevalence of deficiency was significantly higher in the black population compared to Caucasians (44.4% vs. 5.7%), and the opposite for prevalence of sufficiency (11.1% in Black vs. 43.1% in Caucasians). The sufficient group comprised of 8% Blacks vs. 82% Caucasians, and the deficient group comprised of 45% Blacks and 16% Caucasians. No correlation was seen between disease duration or HbA1c and 25-OHD levels.
Conclusions: This descriptive data demonstrates the high prevalence of vitamin D deficiency in our population with T1D as compared to healthy Canadian population, recently reported, with similar ethnic distribution and geographical location. Deficiency is significantly higher in ethnic minorities as compared to Caucasians, for which routine screening for vitamin D levels and supplementing during winter should be considered.

P/152/FRI

First trimester serum cytokine levels and the development of autoimmune disease in offspring

M. Fex[1], S. Björck[1], K. Lynch[1], C. Brundin[1], K. Marsal[2], D. Agardh[1] & S. Resic Lindehammer[1]
[1]*Lund University, Clinical Science, Malmö, Sweden,* [2]*Lund University, Clinical Science, Lund, Sweden*

Objectives: Pregnancy involves local and systemic changes in the balance between the Th1 and Th2 immunological response. It is generally accepted that pregnancy is mediated by a Th2 response inducing tolerance in the mother against the fetal allograft. Several studies suggest that a shift in the Th1/Th2 balance during pregnancy caused by underlying environmental factors could be associated with post-partum autoimmune disease in the offspring. In this study we used Celiac Disease as a model, to investigate if autoimmunity is triggered already *in utero* during early pregnancy, observed as changes in the mother's cytokine profile.
Methods: Ten cytokines were measured by electro chemiluminiscent multiplex ELISA in serum samples obtained from mothers during the first trimester. Cases included women with children who before the age of 5 developed verified Celiac disease. Matched controls were selected based on age, Celiac disease associated HLA genotype and serum sampling date.
Results: We observed that seven out of ten cytokines were significantly increased in the cases when compared to matched controls. Five of the cytokines were Th1 mediated (TNFalfa, IFNg, IL-2, IL-1*beta*, IL-12), and two were Th2 mediated cytokines (IL-13 and IL-10). In the matched case-control analysis, the three top cytokines were shown to be: TNF*alfa* ($p = 0.002$), IL-13 ($p = 0.002$) and IFN*gamma* ($p = 0.005$) which all were all elevated in the case group.
Conclusion: A delicate balance between Th1/and Th2 mediated cytokines is required to ensure a successful pregnancy. However, changes in this balance could predispose the fetus to future disease. In this study we show that autoimmunity in children is triggered already during early pregnancy and can be observed as quantitative changes in the serum cytokine levels of pregnant mothers.

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Preparation, distraction and clinical care of children with multiple islet autoantibodies participating in DiAPREV-IT, the first prevention trial with Alum-GAD

C. Nilsson, G. Hansson, H. Elding Larsson & for the DiAPREV-IT Study Group
Region Skåne, Lund University, Malmö, Sweden

Objectives and aims: Type 1-diabetes (T1D) is predictable by HLA-risk genotypes and islet autoantibodies. The subclinical phase is defined by islet autoantibodies against GAD65 (GADA), IA-2, insulin or ZnT8. A gradually deteriorating glucose metabolism precede clinical onset. Children with genetic risk of T1D are followed prospectively in the Diabetes Prediction in Skåne (DiPiS) and The Environmental Determinants of Diabetes in the Young (TEDDY) studies. Immune tolerance with Alum-GAD (Diamyd) has shown promising results to preserve residual beta-cell function in newly diagnosed T1D children. Diabetes Prevention -Immune Tolerance (DiAPREV-IT) is the first prevention study aiming to evaluate efficacy and safety of Diamyd in non-diabetic children with islet autoantibodies.
Methods: DiAPREV-IT is an investigator-initiated, placebo-controlled, double-blinded study of Diamyd in children with GADA and at least one additional islet autoantibody. Children

from 4 years of age (n = 50) recruited from DiPiS and TEDDY is treated with placebo (n = 25) or Diamyd (n = 25) in two doses of 20 μg. Placebo children developing T1D will be treated with Diamyd at clinical onset. The children are followed every third month with blood sampling, IVGTT and OGTT to evaluate beta-cell function. Preparing and distracting the child to ensure cooperation during IVGTT, OGTT and the blood sampling is of importance. The procedure varies due to the child's age and previous experiences.

Results: A total of 25 children participate and screening for participation is ongoing. No serious adverse events are reported. Both blood sampling and glucose-tolerance tests are tolerated well by the children. The families appreciate the homelike environment and the successful distraction procedures.

Conclusion: DIAPREV-IT is the first prevention study with Diamyd in non-diabetic children with multiple islet autoantibodies. Preparation and distraction are important to retain the families during the 5 year study period.

Diabetes from Devloping Countries

P/154/WED

The effectiveness of photographic educational material on carbohydrate counting for adolescents with diabetes

A.S. Gandolfo[1], A.A. Ferraro[2], D.V. Bastos[3], B.A.J. Makluf[3], L.D.C.L. Neri[1], R.D. Savoldelli[4], T.D. Manna[4] & D. Damiani[4]
[1]*Instituto da Criança – HCFMUSP, Nutrition Department, São Paulo, Brazil,* [2]*Faculdade de Medicina da USP, Pediatric Department, São Paulo, Brazil,* [3]*Universidade Federal de Alfenas, Alfenas, Brazil,* [4]*Instituto da Criança – HCFMUSP, Endocrinology Unit, São Paulo, Brazil*

Objective: To evaluate the effectiveness of photographic educational material on carbohydrate counting for adolescents with diabetes.
Research method: The sample of 76 adolescents with diabetes, was randomly distributed between groups of those who received orientation on carbohydrate counting with photographic educational material (photo) or with a list of foods equivalent (list). Research followed by three steps. First, data were collected on age, gender, BMI, HbA1c, schooling, type of educational material and parents average grade level; answer sheets were applied to evaluate previous knowledge on carbohydrate counting; orientation provided on counting with photo or list. Second, after a month of using each educational material, a quiz by phone was conducted with the main intention of reinforcing orientation. Third, two days later, adolescents were directed to the experimental kitchen to interact with portions of real food and provide answers on amount of carbohydrate. Results were analysed by a nonparametric statistics *t*-test ($P < 0.05$ significant).
Results: Fifty four adolescents finished the research, 79.70% were female. The mean age was 13.81 ± 1.96 years, BMI 21.01 ± 3.2 kg/m^2, schooling 7.94 ± 1.48 years. The parent's schooling 8.03 ± 3.77 years. The photo was distributed to 51.8% of the sample while the list to 48.1%. Both groups achieved equivalent scores to tests applied to evaluate previous knowledge. The mean of the difference between the number of correct answers before and after the intervention with the group exposed to photo was significantly different from that of list group (photo: 2.24 vs. list: 0.96 $P = 0.02$). However, no changes in HbA1c were noticed after using the education material (before: photo 10.01 ± 1.87% vs. list 9.95 ± 2.35% and after: photo 10.58 ± 2.31% vs. list 10.44 ± 1.69%).
Conclusion: The photographic educational material was the most effective tool in this group of adolescents with diabetes to understand and apply on carbohydrate counting.

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HbA1c Levels of Indonesia Diabetic Children with Intensive Insulin Regiment

A. Girimoelyo[1], R. Purbasari[2], F. Soesanti[3], B. Tridjaja[3], J.R. Batubara[3] & A.B. Pulungan[3]
[1]*Sebelas Maret University/Moewardi Hospital, Department of Child Health, Surakarta, Indonesia,* [2]*Pediatric Endocrinology Working Groups of Indonesia, Jakarta, Indonesia,* [3]*Indonesia University, Department of Child Health, Jakarta, Indonesia*

Background: Glycemic controls are the goal of diabetic management in children. One parameter of them is the level of HbA1c. It has not been known yet in Indonesia diabetic children, wether intensive insulin regiment have a better HbA1c level or not.
Objectives: To compare HbA1c levels between intensive and conventional insulin regiment. Also, to find out possibility of other risk factors for HbA1c level in Indonesia Diabetic Children.
Methods: A national survey was conducted from April 2006 to February 2010 to Indonesia diabetic children. Data were collected by interview via phone to the parents and secondary data from medical records. Subjects with no data of HbA1c level at registration or duration of illness less than 3 months were excluded. HbA1 levels were classified into three groups: optimal (<7.5%), suboptimal (7.5–9.0%), and high risk (>9.0%).
Results: Of all 403 diabetic children in Indonesia, only 83 subjects fulfill the criteria. There are 34 (41%) subjects with intensive insulin regiment. Seventeen subjects (20.5%) have no history of diabetic ketoacidosis. The HbA1c levels (optimal, suboptimal, high risk) for conventional regiments are 11 (22.4%), 14 (28.6%), 24 (49.0%) subjects respectively, and for intensive regiments are 9 (26.5%), 11 (32.4%), and 14 (41.2%) subjects ($P = 0.78$, χ^2 test). Relative risk of intensive regiment to have a non-high risk HbA1c level is 1.43 (0.95–2.14). The relative risk to have a high risk HbA1c level for MDI, basal bolus and insulin pump are 0.78 (0.37–1.65), 1.17 (0.68–1.99); and 0.29 (0.05–1.83), respectively. The risk factors for HbA1c level, e.g. age, sex, body mass index, duration of illness, frequency of HbA1c measurement, and frequency of DKA are statistically not significant.
Conclusion: Intensive insulin regiment have a better HbA1c level than conventional one. The MDI and insulin pump have a better non-high risk HbA1c level than BID.
Keywords: Intensive, Conventional, Insulin regiment, HbA1c, Risk factors

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Diabetes care for resource limited settings [D4RLS]: paradigm of childhood/insulin dependent diabetes in India

P. Krishnamurthy, S. Geetha Rao, U. Rangaraj, B. Naik, T. Deepak, A. Sharda, S. Srikanta & Samatvam Endocrinology Diabetes Center – Diabetes Collaborative Study Group
Jnana Sanjeevini Medical Center, Diabetes Nursing Education Research, Bangalore, India

Over the last three decades, focusing on childhood/type 1 diabetes, we have continued to innovate and implement several health care programs/strategies [Project DISHA] to provide best possible care to all socioeconomic segments of the society.
Insulin Lifeline: 1994 – Support of 600 plus (Karnataka State total population 53 million) – FREE Childhood Diabetes Clinic, insulin and syringes, health education counseling. Rationed SHBGM: 2006- Free meter and 5–10 BG strips/month; extra strips for infants, toddlers and major medical emergencies; coupled urine glucose testing; routine HbA1c still unaffordable. Insulin PLUS education: 2009 – Full support towards school and college education, employment placement services through good samaritans; special emphasis- girl child. Clinical followed by biochemical thyroid screening: 1994 – TSH screening on a selective basis. Lower cost insulin pump therapy: 2002 – Extension of the reach to ''middle'' class, by the use of refurbished pumps, basic ''new'' competing pumps, subsidied supplies [50% cost reduction]. Patient parent support groups: 1987 – Juvenile Diabetes Society, DISHA Stars; information technology enriched diabetes health care; 24 hour helplines; peer and family support model. Social engineering

and cost cross subsidy model: 2003 – Revenue generated from upper socioeconomic classes supports expenses related to lower classes [financial viability].

Conclusion: Over the last three decades, through many creative programs, we have struggled to improve the lives of children with diabetes in India, with a specific focus on lower-income population segments. Methodologies that combines empathy, creativity and rationality to meet user needs and create innovative solutions have been implemented [''Human-Centered'' approach: begins by examining the needs, dreams, and behaviors of the people to whom the solution is aiming to help; seeks to listen and understand what is wanted at the grassroots level.]

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Diabetes mellitus education for mothers, part of prevention of diabetes mellitus for children in Kediri, Indonesia

M.J. Fero

Yayasan Peduli Sesama, Diabetes Mellitus Education, Kediri, Indonesia

Objective: Main objective is to prevent Diabetes Mellitus on mothers, children and family. Specific: to give Diabetes Mellitus education to mothers so that they will be able to give the same education to their children or youngsters, so that those children or youngsters will know how to prevent Diabetes Mellitus. The other objective is that the participants who have been trained through DM training will be able to train other mothers who have not been trained.

Methods: Through DM Trainers Training, during the Project period December 2005 to November 2008 there had been trained 1560 mothers. The materials that had been trained during the training among others were DM basic information, DM treatment, how to inject insulin, nutrition for DM patients, how to give information on DM back to other people, role play and DM gymnastics.

Result: There had been trained 1560 mothers through 52 training periods. Therefore the participants who have been trained through DM training will be able to train other mothers who have not been trained.

Conclusion: To train children or youngsters on DM, we think it is easier and faster through mothers, because generally mothers are closest to their children or youngsters, beside that mothers have sufficient time to be with their children or youngsters compared to fathers. This project funded by World Diabetes Foundation.

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"Rationed shbgm" – limited self home blood glucose monitoring in improving metabolic control in economically disadvantaged children with type 1 diabetes in India: discipline "compensation" for poverty

S. Geetha Rao, P. Krishnamurthy, U. Rangaraj, B. Naik, T. Deepak, A. Sharda, S. Srikanta & Samatvam Endocrinology Diabetes Center – Diabetes Collaborative Study Group

Jnana Sanjeevini Medical Center, Diabetes Nursing Education Research, Bangalore, India

SHBGM is unaffordable to majority of children with type 1 diabetes, in poorer societies. One or two random, mostly erratic, and virtually non-informative BG measurements taken at the time of their monthly/quarterly clinic visits, are used by doctors to ''guess and adjust'' approximate insulin doses till their next clinic visit. ''Project DISHA'' FREE ''Insulin Lifeline'' 1994; 600 children: Since 2006, we added ''RATIONED SHBGM'' [free meter, 5–10 BG strips/month; extra strips for infants, toddlers, emergencies]. Children/parents were counseled to record a ''representative'' 7 point BG profile [before after breakfast BB AB, lunch BL AL, dinner BD AD and 3 am MN], spread over 4–6 weeks. This was on the background of forced/regimented life style [diet/activity] and four doses of insulin/day [premeal regular and bedtime NPH]. ''RATIONED SHBGM'' [n = 112; VL, L, M] data, were compared with ''UNLIMITED SHBGM'' [n = 52; U] from a group of affluent children [80% on pump therapy]. Socioeconomic status SES groups:

Very low [VL], low [L], middle [M] and upper [U]. Table: BG mg/dl. Most gratifyingly, VL group [predominantly rural – likely most disciplined and compliant] children could achieve SMBG profiles comparable to the U group.

Conclusion: RATIONED SHBGM, improves glycemic control in resource limited settings. In their struggles towards euglycemia, one way these youngsters ''compensate'' for the infrequent SHBGM readings, is intense discipline, sacrificing flexibility and ''enjoyment'' [basic aspirations of every child or adolescent].

SES	%	BB	AB	BL	AL	BD	AD	Mean	Change
VL initial	24	202	214	179	188	196	179	193	
VL later		139	143	136	166	150	148	137	56
L initial	24	247	214	240	238	193	214	224	
L later		149	140	132	146	157	139	135	89
M initial	20	285	314	184	293	253	286	269	
M later		180	180	144	195	190	199	161	108
U initial	31	191	213	215	189	220	233	210	
U later		136	164	139	156	147	176	149	61

[SHBGM]

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Clinico-epidemiological study of type 1 diabetes mellitus in Egyptian children and adolescents

M.A. Salem[1], A.A. Tantawy[1], M. Radwan[2], E. Mansour[3], I. El Nekhely[3], R.K. Abd El Raouf[3], M.H. El Samahy[1], E.M. Sherif[1], N.A. El Beblawy[1], R.M. Matter[1], M. Abou El Asrar[1], A.A. Adly[1] & A.A. Hamed[1]

[1]*Ain Shams University, Pediatrics, Cairo, Egypt,* [2]*Ain Shams University, Community Medicine, Cairo, Egypt,* [3]*Ministry of Health, Cairo, Egypt*

Objectives: To assess the incidence and prevalence of type 1 diabetes (T1DM) in children from birth to 18 years from different governorates representing the four major administrative sectors in Egypt, through two years follow-up. The presenting clinical characteristics, possible risk factors, pattern of therapy and complications were studied.

Methods: The study population included any case of T1DM whether old or new; diagnosed and treated in any health facility below the age of 18 years over a period of 2 years (from January 1, 2005 to December 31, 2006) in four governorates representing the four major administrative sectors in Egypt; namely Suez, Fayoum, Menofia and North Sinai. Patients were compared to healthy controls matched for age, sex, residence, and socioeconomic status. Monthly reports and line lists were sent every month to principal investigator. The study included 457 diabetic patients (240 females and 217 males, median 13 years) and 400 controls (212 females and 188 males, median age 12.8 years).

Results: The prevalence of type 1 Diabetes Mellitus was 0.27/1000 in Fayoum, 0.17/1000 in Menofia, 0.8/1000 in Suez, and 0.3/1000 in North Sinai. The overall incidence was 3.5/100000. Short duration of breast feeding, early cow milk feeding, first order of birth, positive family history of diabetes, higher

socioeconomic status were significant risk factors for T1DM($P < 0.001$). DKA was presenting feature in 52.7% of old diabetic and 25.5% of newly diagnosed patients. Toddlers represent 17.54% of newly diagnosed patients. Newly diagnosed patients received intensive insulin protocols and had better medical care compared to old diabetic patients.

Conclusions: The estimated prevalence of type 1 Diabetes Mellitus in children and adolescents was 0.38/1000 in Egypt. The overall incidence was 3.5/100000. The national improvement of the health care system of diabetes in youth is of crucial importance in all governorates.

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The challenges of children with diabetes west Nile region Arua–Uganda

A.N. Joyo[1,2]

[1]*Arua Diabetes Association, Medical, Kampala, Uganda,* [2]*Arua District, Health, Kampala, Uganda*

Objectives: Management of T1D involves significant challenges in Sub-Saharan Africa.In the Arua region of Uganda,there are 185 children age 3–20 years with Diabetes.Several Arua Districts have designated diabetic clinics.The Arua Diabetes Association purchase insulin,which is available in few health units and in the regional Hospital.

Methods: A survey was taken of conditions at Arua District Diabetic Clinics.

Results: Twenty-one trained health workers in 12 diabetic clinics provide education and clinical care.educational priorities include insulin injections and hypoglyceamia. Children are seen with adult patients. To increase public awareness of Diabetes in Children, there is a public radio broadcast campaign. (1) Life-threatening insulin insufficiency with virtually with all patients reporting lack of insulin at least sometimes; (2) Lack of individual glucometers; (3) Cultuaral beliefs in bewitching resulting in taking children shrines rather than to health care providers; (4) the focus of the health units on malarial to exclusion of other diseases; (5) lack of foreiegeration for insulin at several health units; (6) Family rejectionsof children with diabetes because of the insulin atstigma and expenses; and (7) Lack of parental involvement with most children attending Clinic alone.

Conclusions: While management of Childhood T1D is improving in the Arua region, there are serious problems.resolving insulin insecurity is the most critical concern, and there is hope that this will improve with a new collaboration between the ministry of health and industry. The number of Diabetes trained healthworkers needs to increase. Future prorities are establishing separate pediatric diabtes clinics and to provide psychosocial and financial couselling. Parents health workers, and goverment stakeholders need to work together to improve outcomes in these Children.

Monogenic Diabetes

P/161/FRI

Infancy onset diabetes: a monogenic or autoimmune form of diabetes?

M. Dirlewanger[1], C. Girardin[1], J.L. Blouin[2] & V. Schwitzgebel[1]
[1]*Children's University Hospital, Unit of Pediatric Endocrinology and Diabetology, Geneva, Switzerland,* [2]*Genetic Medicine, University Hospitals of Geneva, Geneva, Switzerland*

Background: Neonatal diabetes mellitus (NDM) is defined as hyperglycemia diagnosed within the first 6 months of life requiring insulin therapy. It occurs in about 1 in 4 00 000 live births. In half of the cases, glycemia becomes normal within 12 weeks (median), and the disease is therefore called transient (TNDM) neonatal diabetes mellitus in contrast to permanent NMD (PNMD), where hyperglycemia is a life-long concern. Mutations involving the K_{ATP} channel subunits (*ABCC8, KCNJ11*) count for 30% of all NDM. The second most common causes of PNDM are mutations of the insulin gene (*INS*). Recently, *FOXP3* mutations could be found in 4% of males with PNDM. In contrast, type 1 DM rarely manifests before the age of 6 months.

Patient and methods: We report the case of a 3-month-old boy born on term with a normal birth weight, who developed severe ketoacidosis. Intravenous insulin therapy was started immediately and replaced after 48 hours by continuous subcutaneous insulin infusion (1 U/kg/d). HbA1c was 6.4%. The autoimmune antibodies were negative, except for anti-GAD65 (14.9 EI/ml, n < 10), which increased to 328 IE/ml after 2 months. The mother's islet autoantibodies were negative. Pancreatic ultrasound and fecal elastase levels were within normal limits, as well as the thyroid function tests. HLA genotyping showed homozygosity for HLA DR3-DQ2. No mutation was found in the genes: *ABCC8*, *KCNJ11*, *INS* and *FOXP*3.

Discussion and conclusion: We concluded that our patient had a type 1 DM, based on increasing anti-GAD antibodies and HLA genotyping indicative of a high-risk for autoimmune diabetes. This case illustrates the extremely rapid onset of diabetes in infancy and the importance to exclude the transfer of maternal antibodies. We recommend excluding a monogenic origin by sequencing the genes *ABCC8, KCNJ11*, *INS* and *FOXP3*. This approach may have therapeutical consequences since diabetes due to K_{ATP} channel mutations can be efficiently treated by sulfonylurea derivatives.

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Review of genetic diabetes in an irish paediatric diabetes centre

M. White, C. Costigan & D. Cody
Our Lady's Children's Hospital, Diabetes & Endocrinology, Dublin, Ireland

Introduction: Permanent Neonatal Diabetes Mellitus (PNDM) is a rare monogenic disorder accounting for 1–5% of all Diabetes Mellitus (DM) and is due to genetic mutations of the K-ATP channel of the β cell. Recent publications advise gene testing in children diagnosed with DM less than 6 months of age.

Methods: A retrospective analysis of all children who had presented with DM ≤6 months of age was performed and genetic analysis was requested.

Results: A total of 4 children (1 male) were identified (current caseload >400), presenting over the last 22 years. All were being managed with insulin injections. The average age at initial diagnosis was 3.75 months (range 1–6 months). All four tested positive for a causative genetic mutation (Table 1). A Kir6.2 subunit mutation was found in three children, only one of whom is currently managed on glibenclamide alone. There were no severe hypoglycaemic episodes recorded but in this group one female had a deterioration of her HbA1c 6 months after starting glibenclamide. The INS mutation, while causative, is not amenable to oral treatment.

Conclusion: In our clinic cohort, 100% of children diagnosed with DM at ≤6 months of age were found to be positive for a genetic mutation. Younger age was associated with successful discontinuation of insulin and non-compliance with large tablets was an issue. It is important to retrospectively review diabetes clinics past and present to identify children who may be suitable for genetic testing.

Table 1

Patient	Gender	Date of first presentation	Age at first presentation (months)	Mutation	HbA1c prior to genetic diagnosis (2006)	HbA1c 6 months post diagnosis	Insulin Pre Diagnosis (iu/kg/day)	Insulin Post Diagnosis (iu/kg/day)	Glibenclamide (mg/kg/day)
1	F	1988	3/12	Kir6.2	6.9%	8.7%	2.5	0.3	0.8
2	F	1991	1/12	Kir6.2	6.7%	6.8%	0.95	0.73	0.6
3	M	1999	2/12	Kir6.2	8.1%	5.5%	0.75	0	0.14
4	F	1992	6/12	INS	8.2%	7.6%	0.77	1.1	N/A

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Diabetes autoantibodies can discriminate MODY from type 1 diabetes

T.J. McDonald[1,2], K. Colclough[3], R. Brown[3], S. Ellard[3] & A.T. Hattersley[1]
[1]*Peninsula NIHR Clinical Research Facility, Peninsula Medical School, University of Exeter, Exeter, UK,* [2]*Royal Devon and Exeter Hospital Foundation Trust, Clinical Biochemistry, Exeter, UK,* [3]*Royal Devon and Exeter Hospital Foundation Trust, Molecular Genetics, Exeter, UK*

Introduction: Maturity-onset diabetes of the young (MODY) is a monogenic form of familial, young-onset diabetes. MODY is rare (~1% diabetes) and is often misdiagnosed as Type 1 diabetes (T1D) and inappropriately treated with insulin. T1D is characterised by the presence of pancreatic autoantibodies including glutamate decarboxylase (GAD65) and Islet Antigen 2 (IA2). The prevalence of pancreatic autoantibodies is unknown in MODY and may have the potential to differentiate MODY from T1D.

Aims/objectives: (1) To determine the prevalence of GAD65 and IA2 in MODY and T1D.
(2) To determine if pancreatic autoantibodies can discriminate betweenT1D and MODY.

Methods: We measured plasma GAD65 and IA2 antibodies in 508 patients with the commonest forms of MODY (GCK n = 227, HNF1A n = 229, HNF4A n = 52) and 98 patients with newly diagnosed T1D (diagnosed < 6 months).
Autoantibodies were considered positive if ≥99th centile of 500 controls.

Results: (1) GAD and/or IA2 were present in 80/98 (82%) T1D and 5/508(<1%) MODY. In T1D GAD65 was more commonly detected than IA2 (GAD65 and IA2 37%, GAD65 only 24%, IA2 only 19%). In the MODY patients with detectable antibodies, 5/5 (100%) had detectable GAD65 titres and none had detectable IA2.

(2) The presence of GAD and/or IA2 diabetes autoantibodies is highly sensitive (99%) and specific (82%) for discriminating MODY from T1D.

Conclusions/summary: The prevalence of GAD65 and IA2 pancreatic autoantibodies in MODY is <1%. Pancreatic autoantibody testing close to diagnosis gives excellent discrimination of T1D from MODY. This supports autoantibody testing always being performed routinely before requesting, the more expensive, and diagnostic genetic testing.

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Neonatal diabetes mellitus: a clinical analysis of 13 cases

X. Li[1], L. Liu[2], J. Cheng[2] & W. Zhang[2]
[1]*Guangzhou Children's Hospital, Endocrinology, Guangzhou, China,* [2]*Guangzhou Children's Hospital, Guangzhou, China*

Objective: To study the clinical features of neonatal diabetes mellitus (NDM).

Method: Thirteen cases with NDM were seen in our department between July 2004 and September 2009. Their clinical features were reviewed retrospectively.

Results: The average birth weight of 13 cases was 2.30 kg. The diagnostic median age was 2 months. The onset time was under 3 months in all patients, and the preliminary diagnostic mean blood glucose was 22.2 mmol/l. Symptoms in 9 of 13 cases were exacerbated by infection and only five had significant diabetes mellitus symptom known as polydipsia, polyuria, polyphagia and body weight loss. The common clinical findings included athrepsy, dipsesis, and moderate dehydration. Ketoacidosis attacked three cases and three children encountered hypertriglyceridemia, meanwhile, two children had complications of blood clotting disfunction and congenital cardiopathy respectively. IAA of the 11 cases all test negative except one. Glycosylated haemoglobin was increased in six cases. Insulin treatment was started in all of 13 cases. The initial dose was 0.56~1 U/(kg d), and the maximal dose was 1.35 U/(kg d) depending on the variety of blood glucose. Blood glucose decreased significantly within 24 hours. Symptoms of the three cases encountered DKA obtained release after 48 hours, and blood glucose was under good control. Among the eight cases being followed up, six cases had TNDM and two had PNDM, which had switched from Insulin injection to oral glibenclamide.

Conclusion: Early diagnosis and prompt management are required for NDM. Blood glucose monitor is a valuable method to avoid misdiagnoses and identification should be made between NDM and stress hyperglycemia, iatrogenic, or other causes of hyperglycemia. NDM need to be followed up closely because it can be transient or permanent.

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Neurodevelopmental abnormalities in children with neonatal diabetes due to KCNJ11 mutations

R.E.J. Besser[1], O. Rubio-Cabezas[2,3], M. Shepherd[1], B. M. Shields[1], S. Ellard[4], H. Curtis[5] & A.T. Hattersley[1]
[1]*Peninsula NIHR Clinical Research Facility, Peninsula Medical School, University of Exeter, Exeter, UK,* [2]*Peninsula Medical School, Institute of Biomedical and Clinical Science, Exeter, UK,* [3]*Department of Endocrinology, Hospital Infantil Universitario Niño Jesús, Madrid, Spain,* [4]*Department of Molecular Genetics, Royal Devon & Exeter Hospital NHS Foundation Trust, Exeter, UK,* [5]*Royal Devon & Exeter Hospital NHS Foundation Trust, Exeter, UK*

Introduction: Heterozygous activating mutations in *KCNJ11* encoding the ATP-sensitive potassium channel (K_{ATP} channel) in the beta cell membrane commonly cause neonatal diabetes diagnosed <6 months. About 25% patients have neurological features due to mutated K_{ATP} channels in the brain, muscle and nerve, causing developmental delay, epilepsy and neonatal diabetes (DEND) and the milder phenotype, intermediate DEND (iDEND). The nature of these deficits is not clearly defined.

Objectives: To define neurodevelopmental abnormalities in neonatal diabetes due to *KCNJ11* mutations.

Methods: We assessed neurodevelopment in children <18 years with *KCNJ11* mutations known to cause iDEND (V59M, n = 10), neonatal diabetes only (NDO) (R201H, n = 4; R50Q, n = 1) and in 15 non-diabetic siblings using a developmental questionnaire.

Results: Intermediate DEND were similar to NDO patients and controls for age (P = 0.07) and gender (P = 0.5). iDEND and NDO patients had a similar age of diagnosis (1.9 (1.1–2.4) vs. 1.6 (1.4–2.3) months, P = 0.9). There was early gross motor and language delay in iDEND compared to NDO or controls (age at which 50% patients were: sitting unsupported 11 vs. 6 vs. 6 months, P = 0.002; walking unaided 22 vs. 13.5 vs. 13 months, P = 0.003; speaking first word: 42 vs. 14 vs. 10 months, P = 0.03). Eight of nine parents reported early developmental concerns in iDEND compared to 0/5 NDO and 1/14 controls. Five of nine iDEND, 0/3 NDO and 0/13 controls aged ≥3 years reported one or more of the following: inattention, poor concentration, hyperactivity or impulsivity.

Conclusions: We report the first series of developmental abnormalities in patients with neonatal diabetes due to *KCNJ11* mutations. Abnormalities in early motor, language and behaviour are a unique feature of iDEND due to V59M *KCNJ11* mutations, and are not seen in mutations causing neonatal diabetes alone. Simple screening tools are useful in identifying early neurodevelopmental deficits in patients with neonatal diabetes.

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Case report: permanent neonatal diabetes mellitus due to a novel mutation in the INS gene

E. Petraikina[1], I. Garyaeva[1], E. Pronina[1], I. Rybkina[1], T. Mikhailova[1], A. Timofeev[2], J. Tichanovich[3] & A. Tiulpakov[3]
[1]*Endocrinology, Moscow Children City Clinical Hospital, Moscow, Russian Federation,* [2]*I.M. Sechenov Moscow Medical Academy, Moscow, Russian Federation,* [3]*Endocrinology Research Center, Moscow, Russian Federation*

Objectives: Insulin gene (INS) mutations have been described as a relatively frequent cause of permanent neonatal diabetes mellitus (PNDM). We present here a case of a 7-month-old girl with PNDM caused by a novel heterozygous missense mutation.

Methods: Coding exons 2 and 3 of the INS gene were amplified by PCR and subjected to direct sequencing. We also typed the patient for HLA class II genes, and screened her for anti-β-cell antibodies.

Case report: A 7-month-old girl was admitted to an ICU of the Morozovskaya Moscow City Hospital with symptoms of severe diabetic ketoacidosis. These symptoms developed acutely several days after routine immunization in an otherwise healthy child. At admission the blood pH was 6.84, BE 29.3 meq/l, blood ketones up to 5 mmol/l, plasma glucose 41 mmol/l. After several days in ICU the condition was improved and she was controlled on regular and NPH insulins daily dose of 1.3 U/kg. Laboratory work-up showed low serum C-peptide (40 pmol/l; reference 100–1010 pmol/l), and absence of antibodies to islet cells, insulin, and glutamic acid decarboxylase. Molecular genetic study revealed no HLA-DRB1, DQA1, and DQB1 alleles predisposing to diabetes mellitus type 1. However the sequencing of the INS gene showed a novel heterozygous Leu30Arg mutation. The both parents were negative for this mutation, indicating that it

occured de novo. We suggest that this Leu30Arg substitution might affect posttranslational modification of proinsulin by interfering with the disulfide bond formation at Cys31.
Conclusions: We described here a sporadic case of PNDM associated with a novel INS mutation. We recommend that all children diagnosed with diabetes mellitus in the first year of life, at least those without markers of autoimmunity, should be screened for mutations in the INS gene and/or other PNDM-related genes. The molecular diagnosis will have important implications for treatment choice, disease prognosis, and genetic counselling.

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De novo whole GCK gene deletion not detected by gene sequencing, in a boy with phenotypic GCK insufficiency

N.H. Birkebaek[1], J. Vikre-Jorgensen[1], A.E. Sorensen[1], P.K. Jensen[2], O. Pedersen[3] & T. Hansen[3]
[1]*Pediatric Department, Aarhus University Hospital, Skejby, Aarhus, Denmark,* [2]*Clinical Genetic Department, Aarhus University Hospital, Norre Brogade, Aarhus, Denmark,* [3]*Hagedorn Research Institute, Copenhagen, Denmark*

Objective: To report on a boy with diabetes mellitus and a phenotype indicating glucokinase (GCK) insufficiency, but normal GCK gene examination applying gene sequencing.
Case report: The boy was referred for diabetes mellitus (DM) 7.5 year old, with two fasting blood glucoses (BG) of 7–8 mmol/l and an HbA1c of 6.4%. He was born at term with a birth weight of 2800 g and a birth length of 51 cm. He was slightly retarded. A MRI of the brain was normal apart from an arachnoideal cyst at cisterna ambiens. The parents were non consanguineous. The father, grandfather and grand grand father suffered type 2 DM. The grandfather died 54 years old. Sequencing of all GCK exons, intron-exon boundaries and the promoter did not reveal any mutations. After several BG profiles of 6.5–10 mmol/L the boy was treated with NPH insulin 8 IE in the morning (0.3 IE insulin per kg body weight). After three years on NHP 8 IE once a day HbA1c was 6.8%. Stimulated C-peptid was 842 pmol/L and the boy was tested negative for GAD65 and IA2 autoantibodies. The treatment was changed to sulphonylurea 750 mg a day. After 4 years on sulphonylurea HbA1c was 7.0%. At that time a multiplex ligation-dependent amplification dosage assay (MLPA) revealed a whole GCK gene deletion. The GCK gene deletion was not identified in the parents, indicating that the deletion was a de novo mutation. The sulphonylurea treatment was ceased. One year later HbA1c was unchanged 6.8%. An array comparative genomic hybridization of the whole genome did not reveal other mutations, and only the GCK gene was deleted.
Conclusions: A negative molecular genetic test for GCK gene mutation applying gene sequencing should be followed by MLPA. Detection of a GCK mutation has implications for treatment of the patient.

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DEND syndrome: establishment of good glycemic control with glyburide with little improvement in cognitive function

M. Marinkovic[1,2], C. Demeterco-Berggren[1,2], S. Nichols[3], R. Haas[2,4] & K.L. Jones[1,2]
[1]*Pediatric Endocrinology, University of California, San Diego, San Diego, United States,* [2]*Rady Children's Hospital, San Diego, United States,* [3]*Neurosciences, University of California, San Diego, San Diego, United States,* [4]*Pediatric Neurology, University of California, San Diego, San Diego, United States*

We have transitioned a patient with developmental delay (D), epilepsy (E) and neonatal diabetes (ND), the DEND syndrome, from insulin to glyburide, assessing glycemic, neurological and cognitive changes. This 16 years old boy was diagnosed with diabetes at 6 weeks of age and treated with insulin. He developed a seizure disorder at 3 months and subsequently was found to have muscular weakness and developmental delay. When the DEND syndrome was described, he was suspected, tested and found to have a G53D mutation in the KCNJ11 gene, known to be associated with DEND syndrome. We initiated transition from insulin to glyburide using the outpatient protocol described by Hattersley's group, introducing glyburide in increasing doses and reducing insulin as allowed by blood glucose monitoring. Stability was achieved and insulin discontinued at a glyburide dose of 1.3 mg/kg/day with improved glycemic control (HbA1C decreased from 8.7% to 6.6%) and fasting C-peptide (increased from <0.5 ng/ml to 2.8 ng/ml). He is currently maintained on glyburide 1.3 mg/kg/day without significant hypo- or hyperglycemia. Although the mother reported some subjective change in strength and coordination, there was no measurable neurologic change. Psychometric testing did demonstrate a minor improvement, especially in the areas of verbal performance. Glyburide use in our patient with G53D mutation in the KCNJ11 gene produced significant improvement in glycemic control and allowed discontinuation of insulin. There was little improvement in the cognitive and neurological components of his condition.

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Severe neonatal infection in wolcott rallison syndrome

E. Bismuth[1], M. Gerard[2], R. Blonde[3], J.-C. Carel[1] & N. Tubiana-Rufi[1]
[1]*Pediatric Diabetes and Endocrinology, Hopital Robert Debré, Paris, France,* [2]*Department of Genetics, Hopital Robert Debré, Paris, France,* [3]*Pediatric Intensive Care Unit, Hopital Robert Debré, Paris, France*

Objective: Neonatal diabetes is a rare condition due to monogenic defects. Genetic studies are critical in the diagnosis and treatment of these patients. Wolcott-Rallison syndrome (WRS) is an autosomic recessive disease associates early childhood insulin dependent diabetes, epiphyseal dysplasia, and other variable multisystemic clinical manifestations among cases (developmental delay, hepatic or kidney dysfunction, neutropenia, frequent infection episodes, hypothyroidism). We presented a Wolcott Ralisson case with severe neonatal infection.
Patient: A boy born small for gestational age from a consanguineous Pakistanis' couple. Neonatal diabetes occurs at age 2.5 months with ketoacidosis and fever at presentation. After stabilization of metabolic control by insulin pump therapy, persistant sepsis resistant to antibiotics remained with major inflammatory state and respiratory distress. TDM reveals a posterior mediastinal infection with lumbar infection and gullet rupture. Ponction revealed streptomonas maltophilia. Evolution was lethal despite surgical procedure and IV antibiotics. The baby passed away at 3.2 months old.
Discussion: Given the severe infection and the patient gender, an IPEX syndrome was first considered but was not confirmed by immunologic results. Cerebral RMI was then performed to look for potential sequellae of cerebral oedema and revealed simplified gyration. We then consider WRS (context of consanguinity) and molecular analysis confirmed a homozygoteous deletion on EIF2AK3 gene.
Conclusion: WRS is a very rare syndrome that shows variability between WRS cases. Susceptibility to infection is a rare feature of the syndrome but drawn to a dramatic issue in our case. WRS should be considered in patient presenting neonatal diabetes in consanguineous families. Epiphysal dysplasia usually occurs later in infancy and should not exclude the diagnosis at younger age.

Pumps and Sensors I

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Faster is better: investigating the effect of a novel warming device on the pharmacodynamics of rapid acting insulin in youth with type 1 diabetes (T1D)

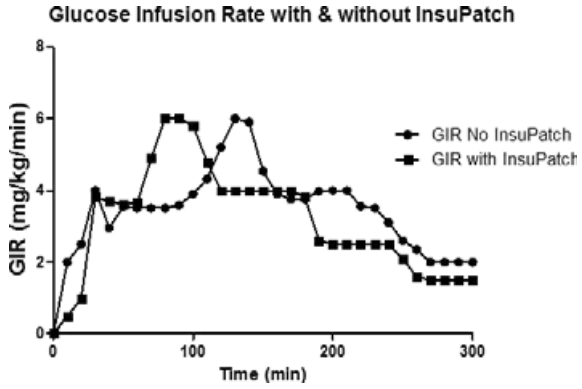
E. Cengiz, W.V. Tamborlane, J. Sherr, M. Martin, A.T. Steffen, L. Carria & S.A. Weinzimer

Pediatric Endocrinology, Yale University School of Medicine, New Haven, United States

Background: Accelerating the rates of insulin absorption and action may improve the performance of both open- and closed loop systems that rely on subcutaneous insulin pumps.

Methods: The glucose clamp technique was used to examine the effect of an infusion site warming device, InsuPatch, on the PD of a 0.2 u/kg bolus of aspart insulin in pump-treated subjects. Studies were performed on two separate mornings with and without the activation of InsuPatch device. On both days, the basal infusion was suspended and glucose levels maintained between 80–100 mg/dl by a variable rate dextrose infusion for up to 5 hours after the bolus. To date, six subjects (15 ± 1 years, A1c 7.3 ± 0.5%) have completed both clamps. Glucose infusion rate (GIR) profiles for one subject are depicted in the figure.

Results: As hypothesized, the time to peak insulin action ($Tmax_{GIR}$) occurred earlier with InsuPatch (95 ± 26 minutes) than without the InsuPatch (138 ± 18 minutes, P = 0.01); whereas, bioavailability (AUC $GIR_{0–300\ minutes}$ 1161 ± 222 vs. 1304 ± 338, P = 0.3) and peak responses (GIRmax 7.1 ± 2.6 vs 6.6 ± 2 mg/kg/minutes, P = 0.6) did not differ with and without infusion site warming.



Conclusions: Our preliminary data suggest that warming of the infusion site is an effective means to accelerate the time to peak action of rapid-acting insulin analogs in pump-treated patients. Such improvements in time action responses may provide a means to obtain better control of post-meal glucose excursions with open and closed-loop insulin delivery.

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Improved treatment satisfaction using continuous subcutaneous insulin infusion compared to multiple daily injections in children at onset of type 1 diabetes mellitus – a five-year follow-up study

L. Skogsberg[1], J. Skogsberg[2] & H. Fors[3]

[1]*Pediatric Clinic Gavle Hospital, Gavle, Sweden,* [2]*Karolinska Institutet, Stockholm, Sweden,* [3]*Pediatric Clinic Northern Alvsborgs Hospital, Trollhattan, Sweden*

Objectives: We have previously reported a 2-year follow up study about metabolic control and quality of life in children with newly diagnosed diabetes mellitus where multiple daily insulin injections (MDI) was compared to continuous subcutaneous insulin infusions (CSII) from onset of their diabetes. At the 2-year follow up there was no difference in metabolic control but improved treatment satisfaction in the CSII-group. These patients have now been followed for another 3 years.

Methods: Seventy-two children/adolescents were enrolled in this open, randomized, parallel and multicenter study. About half of the patients were treated with intermediate-acting insulin once or twice daily and rapid-acting insulin three and four times a day as mealtime insulin. The other half received CSII. The patients were initially followed for 24 month with several clinical visits where HbA1c levels were registered and Diabetes Treatment Satisfaction Questionnaires (DTSQ) were answered. In the 5-year follow up study HbA1c levels was additionally measured at 36, 48 and 60 months and the patients answered a new DTSQ at the 60 month visit.

Results: After 24 months some patients switched treatment regime from MDI to CSII (16 patients) and from CSII to MDI (2 patients). After 5 years, treatment satisfaction was still significantly higher in patients treated with CSII for the whole 5-year period compared with MDI treated (P < 0.05). However, we could still not identify any significant difference in metabolic control between the treatment groups although there was a trend towards improved metabolic control in patients treated with MDI for the whole 5-year period.

Conclusions: CSII treatment proved to be a safe therapy in children/adolescents followed for 5 years after onset of their diabetes. Treatment satisfaction was higher in the CSII treated patients, although there was no difference in metabolic control compared with the MDI treated patients.

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Is CSII superior to MDI in everyday life to decrease glucose variability when using the real time continuous glucose monitoring system (RT-CGMS)?

S. Zucchini[1], M. Scipione[1], C. Balsamo[1], G. Maltoni[1], A. Rollo[1], P. Di Stefano[2] & A. Cicognani[1]

[1]*Pediatrics, S.Orsola-Malpighi Hospital, Bologna, Italy,* [2]*Clinical Department, Medtronic Italia, Sesto S. Giovanni (MI), Italy*

Aim: To compare in everyday life mean BG and inter-intra day BG variability using RT-CGMS in pts treated with CSII or MDI. Inclusion criteria were: undetect C-Pept levels, age >5 years, HbA1c levels <10% and use of pump or MDI therapy for at least 3 months.

Patients: Thirty-five consecutive pts were studied: 11 were on CSII (Medtronic Paradigm) and 24 on MDI (glargine + asp or lis). They were monitored with Guardian RT for 4 days (from 4 p.m.).

Methods: During monitoring all pts were encouraged to behave as usual, using CHO counting. The variables studied were whole mean BG, SD_BG, AUC > 180, AUC < 70, CV, SD, MODD, CONGA-2,4 (day/night), BG rate LBGI and HBGI.

Results: Pts on CSII preferably administered boluses in case of hyperglycemia, whereas pts on MDI preferably avoided snacks (n of boluses 5.2 ± 1.6 vs. 4.3 ± 1.0). AUC < 70 was <0.2% in both groups. In the whole group HbA1c was correlated with mean BG (r = 0.38; P = 0.03) and most of the parameters of

variability, with the highest values for CONGA2-night (r = 0.45; P = 0.006).

Conclusions: In everyday life sensor-augmented pump therapy seems more effective than sensor-augmented MDI therapy, both in terms of BG mean values and intraday variability. As expected, pump was better in correcting hyperglycemic excursions, whereas the indexes of low BG values and speed of fluctuation were similar. RT-CGMS prevented most of low BG periods. Intra-day BG variability indexes evaluated in a 4 day-period showed significant correlations with HbA1c.

	CSII (11 pts)	MDI (24 pts)	P-value
Diabetes duration(years)	7.09 ± 4.7	7.35 ± 4	NS
Age at CGMS(years)	15.48 ± 4.1	14.96 ± 3.2	NS
UI/Kg	0.73 ± 0.2	0.87 ± 0.25	0.042
HbA1C(%)	8.03 ± 1	8.67 ± 0.7	NS
AUC > 180 mg/dl(%)	11.8 ± 12.8	25.3 ± 19.4	0.014
Average glucose	143.8 ± 30	175.2 ± 38	0.014
SD glucose	43.6 ± 11.8	53.4 ± 13.3	0.039
Conga2 day	44.2 ± 11	55.2 ± 15	0.021
HBIG	4.9 ± 3.8	9.7 ± 6	0.006

[Clinical and variability differences]

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Insulin pump treatment, increasing prevalence and better metabolic outcomes in Danish children and adolescents with type 1 diabetes

B.S. Olsen[1], M.-L. Andersen[1], J. Johannesen[1], L. Lyngsøe[2], H. Rida[1], B. Hertz[3], N. Birkebæk[4], J. Svensson[1] & The Danish Study Group for Diabetes in Childhood

[1]*Department of Pediatrics, Glostrup and Herlev University Hospital, Glostrup, Denmark,* [2]*Pediatrics, Hillerød Hospital, Hillerød, Denmark,* [3]*Pediatrics, Viborg Hospital, Viborg, Denmark,* [4]*Pediatrics, Skejby University Hospital, Århus, Denmark*

Introduction: Since 1996 the Danish Childhood Diabetes Registry has collected data on all Danish diabetic patients aged 0–15 years. Here we report increasing use and better metabolic outcome of insulin pump treatment in young Danish patients with type 1diabetes.

Methods: Among several other parameters the Registry on a yearly basis gather data on central measured HbA1c, insulin regimen, severe hypoglycaemia and ketoacidosis.

Results: In the period 2003–2009 the percentage of young patients treated with insulin pump increased from 0.1% to 27%. In 2009 52.9% of children <6 years, 32% of children 6–12 years and 23.2% were on insulin pump. HbA1c was significantly lover in pump treated children in all age-groups, −0.79, −0.46 and −0.62% and significantly more received the goal of HbA1c <7.5%. (P < 0.001).The improved metabolic control was sustained over time. The prevalence of serious hypoglycaemic episodes (unconsciousness and/or convulsions) was significantly lower in patients on pumps compared to patients on pen (1 hypoglycaemic episode per year, 4.35 vs. 7.6/100 patient years and two or more episodes, 1.73 vs. 3.08/100 patient years) (P = 0.02). The prevalence of ketoacidosis was low and with no significant difference between treatment groups.

Conclusion: Insulin pump treatment is increasing in young Danish patients. Pump patients have significantly lower HbA1c in all age-groups and a lower prevalence of serious hypoglycaemia with no increased risk for ketoacidosis.

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Insulin pump therapy versus multiple injections in young children with diabetes: comparison of long-term efficacy

R. Bonfanti, F. Meschi, M. Viscardi, A. Rigamonti, V. Biffi, G. Frontino, R. Battaglino, V. Favalli, C. Bonura & G. Chiumello

San Raffaele Scientific Institute, Department of Pediatrics, Milano, Italy

Objectives: To compare continuous subcutaneous insulin infusion (CSII) to multiple daily injections (MDIs) (rapid-acting insulin analogues + NPH insulin) in preschoolers treated for more than 1 year.

Methods: We evaluated 25 patients (11 males, 14 females; 14 CSII, 11 MDIs) with a history of type 1 diabetes of at least one year duration (CSII: 2.9 ± 1.2; MDIs: 2.3 ± 1.1). Glycated hemoglobin (HbA1c), mean BG (MBG), standard deviation (SD), percent of BG values (BG%) above/below target regarding the last 3 months of follow up, and the average daily risk range (ADRR) regarding the last month of follow up, were evaluated. A two-tailed Mann-Whitney test was used to analyze data. Ages ranged from 2 to 6 years (CSII 4.6; MDII 4.6), average CSII duration was 2.5 years.

Results: Comparison of HbA1c (CSII 7.09%; MDIs 7.38%), MBG (CSII 161.8 mg/dl; MDIs 168 mg/dl), SD (CSII 82.1 mg/dl; MDIs 85.2 mg/dl), and BG% values below target (CSII 12.7%; MDIs 15.2%), showed no statistically significant differences. MDIs showed increased BG% above target (CSII 35.1%; MDIs 47.2%; P < 0.05). The CSII group showed a greater risk for glycemic excursions (CSII ADRR: 44.9; MDIs ADRR: 35.6), although the difference was not statistically significant.

Conclusions: Both CSII and MDII achieved optimal glycemic control (GC) (HbA1c < 7.5%, ISPAD 2009 guidelines), underlining that it may be obtained independently of the means of insulin administration. Although CSII can be safe and effective in young children, long-term use in our patients was not associated with improved GC as compared to intensive MDIs therapy, confirming previous short-term studies. Consequently, rationale for initiating CSII in this age should be primarily based on patient/parent selection and lifestyle preference. Further studies involving sensor augmented CSII in this age group are needed in order to evaluate benefits which go beyond lifestyle improvements.

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Can a paediatric insulin pump program be successful in rural practice?

P.W. Goss

Gippsland Paediatrics, Sale, Australia

Objectives: The purpose of the study was to evaluate a rural Australian paediatric insulin pump program managed independently from a metropolitan paediatric centre.

Methods: In 2007, an independent rural Australian paediatric practice established an insulin pump program within the framework of a new rural multidisciplinary model. By the final quarter of 2009, 45 of 64 (70%) of our patients, representing 65% of all children and adolescents in the region of almost 100,000 people were managed with Insulin Pump Therapy (IPT). An observational study of the 45 children and adolescents managed with IPT in late 2009 evaluated glycaemic control, quality of life and patient satisfaction. Glycaemic control compared average HbA1c 12 months prior to IPT with HbA1c in late 2009 using t test analysis.

Results: The average HbA1c of patients on insulin pump therapy reduced from 9.0% ± 1.4 (median 8.9%) to 7.5% ± 0.98 (median 7.3%). ($P < 0.001$) Those managed without IPT had average HbA1c 8.4 ± 2.1 (median 7.5%). The overall HbA1c of the diabetes clinic was 7.8% ± 1.47 (median 7.4%). The improvement in glycaemic control on IPT was maintained over a 24 month period. There was overwhelming patient satisfaction with IPT. Quality of life indicators showed a significant improvement in mental health, self esteem, parental emotional impact and change in health status for rural children IPT. Total insulin dosage reduced by 24%. Significant hypoglycaemia was rare. There were significant reductions in hospital admission in 2009 compared with the rates prior to the introduction of the IPT program ($P < 0.01$).

Conclusions: Effective insulin pump therapy initiation and management can be successfully achieved in a rural setting using a local model of multidisciplinary care with results comparable or better than large metropolitan child diabetes units.

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Evaluation of continuous glucose monitoring in a rural Australian paediatric diabetes program

P.W. Goss & M.A. Paterson
Gippsland Paediatrics, Sale, Australia

Objectives: To determine whether the use of Continuous Glucose Monitoring (CGM) improves glycaemic control and provides patient satisfaction for children and adolescents with type 1 diabetes mellitus (T1DM) when managed by a rural multidisciplinary diabetes team.

Methods: Gippsland Paediatrics is a rural Australian general paediatric practice incorporating a multidisciplinary diabetes team. In late 2009, Gippsland Paediatrics cared for 64 children and adolescents with T1DM. Two CGM units (Medtronic MiniLink Real time) were used with patients spending up to 6 days per episode on CGM. The CGM units and sensors were supplied by a local charitable trust. An observational study measured glycaemic control of all Gippsland Paediatrics T1DM patients who used the CGM device during 2009. The average HbA1c for the 6 months prior to using the CGM was compared with the HbA1c at 6 months following use of CGM using t test analysis. A CGM patient satisfaction survey was applied to all patients who used CGM.

Results: The CGM was applied to 31 children and adolescents on 34 occasions during 2009. A total of 23 CGM usages were in conjunction with Insulin Pump Therapy (IPT) and 11 were on insulin injection therapy. The average HbA1c for 6 months pre CGM was 8.65% ± 1.55 (median 8.3%) reducing to a six month post CGM HbA1c of 8.25 ± 1.47 (median 7.85). ($P = 0.004$) Of the 22 CGM usages on IPT, mean HbA1c reduced from 8.43% ± 1.55 (median 7.9%) to 8.01 ± 1.12 (median 7.6). ($P = 0.04$) Non pump CGM usages improved average HbA1c from 9.21% ± 1.51 (median 9.2) to 8.60 ± 1.98 (median 8.1). ($P = 0.09$). The patient satisfaction survey showed that CGM was well tolerated for short periods of time and assisted self awareness of diabetes control.

Conclusions: Glycaemic control can be improved by CGM when used by a rural multidisciplinary team particularly in children and adolescents on IPT. Currently CGM is underutilised because of cost. CGM is a valuable tool in the management of diabetes in a rural setting.

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High quality of life in children and psychological wellbeing in mothers 12 month after diabetes onset: results of the paediatric onset-trial of sensor-enhanced CSII

K. Lange[1], R. Coutant[2], T. Danne[3], T. Kapellen[4], E. Pankowska[5], B. Rami[6], B. Aschemeier[3], S. Bläsig[3], R. Hartmann[3], N. Krug[1], E. Marquardt[3], K. Remus[3] & O. Kordonouri[3]
[1]*Medical Psychology, Hannover Medical School, Hannover, Germany,* [2]*Département de Pédiatrie, Centre Hospitalier Universitaire, Angers, France,* [3]*Kinderkrankenhaus auf der Bult, Hannover, Germany,* [4]*Universitätsklinik und Poliklinik für Kinder und Jugendliche, Leipzig, Germany,* [5]*Department of Pediatric Diabetology and Birth Defects, Medical University of Warsaw, Warsaw, Poland,* [6]*Universitätsklinik für Kinder- und Jugendheilkunde, Wien, Austria*

Objective: The prospective, international open randomised clinical trial investigates if paediatric patients using a combination of insulin pump and real time continuous glucose monitoring from the onset of type 1 diabetes have a better glycemic control and quality of life than those using an insulin pump and conventional self-monitoring blood glucose (SMBG). Psychological data after 12 months are presented.

Method: One hundred and sixty children (aged 1–16, Mean ± SD: 8.7 ± 4.4 years; 47.5% girls) were randomised. Children's Health related Quality of Life (parents' perspective: KIDSCREEN-27-proxy; children (≥8 year): KIDSCREEN-27) and their primary care giver's wellbeing (WHO-5, screening-instrument for depressive disorder) were assessed at onset and at 6 and 12 months.

Results: Children's health related quality of life at onset showed significantly lower scores compared to European norm data for physical, psychological, social support, and school at baseline, normalizing after 6 months and remaining normal after 12 months with no significant difference between the intervention and control groups. As assessed with the WHO-5 questionnaire, the primary caregiver fulfilled on average (46.3 ± 22.8) the clinical diagnosis of depression (score below 48) at baseline. The scores reached normal values at 6 months (60.2 ± 22.6 vs. 60.7 ± 22.6) and remained normal after one year (62.7 ± 18.9 vs. 60.8 ± 19.3) with no significant difference between both groups.

Conclusion: Within 6 months children and caregivers of both groups emotionally recovered from diabetes onset with no difference in well being compared to healthy controls. Compared to former data of children on multiple injection therapy care givers of children in the present study emotionally recovered faster. There is no indication that the technical requirements of these modern therapies lead to a deterioration of children's health-related quality of life or their parents' wellbeing as has been implicated repeatedly.

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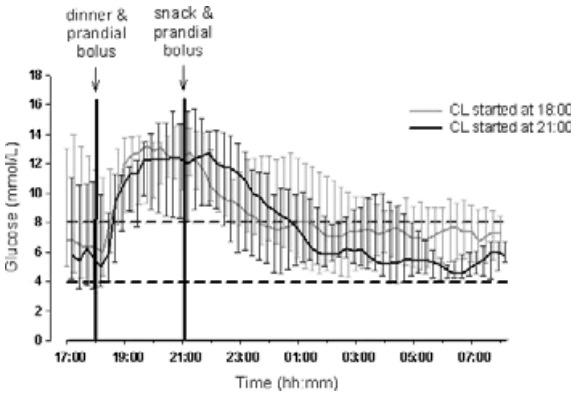
Automated overnight closed-loop glucose control in young children with type 1 diabetes (T1D)

J. Allen[1,2], D. Elleri[1,2], M. Nodale[1], M.E. Wilinska[1,2], J.S. Mangat[3], A.M. F. Larsen[1], C.L. Acerini[2], D.B. Dunger[1,2] & R. Hovorka[1,2]
[1]*Institute of Metabolic Science, University of Cambridge, Cambridge, United Kingdom,* [2]*Department of Paediatrics, University of Cambridge, Cambridge, United Kingdom,* [3]*Department of Medical Physics and Clinical Engineering, Cambridge, Addenbrooke's Hospital, United Kingdom*

Objectives: We evaluated automated overnight closed-loop (AOCL) insulin delivery in young children with T1D.

Methods: Eight children with T1D (M 4; age 9.4 ± 2.7 years; duration of diabetes 3.9 ± 2.5 years; total daily insulin dose 0.7 ± 0.1 U/kg/day; A1C 7.9 ± 0.9%; mean ± SD) were studied in a clinical research facility on two occasions. Subjects had meal at 18:00 (77 ± 8 gCHO) and snack at 21:00 (21 ± 6 gCHO) both accompanied by insulin bolus. In random order, AOCL started at 18:00 or 21:00 and ran until 08:00 next day. Subcutaneous (sc) continuous glucose monitoring data was fed automatically into model predictive control algorithm. Calculated sc insulin infusion rates were sent wirelessly to an insulin pump. Plasma glucose was measured to assess closed-loop performance.

Results: No rescue carbohydrates were administered. Time spent in target plasma glucose range 3.9–8.0 mmol/L [42 (18.64) vs. 58 (32.79)%; median (IQR); P = 0.161] and time when plasma glucose was above 8.0 mmol/L [42 (25.82) vs. 29 (14.64)%, P = 0.093] did not differ on the two occasions. Time below 3.9 mmol/L [0(0.11) vs. 8(0.17)%, P = 0.500], low blood glucose index [0.1(0.0.2.5) vs. 1.7(0.4.3.3), P = 0.380], plasma glucose at the start of AOCL [12.5 ± 2.7 vs. 11.6 ± 4.2 mmol/L, mean ± sd, P = 0.562] and mean overnight plasma glucose [8.3 ± 2.1 vs. 7.5 ± 2.2 mmol/L, P = 0.246] were also similar.



Conclusions: Automated overnight closed-loop is feasible in young children with T1D. Comparable results were obtained when closed-loop was initiated at 18:00 or 21:00.

Pumps and Sensors II

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Acute diabetes complications and CSII treatment

N. Zelinska, Y. Globa & L. Nifontova
Pediatric Endocrinology, Ukrainian Center of Endocrine Surgery, Kyiv, Ukraine

Objective: Diabetic ketoacidosis (DKA) and severe hypoglycemias (SH) are associated with significant morbidity and mortality. The use of continuous subcutaneous insulin infusion (CSII) in pediatric patients is increasing. The aim of this study was to determine the frequency of acute complications before and after 1 year of CSII.
Methods: We have a data base of 34 children, 1 to 18 years old, with DM type 1 and it duration from 2 month to 15 years, who started CSII. This data base was found from 2007 and includes information about annual frequency of DKA different severity, easy hypoglycemias (EH) and SH, daily dose of insulin, level of lipids, HbA1c.
Results: Mean age of the study cohort was 14.06 ± 4.65 years old, 61.8% was a females, mean disease duration was 4.39 ± 3.4 years. Before CSII 100% of children had episodes of mild DKA, 29.2% – moderate and severe DKA, after 1 year of CSII its amounts became 62.5% ($P = 0.02$) and 29.2% ($P > 0.05$), respectively. The rate of mild DKA was 15.28 per year, moderate and severe DKA – 1.65 per year, after 1 year of CSII its rates was increased: 6.14 ($P = 0.02$) and 0.58 per year ($P > 0.05$), respectively. Before CSII 85.2% children had episodes of EH, 26.9% – SH, and after 1 year – 79.2% ($P = 0.01$) and 16.7% ($P > 0.05$), respectively. Rates of EH before CSII was 10.8 per month, SH – 0.11, after 1 year – EH become 4.1 ($P = 0.01$) episode per month, SH 0.04 ($P > 0.05$). Daily dose of insulin was 0.92 ± 0.34 U/kg before and 0.77 ± 0.25 U/kg – at the beginning of CSII ($P = 0.07$) and after 1 year of SCII – 0.82 ± 0.2 U/kg ($P > 0.05$). HbA1c decrease from 11.33 ± 1.39% to 9.58 ± 0.82% after 3 months of SCII ($P = 0.02$), to 9.21 ± 1.79% – after 6 months ($P = 0.03$) then up to 10.25 ± 1.84% and 10.28 ± 1.51% after 9 and 12 months of SCII, respectively ($P > 0.05$).
Conclusions: We estimated decreasing of the rate of DKA and hypoglycemias, reduction of insulin daily dose and HbA1c in the children on CSII.

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Insulin pump applied to a 1600 g preterm neonate presenting multiple congenital defects

A. Galli-Tsinopoulou[1], E. Emmanouilidou[1], P. Karagianni[2], M. Lithoxopoulou[2], I. Maggana[1] & N. Nikolaidis[2]
[1]*4th Department of Pediatrics, Medical School, Aristotle University of Thessaloniki, Thessaloniki, Greece,* [2]*2nd Department of Neonatal Intensive Care Unit (NICU), Medical School, Aristotle University of Thessaloniki, Thessaloniki, Greece*

Objective and methods: We report a female preterm infant with non-autoimmune diabetes mellitus accompanied by: proportionate IUGR, congenital hypothyroidism and multiple organ anomalies.
Results: She was born after a 32 weeks pregnancy complicated with IUGR, oligohydramnion and fetal distress. Due to respiratory distress syndrome she was transferred to the NICU. Observation revealed low dysmorphic ears and depressed nasal bridge. On the second day of life, she developed hyperglycaemia (600 mg/dl) and subcutaneous insulin was started. Neonatal Diabetes (ND) was confirmed by: low insulin and c-peptide levels, negative anti-islet and anti-insulin antibodies and positive anti-GAD antibodies. Testing for transient ND (chromosome 6q24) was negative. Due to frequent transition from hyper- to hypoglycaemia, despite tight glucose monitoring, continuous subcutaneous insulin infusion (aspart insulin diluted with diluting medium) was applied. A basal rate of 0.025–0.050 units/hour and boluses for meals and correction were used. Technical problems aroused due to: low subcutaneous fat, lack of the appropriate size catheter and low insulin needs. Gradually a glycaemic control was obtained. She stayed on mechanical ventilation for 2 months and never weaned from oxygen. Furthermore, acyanotic heart disease (coarctation of the aorta, patent ductus arteriosus), brain anomalies (corpus callosum hypoplasia, low set cerebellum tendorium, atrophy of the occipital, parietal and temporal lobes) were diagnosed. Laboratory testing revealed abnormal liver and kidney function. Ultrasound and MRI showed normal liver, pancreas and kidneys anatomy. Karyotype was normal. At the age of 3 months, she started having refractory seizures. She died at the age of 3.5 months due to status epilepticus.
Conclusions: This is the first report of an insulin pump applied to a low weight premature neonate presenting multiple congenital defects. Unfortunately a known syndrome could not be applied in our case.

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Adverse events in diabetic patients on continuous subcutaneous insulin infusion (CSII)

J. Suzuki, A. Yoshida, H. Saito, M. Ishige, S. Takahashi & H. Mugishima
Department of Pediatrics, Nihon University School of Medicine, Tokyo, Japan

Background/aims: CSII is widely used in children with diabetes and several reports have endorsed its efficacy. However, there are still a few reports of adverse events arising during CSII. The aim of this study was to evaluate the frequency of adverse events arising during CSII, including Diabetic ketoacidosis (DKA) and severe hypoglycemia, and also minor problems, such as skin problems and mechanical troubles, and to clarify the problems associated with insulin pump therapy.
Methods: A retrospective chart review of 28 patients who were started on CSII at our outpatient clinic from January 1, 2005, to December 31, 2009, was conducted. The frequencies of DKA and severe hypoglycemia episodes were evaluated, as also those of other minor troubles associated with the use of the insulin pump.
Results: Two patients had eight episodes of DKA, yielding a frequency of DKA on CSII of 0.136/patient/year. Sixteen episodes of severe hypoglycemia were observed in five subjects, yielding a frequency of subcutaneous on CSII of 0.274/patient/year. Minor problems were observed as follows; skin problems in four cases, mechanical troubles in three cases and catheter troubles in two cases.
Conclusions: The frequencies of DKA and severe hypoglycemia in patients on CSII were not significantly different from those in patients on multiple daily injection therapy (MDI). CSII seems as safe as MDI, notwithstanding the high frequency of adverse events in a few patients. Re-education on and review of the use of CSII might be necessary in patients developing repeated episodes of DKA and severe hypoglycemia.

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Insulin pump therapy in children and adolescents with type 1 diabetes in Siberia

I.V. Osokina[1] & G.U. Strelnikov[2]
[1]*Pediatric Endocrinology, Institute for Medical Studies of the North, Krasnoyarsk, Russian Federation,* [2]*Pediatric Endocrinology, Krasnoyarsk City Hospital # 20, Krasnoyarsk, Russian Federation*

Introduction: Insulin pump therapy is more effective than multiple daily injections for achieving optimal metabolic control of diabetes but because its price it is not available to all children and adolescents with type 1 diabetes. In Russia more than 1000 children use the insulin pump therapy. In Moscow 15% of pediatric diabetic population have CSII. In Siberia less than 200 children (1%) use insulin pump therapy (in Novosibirsk region – 30; in Omsk – 15; in Krasnoyarsk – 15, in Irkutsk – 8). In 2010 the Chloponin's Foundation buys 60 insulin pumps for Krasnoyarsk children with type 1 diabetes, thus 15% of pediatric diabetes patients will get insulin pump therapy in Krasnoyarsk region too.
Aims: To investigate the metabolic control, insulin doses and quality of life children and adolescents with type 1 diabetes before and after the start of using CSII.
Methods: We compared the data of HbA1c, insulin doses and quality of life in 12 children and adolescents (5M/7F) with type 1 diabetes on CSII. Our patients were mean 12.3 years old, with average duration of diabetes 4.5 years. The insulin pumps Accu-Check Spirit, Medtronic Paradigm 712 and Medtronic Paradigm 722 (PRT) was used. HbA1c level before and in 3, 6 months after the start of CSII; the frequency of severe hypoglycemia and diabetic ketoacidosis, quality of life (by written questionnaires) were analysed.
Results: Mean HbA1c in our patients before CSII was 8.2 ± 1.9%; in 3 months after the start of CSII HbA1c was 8.0 ± 2.1%; in 6 months – 7.7 ± 1.3% respectively. Daily insulin dose decreased in all patients from 15 to 20%. Diabetic ketosis and severe hypoglycemia occurred in two patients. CSII improved the quality of life in all children due to reduction in the number of injections, flexibility of eating and better metabolic control.
Conclusion: By insulin pump therapy we significantly reduce daily insulin dose, improve metabolic control of diabetes and quality of life in our patients.

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Influence of insulin pump-therapy on chronic diabetes complications in children with dm 1 in Ukraine (results from 1-year follow-up data)

N. Zelinska[1], Y. Globa[1] & L. Nifontova[2]
[1]*Ukrainian Center of Endocrine Surgery, Kyiv, Ukraine,* [2]*Ukrainian Pediatric Hospital 'OHMATDIT', Kyiv, Ukraine*

Objectives: Insulin pump therapy is well established in pediatric patients with DM type 1. Most studies focus on such parameters like HbA1c, hypoglycemia and quality of life, whereas progressing of heavy chronic complications not described. The aim of our study was to assess dynamics of chronic complications and HbA1c before and 1 year after of continuous subcutaneous insulin infusion (CSII).
Materials and methods: We created Ukrainian diabetes pumps register, which included whole information about children with DM1 0 to 18 years old, including availability of acute and chronic complications (cataract (DK), retinopathy (DR), nephropathy (DN), peripheral motor or sensor neuropathy (DNm, DNs), angiopathy of legs (DA), steatohepatosis (DS), lypodistrophy (DL), hairopathy (DH) and others; HbA1c. In this registry we have identified a database of 50 children 1 to 18 years old, 59.4% – females, which were treated by CSII from 2007. These children had duration of DM 1 from 4 month to 15 years. Efficacy of treatment were estimated annually (for acute and chronic complications) and each 3 months for HbA1c.
Results: After 1 year CSII, we have the regression of rates of complications: DR1 from 6.5% to 0% (despite on increasing level of HbA1c), DNs from 46.8% to 32.2%, DH from 15.6% to 10%, DL from 43.7% to 0%, DS from 37.5% to 20.7%, DA from 18.7% to 16.6%. Progression of DK registered at one child, DN from 31.2 to 38.7%, DNm from 34.4% to 38.7% with marked gradual decrease the level of HbA1C on SCII every 3 months, respectively: from 11.18 ± 1.38% to 9.58 ± 0.82% ($P < 0.05$), 9.47 ± 1.84% ($P < 0.05$), 10.48 ± 1.93% and 10.25 ± 1.51% ($P > 0.05$).
Conclusions: Further research is needed to establish long term benefits of CSII on development of chronic complications.

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Continuous subcutaneous insulin infusion (CSII) and multiple daily insulin injections (MDI): do these treatments affect quality of life? Results of Vipkids study

V. Cherubini[1], R. Gesuita[2], A.M. Cester[1], M. Biagioni[1], M. Marigliano[1], A. Iannilli[1], A. Scaramuzza[3], I. Rabbone[4], F. Lombardo[5], N. Sulli[6], R. Schiaffini[7], S. Tumini[8], R. Bonfanti[9], P. Frongia[10], A. Franzese[11], D. Iafusco[12], L. Pinelli[13], A. Salvatoni[14], S. Toni[15] & F. Carle[2]
[1]*Polytechnic University of Marche, Salesi Hospital, Ancona, Italy,* [2]*Department of Epidemiology, Polytechnic University of Marche, Ancona, Italy,* [3]*Ospedale Sacco, Milano, Italy,* [4]*Clinic of Pediatrics, University of Torino, Torino, Italy,* [5]*Clinic of Pediatrics, University of Messina, Messina, Italy,* [6]*Clinic of Pediatrics, Sapienza University, Roma, Italy,* [7]*UOC Endocrinologia e Diabetologia, Ospedale Bambino Gesù, Roma, Italy,* [8]*Clinic of Pediatrics, University of Chieti, Chieti, Italy,* [9]*Clinic of Pediatrics, University of Milano, Milano, Italy,* [10]*Ospedale Brotzu, Cagliari, Italy,* [11]*Clinic of Pediatrics, University Federico II, Napoli, Italy,* [12]*Centro Diabetologia, Seconda Università, Napoli, Italy,* [13]*Centro Diabetologia, University of Verona, Verona, Italy,* [14]*Clinic of Pediatrics, Sapienza UniversityUniversity of Varese, Varese, Italy,* [15]*Centro Diabetologia, Ospedale Meyer, Firenze, Italy*

Objective: To examine the influence of two alternative intensive insulin treatments on quality of life (QoL) in adolescents aged 10–17 years.
Methods: This is a cross-sectional study involving 14 Italian pediatric diabetes centers. All the patients with diagnosis of type 1 diabetes and on MDI or CSII therapy were consecutively recruited between February 2008 and January 2009. Diabetes-specific QoL was measured by DQOLY (Diabetes Quality of Life in Youth) and IDSRQ (Insulin Delivery System Rating Questionnaire) was used to investigate the patients' perception of their insulin delivery system. Personal, clinical and family data were collected. Wilcoxon rank sum test, chi-square test or Fisher' exact test were performed to compare MDI and CSII treatments. Quantile regression analysis was performed to evaluate the effect of treatment modality on each domain of QoL adjusted for subjects' demographic and clinical features. The R software and a level of significance equal to 5% were used for all the statistical analysis.
Results: Six hundred and four patients were consecutively enrolled; 320 (53%) subjects used MDI and 284 (47%) CSII. IDSRQ revealed that CSII played a positive effect on treatment satisfaction, perceived clinical efficacy and daily activity interference. DQOLY showed that there were more worries as age and diabetes duration increased; more so in girls. Furthermore, QoL in all subscales tended towards lower levels

as the subjects' age increased. Diabetes duration and number of visits to diabetic centres negatively affected the perception of diabetes impact and overall concerns. The more the hours the adolescents dedicated to physical activity the better the QoL.
Conclusion: Treatment modality may be considered among the determinants of QoL. Our results showed a different effect of CSII on QoL when compared to MDI. Demographic and others disease-related factors also play an important role in perceived quality of life.

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Diabetes mellitus during the first 6 months of life: cumulative experience from the austrian/german DPV register

M.H. Borkenstein[1], J. Grulich-Henn[2], K. Raile[3], T. Kapellen[4], J. Wolf[5], S.E. Hofer[6], A. Hattersley[7], S. Ellard[7], R.W. Holl[8] & for the DPV Initiative and the German BMBF Competence Network Diabetes
[1]*Pediatrics and Adolescent Medicine, Medical University of Graz, Graz, Austria,* [2]*Pediatrics, Unversity of Heidelberg, Heidelberg, Germany,* [3]*Pediatrics, Berlin Charite, Berlin, Germany,* [4]*Pediatrics, Uni Leipzig, Leipzig, Germany,* [5]*Pediatrics, Paderborn, Paderborn, Germany,* [6]*Pediatrics, Medical University of Innsbruck, Innsbruck, Austria,* [7]*Peninsula Medical School, University of Exeter, Exeter, United Kingdom,* [8]*University of Ulm, Ulm, Germany*

Objectives: The discovery of activating mutations in potassium channels from pancreatic B-cells, with the possibility to treat these children by oral sulfonylureas, has drawn much attention to this rare form of diabetes. Most likely, each pediatric diabetologist will see few patients with this diagnosis during his/her career. Therefore the joint experience from a prospective, longitudinal multicenter register is valuable.
Methods: The DPV register was started in 1995. By March 2010, 330 diabetes centers (eight from Austria) use this computer-based standardized register to document information. Anonymized data are pooled twice yearly for joint analyses. Inconsistent data are reported back for correction. The total number of patient visits documented in the system is 1,500,691 from 207,795 patients.
Results: The DPV database includes 54,299 pediatric patients (diagnosis of diabetes < age 18). Among those, 125 (0.23%) had a diabetes onset within the first 6 months: mean age was 6.6 weeks, 56.8% were male. In 13 patients, a KIR6.2-mutation was detected (mean age at onset: 11.6 weeks, 69% male), in addition to 10 patients with a proven SUR-1-mutation (4.9 weeks at onset, 40% male). Surprisingly only nine patients had transient diabetes due to UPD6 abnormalities. Age at diabetes onset in those was significantly younger (mean 0.64 weeks) as well as in 11 patients with pancreatic insufficiency/hypoplasia (mean 0.52 weeks). Other forms included pancreatectomy due to hyperinsulinism (n = 2), IPEX (n = 2), Wolcott-Rallison-syndrome (n = 2), prematurity (n = 2), transient diabetes without chromosomal abnormalities detected (n = 3), IPF mutation (n = 3), and one patient each of insulin-receptor-mutation, insulin gene mutation or CMV infection. In 66 patients, definitive diagnosis is pending.
Conclusions: Patients with onset of diabetes during the first 6 months of life present with multiple diagnoses, among which potassium channel mutations are remarkable for the possibility of oral therapy.

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The SWITCH study (Sensing with Insulin Pump Therapy to Control HbA_{1c}). Design and methods of a randomized controlled cross-over trial on sensor-augmented insulin pump efficacy in type 1 diabetes sub-optimally controlled with pump therapy

I. Conget[1], T. Battelino[2], M. Giménez[1], H. Gough[3], J. Castañeda[4], J. Bolinder[5] & SWITCH Study Group
[1]*Endocrinology Unit, Hospital Clinic i Universitari, Barcelona, Spain,* [2]*University Medical Center, Ljubljana, Slovenia,* [3]*Medtronic International Trading Sarl, Bassel, Switzerland,* [4]*Medtronic International Trading Sarl, Maastricht, Netherlands,* [5]*Karolinska Institute, Stockholm, Sweden*

Background: Studies investigating the effect of RT-CGM combined with pump therapy on glycemic outcomes in T1D is growing. Pump therapy is well established as a ''gold standard'' for insulin delivery, offering improvements over MDI. However, there is still a proportion of subjects using CSII in which goals for metabolic control are far from achieved or benefits of this type of insulin therapy are transient. Sensing With Insulin Pump Therapy to Control HbA1c (the SWITCH study) is a multicenter, randomized, controlled, cross-over study to evaluate if adding continuous glucose monitoring to experienced pump patients with suboptimal metabolic control, will provide additional insight enabling clinical and therapeutic benefit.
Methods: Subjects meeting the inclusion criteria were randomized to Sensor On or Sensor Off arms for six months, after a one month run-in period. Following a four month wash out period, the subjects crossed over to the other study arm for six months. The primary endpoint was the between arm difference in HbA_{1c} levels. Among others, additional endpoints include time spent in different glycaemic ranges, percentage of patients with $HbA_{1c} < 7\%$, number of hypoglycemic events, glucose variability parameters, safety outcomes, treatment satisfaction and quality of life.
Results: Recruitment occurred between January 2008 and February 2009. A total of 153 patients were randomized. Study completion is anticipated in July 2010.
Conclusions: The results will establish if adding CGM to existing, capable, insulin-pump users can enable better metabolic control.

Type 2 Diabetes in Children

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Health-related quality of life of overweight preschool children

C. Ziegler[1], B. Aschemeier[1], A. Tewes[1], E. Marquardt[1], E. Sadeghian[1], T. Danne[1] & K. Lange[2]
[1]*Kinderkrankenhaus auf der Bult, Diabetes-Zentrum für Kinder und Jugendliche, Hannover, Germany,* [2]*Medizinische Hochschule Hannover, Medizinische Psychologie, Hannover, Germany*

Objectives: The negative impact of childhood overweight on quality of life has been shown for school age children and adolescents but not yet in a sample of preschool children. The association between weight and health-related Quality of Life (HrQoL) is investigated in a one year longitudinal study with a representative sample of 827 preschool children living in the north of Germany.
Methods: Data were collected at baseline and after 12 months as part of the primary prevention study of obesity ''Gesunde Kindergärten in Niedersachsen – Fit von klein auf''. Outcome parameters included height, weight and health related quality of life using the Kiddy-KINDL^R (Ravens-Sieberer & Bullinger, 2000) by parent-proxy. Weight categories based on national cutoff values.
Results: At baseline 80.2% of the children were classified as not overweight (P10–P90), 11.6% (>P90) overweight with a mean BMI-SDS of 0.1 ± 1.0 (mean age 4.6 ± 0.4 years, 51.6% male). The parent-proxy total HrQoL-Score of the 4-year old children was 77.3 ± 8.2 (range: 0–100) with no significant relationship between HrQoL and weight. Parent-proxy total HrQoL-Score of not overweight children was 77.1 ± 8.3, and of overweight children 77.2 ± 7.6 ($P > 0.10$). There was no impact of the one year intervention neither on parent-proxy total HrQoL-Score nor at the subscales level on parent-proxy HrQoL of overweight children ($P > 0.10$).
Conclusions: In this large sample of preschoolers there is a comparable HrQoL in not overweight and overweight children. To avoid negative psychosocial consequences of overweight, obesity and diabetes prevention initiative should be implemented before entering primary school.

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Influence of the polimorphism of KCNJ11, encoding for the pancreatic beta-cell adenosine 5'-triphosphate-sensitive potassium channel subunit Kir6.2, on birth weight and auxological parameters, glucose, insulin and lipids secretion in prepubertal SGA children

M. Szalapska[1], R. Stawerska[1,2], M. Borowiec[3], W. Mlynarski[3], K. Antosik[3], M. Hilczer[1,2] & A. Lewinski[1,4]
[1]*Department of Endocrinology and Metabolic Diseases, Polish Mothers' Memorial Hospital – Research Institute, Lodz, Poland,* [2]*Department of Pediatric Endocrinology, Medical University of Lodz, Lodz, Poland,* [3]*Department of Pediatrics, Oncology, Hamatology and Diabetes, Medical University of Lodz, Lodz, Poland,* [4]*Department of Endocrinology and Metabolic Diseases, Medical University of Lodz, Lodz, Poland*

Objectives: In children born small for gestational age (SGA) the higher risk of obesity, insulin resistance (IR) and DM2 is observed during adolescence. The variant E23K of KCNJ11 is associated with hypersecretion of insulin and IR in children. In the present study we have assessed the influence of variant E23K on birth weight as well as actual body mass index (BMI) and metabolic profile in prepubertal SGA children.
Methods: One hundred and twelve (67 girls) prepubertal children, aged from 4.8 to 9.4 years (mean: 6.8 ± 1.38 years), born SGA (birth weight below third percentile) were qualified into the study. The actual BMI SDS was calculated and fasting serum glucose, insulin, triglycerides, HDL, LDL and total cholesterol concentration were measured, as well as glucose and insulin concentration during OGTT. All subjects were genotyped for E23K variant of KCNJ11.
Results: Variant E23K was observed in 41.1% children with SGA, while variant E23E in 45.5% and variant K23K in 13.4%. In children with E23K variant the birth weight SD was significantly heigher (−1.8 ± 0.54 SD) than in children with E23E variant (−2.23 ± 0.49 SD) ($P = 0.0023$), while in K23K variant birth weight SDS was lower (−2.0 ± 0.39 SD) than in E23K carriers but the difference did not reach a border of statistical significance. We did not observe any statistical differences for actual BMI among three groups. The glucose and insulin concentration during OGTT, as well as fasting lipids concentration were similar in E23K variant carriers and in both other groups.
Conclusions: In children with SGA and a variant E23K of KCNJ11 the better birth weight was observed in comparison with E23E and K23K carriers, which may be connected with higher insulin concentration in fetal period in E23K children. Presence of E23K variant of KCNJ11 did not influence on higher glucose, insulin or lipids concentration in prepubertal children born with SGA, as well as it did not affected the BMI value.
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Clinical and metabolic phenotype of 629 obese children and adolescents with normal glucose tolerance, impaired glucose tolerance, and type 2 diabetes mellitus

F. Ugrasbul[1], G. Babar[1] & A.M. Sherman[2]
[1]*Department of Endocrinology and Diabetes, Children's Mercy Hospital, Kansas City, United States,* [2]*Biostatistics, Children's Mercy Hospital, Kansas City, United States*

The epidemic of childhood obesity has led to an increase in the prevalence of type 2 diabetes mellitus among children and adolescents. We performed a retrospective chart review of pediatric patients who had clinical features of insulin resistance (IR) ± family history (FH) of diabetes that underwent a 2-hour oral glucose tolerance test (OGGT) at our institution between the years 2004–2008. Out of a total of 629 patients, 86% had normal glucose tolerance (NGT), 12% were found to have impaired glucose tolerance (IGT), and 2% had silent type 2 DM. Female to male distribution was 72% vs. 28%. Race distribution for the whole group was 58% non-Hispanic white (W), 27% African American (AA), 10% Hispanic (H) and 5% Other (O). For the IGT group race distribution was 56% W, 30% AA, 8% H, 6% O. In the diabetic group there were six W, three AA, three H and one Asian patient. 40% patients in the NGT group had a first degree relative with type 2 DM vs. 43% patients in IGT group and 67% in the DM group. Only 46.1% of patients in the DM group and 21.9% of patients with IGT had impaired fasting glucose (IFG). The prevalence of IGT was higher in adolescents than prepubertal children (13.39% vs. 8.62%). Patients with IGT had higher max OGGT insulin levels (316.60 ± 244.78 U/ml vs. 167.17 ± 96.13 U/ml; $P < 0001$), HOMA-IR (7.771 ± 6.358 vs. 4.509 ± 4.104;

P < 0001) but a lower QUICKI (0.131 ± 0.017 vs. 0.140 ± 0.015; P < 0001) compared with subjects with NGT. The IGT group had higher (P < 0.0001) percentage of HBA1c values >6% (32.79%) compared with NGT group (13.79%). A slight increase (P < 0.05) in AST and ALT levels in IGT vs. NGT group was noted.
Conclusion: IR is highly prevalent in pediatrics. Severe hyperinsulinemia is associated with the onset of IGT. No cut point values for HOMA-IR and QUICKI can predict IGT. FBG, insulin levels, HOMA-IR, and QUICKI are not effective screening tools for IGT. An OGTT is required in all subjects at high risk of developing type 2 DM.

P/190/WED

Assessment of maternal perceptions of health problems: type 2 diabetes risk reduction intervention

A.M. Patino-Fernandez[1], E. Pulgaron[1], J. Hernandez[1], J. Sanchez[2] & A.M. Delamater[1]
[1]*Department of Pediatrics/Division of Clinical Psychology, University of Miami Miller School of Medicine, Miami, FL, US,* [2]*Department of Pediatrics/Division of Pediatric Endocrinology, University of Miami Miller School of Medicine, Miami, FL, US*

Objectives: Being overweight (OW) and having a family history of type 2 diabetes (T2D) puts a child at higher risk for T2D.Greater appreciation of factors contributing to participation in programs to reduce children's weight and risk for T2D is needed. We examined how maternal perceptions of OW and risk-perception of their child developing T2D influence participation in a randomized family behavioral prevention program and if perceptions predict outcomes over a 1-year period (6 and 12 months).
Methods: Mothers of 52 Hispanic children (*M* age = 9.9, 60% male) at-risk for developing T2D based on their OW (*M* *z*BMI = 2.0) and family history of T2D completed validated measures assessing perception of child OW and risk of T2D.
Results: Mothers (94%) worried about their child's weight, but only 39% reported their child as OW. Using digital images, 86% accurately identified their child as OW. Mothers of heavier children (% body fat, *z*BMI) were more likely to perceive their child as OW (P < 0.001) and to worry about their child's weight (P < 0.001) over time. Mothers' perception that T2D is a well-understood risk predicted higher child *z*BMI at 6- (P = 0.01) and 12-months (P = 0.04).Intervention and control groups did not differ on their perceptions. Number of intervention sessions attended predicted improvements in waist-to-ht ratio from baseline to 6- (P = 0.03) and 12-months (P = 0.04). Among those offered the intervention, those who participated felt a stronger influence on their child's behavior (P < 0.05), more personal control over their child developing T2D (P = 0.06), and thought of T2D as a more dreaded risk prior to (P = 0.02) and after (P < 0.01) the intervention.
Conclusions: Most mothers of OW children do not label their child as OW, but do worry about the sequelae of their child's weight. Attending more sessions could lead to greater reductions in waist-to-ht ratio. Beliefs about T2D and feeling able to influence one's child's behavior and health outcomes predicts participation in a T2D prevention program.

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Clinical characteristics in children with non-obese type 2 diabetes detected by the urine glucose screening program at schools in the Tokyo metropolitan area

T. Urakami[1], M. Habu[1], N. Nagano[1], A. Yoshida[1], J. Suzuki[1], M. Ishige[1], H. Saito[1], S. Takahashi[1] & H. Mugishima[1]
[1]*Pediatrics, Nihon University School of Medicine, Tokyo, Japan*

Objective: Non-obese type 2 diabetes (T2D) is reported to be a great number in a Japanese population as compared with Caucasian populations. We studied clinical features in Japanese children with non-obese T2D.
Methods: Twenty four children were included in the study. All the patients were identified as having T2D by the urine glucose screening program at schools to detect childhood diabetes in the Tokyo Metropolitan Area. They were non-obese with BMI < 25 at the time of diagnosis. Patients with genetic disorders including MODY and mitochondrial diabetes were excluded from the study.
Results: 1) The mean age at diagnosis was 12.1 ± 2.3 years. Female was dominant in gender (M/F = 4/20).
2) 62.5% of the patients had a family history of T2D in the first-degree relatives.
3) 20.8% was small for the gestational age and 8.3% was large for the gestational age.
4) The mean FBG was 123.5 ± 86.5 mg/dl and the mean HbA1 was 7.6 ± 4.2% at the time of diagnosis.[[AUTHOR: Please define FBG and HbA1.]]
5) The majority of the patients showed low insulin secretion capacities; the mean fasting IRI was 8.2 ± 3.4 μU/ml, HOMA-IR was 5.2 ± 2.3, insulinogenic index ($^{\Delta}$IRI/$^{\Delta}$BG) on an OGTT was 0.32 ± 0.333.
6) All the patients were initially treated with diet and exercise therapy, however, the majority was treated with either an oral hypoglycemic drug (45.8%) or insulin (50.0%) at the time of the study with a mean duration of diabetes of 12.3 ± 5.8 years.
7) In regard with the prognosis, 8.3% had background retinopathy and 12.5% had incipient nephropathy with microalbuminemia.
Conclusions: Characteristics of non-obese T2D seemed to be different from those in obese T2D. Children presenting non-obese T2D were greatly predominant in female and tended to be low birth weight. They tend to show lower insulin secretion capacities from the time of diagnosis and earlier progress to pharmacological treatment. Some genetic factors associated with decrease in endogenous insulin might play a major role in non-obese T2D.

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D-dimer levels in type 1 and type 2 diabetic children and adolescents; relation to microvascular complications and dyslipidemia

M. El Asrar[1], A. Adly[1] & E. El Hadidi[1]
[1]*Ain Shams University, Cairo, Egypt*

Hypercoagulability is state that commonly observed in type 2 diabetes, however the status of fibrinolytic system in type 1 diabetes is not investigated.
Aim: Was to assess the D-dimer level in both type 1 and 2 diabetic patients and to correlate it with microvascular complications, metabolic control and dyslipidemia. Patients and methods: the study included 90 children and adolescents divided into two groups.
Group 1: Included 50 type 1 diabetic patients, their mean age was 13.9 ± 3.9 years.
Group 2: Included 40 type 2 diabetic patients, their mean age was13.5 ± 2.9 years.
Patients were subjected to: History taking, through clinical examination. Laboratory investigations included; random blood sugar, glycosylated hemoglobin, albumin creatinine ratio (ACR),serum total cholesterol (TC) as well as measurement of plasma D-dimer levels.

Results: Fasting C-peptide values were significantly elevated among type 2 diabetics compared to type I diabetics ($P < 0.01$). Type 2 diabetes had significantly higher weightSDS ($P < 0.01$), and BMISDS ($P < 0.01$) compared to type I diabetics. Type 2 diabetics had significantly elevated TC ($P < 0.05$) and d-dimer levels ($P < 0.001$) compared to type1 diabetics. Mean level of d-dimer was significantly elevated among type 1 diabetics with retinopathy ($P < 0.05$), neuropathy ($P < 0.001$) and nephropathy ($P < 0.001$). Type 1 diabetics with peripheral neuropathy and nephropathy had significantly higher d-dimer levels ($P < 0.01$). In type 2 diabetics their was a positive significant correlation between cholesterol level and BMI ($r = 0.48$, $P < 0.05$).In type 1 diabetics their was a significant correlation between D-dimer levels and systolic blood pressure ($r = 0.64$, $P < 0.01$), diastolic blood pressure ($r = 0.55$, $P < 0.01$) and ACR($P < 0.05$) . D-dimer level was significantly correlated with TC ($P = 0.05$), ACR,disease duration($P < 0.001$) and HbA1c ($P = 0.05$)in type 2 diabetics. D-dimer level is strongly correlated to microvascular complications in both type 1 and 2 diabetes.

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Correlates of treatment patterns among youth with type 2 diabetes

C. Pihoker[1], A. Badaru[1], J. Talton[2], D. Casey[3], B. Linder[4], E. Mayer-Davis[5], W. Fujimoto[6], J. Lawrence[7], S. Marcovina[8], D. Dabelea[9], G. Imperatore[10], G. Klingensmith[11] & SEARCH for Diabetes in Youth
[1]*Pediatric Endocrinology, Seattle Children's Hospital, Seattle, United States,* [2]*Biostatistical Sciences, Wake Forest University School of Medicine, Winston Salem, United States,* [3]*Public Health, Wake Forest University School of Medicine, Winston Salem, United States,* [4]*Diabetes Endocrinology and Metabolic Diseases, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, United States,* [5]*Nutrition, University of North Carolina, Chapel Hill, United States,* [6]*Unversity of Washington, Seattle, United States,* [7]*Kaiser Permanente, Department of Research, Pasedena, United States,* [8]*Department of Medicine, Northwest Lipid Research Laboratories, Seattle, United States,* [9]*University of Colorado, Colorado School of Public Health, Aurora, United States,* [10]*Division of Diabetes Translation, Center for Disease Control, Atlanta, United States,* [11]*Pediatric Endocrinology, University of Colorado, Denver, United States*

Because type 2 diabetes (T2DM) has recently emerged in children, pediatric treatment guidelines are fairly new. Few elements of current guidelines are evidence-based, and there is paucity of data describing associations between treatment patterns and clinical outcomes.
Objectives: SEARCH for Diabetes in Youth, a population-based study, offers the opportunity to examine treatment patterns, their associations with clinical characteristics around diagnosis, and clinical outcomes including glycemic control.
Methods: The study includes 620 SEARCH participants with a clinical diagnosis of T2DM. Data including demographic, centralized analyses of fasting blood samples, and treatment regimens were collected at a study visit.
Results: Mean age of 16.2 ± 2.8 years at the study visit; 35% were Black, 21% Hispanic, 19% non-Hispanic White, and 17% Native American; 76% were from households with an annual income <$50,000 and 51% had private insurance. Associations between treatments and clinical characteristics are in table 1:
Conclusion: Participants with younger age at diagnosis, positive DAA, lower FCP and DKA at presentation were significantly more likely to be on insulin ± an oral hypoglycemic agent (OHA). Those on metformin or no medication had significantly lower A1c than those on insulin, insulin + metformin or other OHA, or multiple OHAs. Strategies to improve treatment approaches in youth with T2DM, particularly those with lower C-peptide values, are needed to prevent complications.

Treatment (n = 620)	Age at Diagnosis (year)	Diabetes Duration (month)	DKA at Diagnosis (n) (col%)	Diabetes autoantibodies (DAA) positive (n)	A1C (SD)	FCP (SD)
None (36)	14.9 (2.6)	28.9 (22.7)	2 (18.2)	2	7.4 (2.4)	4.5 (2.2)
Diet/exercise (63)	15.1 (2.3)	23.3 (22.4)	2 (5.1)	3	7.1 (2.4)	4.1 (2.2)
Metformin (227)	13.7 (2.3)	19 (17.5)	8 (6.2)	10	6.9 (1.9)	3.9 (2.1)
Other OHA (34)	14.8 (2.5)	27.7 (17.9)	0 (0)	1	8.6 (2.5)	3.2 (1.4)
Multiple OHA (47)	14.4 (2.3)	38.4 (26)	1 (7.1)	1	9.5 (2.5)	3.8 (2.3)
Insulin (73)	13.2 (2.4)	28.7 (27.6)	7 (20)	19	9.2 (2.6)	2.3 (1.8)
Insulin + Metformin (111)	13.6 (2.5)	19.6 (18.1)	11 (21.6)	14	8.3 (2.5)	3.1 (2.0)
Insulin + other OHA (29)	13.2 (2.2)	30.4 (27.6)	1 (6.7)	4	8.9 (2.3)	3.3 (2.7)
Overall p value	<.001	<.001	0.02	<.001	<.001	<.001

[table 1]

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Ketosis prone African type 2 diabetes does also exist in children

F. Njuieyon[1,2], S. Guilmin-Crepon[1], E. Bismuth[1], J.C. Carel[1] & N. Tubiana-Rufi[1]
[1]*Endocrinology and Diabetology, Robert Debre Hospital, AH-HP Paris, Paris, France,* [2]*Endocrinology and Diabetology, University Children's Hospital of Yaounde, Yaounde, Cameroon*

Pediatric type 2 diabetes (T2D) is emerging worldwide. In France, we have shown that its prevalence significantly increased (x2.5) in the periods 2001–06 vs. 1993–98 . Our clinical cases description indicated that subjects are usually obese girl of pubertal age, mostly of caucasian origin. Ketosis was present half of time at diagnosis, mostly frequent than in adult with T2D. We reported here four cases of pediatric T2D with the same characteristics as ketosis prone diabetes described in adults of African origin. They were four girls, aged between 10.5 and 14.5 years, pubertal stage (Tanner 2 or 3), of central and west African origin. Three of them were obese since age 5 years. Hyperglycemia with ketosis or ketoacidosis was observed at diagnosis and they all have short course transitory insulin. Auto-antibodies (IAA, GAD, IA2) were negative. In all cases, at least one parent or both parents had known ketosis prone T2D. Glycated hemoglobin rapidly normalized in all patients with diet and oral anti-diabetic drug. Two of them had a sudden relapse of ketosis, almost one year after the diagnosis and no risk factor was found, ie. no infection by type 8 herpes virus . In those two cases, hindsight is enough to newly show a rapid normalization of glycemic control after a brief insulin therapy followed by appropriate diet and oral anti diabetic drug. In the two other cases, HbA1c remained in normal range without insulintherapy, 2 and 5 years after inaugural hyperglycemia and ketosis.
Thus, rare form of ketosis prone T2D described in African native also exists in children of African origin and they are characterized by ketosis at presentation, remissions with normalization of HbA1c and potential relapse of ketosis which mechanisms remain unexplained.

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Different stages of glucose tolerance alteration (impaired fasting glucose, impaired glucose tolerance and type 2 diabetes melltitus) in obese children and adolescents

J. Argote Parolis[1], M.E. Licea Puig[2], F.C. Martínez[3] & R.M. González Suárez[2]
[1]*Hospital Pediátrico Docente ``Juan Manuel Márquez'', Clínica del Adolescente con Diabetes, Instituto Nacional de Endocrinología, La*

Habana, Cuba, [2] *Instituto Nacional de Endocrinología, La Habana, Cuba,* [3] *Instituto Nacional de Endocrinología, Departamento de Endocrinología Pediátrica, La Habana, Cuba*

Antecedents: Obesity and Type 2 diabetes mellitus (T2DM) constitute an increasing problem of infantile health in the world.
Objectives: Determine the frequency of different glucose intolerance degrees [impaired fasting glucose, impaired glucose tolerance and T2DM] in obese children and adolescents, and identify other associated risk factors.
Materials and methods: It was studied 69 obese children and adolescents, with a range of age between 8 and 15 years old. It was taken into account the following variables: age, sex, weight, height, waist and hip measures, waist-hip index, symptoms and signs of insulin resistance (IR), familiar pathologic antecedents of T2DM, hypertension, obesity and gestational diabetes. The glucose tolerance test was completed for measuring glycemia and insulin. Homeostasis model was used to determine insulin sensitivity. It was also indicated cholesterol, trglycerides, high-density lipoprotein cholesterol level, uric acid and microalbuminuria tests.
Results: The frequency of different degrees of glucose intolerance was 14.5% (six with impaired fasting glucose, two with impaired glucose tolerance and two with T2DM). Any patient had retinopathy, nefropathy, hypertension or dyslipidemia on diagnosis; but all of them had abdominal obesity. Homeostasis model was >3.19 in 3/7 patients. Acantosis nigricans and the familiar antecedents of T2DM, hypertension and obesity were very frequent.
Conclusions: Different degrees of glucose intolerance are frequent in obese children and adolescents. Obesity, IR, familiar antecedents of T2DM, hypertension and obesity constitute important associated risk factors.
Keywords: Children, Adolescents, Obesity, Type 2 Diabetes, Impaired Fasting Glucose, Impaired Glucose Tolerance, Insulin Resistance, Acantosis Nigricans.

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Features of the clinical course of type 2 diabetes in children and teenagers

E.G. Michailova & A.V. Kulyashova
Samara State Medical University, Samara Children's Hospital 1, Samara, Russian Federation

Nowadays obesity is an international health problem for children and adults that can lead to the development of type 2 diabetes. Obesity and type 2 diabetes is becoming a common problem among children and teenagers.
Objective: We examined features of the manifestation and clinical course of type 2 diabetes in children and teenagers.
Methods: A total of 25 patients with verified diagnosis at the age from 8 to 17 years had been examined. The clinical and laboratory examinations included results of anthropometrical measurements, biochemical tests, hormone analysis (cortisol, insulin, C-peptide, thyroid hormones, insulin antibodies and GAD antibodies) and others.
Results: All patients suffered from excess weight (68%) and obesity (34%). In 15% of cases the disease was started with ketoacidosis (this group has never observed before). The second group of patients had observed by endocrinologist with obesity and glucose intolerance. Diagnosis was based on level of C-peptide, level of insulin, level of HbA1c and glycemia. C-peptide was 4.9 (3.6–6.2) ng/dl (norm – 0.8–4.2 ng/dl), level of insulin was 11.2 (7.6–14.8) mU/ml (norm – 6.0–27.0 mU/ml), HbA1c – 9.8 (8.3–11.4)%, and level of glycemia – 12.4 (7.6–17.2) mmol/l. Thirty percent of patients had a hypertension (blood pressure over 130/90 mmHg) and used antihypertensive drug. The first group had received insulin therapy at the beginning and than metformin, the second one had received all time only metformin.
Conclusions: It is said that type 2 diabetes to be the disease elderly people, but now it is serious problem younger generation. And our aim to reveal minimal glucose intolerance as quickly as we can and treat them.

Varia

P/197/FRI

Transient hiperglycemia during induction therapy in children with acute lymphoblastic leukemia

L. Gaete[1], L. Caracotche[1], F. Miari[1], P. Silvina[2], M. Gutierrez[2], B. Galli[3], V. Osta[3], L. Aversa[2] & L. Trifone[1]
[1]*Hospital de Niños Doctor Ricardo Gutierrez, Nutrition and Diabetes Unit, Buenos Aires, Argentina,* [2]*Hospital de Niños Doctor Ricardo Gutierrez, Haematology Unit, Buenos Aires, Argentina,* [3]*Hospital de Niños Doctor Ricardo Gutierrez, Laboratory Division, Buenos Aires, Argentina*

Introduction: Transient hyperglycemia (TH) in pediatric patients frequently occur as a complication for the using of L-asparaginase and corticosteroids during induction treatment of acute lymphoblastic leukemia (ALL).
Objective: To asses the prevalence and risk factors for TH during the induction treatment in paediatrics patients with ALL.
Material and methods: It was evaluated a sample of 189 children (between 1 and 18 years) with newly ALL diagnosed and treatment at Haematology and Nutrition Units, between December 2002 and March 2010. Data: age, gender, BMIz-score, blood pressure. Laboratory: glycaemia (G) (the highest value at induction treatment: L-aspasginase, corticosteroids, vincristine, and daunorrubicin), total cholesterol, LDLc, HDLc, triglycerides, ALAT; ASAT; amylase, lipase. Family history of diabetes; hypertension, overweight and obesity and dyslipidaemia; infections disease associated, and ALL risk classification: high, intermediate and standard. TH: glucose concentration of ≥200 mg/dl (ADA) in two or more determinations during the first 28 days of induction period.
Result: TH occurred in the 13.8% (26/189) of patient, G: x294, 95 mg/dl ± 104 at the 6, 7 day ± 5.3 from the beginning of treatment. The HT was highly associated ($P < 0.05$) with female gender 69.2% (19/26p), puberty; mean age 12 years, and family history of diabetes, dyslipidaemia, and obesity. The 80.7% (21/26p) needed insulin for more than seven days, average 32.6 days ± 22.5 and G x 298.71 mg/dl ± 93. The 52.4% (11/21p) received insulin in another time of the disease. Only one patient of the TH group did not required insulin.
Conclusions: The prevalence of TH during induction period in paediatric patient with ALL occurs commonly within first week. Identification of risk factors, early diagnosis and nutritional treatment is critical in preventing great metabolic complications and increase of the morbimortality of this disease.

P/198/FRI

Anthropometry, metabolic control in type 1 diabetes with celiac disease

E. Faleschini, P. Pascolo, G. Tornese & G. Tonini
[1]*Child Institute IRCCS ``Burlo Garofolo'', Endocrinology, Auxology, Diabetology Unit – Department of Pediatrics, Trieste, Italy*

Background: Patients with type 1 diabetes mellitus (T1D) are at increased risk to develop celiac disease (CD).The co-occurrence of both diseases may be explained by a similar genetic background and similar trigger mechanisms for the autoimmune process.
Objectives: To evaluate the prevalence of CD in a cohort of children with T1D and investigate the influence of CD on growth and metabolic control before and after the gluten free diet (GFD).
Population and methods: Clinical records of 17 patients with T1D and CD, were reviewed. Fifty-seven patients with type 1 diabetes alone, followed at our unit between 2008–2009, matched for sex, age and duration of diabetes were chosen as controls. The following variables were considered at the diagnosis of diabetes and celiac disease and after 12 months of GFD: weight, height, BMI, HbA1c levels and glycemic variability and per kg/day dose insulin.
Results: The onset of diabetes occurred early in patients who additionally had CD (6.1 ± 4 years vs. 8 ± 3.9 years). Female subjects were particularly predisposed to have CD (65% compared with 35% female subjects in the group of patients with diabetes alone). In only one patient CD was diagnosed before and in 10 patients after T1D onset, in six subjects the diagnosis was contextual. Symptoms led to the diagnosis in only five patients and screening test in 12 patients (70%). At T0 height and BMI, daily insulin dose were comparable in type 1 DM + CD and in control subjects. After 1 year of diet BMI increase (42% vs. 56%) in patients with DT1 and CD HBA1c levels was <8% in 70% of patients (vs. 54% of subjects with DT1 alone) before the GFD and in 42% after GFD, while in the group with DT1 and CD the glycemic variability was 65% (vs. 53% of subjects with only DT1) before GFD and after 1 year of diet, was 28.5%.
Conclusion: Serological screening is useful for diagnosing asymptomatic CDGFD can allow a growth and diabetes control comparable with patients with T1D alone.

P/199/FRI

Clinical symptoms of celiac disease in children and adolescents with type 1 diabetes: children's hospital of the holy trinity of Córdoba

M. Molinero de Rópolo, I.J. Kohn, C. Riga, N. Zanotti, M.H. Nuñez, R.A. Furnes & M.L. Mignon
Children Hospital, Diabetology, Córdoba, Argentina

Objective: To know the most frequent clinical symptoms of Celiac Disease (CD) at the moment of the diagnosis in children and adolescents with Diabetes Mellitus 1 (DM 1) that attend to the Diabetes Area of the Children's Hospital of the Holy Trinity of Córdoba.
Material and methods: Retrospective study through examination of Medical Records (MRs) of children and adolescents with diagnosis of DM 1 and CD. The diagnosis of CD was done by the histological demonstration of intestinal villi atrophy (Marsh 3) in the biopsy of the small intestine (SI). The MRs of 53 patients – 28 (53%) of which were female – with DM 1 and CD who were diagnosed CD between the years 1992 and 2009 were reviewed.
Laboratory: There were test results of: Serum IgA, Anti-Gliadin IgA, Anti-Endomysial IgA, and Transglutaminase.
Results: Of the total of MRs, there could be identified the symptoms prior to the diagnosis in 45 patients (84%), 12 (27%) of which had the typical symptoms of CD, 2 presented Recurrent Abdominal Pain (RAP); 2 Staturo-Ponderal Delay; 29 (64%) did not present symptoms typical of CD: 26 were studied as part of the screening for CD that is done to every child with DM 1, 2 because of family history, and 1 because of the presence of Autoimmune Hepatitis antecedents.
Conclusions: The majority of the patients with DM 1 were found asymptomatic at the moment of the diagnosis of CD. The diagnosis of this pathology was carried out after screening studies according to international recommendations.

Considering the patients who presented symptoms at the moment of the diagnosis, the most frequent ones were: diarrhea, abdominal pain and distension, a few patients presented RAP and staturo-ponderal Delay.

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Characteristics of celiac disease (CD) in patients with type 1 diabetes (DM1)

G.M. Lou-Francés[1], M. Rodríguez-Rigual[1], M.I. Pellicena[2], M. Ferrer[3], L. Ros Mar[4], V. Giménez[1] & A. Campos[1]

[1]*Miguel Servet Hospital, Pediatric Diabetes Unit, Zaragoza, Spain,* [2]*Miguel Servet Hospital, Biochemical Service, Zaragoza, Spain,* [3]*San Jorge Hospital, Pediatric Endocrinology Unit, Huesca, Spain,* [4]*Miguel Servet Hospital, Pediatric Gastroenterology Unit, Zaragoza, Spain*

Objectives: To observe prevalence of CD in DM1 to value characteristics at onset of CD, analysis, clinic and evolution of them.

Methods: We analysed CD markers Antitransglutaminase antibodies (AcTG) in our patients from 1991 to 2009 at the onset and annually. We differenced a group with positive markers and a subgroup with confirmed biopsy. We have taken DM1 patients as controls who have started at the same time with similar age and gender. We studied: age, gender, diabetes evolution at starting positive CD markers, title of markers, symptoms at the onset of CD, autoimmune or other associated pathology, Immunoglobulins, Auxological (Weight, Height, BMI) and analytics (Haematology, Lipids, Calcium, Biochemical, HbA1c) and insulin dosage. These data were evaluated at diagnosis of CD, negativization of markers and after 5 years.

Results: Among 406 patients the prevalence of CD was 6.4%. Positive markers: 3.2% and with confirmed biopsy: 3.2%. Men: 32% and Women: 68%. Age at the onset in our population of DM1: 8.5 ± 4.02 years.

Digestive symptoms: 12%, extradigestive: 4%, asymptomatic: 84%.IgA deficit: 8%. Associated autoimmune pathology: 57.6%. Other pathologies: 27%. Negativization: 87.5%, time: 13.66 ± 9,38 months. Significative data: DM1 with CD have liver transaminase higher at diagnosis of CD and total and LDL cholesterol lower at negativization than DM1 controls.

Conclusions: Screening with AcTG antibodies at the onset of DM1 and annually is useful for early diagnosis of CD. The age at the onset of DM1 with CD is lower than the age of DM1 population. Biopsy should be recommended in asymptomatic cases with high titles of AcTG. ''Natural'' gluten free diet is recommended and useful to reduce total and LDL cholesterol.

	n	DM1 WITH CD			
		Age at the onset (+) EMA/ AntiTG	Age if (+) markers at the same time of onset DM-1	Time of evolution of DM-1 with starting (+) markers	Title AcTG antibodies
(+) markers	13	10.01 ± 6.13	n: 6 (24%) 8.03 ± 3.15	2.64 ± 3.62	15.25 ± 6.73
p		n.s	n.s	n.s	n.s
(+) markers and biopsy	13	8.52 ± 3.92	n: 6 (24%) 7.03 ± 3.57	1.18 ± 1.57	63.31 ± 78.29
ALL	26	9.22 ± 5.04 (2.6–23.3)	n: 12 (48%) 9.23 ± 5.04 (2.6–13)	1.88 ± 2.79 (0–9.4)	36.28 ± 55.52

[DM1 WITH CD]

P/201/FRI

Routine screening for celiac disease among patients with diabetes

M. Rewers, E. Hoffenberg, G. Klingensmith, J. Simmons, G. Eisenbarth & E. Liu

University of Colorado Denver, Barbara Davis Center, Aurora, USA

Background: Type 1 diabetes (T1D) and celiac disease (CD) share genetic determinants. Patients with T1D may benefit from a routine screening for CD.

Methods: Since 1999, our center has routinely screened patients with diabetes for CD using a quantitative transglutaminase IgA autoantibody (TG) radioassay with the the 99th percentile cut-off >0.05. Index >0.5 is 80% predictive of positive intestinal biopsy among screening-detected cases. CD was defined as a positive biopsy, TG >0.5 or TG+ with symptoms requiring gluten-free diet (GFD).

Results: We have screened 5578 patients with diabetes diagnosed <35 year of age. TG+ was found in 13.0% (666/5131) of T1D patients, 2.5% (4/162) with T2D, 1.4% (3/221) with undetermined DM type, and in 0/64 with secondary or monogenic DM. Only results for T1D patients are presented. Of the 2031 T1D patients tested within one month after diagnosis, 9.9% were TG+ (seven had previously known CD). Among those initially TG-, additional 6.1% (61/999) have developed TG+ at median age of 10 (range 3.3–24) and duration of diabetes 2.9 (0.2–11).

Of the 666 TG+ T1D patients, CD has been diagnosed in 51%, while 24% postponed biopsy, 13% were TG- on re-testing, and 13% have not been re-tested. Recently, more patients start GFD based on TG+ and symptoms alone.

In our experience, antibodies to deamidated gliadin peptide may be a better marker of GFD compliance than TG. Intensive follow-up of 79 TG+ children (baseline age 10.4 ± 0.4, diabetes duration 3.8 ± 0.3, 56% M) for up to 2 years has demonstrated that those with persistently high TG levels had lower bone mineral density, ferritin and vitamin D 25OH levels, compared with 56 matched TG- controls.

Conclusions: We recommend routine TG screening of all patients at diagnosis of T1D followed by re-testing every 2 years or if symptoms develop. Long-term follow-up or a randomized clinical trial is needed to define which screening-detected patients require GFD to prevent adverse outcomes of CD.

P/202/FRI

Limitations of race and ethnicity classifications for pediatric patients with type 1 diabetes: early results from a pilot study

R. O'Connor[1,2], A. Doorenbos[2,3], J. Yi-Frazier[1,4], J. Voss[2], A. Dobra[2,5], A. Badaru[1,4] & C. Pihoker[1,4]

[1]*Seattle Children's Hospital, Diabetes/Endocrinology, Seattle, USA,* [2]*University of Washington, School of Nursing, Biobehavioral Nursing and Health Systems, Seattle, USA,* [3]*University of Washington, School of Medicine, Department of Global Health, Seattle, USA,* [4]*University of Washington, School of Medicine, Department of Pediatrics, Division of Endocrinology, Seattle, USA,* [5]*University of Washington, Department of Statistics, Seattle, USA*

Objective: Several recent studies have indicated that rates of type 1 diabetes (T1D) and diabetes outcomes differ between black and Caucasian youth. However, within the 'black' classification, little is known about potentially important distinguishing characteristics such as recent immigrant status and country of origin. The purpose of this research is to describe the T1D population at a tertiary care pediatric hospital whose race is classified as 'black' in medical records.

Methods: Demographic data (including gender, country of origin, language, insurance type, interpreter requests) was collected from medical records for T1D patients whose race was listed as 'black' and seen at Seattle Children's Hospital (SCH) from 01/01/2005 to 31/12/2009. Patients were identified as African immigrants if 1. Language/interpreter requests included an African language or 2. Country of origin for patient/parents was identified in provider notes.
Results: Of the 78 T1D patients classified as ''black'', 56% were African immigrants, 62% female, and 72% had government insurance. Patients of East African descent comprised 51% of the total 'black' classification. Forty percent of patients were non-immigrant black.
Conclusions: Early data from this research study indicates that African immigrants are disproportionately represented in pediatric patients with T1D at SCH. They represent 56% of the population, but comprise only 18% of the estimated 170,000 black population in the metropolitan area. Given known inequalities and barriers to care in immigrant health, this data highlights the importance of expanded race/ethnicity classification. Currently no data is collected to explore differences between immigrants and non-immigrant blacks. Limited classification of race/ethnicity may conceal possible trends in prevalence rates of T1D as well as diabetes outcomes. Further research is warranted to examine prevalence and outcomes of diabetes between immigrant and non-immigrants blacks with T1D.

P/203/FRI

CF-related diabetes (CFRD) in pediatric patients compared to type-1-diabetes (T1DM): analysis based on the German/Austrian DPV register

K. Tzamouranis[1], A. Thon[2], K. Schaaf[3], M. Fritsch[4], E. Fröhlich-Reiterer[5], H. Bartelt[6], R. Holl[7] & the DPV Initiative and the German BMBF Competence Network Diabetes
[1]*DKD Wiesbaden, Department of Paediatric and Adolescent Medicine, Wiesbaden, Germany,* [2]*Medical School Hannover, Zentrum Kinderheilkunde & Jugendmedizin, Hannover, Germany,* [3]*University Hospital of Essen, Department of Paediatrics, Essen, Germany,* [4]*Medical University of Vienna, Department of Pediatrics and Adolescent Medicine, Vienna, Austria,* [5]*Medical University of Graz, Department of Paediatrics, Graz, Austria,* [6]*University Children's Hospital of Leipzig, Pediatric Diabetology and Endocrinology, Leipzig, Germany,* [7]*University of Ulm, Department of Epidemiology, Ulm, Germany*

Objectives: With increased life expectancy, secondary diabetes in patients with cystic fibrosis is becoming more frequent. However, pediatric diabetes centers usually only provide care for few diabetic CF patients, personal experience is therefore limited. In order to better describe the characteristics of CFRD patients compared to type-1 patients, data from the German / Austrian prospective, longitudinal multicenter DPV register were analysed.
Methods: The DPV register was started in 1995 on a nationwide basis. By March 2010, 330 diabetes centers (eight centers from Austria) contribute to this computer-based standardized register. The total number of patient visits documented in the system is 1,500,691 from 207,795 patients. 46457 patients with complete data and a pediatric onset (<20 years) of either type-1 diabetes or CF-related diabetes were analysed, based on the most recent year of treatment (<21 years).
Results: Based on the inclusion criteria, 330 patients with CFRD and 46127 patients with type-1 were included. Mean age at diagnosis in CFRD was 13.7 years [11.7–16.2, Q1–Q3] compared to 8.5 years [4.9–11.8] in T1DM ($P < 0.0001$). 40% of CFRD-patients were male (52% in T1DM, $P < 0.0002$). Mean BMI-SDS was -0.92 ± 0.07 in CFRD compared to $+0.52 \pm 0.01$ in T1DM, and height-SDS -1.35 ± 0.07 compared to -0.05 ± 0.01 (both P-values < 0.0001). Seventy-one percent of CFRD-patients in this series were on insulin, with a mean dose of 0.91 ± 0.04 U/kg and day and 3.9 ± 0.12 injections per day. Eleven percent were treated with oral agents. Mean HbA1c in CFRD-patients was significantly lower ($7.31 \pm 0.12\%$) compared to $8.27 \pm 0.01\%$ in T1DM ($P < 0.0001$). Interestingly, B-cell-antibodies were present in 35% of CFRD patients (83% of T1DM patients). Thirty-two percent had C-peptide-values >1.5 ng/ml.
Conclusions: Pediatric patients with CF-related diabetes present an important group with clear demographic and metabolic differences from type-1 patients. Specific guidelines for longterm management are required.

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Transient hyperglycemia during induction chemotherapy in children with acute lymphoblastic leukemia

K. Flower[1] & S. Kannan[2]
[1]*Manchester Medical School, Manchester, UK,* [2]*Royal Manchester Children's Hospital, Manchester, UK*

Objectives: Children with acute lymphoblastic leukemia (ALL) are treated with remission inducing chemotherapy agents, which include high dose steroids and asparaginase. Some of these children develop transient hyperglycemia which necessitates treatment with insulin injections.
The objective of this study was to look at the incidence of transient hyperglycemia in children whilst following ALL treatment protocols in Royal Manchester Children's Hospital, UK. Predisposing factors, if any, were assessed, and the diabetic management in these children reviewed.
Method: Retrospective record review of patients diagnosed and treated for ALL between 1997 and 2007. Patient demographics, type and dose of steroid and asparaginase were recorded. Hyperglycemia was defined as ≥2 glucose determinations of ≥11.1 mmol/l during the first 28 days of induction chemotherapy. For patients who became hyperglycemic, the presenting symptoms, number of days after treatment induction that hyperglycemia became apparent, and the treatment regimens were recorded.
Results: Overall, 6.9% (11 out of 160) of the study cohort developed transient hyperglycemia during induction chemotherapy. Nine of them were treated with insulin injections. The mean number of days post initiation of chemotherapy that hyperglycemia was noted was 8.8 days. Being 10 years or older, pubertal and with a high body weight and surface area, and therefore steroid dose were all risk factors for developing hyperglycemia. No gender difference was found.
Conclusion: The incidence of transient hyperglycemia secondary to remission inducing chemotherapy in our study group is similar to that reported in previous studies in paediatric ALL patients.

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High day-to-day variability in carbohydrate intake is associated with increased fluctuations in plasma glucose in children <7 years with T1DM but not with higher HbA1c

F. Sundberg[1], U. Cederholm[2], G. Forsander[1] & M. Axelsen[2]
[1]*The Sahlgrenska University Hospital, The Queen Silvia Children's Hospital, Gothenburg, Sweden,* [2]*The University of Gothenburg, Department of Clinical Nutrition, Gothenburg, Sweden*

Objectives: High variability in plasma glucose is a major obstacle to achieve good glycemic control in preeschool

children with T1DM. The correlation between day-to-day variability in carbohydrate intake and plasma glucose variability in children <7 years of age with T1DM was studied.
Methods: The Diabetes Unit at The Queen Silvia Children's University Hospital serves all patients with diabetes younger than 18 years living in the city of Gothenburg, Sweden and the surrounding area. Inclusion criteria: age <7 years, T1DM duration >3 months. Self Measured Plasma Glucose (SMBG) data was collected prospectively during one year from autumn 2008. Thirteen children (seven boys) aged 4.6 (1.8–6.9) years with a diabetes duration of 2.1 (0.6–4.7) years participated. Each child uploaded >300 days of SMBG data and fulfilled at least four consecutive days of food diary. Eleven children were on pump therapy and two used MDI. The average mean HbA1c was 7.8 (7.1–8.7)% (DCCT-standard), half of them had a mean HbA1c ≤7.5%. Mean daily SMBG frequency was 7.9 (3.2–14.2). HbA1c was measured at the study start and ≥4 times during the year; the individual mean was calculated. The families were asked to fill in a food diary form from Saturday until Tuesday twice during the year.
Results: Higher day-to-day variation in carbohydrate intake (measured as SD) was associated with increased variability in plasma glucose (measured as SD) ($r = 0.81$, $P = 0.001$) but not with higher HbA1c.
Conclusion: Less variability in carbohydrate intake combined with extended knowledge in carbohydrate counting could improve the glycemic control in the youngest group of patients.