Poster Tour I: Acute and chronic complications I

P1

Always be on your guard, never let your guard down

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A quick diagnosis of type 1 diabetes (T1D) and the start of a prompt therapy with insulin are necessary for preventing a dangerous ketoacidosis (DKA). Nevertheless, the unmotivated confidence in alternative therapies has led to serious consequences, as we show in the following case. A 15 years old girl at the onset of T1D presented with DKA and leg skin necrotic ulcers due to sustained hyperglycemia. She has been treated with insulin infusion and after 24 hours of IV therapies, a basal bolus therapy (Lyspro and Glargine) had been started. During the inpatient hospital care educational therapy has been performed by Diabetology Unit Staff. During the follow up she mantained a good metabolic control with a HBa1c lower than 49 mmol/mol. Nine months after diabetes onset she has been evaluated by an enchantress, who denied T1D diagnosis and recommended to stop the insulin therapy in order to stimulate the insulin secretion. She recommended to take galenic formulations containing vitamins and mineral salts, taken both orally and through poultice. Parents reported that three days after discontinuing insulin, the daughter presented with abdominal pain, weakness, drowsiness. General conditions worsened in a week and she started presenting pale skin, dehydration, Kussmaul breathing and coma. After ten days she presented with a respiratory arrest and parents called the Emergency Medical Service. When she arrived at the hospital she was unconscious, intubated and mechanically ventilated because of the cardiorespiratory arrest; glycemia was 47.22 mmol/L and blood parameters showed a severe DKA (pH 6,5) and hypovolemic shock. Although the clinical condition were severe, the parents asked to continue the treatment with their galenic formulation. Despite the IV administration of liquids, insulin, bicarbonate, dopamine, the day after she died. During the same year, other two children died for neglected diabetes worldwide.

P2

Frequency, causes and consequences of delay to definitive care in children with new diagnosis type 1 diabetes: the need for a local education campaign

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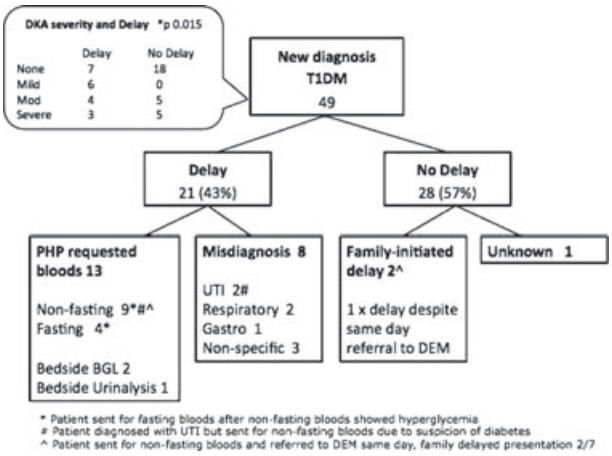
Objectives: Assess frequency and causes of delay to definitive care in patients with new diagnosis Type 1 Diabetes (T1DM) admitted to Royal Children's Hospital (RCH) Brisbane. Secondary aim of defining relationship between delay and diabetic ketoacidosis (DKA).

Method: Retrospective chart audit of children 0–17 years with new diagnosis T1DM admitted to RCH between Jan 2008 and Dec 2009. Definitive care defined as healthcare provider able to institute insulin therapy. Delay defined as more than 24 hours between initial PHP review and first insulin dose. Comparison made between patient groups with and without delay using suitable parametric or non-parametric tests.



Results: Prevention of delay significantly associated with bedside BGL (p 0.005). No significant association with presenting symptoms. Whilst association with DKA did not reach significance (p 0.069), relationship between delay and DKA severity did (p 0.015), with higher rates of mild DKA (Figure 1).

Conclusions: Patients with new diagnosis T1DM are experiencing delay in reaching definitive care, primarily due to lack of use of bedside investigations. Small sample size may have prevented identification of significance between delay and DKA. No difference in moderate and severe DKA regardless of delay, suggests other factors play a role in DKA rates, such as patient age, community awareness or disease process. The increased patients with delay in mild DKA group, suggests DKA rates can be improved through targeted education.

P3

Frequency of moderate and severe diabetes ketoacidosis in newly diagnosed children with diabetes mellitus a study of the Paediatric Diabetes Registry in the Netherlands (PDR.NL)

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Objectives: In many countries, the incidence of diabetic ketoacidosis (DKA) in children has decreased due to increased awareness of health care workers. In the Netherlands, we also have the clinical impression that in the last few years newly diagnosed children with diabetes mellitus present less often with DKA than before. In this study we evaluate whether this impression can be supported by epidemiological data in the national database.

Methods: The Paediatric Diabetes Registry.NL* (PDR.NL) is initiated in 2012 to become a prospective national registry for children and adolescents with DM in The Netherlands. All hospitals were invited to submit an anonimised cross-sectional dataset of their patients to the central database. This dataset contains mainly the clinical and biochemical data at diagnosis. Thus far, from approximately 80% of Dutch patients data have been provided. In a randomly selected 1/3 of cases the original clinical data were reviewed. No significant errors of data quality were found. A moderate DKA was defined as a DKA with a pH < 7.2; severe DKA with pH < 7.1.
Results: The data from 5606 patients, diagnosed from 1994 to 2012 were evaluated. The percentage of newly diagnosed children in which the blood pH was measured and available increased from about 40% in 1994 to 65 % in the last 10 years. From the patients in which a blood pH measurement was available, the percentage of patients with a low pH was stable over time: pH < 7.2 about 12% and pH < 7.1 about 8%.
Conclusion: In the Netherlands, the percentage of newly diagnosed children with DM with moderate and severe DKA is low. The percentages were stable over time in the last 20 years. In the first few years after 1994, reporting bias may be due to the lack of observed changes. One may speculate, however, that the increased awareness of health care workers for DM in children in the Netherlands has developed already before 1994, making it harder to cause a further decrease in the frequency of DKA.

P4
Risk factors for ketosis in newly diagnosed type 1 diabetes in Lithuanian pediatric population

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Background: Diabetic ketoacidosis remains a serious condition in newly diagnosed type 1 diabetes (T1D) in children with a frequency varying from 25 to 70% in different countries.
Objectives: To test if there is an association of diabetic ketosis at presentation with age, autoimmunity status and family history of diabetes in the Lithuanian pediatric population.
Methods: Study sample consisted of 256 newly diagnosed T1D in children less than 18 yrs in Lithuania since 2007 in whom pancreatic antibodies tests were available.
Results: At presentation, 22.8% of children were 0–4 years old, 28.3% - 5–9 years old, 42.9% - 10–14 years old and 5.9% older than 14 years. Frequency of ketosis at presentation was 67.2%. 24.2% of children had positive family history of diabetes among first, second or third-degree relatives. Tyrosine phosphatase antibodies (IA2) alone were found in 20.7%, glutamic acid decarboxylase antibodies (GAD65) alone - in 19.3%; both types of antibodies - in 53.1% of cases; 6.9% of children were antibody-negative.
No significant association between ketosis at the onset of disease and age groups was found (p = 0.95).
Ketosis at the diagnosis was present in 55% of patients without family history of diabetes and only in 12% in those with positive family history (p = 0.02).
Diabetic ketosis was found in 76.7% of children with positive IA2 antibodies, in 60.7% - with positive GAD65 antibodies, in 71,4% - with both types of antibodies, and in 30% in antibody-negative children (Fisher exact p = 0.074).
Conclusions: Ketosis in newly diagnosed diabetes cases in childhood in Lithuania was more frequent among children without family history of diabetes, but not related to age at presentation. A trend towards more frequent ketosis was found in children with positive pancreatic antibodies, especially IA2 and a combination of IA2 and GAD65.

P5
Ketoacidosis at diagnosis of type 1 diabetes melitus in children and adolescent in Franche-Comté region: effect of a national campaign prevention

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Objectives: To evaluate the effect of the campaign of information to prevent DKA at diagnosis in the Franche-Comté region and some specific factors associated with DKA.
Methods: The following data were collected for each new T1D patient (< 15 yr): age, sex, clinical and biological signs, patient's route to the hospital. DKA was defined as pH < 7.3 or bicar < 15 mmol/l, severe DKA pH < 7.1 or bicar < 5 mmol/l. After one year of data collection (yr 0), a national campaign of information aimed at reducing the delay to diagnosis and the rate of DKA. Data were compared between yr 0 and yr 1 of the campaign. A questionnaire was sent to 200 general practitioners to evaluate their practice at diagnosis of childhood T1D.
Results: There were 33 new T1D on yr0 and 30 on yr 1 (25 boys, 38 girls). From yr 0 to yr 1, the rate of DKA decreased from 58 to 40%, severe DKA from 24 to 13%. On yr 0, 6% of the patients were referred to the hospital by a pediatrician, 45% by a general practitioner, and 45% came at the family's initiative. Patients who came at the family's initiative had previously consulted a physician in 53% of cases yr 0 and 30% of cases yr 1. In 63% of cases yr 0 and 61% yr 1, diagnostic was delayed > 24 h, delay mainly due to misdiagnosis (yr 0 44%, yr 1 35%) and prescription of venous blood glucose (yr 0 100%, yr 1 67%).
Questionnaires returned by 59 physicians showed the following: 98% evoke T1D if polyuro-polydipsia, 20% if enuresis; 36% declare that T1D cannot occur before 2 yr of age; 65% ask for venous blood glucose in a laboratory; 30% would start the treatment by themselves, 41% with insulin, 47% by diet; 38 % had information on childhood T1D more than 5 yr ago.
Conclusion: DKA is frequent at diagnosis of T1D but it can be decreased by a campaign of information. Identifying factors associated with the delay to diagnosis, including the insufficient knowledge of physicians on childhood T1D, may help adjusting the strategy of the campaign to further decrease the rate of DKA.

P6

Avoidable hospital admission rates for diabetes short-term complications in Germany: trends from 2005 to 2011 and geographic variations

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Objectives: Indicators based on counts of population-based hospital admissions for certain chronic conditions serve as a proxy for quality of primary care. Institutions such as the OECD use these data - based on the principal diagnosis of an adult hospitalization - for public reporting.

Marked geographic variations occur across OECD countries, e.g. hospital admission rates for diabetes short-term complications vary between 1 (New Zealand) and 60 (United States) per 100,000 population (OECD 2009).

The aim of our study was to examine the national trend and geographic variations in hospitalizations for diabetes short-term complications such as coma and ketoacidosis in Germany between 2005 and 2011.

Methods: Using hospital administrative data from the German DRG database administrated by the Federal Statistical Office, we calculated hospital admission rates for diabetes short-term complications from 2005 to 2011. Admission rates of both, the 16 German states and the more than 300 counties, were analyzed.

Results: Overall, the standardized rate for diabetes short-term complications decreased slightly from 16.2 admissions per 100.000 inhabitants in 2005 (men: 17.7; women: 14.7) to 13.1 in 2011 (men: 14.4; women: 11.7). However, among the youngest group (15–19 years) the admission rate increased from 24.7 to 30.5 admissions per 100.000 inhabitants. We found regional variations across German states, as well as across counties within several states. In 2011 the admission rate of Mecklenburg-Vorpommern (19.2) - the state with the highest rate - was about two times higher compared to the state with the lowest rate (Baden-Württemberg: 9.1). Across counties, 2010 standardized rates ranged from 2.1 to 44.4 admissions per 100.000 inhabitants.

Conclusions: A decrease in hospitalizations for diabetes short-term complications might indicate an improvement in diabetes treatment at the primary care level. Our data also show that young adults do not benefit from this improvement.

P7

Acute complications and level of metabolic control among children with diabetes mellitus

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Objectives: To assess the structure of hospitalizations and glycaemic control among admitted diabetic children.

Material and methods: Glycated hemoglobin (HbA1c) in all hospitalized children already diagnosed with type 1 diabetes was assessed in relation to maternal educational level and reasons for admission.

Results: Hospitalizations were 184/160 children (84 boys) aged 11.9 ± 4.5 years, disease duration 5.4 ± 3.7 years. Mean HbA1c $9.45\% \pm 1.96$; boys $9.6\% \pm 1.9$, girls $9.3\% \pm 2.0$, $p > 0.05$. HbA1c in groups with elementary, secondary or university maternal education was $10.4\% \pm 2.3$ (16.36%), $9.5\% \pm 1.7$ (59.4%) and $8.7\% \pm 2.0$ (24.24%) respectively. There was no significant difference of HbA1c between groups of elementary and secondary school: $10.4\% \pm 2.3$ vs $9.5\% \pm 1.7$, $p > 0.05$. Group of children with university educated mothers differed significantly from the group with elementary education: $8.7\% \pm 2.0$ vs $10.4\% \pm 2.3$,$p < 0.01$ as well as from the group with secondary education: $8.7\% \pm 2.0$ vs $9.5\% \pm 1.7$ $P < 0.05$. HbA1c based on reasons for hospitalization:

i Hypoglycemia: HbA1c $8.1\% \pm 1.4$
ii Severe ketoacidosis: HbA1c $11.4\% \pm 1.6$
iii Gastrointestinal complaints: HbA1c $8.4\% \pm 1.5$
iv Respiratory infections: HbA1c $8.3\% \pm 1.3$
v Worsened/permanent poor control: HbA1c $10.2\% \pm 1.6$
vi Assessment/change of insulin:HbA1c $9.2\% \pm 1.9$

Children from groups 1,3,4 had satisfactory metabolic control. Children with severe ketoacidosis were systematically decompensated with no one having HbA1c < 9.0%. Less children from groups 4 and 6 had university educated mothers (8.33% and 17.5%) due to capacity to resolve such problems at home. On the contrary-patients from group 2 had 33.3% university and 53.3% secondary school educated mothers.

Conclusions: Hospitalizations for acute complications or reassessment of the treatment are still essential. Severe ketoacidosis is related to persistent hyperglycaemia, showing psychological problems of patients and/or worsened parental control despite of educational level.

P8

The influence of basal C-peptide values on severe hypoglycemia and diabetic ketoacidosis risk in Romanian type 1 diabetic children

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Objectives: In the development of diabetic ketoacidosis and severe hypoglycemia, the most encountered acute complications of Type 1 Diabetes, a long series of factors are involved, some of them not being comprehensively studied. Our main aims were to investigate the relation between the presence of insulin secretion (estimated using basal C-peptide) and the risk of developing ketoacidosis respectively severe hypoglycemia in a group of Romanian children with Type 1 Diabetes.

Method: We studied 446 children with Type 1 Diabetes admitted in our Medical Center between 2008 and 2012. Basal C-peptide was measured using an ultra-sensitive method (0.003 nmol/L detection threshold). To estimate the influence of C-peptide on ketoacidosis respectively severe hypoglycemia, these variables were fitted on logistic regression models, both univariate and multivariate (with age, diabetes duration, daily insulin dose and the number of self-monitoring daily tests as confounding factors).

Results: We observed that an increased C-peptide decreased significantly the risk of severe hypoglycemia and ketoacidosis in both univariate and multivariate models (Table 1). Patients with C-peptide < 0.2 nmol/L (cutoff value for the last quartile) had in 17.5% cases a positive history for severe hypoglycemia compared to 6.1% of patients with C-peptide ≥0.2 nmol/L ($p = 0.002$). Also, the percentage of patients having an event of ketoacidosis in history was lower in the C-peptide ≥0.2 nmol/L group (10.4% vs. 20.2%; $p = 0.016$).

Conclusions: The presence of residual insulin secretion, estimated using basal C-peptide, acts both independently and as a co-factor,

Table 1. Exp(b) calculated for units of 0.1 nmol/L

Event	B	Exp(β) (95% CI)	p
Severe hypoglycemia - Univariate	−0.603	0.547 (0.388 to 0.773)	0.001
Severe hypoglycemia - Multivariate	−0.284	0.916 (0.866 to 0.966)	0.012
Ketoacidosis - Univariate	−0.322	0.725 (0.573 to 0.918)	0.008
Ketoacidosis - Multivariate	−0.233	0.928 (0.873 to 0.983)	0.039

reducing the risk of severe hypoglycemia and ketoacidosis in children with Type 1 Diabetes Mellitus.

P9
Features of clinical and metabolic status of children with diabetic ketoacidosis in Belarus in 2005-2013

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Objectives: To identify features of the clinical and metabolic status of children with diabetic ketoacidosis (DKA), depending on the severity and age of the patients.
Methods: Retrospective study of 77 children with the DKA was conducted in the University Clinic (Minsk) in 2005–2013 yrs. Patients were divided into 3 groups according to the age: group1 (G1) - 0-6 years, group2 (G2) - 6-11 years, group3 (G3) - 11-18 years. Anamnesis, clinical features, laboratory analysis, the levels of HbA1c were analyzed. Results were processed using Statistic 10.
Results: In 71.4% of cases DKA developed in the manifestation of diabetes mellitus type1 (DM1), 28.6% - with decompensation of previously established DM1. 17 patients had cognitive disorders of various severity: stunning, stupor, coma grade1-2. All children had metabolic acidosis of various severity. Indicators of blood acid-basic state with children with DKA: G1-pH7,16 ± 0,06; base excess (BE)-19,9 ± 3,0 mmol/l; bicarbonate (HCO3)8,5 ± 1,9 mmol/l; pCO2 20,0 ± 3,1 mmHg; G2-pH7,17 ± 0,06; BE-20,6 ± 3,3; HCO3 7,9 ± 2,0; pCO2 20,1 ± 2,5; G3-pH7,13 ± 0,08; BE-19,6 ± 3,1; HCO3 8,7 ± 2,0; pCO2 22,5 ± 2,4. Significantly more severe disorders of the blood acid-basic state were noted with patients with consciousness disorders: pH6,92 ± 0,07 (min6,66), BE-27,6 ± 1,0 (min-31,3), HCO3 4,6 ± 1,0 (min2,0) compared with patients without impairment of consciousness - pH7,21 ± 0,03, BE-17,9 ± 1,7, HCO3 9,4 ± 1,1 ($p < 0,05$).
Reasons of DKA: Long progressive development of DM1 until it manifests: clinical (polydipsia, polyuria, weight loss during 0,5-2 months) and laboratory (the levels of HbA1c in hospitalization >6,1%); acute respiratory infections-48%; stress-4children; treatment failure with children with previously established DM1-81,8%.
Conclusions: No significant differences were found in the blood acid-basic state according to the age. There was a significant correlation between the severity of violations of the blood acid-basic state and the severity of the neurological status.

P10
Unusual case of a child with hepatomegaly, persistent hypoglycemia and type 1 diabetes (T1D)

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Objectives: The presentation of celiac disease (CD) varies in children and adolescents with T1D from the silent form to more typical symptoms. We present an unusual case of CD.
Methods: The patient was referred because of hepatomegaly and frequent hypoglycemic episodes despite a very small dose of insulin. He was a 14 year old male who was diagnosed with T1D at the age of 8 years with ketoacidosis. He was on a multiple injection regimen with very good glycemic control the 1st year and deterioration of his HbA1c thereafter (8-10%). At the age of 12 1/2 years he presented with hepatomegaly and slightly increased liver enzymes, with no apparent anemia. His initial anti-celiac disease antibodies were: antiendomycial antibodies (−), anti tissue transglutaminase IgA 28 U (normal < 20 units), which became negative thereafter on repetitive measurements. The patient had severe hypoglycemic episodes which led to an extreme reduction of his insulin dose.
Results: At his presentation he had considerable hepatomegaly. He was on 1/2 to 2 units of aspart per meal and 0-1/2 U of detemir. A CGMS investigation revealed great blood glucose variability with hypoglycemic episodes alternating with hyperglycemic peaks. HbA1c: 8.6%, serum insulin levels: 0.66μU/ml, C-peptide: 0.16 ng/ml, anti GAD and anti IA2 antibodies (−). Other autoantibodies (−), SGOT 82 U/L, SGPT 111U/L, γGT 61U/L, hepatitis antibodies (−), anti-HBs (+), Fe 104 μg/dl, Hct35,85%, Hb 11.5 g/dl, RDW12.6. A thorough investigation of hepatomegaly was negative. Intestinal MRI and liver biopsy showed increased size of liver with extended fatty liver infiltration and no fibrosis. Gastrointestinal (GI) biopsies revealed Marsh-Oberhuber 3B lesions for celiac disease. The patient started gluten free diet thereafter.
Conclusions: CD may present with hepatomegaly and frequent hypoglycemic episodes in the presence of negative anti celiac antibodies. Physicians should have increased level of suspicion and perform GI biopsy in similar cases.

Poster Tour 2: Acute and chronic complications II

P11
Hepatomegaly associated to glycogen storage in poorly controlled type 1 diabetes, presentation of two cases of Mauriac Syndrome

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Objectives: To discuss how patients with poorly controled Type 1 Diabetes Mellitus (T1D) can develop increase in liver size, due to glycogen storage. The association of hepatomegaly with cushingoid characteristics, growth and pubertal delay are the main symptoms associated to Mauriac Syndrome (MS).
Methods: Description of 2 patients with documented MS.
Results: Case 1: SLSR, 16 y., fem., T1D since 4 years old, increase of HbA1c in the last 2 years, irregular use of insulin, cushingoid fascies, pubertal delay, painful hepatomegaly and liver palpable at 13 cm. HbA1c = 13,9%, triglycerides = 411 mg/dl, total cholesterol = 275 mg/dl, HDLc = 45 mg/dl, GOT = 222U/L, GPT = 258U/L, normal albumin, bilirubins and blood coagulation factors, and negative serologic tests. Hepatic Biopsy: presence of intracellular glycogen. Case 2: PPSS, 15 y., fem., T1D since 11 years old, metabolic control got worse 2 years before, weight gain, abdominal pain for the last 4 weeks. Painful liver, 8 cm from costal border, cushingoid fascies, menstrual irregularities. HbA1c = 15%, GOT = 166U/L, GPT = 129U/L, TC = 242 mg/dl, HDL = 29 mg/dl, LDL = 144 mg/dl, triglyceride = 343 mg/dl. Hepatic Biopsy: presence of intracellular glycogen. In both cases, with insulin adjustment, there was partial recovery of clinical and laboratory findings.
Conclusions: The importance of these descriptions of MS is justified by the rarity and the reversibility of the hepatomegaly and clinical features after optimization of insulin therapy. Although the complete initially described form of MS is rare, this diagnosis have to be kept in mind even if not all components are present. Precocious diagnosis permits intensification of treatment and prevent future complications.

P12
A case report of pulmonary mucormycosis associated with type 1 diabetes child and review the literatures

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Aims: The purpose of this article is to describe a rare case of pulmonary mucormycosis in a 14-year-old type 1 diabetes child and review the literatures of pulmonary mucormycosis in the setting of diabetes.
Methods: Analysis of clinical manifestations, diagnosis and treatment, and review the literatures to find advanced methods.
Results: The child was new onset type 1 diabetes and ketoacidosis combination with pulmonary mucormycosis. Clinical course was dangerous and rapid progress. There was poor efficacy of treatment with amphotericin B liposome after admission 2 weeks and no effect of fibre optic bronchoscopy. She died from severe haemoptysis due to no lung surgery. After review the literatures, we found that effective management requires 4-pronges combination of early diagnosis, active treatment of primary disease, surgical debridement and liposomal amphotericin B.
Conclusions: Pulmonary mucormycosis is a life-threatening invasive fungal infection and has high mortality. Early diagnosis and the combination of early surgical resection to antifungal therapy has a significant improvement in survival.

P13
Pneumomediastinum and subcutaneous edema in a boy with diabetic ketoacidosis

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Objectives: Pneumomediastinum is a rare condition characterized by the presence of the air in the mediastinum. Spontaneous pneumomediastinum results from alveolar rupture that can occur when high intrathoracic pressure is produced. Vomiting, sneezing, coughing, Valsalva manoeuvres, labour can be risk factors as well as diabetic ketoacidosis with Kussmaul' respiration and vomiting. We describe a boy with diabetic ketoacidosis who presented pneumomediastinum and subcutaneous oedema.
Methods: A 13-year old Caucasian boy has been admitted to the local hospital because of bad condition during antibiotic treatment of otitis media acuta with perforation. According to parents' report polyuria, polydipsia, body weight loss were observed for a month. The boy subsequently developed vomiting and difficulty with breathing. He denied cough, difficulty with defecation, trauma vigorous athletic activity nor lung disease. At admission to the hospital a child was lethargic, severe dehydrated, with Kussmaul breath 20 per minutes In laboratory scores were noted pH 6,9, base excess: - 28,7 mmol/l, glucose level: 742 mg/dl, low level of potassium:2,41 mmol/l and sodium: 127 mmol/l. Type 1 diabetes was diagnosed and intravenous insulin and hydration was applied. Next day the boy was transmitted to the Diabetology Clinic where crepitation with subcutaneous edema was noted on the both side of the neck. On auscultation of the chest there was Hamman's crunch (systolic crunching sound) presented. A chest radiograph demonstrated pneumomediastinum with bilateral cervical subcutaneous oedema.
Results: The patient was treated for dyselectrolytemia and DKA according to ISPAD guideline. Pneumomediastinum and subcutaneous oedema resolved spontaneously during the 4 days.
Conclusions: Pneumomediastinum can be possible factor delaying type 1 diabetes. Pneumomediastinum and subcutaneous edema may be self-limiting condition in children with diabetic ketoacidosis.

P14
Acute pancreatitis in the course of diabetic ketoacidosis

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Diabetic ketoacidosis (DKA) is a common complication of type 1 diabetes. The most dangerous complication is cerebral edema; however, other complications such venous thrombosis, hypoglycemia, arrhythmia, acute pancreatitis (AP), and hypertriglyceridemia

(HTG) are well described. The pathogenesis of AP in DKA varies, but at least some transient and profound HTG is an identifiable factor. A relationship between acidic conditions and AP were also suggested We present 4 cases of adolescent patients with type 1 diabetes who developed AP in the course of severe DKA (pH < 7,1). The metabolic control of diabetes was bad in all cases (HbA1c constantly >9%). In all cases cholesterol, HDL, LDL and TG levels were not significantly increased. After metabolic compensation and strict diet AP resolved in all cases without complications.
Conclusion: Low pH alone significantly increases the risk acute pancreatitis in diabetic patients.

P15
Ghrelin variations during diabetic ketoacidosis treatment in a pediatric population

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Elevation of counterregulatory hormones can reduce sensitivity to insulin and the role of glucagon, GH, catecholamines and cortisol in diabetic ketoacidosis (DKA) has been investigated since 1970-80s. Ghrelin was more recently associated to glucose homeostasis; however, its participation in DKA is still controversial.
Objectives: To evaluate ghrelin and other counterregulatory hormones at DKA diagnosis, during the first 72 hours of treatment and after discharge.
Patients and methods: We analyzed 25 DKA episodes in 22 patients at the emergency department from March 2010 to February 2013. Inclusion criteria were DKA diagnosis (blood glucose > 200 mg/dL, pH < 7.3 or bicarbonate < 15 mEq/L, ketonuria ++) and body weight > 25 kg; patients in use of hyperglycemic drugs were excluded. Samples for glucose, insulin, ghrelin, GH, cortisol and catecholamines were collected at admission (T0), after 2, 4, 6, 12, 24 and 72 hours of treatment. After discharge (AD), 2 samples were collected in routine evaluations at least 3 months after CAD. Data were analyzed using software GraphPad Prism4 and $p < 0,05$ was considered significant.
Results: Ghrelin was significantly lower after 2 hours of treatment when compared to AD ($504,2 \text{ pg/ml} \pm 152,8$ vs $702,7 \pm 211,1$; $p < 0,05$); insulin was higher AD compared to all samples during first 72 hours ($p < 0,001$); glucagon was higher at T0 compared to all other samples ($p < 0,01$); GH was higher at T0, 2, 4 and 6 hs, compared to AD ($p < 0,05$); cortisol was higher at T0 compared to 4,6,12,24,72 hs and AD ($p < 0,05$); norepinephrine was higher at T0 compared to 24 and 72hs. There was a positive correlation only between ghrelin and glucagon (r 0,323; $p < 0,0001$).
Conclusions: Lower levels of ghrelin occurred after 2 hours of treatment with 0,9% saline and insulin. Increased insulin levels were associated with lower levels of GH, cortisol and norepinephrine, but not with inhibition of ghrelin or glucagon in this pediatric population after recovery from DKA.

P16
Impact of BSPED guidelines for the management of DKA in children on clinical and financial effectiveness

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Aim: Timely fluid resuscitation and timely insulin treatment has a significant impact in the management of diabetic keto-acidosis (DKA) in paediatric population. Guidelines are in place to recommend appropriate management strategies including the British Society for Paediatric Diabetes and Endocrinology and Advanced Paediatric Life Support (APLS). We reviewed the impact of guidelines in glycaemia control and time to introduction of subcutaneous insulin and the effect on staff education and training.
Methods: In a district general hospital with an annual admission listed as 17 from a total diabetic case load of 95 children a retrospective review of case notes was undertaken over a period of one year.
Results: There were 20 DKA episodes in 17 patients with Type 1 diabetes analysed. 5 patients were over 16 and were under adult team. 14 episodes from 12 patients were analysed of which only 9 had complete documentation. There were a male to female ratio of 1:2 with age range from 5 to 16 years. 6 children presented with DKA as a first presentation in the paediatric acute admission.6 of the 9 patients had fluid according to BSPED guidelines with the rest having fluids according to the APLS or random process. In children who had the BSPED recommended fluids, the average time to subcutaneous insulin was 24 hours compared to 27.66 hours in children. For children who had the right insulin calculation (BSPED) done the average time to sub cutaneous insulin was 24.83 hours compared to 32.5 hours. This led to earlier discharge from HDU and the hospital with cost savings.
Conclusions: In our unit the BSPED resuscitation and insulin regime led to better glycaemia control and shorter time to subcutaneous insulin. Education and training the staff on the BSPED guidelines improved patient flow and care. We need larger number numbers to validate the impact of these guidelines in wider practice with regards to clinical and financial effectiveness.

P17
Management of diabetic ketoacidosis in limited resource setting

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Introduction: Up to 40% of newly diagnosed Type 1 Diabetes Mellitus (T1DM) were affected by diabetic ketoacidosis (DKA). The incidence of T1DM in Indonesia reached 33-66% and in Child Health Department of Dr. Soetomo hospital Surabaya, 32 (58%) cases of DKA out of 55 cases of T1DM (2002–2007) noted. Majority of children who develop T1DM can be diagnosed in primary care where DKA is determined by point-of-care tests. A high index of suspicion from clinical presentation give great impacts on the DKA outcome and survival after initiating the first hours management.
Purpose: To elaborate the management of diabetic ketoacidosis in limited resource setting.
Case: A case of DKA in a 16-year-old girl with 9 years of T1DM managed in limited resource setting was reported. Diagnosis was based on more clinical presentations supported by point-of care tests only for hyperglycemia and ketonuria. Complete biochemical panels were unavailable, thus severity of DKA was undetermined. Cause of DKA were non-compliance, unknown insulin adherence, and urinary tract infection with evident of leukocytosis. Management comprised of normosaline rehydration in 48 hours with potassium chloride. Once rehydrated and adequate urine output, 0.1 Units/kg of subcutaneous insulin was administered 2-hourly until desired blood glucose achieved. Antibiotic was given to manage infection. No complications were encountered. DKA resolved in 12 hours and the patient discharged on the forth day of hospitalization with educational advices to family and the patient.
Summary: Diabetic ketoacidosis can be managed in local circumstances with relatively limited resources.
Key words: diabetic ketoacidosis – limited resource setting

P18

Hyperosmolar hyperglycaemia syndrome in paediatrics: the need for evidence based guidelines

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Objectives: Hyperosmolar hyperglycaemic syndrome (HHS) is generally associated with Type 2 Diabetes and is rare. In contrast to well established guidelines for the management of DKA in children and adolescents, there is a paucity of evidence-based management and clinical guidelines for children and adolescents with HHS.
Methods: The following case highlights the therapeutic challenges associated with managing HHS in children. An 11 year old, East Timorese boy presents to emergency with confusion, vomiting, polyuria and polydipsia. Initial examination revealed GCS 13, ~7.5% dehydration as evidenced by poor perfusion (central refill time >4secs), tachycardia (150 bpm), normotensive (91/52) with acanthosis and obesity (~80 kg).
Results: Initial results showed Na 175 mmol/L, Gluc 60 mmol/L, Osm 420 mmol/L, ketones 7, pH 7.28, HCO3 21 mmol/L, Lactate 3.8 mmol/L. His fluid management was conservative in order to reduce the risk of cerebral oedema. He arrested 6 hours post presentation following a period of hypertension and died for 48 hours later. Additional complications included acute tubular necrosis and rhabdomyolysis. MRI post mortem showed evidence of cerebral hypo-perfusion and oedema.
Conclusions: On review, this patient presented with features of HHS. This unfortunate outcome initiated a literature review of his management. Early diagnosis and biochemical evaluation are critical to outcome. The key discriminator at diagnosis is the degree of conscious state alteration and dehydration without significant acidosis in HHS. This along with higher serum glucose and osmolality should allude to the diagnosis of HSS. Fluid management in HHS is a higher priority than insulin therapy.

P19

Use of a ketogenic diet in an adolescent with type 1 diabetes and epilepsy on insulin pump therapy

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Objectives: A 12 year old girl with type 1 diabetes and uncontrolled epilepsy was started on a ketogenic diet in order to control her seizures. Her seizures were focal seizures presenting as laryngospasm and establishing adequate anti-epileptic drug therapy had been unsuccessful. There has been limited use of ketogenic diet being used in patients with type 1 diabetes and only one other case documented where this has been done with a patient on pump therapy. There is concern about using ketogenic diet in type 1 diabetes because of the risk of DKA as well as a risk of hypoglycaemia and the difficulty in treating hypoglycaemia while maintaining a ketogenic state.
Methods: The patient was admitted to hospital and put on a continuous glucose monitor and gradually converted to a ketogenic diet, starting with a low fat:carb ratio of 2:1 and gradually increasing to a 4:1 ratio. Blood ketones were measured 4 hourly with initial target of 2–2.5 mmol/l, which was increased to 3-4 mmol/l by day 10. Correction doses of insulin were to be given if blood glucose >10 mmol/l or if blood glucose > 8 mmol/l and ketones > 3 mmol/l.
Results: Unfortunately by day 16 of the ketogenic diet the patients seizures escalated and she required admission to PICU. However before this occurred we were able to achieve moderate ketosis. Initial ketosis target of between 2–2.5 was achieved. When trying to increase this level to 3-4 mmol/l we found that any correction of insulin led to a rapid reduction in ketones. This led us to become more tolerant of higher blood sugars and to only correct if BG were >12 mmol/l or if >10 for more than 1 hour. On occasions where the blood ketones were above 4mmo/l (highest ketone level was 5.4) capillary blood gases were done and on each occasion demonstrated a normal blood pH.
Conclusion: This case demonstrates that a ketogenic diet can be implemented safely in a diabetic patient. However, achieving adequate ketosis with normoglycaemia is challenging and was aided by CGMS.

P20

Insulin infusion therapy for acute stress hyperglycemia

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Background: Stress hyperglycaemia is a common clinical finding in children. The practice of strict glycaemic control using insulin remains controversial within paediatric critical care and considerable disparity exists between beliefs and actual practice maintaining euglycaemia. It is unknown whether intensive insulin is associated with beneficial clinical outcomes.
Objectives: A review to assess the effect of using insulin in the treatment of stress hyperglycaemia in children without diabetes in: achieving normoglycaemia, improving on symptoms associated with hyperglycaemia and survival, and to determine if any adverse effects are associated with the use of insulin. We excluded adults and neonates as the use of insulin in this group have shown divergent results with no improved benefits to mortality.
Methodology: Randomised and quasi-randomised trials were identified using the standard search strategy which included searches of The Cochrane Library, MEDLINE and EMBASE and the trials register. Authors independently selected trials, assessed risk of bias and analysed data. Methodological quality of the trials were assessed using criteria set by Juni for blinding, randomisation, etc.
Results: The initial search identified 77 records which identified 17 publications for further examination. After screening the full text of the 17 selected papers, only three met the inclusion criteria. This review found that intensive insulin therapy compared with conventional insulin therapy in the treatment of stress hyperglycaemia in children may be of benefit in improving morbidity and reduced mortality but there is a substantial risk of biochemical hypoglycaemia.
Conclusion: There were only three randomised controlled trial evaluating the effects of using insulin in the treatment of stress hyperglycaemia in children without diabetes. There is currently insufficient evidence that routine use of insulin in stress hyperglycemia is more beneficial than conventional care.

Poster Tour 3: Acute and chronic complications III

P21
Is it safe and cost-effective to follow ISPAD guidance on annual screening for complications in children less than 12 years, with type 1 diabetes?

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Objectives: To evaluate the value of Annual screening in children less than 12 years who were diagnosed to have Type I Diabetes (TID) for more than 5 years.

Method: We retrospectively analysed the annual screening results of 22 children who were diagnosed to have TID for more than 5 years but were below the age of 12 years. The parameters taken into account were the latest HbA1C, recent Body Mass Index(BMI), thyroid function tests, coeliac screen, microalbuminuria and blood pressure. Every child's height, weight, blood pressure, HbA1C, skin and joint changes, were reviewed once in every 3 months. They had blood and urine tests for annual screening once a year as per the local practice.

Results: Out of our 106 patients with TID, 22 (20.7%) patients had annual screening performed between 5 and 12 years of age. 12 of these children were between 9 and 12 years out of which two of them had an elevated Thyroid PerOxidase antibodies(TPO) with normal thyroid function tests. In children less than 9 years, two children (9%) had high tissue trans-glutaminase IgA antibody levels (TTG) but both had negative jejunal biopsies. Two children (20%) were found to have an elevated TPO. One child was confirmed to have hypothyroidism and was started on thyroxine. Transient microalbuminuria was noted in two patients which settled spontaneously. Blood pressure and BMI were found to be normal for the age and sex in all these children. Skin and joints did not have any significant changes.

Conclusions: Annual screening in children less than 9 years identified one asymptomatic hypothyroidism which needed treatment. Although other abnormalities such as transient microalbuminuria, raised TPO antibody and high TTG levels were identified, none of them needed any specific treatment. To maintain a safe but cost-effective clinical practice and avoid unnecessary anxiety to the parents and children, we recommend performing larger studies on annual screening in children less than 12 years.

P22
Children with type 1 diabetes mellitus developing a concurrent autoimmune disease are not at risk of worsening metabolic control or growth impairment

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Objectives: To study the effect of Type 1 diabetes mellitus (T1DM) and concurrent autoimmune condition (AI) on glycemic control and growth in children.

Methods: 28 children with T1DM and associated autoimmune condition were matched by sex and age at onset with two controls each. HbA1c, height SDS, weight SDS and BMI SDS were measured between 6 months and 5 years after developing T1DM.

Results: We included 28 children with T1DM and AI (10 males) and 56 (20 males) age and sex matched controls with T1DM. Out of the 28 patients with AI conditions, 21 (75%) had coeliac disease (CD), 8 (28%) had autoimmune hypothyroidism (AH) and 1 (4%) patient had both CD and AH. Development of an AI condition occurred at 2.3 ± 3.1 years after diagnosis of T1DM. There was no significant difference in growth parameters between children in the AI group compared with controls from diagnosis to 5 years after diagnosis of T1DM. Children in the AI group had a significantly better HbA1c control 6 months after diagnosis, but no significance was noted at 1, 2, 3 and 5 years. Multiple logistic regression of factors showed no independent risk factors that affected the development of an AI.

Table 2. Results of children with AI compared to controls

Outcome	AI, N = 28 Mean (SDS)	Controls, N = 56 Mean (SDS)	Difference (95% CI) Mean (SDS)	p-value
HbA1c at 6 months (mmol/mol)	60 (15.2)	66 (12.1)	−6.86 (−13.44, −0.27)	0.04
HbA1c at 12 months (mmol/mol)	65 (14.7)	67 (13.6)	−2.06 (−8.84, 4.72)	0.55
HbA1c at 2 years (mmol/mol)	68 (12.4)	71 (12.2)	−2.61 (−8.59, 3.26)	0.38
HbA1c at 5 years (mmol/mol)	69 (13.1)	76 (15.9)	−6.63 (−15.19, 1.90)	0.13
BMI SDS at 6 months	0.87 (0.82)	0.87 (0.82)	0.09 (−0.35, 0.53)	0.68
BMI SDS at 12 months	0.88 (0.70)	0.88 (0.70)	−0.02 (−0.42, 0.38)	0.90
BMI SDS at 2 years	0.72 (0.65)	0.72 (0.65)	−0.28 (−0.64, 0.09)	0.14
BMI SDS at 5 years	0.68 (0.61)	0.68 (0.61)	−0.18 (−0.60, 0.24)	0.39

Conclusion: Suboptimal therapeutic control of an autoimmune condition such as coeliac disease and T1DM is known to lead to impairment in growth and substantial morbidity. Our study shows children with T1DM developing a concurrent autoimmune disease were not at risk of worsening metabolic control or growth impairment long term.

P23
Autoimmune thyroiditis in children with type 1 diabetes mellitus – multicentre Polish study

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Objectives: To investigate whether autoimmune thyroiditis (AIT) in children with DM1 may influence on glycemic control, lipid profile or thyroid volume and determine if L-thyroxine treatment influences the course of AIT or prevents progression to hypothyroidism.

Methods: The study was performed in four Polish Pediatric Diabetes Centres (Łódź, Katowice, Warsaw, Gdansk) between 2008 and 2012. 330 patients with type 1 diabetes and autoimmune thyroiditis

(DM1 + AIT Group) were compared with 309 children with DM1 without AIT (Control Group). Of the DM1 + AIT Group 101 received L-thyroxine and 160 underwent clinical observation for 24 months, 69 patients were not finally enrolled in the analyses. All patients underwent measurements of TSH, fT4, anti-TPO, anti-TG, HbA1c levels, lipid profile and thyroid ultrasound examination.

Results: Among AIT + DM1 patients 62% (n = 205) were female, whereas in the Control Group 60.8% (n = 188) were men ($p < 0.0001$). Children with AIT + DM1 had lower BMI-SDS ($p < 0.0001$), higher SDS thyroid volume ($p = 0.014$) and needed less insulin ($p < 0.0001$) in comparison to the Control Group. AIT patients had higher HbA1c levels ($p < 0.0001$), lower HDL cholesterol ($p = 0.002$) and higher triglyceride levels ($p = 0.02$). Patients treated with thyroid hormones had higher TSH levels ($p < 0.0001$). After first year of treatment fall of TSH level ($p < 0.0001$) was documented. FT4 level did not differ between the groups at the baseline ($p = 0.7434$), but rose in treatment group and fell in observation group, both after 12 months ($p = 0.02$) and after 24 months ($p = 0.005$). Anti-TPO decreased over the 24-month period ($p < 0.000$ and anti-TG showed a borderline decrease ($p = 0.08$) in time in the treatment group.

Conclusion: AIT accompanying DM1 is associated with worse glycemic control and lipid profile and lower daily insulin requirement. Treatment with L-thyroxine in euthyroid pediatric patients with DM1 and AIT stabilizes autoimmune inflammation in thyroid gland.

P24

Comparative study of dual energy X-ray absorptiometry (DXA) and quantitative ultra-sonography (QUS) in assessing bone health in children and adolescent with type 1 diabetes mellitus

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Objectives: Relatively recent studies indicate that children and adolescents with type 1 diabetes mellitus (T1DM) are at a higher risk for reduced bone mass. The aim of this study was to assess bone parameters in children and adolescent with T1DM using two methods, Dual energy X-ray Absorptiometry (DXA) and Quantitative Ultra Sonography (QUS) and subsequently to investigate the degree of correlation between these two methods.

Methods: Twenty-five children and adolescents with T1DM (14 boys and 11 girls) participated in the study. Mean decimal age was 11.27 ± 2.79 years (range: 5.62 - 15.85). Mead duration of the disease was 4.17 ± 2.76 years (range: 1.04 - 10.91). In all patients, anthropometric parameters including weight and height were assessed using standards methods and body mass index (BMI) was calculated. All patients had DXA scan in two sites: lumbar spine vertebrae (L2-L4) and hip (femoral neck and total hip) and QUS scan in radius and tibia.

Results: With regards to lumbar DXA, 2 patients had BMD measurements < -2 SD (Standard Deviation), whereas, 5 patients had -1 SD $<$ BMD (L2-L4) ≥ -2 SD. With regards to hip DXA, 6 patients and 5 patients had BMD measurements < -2 SD at femoral neck and total hip respectively and additionally 2 and 6 patients had BMD < -1 SD but ≥ -2 SD, respectively. With regards to the QUS measured at radius, 2 patients had SOS (Speed of Sound) values < -2 SD and additionally 4 patients had SOS values < -1 SD. QUS measured at tibia showed only 2 patients with -1 SD $>$ SOS values ≥ -2 SD. BMD values measured at various sites were significantly correlated to each other as well as QUS values measured at radius and at tibia. No linear correlation was observed between any densitometric parameter and duration of T1DM or levels of HbA1c. BMD parameters were correlated to anthropometric parameters.

Conclusions: No level of agreement was observed between DXA and QUS methods in identifying children or adolescents with T1DM and impaired bone properties.

P25

Sympathetic skin responses in type 1 diabetic children: relationship to urodynamic findings

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Objectives: Cystopathy is an important problem in diabetes mellitus (DM) when diabetes is not well-controlled. In most cases of diabetic cystopathy, autonomic involvement is responsible, which develops insidiously over a long time. We investigated the hand and genital sympathetic skin responses (SSRs) and its relation to urodynamic abnormalities in this group of patients.

Methods: We performed hand and genital SSRs in 24 children with poor controlled Type-1 DM. We also recruited 19 healthy children for SSRs measurements. Cystometry was performed in 24 children with Type-1 DM. Based on cystometry findings, these children were classified into two groups as normal (n:6) and abnormal (n:18). The amplitude and latency of hand and genital SSRs of 24 children with Type-1 DM and 19 healthy children were compared.

Results: Hand and genital SSRs were obtained from all of the diabetic and healthy children. The mean genital SSRs amplitude in diabetic children was significantly lower than the controls. There was no difference in the mean values of all investigated parameters between the normal group and controls. When compared to the controls, there was prolonged latency and decreased amplitude of genital SSRs and decreased hand SSRs amplitude in abnormal group.

Conclusions: SSR is a non-invasive test for the evaluation of autonomic sympathetic involvement. Our study revealed differences in genital SSR before the manifestations of cystopathy. Children with abnormal urodynamic findings had changes in both hand and genital SSRs. These findings suggest that SSR tests may have a place in the evaluation of diabetic cystopathy in the early asymptomatic period.

P26

Voiding pattern and bladder condition. A quantitative descriptive study of children, adolescents and young adults with T1DM. A 12-year follow-up study

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Objectives: To explore if children and young adults have a higher frequency of voiding disorders or bladder problems than subjects without diabetes and if so, if there is an association between bladder disorder and metabolic control.

Methods: Children and adolescents, 3–19 years old, were asked year 2000 to participate in a study where an interview regarding

their voiding pattern as well as a urinary flow measurement and an ultrasound residual urine measurement was performed. General health status and metabolic control was examined. The same patients were 12 years later asked to participate in a follow-up study.
Results: Initially 105 patients (53 F/52 M), mean age 12 y (range 3–19) with diabetes duration 5 y (range 0.7-18), 9% with CSII, participated in the study. Twelve years later 39 patients (43%) were available to follow-up, 49% on pump therapy. At both occasions, 21% of the patients had a HbA1c >73 mmol/mol. Mean HbA1c was initially 58, 12 y later 63 mmol/mol (NGSP 7.5 resp 7.9 %). Children with diabetes had a larger max voided volume (P = 0.002) and more often emptying problems (p = 0.023) than healthy children. 22% of children 7–15 y were incontinent in comparison to 15% of the healthy children of the same age. There was a higher percentage of UTI (33%) 12 years later to the initial investigation when 5% had experienced an UTI. Subjects showing HbA1c > 73 mmol/mol had more often symptoms from the urinary tract in comparison to peers in better metabolic control (P = 0.058).
Conclusion: There is a clear and early association between bladder dysfunction and T1DM that should be investigated further in larger studies.

P27
Exocrine pancreatic insufficiency in children with type 1 diabetes mellitus (DM): a Russian pilot study

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Objectives: One of severe complications of DM1 is the development of pancreatic exocrine insufficiency. Fecal elastase 1 (FE 1) is a good marker of pancreatic exocrine secretion in childhood. The aim of the study was to evaluate the pancreatic exocrine secretion in children with type 1 DM, using FE 1 test for estimation of the possible need for exogenous pancreatic enzyme replacement therapy.
Methods: A total of 76 children (male/female ratio 44/32, mean age 13.7 ± 0.2 years, range 9–16 years) were included in the study. We defined 2 groups: group 1 (diabetic children, n = 54), group 2 (control group children without any pancreatic pathology / DM1, n = 22). Both groups have no differences in age and sex. None of them received pancreatic enzymes before the study. The exocrine pancreatic function was evaluated in all of the patients on the basis of steatocrite test (A. Bijoor) and a determination of FE 1 concentrations measured by ELISA (Bioserv diagnostics, Germany). Those children with FE 1 > 200 µg/g stool were considered as having normal pancreatic function.
Results: Compared to the controls, 11 (20.3%) diabetic children had significantly lower levels of FE 1 concentration (median 134.5 µg/g stool, range 24.4 - 169.6 µg/g stool; p < 0.001). Steatorrhoea was registered in all the patients with FE 1 level < 200 µg/g stool (median 11.3 g/24 h, range 7.8 - 13.2 g/24 h). All those patients were treated with pancreatin (creon) for 1 month. A significant reduction of fat excretion was observed in the pancreatin treated group at the end of the study (median 4.9 g/24 h, range 3.3 - 7.4 g/24 h).
Conclusion: Pancreatin replacement therapy can be used successfully in children with type 1 DM associated with exocrine pancreatic insufficiency.

P28
Prevalence of hepatitis B, C and HIV in diabetic children and adolescents receiving insulin

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Children & adolescents with diabetes receiving multiple daily insulin injections for life, they are in contact with health facilities and subjected to repeated blood testing on regular bases.
This study was carried to see the prevalence of Hepatitis B, C and HIV among those studied.
Aim of the study: To investigate possible factors that may have a role in getting Hepatitis B, C and HIV in diabetic children & adolescents receiving multiple daily insulin injections.
Patients and methods: This study was carried out at Pediatric Endocrine and Diabetes Department, Tripoli Medical Center, for the period 1989–2006, Tripoli - Libya.
In this study 2100 children and adolescents with type 1 diabetes were screened for hepatitis B, C, and HIV by ELISA, and those who were sero-positive were further tests by PCR, and those who were confirmed by PCR were studied for history of blood transfusion, and any surgical interventions or dental work up, social back ground and family history of diabetes.
Results: 2100 children and adolescents with type 1 diabetes were screened for Hepatitis and HIV. 25 were found sero-positive for hepatitis by ELISA, 17 were confirmed by PCR (0.77), [15 patients were positive for hepatitis C, 2 patients were positive for Hepatitis B and there was no HIV cases detected].
Conclusion: There is low incidence of hepatitis B & C in this cohort, and this is mainly due to the fact that most children were vaccinated for hepatitis B, while the incidence of hepatitis C is less than that found in normal Libyan population, this is partly due to parental care and partly due to continuous patients and family educations.

P29
Limited joint mobility in T1DM patients' life

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Objectives: It is well known that subjects with type 1 Diabetes mellitus (T1DM) may have a limited joint mobility (LJM) that is connected to other chronic complications, and it is a risk factor for diabetic foot. The aim of this study was to verify the T1DM patients' trend.
Methods: We evaluated ankle's range of motion (ROM) in plantar and dorsal flexion in: 14 young T1DM subjects (YDG), mean age 13,63 ± 1,24 years; diabetes duration 6,1 ± 4,5 years, mean HbA1c 7,2 ± 0,72%, (7/7 M/F); 14 young healthy subjects (YCG), mean age 14,43 ± 1,79 years, (6/8 M/F); 19 adults with T1DM (ADG), mean age 54,05 ± 13,05 years, diabetes duration 27,74 ± 11,95 years, mean HbA1c 7,90 ± 1,18%, (8/8 M/F); 30 healthy adults (ACG), mean age 58,42 ± 5,97 years, (11/19 M/F) and in 11 diabetic patients with diabetic foot ulcer dating less than one year (UG) mean age 65,09 ± 7,81 years, diabetes duration 13,91 ± 11,55 years, mean HbA1c 7,13 ± 0,90 %, (10/1 M/F). Ankle's joint mobility was evaluated by inclinometer.
Results: The ankle's joint mobility of different groups was: YCG 152,89° ± 13,17°, ACG 133,72° ± 18,43°, YDG 119,46° ± 13,92°; ADG 107,65° ± 30,32°; and UG 82,33° ± 23,33°. Joint mobility

in YHG group was significantly higher than in all other groups $p < 0,005$. YDG showed a significantly lower JM compared to ACG $p < 0,05$ and not significantly higher than that of adults with T1DM. The ankle's ROM in UG group was significantly lower than that of all other groups, $p < 0,05$ in particular was 85.70% less than that in the YHG, 62,42% less than in ACG, 45,10% less than in YDG, and 31,00% less than in ADG.

Conclusions: In young subjects with T1DM there is a early reduction of ankle joint mobility which continues to decrease with slower intensity in adults. These results highlight the importance of a proper management of patients with T1DM in the pediatric age. The assessment of joint mobility, in particular at the foot level, could be useful in monitoring young patients with T1DM.

Poster Tour 4: Acute and chronic complications IV

P30

Poor metabolic control in adolescents and young adults significantly increases the risk of early complications

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Objectives: To compare HbA1c in patients with type 1 diabetes during adolescence with clinical variables between 18–41 years of age, aiming to evaluate how HbA1c in adolescents affects complications in young adults.
Methods: Data on HbA1c from 4250 patients (54 % boys, 46 % girls) participating in both the Swedish paediatric national quality registry, Swediabkids, 12–17.99 years of age, and the National Diabetes Registry (NDR) aged 18–41 was used. Fifty percent of the patients were diagnosed before 10 years of age and had a diabetes duration > 15 years. Data in NDR on microalbuminuria was missing in 27 %, on macroalbuminuria in 30 % and on retinopathy in 21 %.
Results: The analysis shows that the patients with mean HbA1c values >78 mmol/mol in both registries had a higher HbA1c already at diagnosis (102 mmol/mol) compared to 94 mmol/mol among the patients with mean HbA1c < 57 mmol/mol ($p < 0.001$).
There is a significant correlation ($p < 0.001$ between all HbA1c groups) between mean HbA1c in adolescence and complications in young adults (table 1). There is a correlation, but less pronounced, even when comparing complications to mean HbA1c in NDR, (Table 1).
Conclusions: In this large population based study using national quality registries data both from childhood and young adults, it is shown that the risk of severe complications is significantly increased in young adults when having a poor metabolic control during adolescence. It is of great importance that caregivers are aware of this to give adolescents best possible care and information to avoid complications already early in life.

Table 1.

HbA1c	Swediabkids			NDR		
	Microalb %	Macroalb %	Retinopathy %	Microalb %	Macroalb %	Retinopathy %
<57	4.7 n = 35	1.4 n = 10	29.8 n = 229	4.2 n = 29	1.4 n = 11	43.2 n = 207
57-78	5.4 n = 93	1.2 n = 21	55.5 n = 1035	6.5 n = 119	1.8 n = 30	56.2 n = 1085
>78	15.8 n = 100	4.9 n = 31	83.4 n = 591	13.0 n = 80	3.5 n = 21	65.7 n = 466

P31

Monitoring progress of children and adolescent with type 1 diabetes in Navarre

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Objectives: To evaluate acute and chronic complications in diabetic patients diagnosed in a pediatric Unit, between the years 1990 and 2011 who currently are over 17 years of age.
Methods: We analyzed retrospectively the presence of acute (severe hypoglycemias HG and ketoacidosis DKA) and chronic complications (retinopathy, kidney disease, and peripheral neuropathy), and autoimmune diseases. Data were collected from the Navarre Diabetes Registry.
Results: From 1990 to 2011, three hundred and eleven (311) children and adolescents were diagnosed in Navarre. At the time of the study, 172 were 17 years old or over (98 M/74 F). Mean age 23.2 years (range:17–36). Evolution time: 13.07 years ±5 SD. Mean lifelong HbA1c: 8.04% (range:5.9-12.5). Almost 94% (94.2%) of the patients were on optimized therapy (MDI or ICSI). Over the course of their disease, 71 presented at least one acute complication (59% HG and 41% DKA). There are significant differences regarding HbA1c and evolution time ($p < 0.001$) between both groups (with or without complications). As regards chronic complications, 25 patients (14.6%) presented retinopathy (simple 98.8% and proliferative 1.2%), 22 (12.8%) had kidney disease (persistent microalbuminuria 3.5% and proteinuria 1.7%), and suffered of peripheral neuropathy 6.4%. Poorer metabolic control and time of evolution influence the development of retinopathy ($p < 0.001$) and kidney disease ($p = 0.0039$), but not neuropathy. 17% of all patients had at least one other autoimmune disease (12 celiac disease and 43 thyroid disease).
Conclusions: The most common and earliest chronic complication continues to be retinopathy, although it has decreased dramatically. The intensification of metabolic control assures delaying and reducing the severity of complications. Autoimmune disease must be ruled out periodically.

P32

Plasma thrombin-activatable fibrinolysis inhibitor levels (TAFI) in children and adolescents with type 1 diabetes mellitus: possible relation to diabetic microvascular complications

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Background: Thrombin activatable fibrinolysis inhibitor (TAFI) is a potent inhibitor of fibrinolysis isolated from human plasma.
Objectives: This study was designed to investigate the association between TAFI levels in relation to metabolic control, microvascular complications and lipid profile in a cohort of Egyptian children and adolescents with T1DM.
Subjects and Methods: Eighty normotensive non obese T1DM patients (45 with and 35 without microvascular complications)

with a mean age of 12.75 + 3.3 years and mean disease duration of 6.42 + 2.4 years in addition to 60 sex and age matched normal subjects were enrolled in this study. Anthropometric measurements, blood pressure and microvascular complications were analyzed. HbA1c, *albumin to creatinine ratio* in urine, lipid profile and TAFI levels were measured.

Results: Plasma level of TAFI in diabetic patients was significantly elevated, compared with normal subjects (16 + 2.8 *vs.* 10.3 + 0.7 μg/ml; $P < 0.004$). Plasma level of TAFI in diabetic patients with microvascular complications was significantly higher than in diabetic patients without complications (17.9 + 1.8 *vs.* 12.9 + 0.6 μg/ml ; $P < 0.001$). Plasma TAFI levels were positively correlated with HbA1c levels (r =0.38; $P < 0.03$) and systolic blood pressure (r = 0.37; $P < 0.02$). Total cholesterol and triglycerides were higher in patients with microvascular complications than those without complications ($P < 0.001, P < 0.05$ respectively). Our results showed that TAFI is considered a valid predictor for microvascular complications with best cut off value 15 μg/ml with sensitivity of 99% and specificity of 100%.

Conclusion: Our data suggest that increased plasma TAFI as well as high lipid levels may be involved in the mechanism of vascular endothelial damage in patients with type 1 diabetes mellitus. This suggests the possibility of TAFI participating in the mechanism of hypofibrinolysis hence occurrence of microvascular complications in diabetes.

P33
Effect of angiotensin converting enzyme inhibitors on natural course of nephropathy in Egyptian type 1 diabetic patients: single center experience

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Objectives: To assess the impact of treatment with angiotensin converting enzyme inhibitors (ACEI) on course of diabetic nephropathy (DN) in patients with type 1 diabetes mellitus (T1DM).

Methods: This longitudinal study included 25 patients with T1DM; 10 males and 15 females, whose ages ranged from 12–31 years. The mean age was 21.56 ± 5.78 years and duration of DN ranged from 1–19 years. All patients were on Angiotensin Converting Enzyme Inhibitors (ACEI) for diabetic nephropathy. Data recorded at time of diagnosis, during ACEI and at the study time, included age, sex, disease duration, dose and compliance of ACEI, history of diabetic microvascular complications, anthropometric measures and vital signs. Laboratory investigations included; mean HbA1c%, urinary albumin excretion (UAE) and fasting lipid profile.

Results: Twenty percent of patients reverted to normal UAE during ACEI and increased to 60% at time of the study with a significant decrease in UAE from 88(36–590) mg/day at diagnosis to 27(10–184) mg/day at study time ($p < 0.01$). Among patients with normal UAE at time of the study; 93% were compliant to ACEI therapy and 80% had normal level of cholesterol. At time of the study; there was no significant difference between normoalbuminuric and microalbuminuric patients as regard age, duration of DM, duration of DN, systolic or diastolic BP, dose of ACEI, mean HbA1c% or the presence of other microvascular complications ($p > 0.05$).

Conclusion: Treatment with ACEI in patients with diabetic nephropathy significantly reduces the risk of progression and increases the rate of regression of microalbuminuria.

P34
Microalbuminuria (MA) in youth with childhood-onset diabetes at a large university-based clinic

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Objectives: To establish the prevalence, risk factors, and course of a positive microalbuminuria (MA) screen in type 1 diabetes mellitus (T1D) in a large university-based pediatric Diabetes Clinic.

Method: Retrospective review of all case records for youth (< 18 yo) attending the Diabetes Clinic from January 2011 to July 2012.

Results: 871 subjects attended Diabetes Clinic during this period. 69.6% met the ISPAD criteria for MA screening; 86.7% (N = 528; 496 T1D; 32 T2D) underwent screening. The prevalence of MA (urine albumin:creatinine ratio ≥30 mg/gm) was 17.7% and 18.7% in T1D and T2D, respectively. In the 88 T1D children with a positive MA screen, mean (±SD) age was 15.9 ± 3.0 years and 52.4% were male. Those with a positive MA screen had younger age at onset (7.0 ± 3.8 vs 8.1 ± 4.0), higher systolic blood pressure (118 ± 11 vs 114 ± 11 mmHg) & shorter stature (height 162.0 ± 11.6 vs 165.3 ± 12.2 cm) (all $p < 0.05$) than those with a negative MA screen. Those with a positive MA screen tended to have higher HbA1c (9.5% vs 9.1%) and higher diastolic blood pressure (69 vs. 67 mmHg), were more likely female (20.3% vs.16.3%), reported more smoking (6.5% vs. 2.5%), and were more likely to have co-existing retinopathy (7.1% vs. 3.9%); however, these trends were not statistically significant (all p's > 0.05). Five children with a positive screen were prepubertal. The course of a positive MA screening test was either transient (no recurrence; 64.7%), intermittent (resolved, then recurred;15.4%) or persistent (remained positive; 9.7%). 71.4% of those with persistent MA were started on ACE inhibitor therapy whereas no subjects with intermittent or transient MA received treatment.

Conclusion: The prevalence of microalbuminuria in our clinic was 17.7%. Younger age at diabetes onset, higher systolic blood pressure and shorter stature were risk factors for development of microalbuminuria in this cohort.

Support: This research was supported by the 2012 Allan Drash Clinical Fellowship from ISPAD.

P35
Early detection of autonomic neuropathy in young patients with type 1 diabetes mellitus

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Background: Diabetic autonomic neuropathy (DAN) is a disease of cholinergic, adrenergic and peptidergic autonomic fibers, characterized by an alteration in heart rate (HR) and/or a dysregulation of blood pressure (BP). In pediatric age, experience of typical clinical presentation is rare due to the phenomena of compensation that tend to delay the onset of symptoms.

Objectives: Look for evidence that would allow making pre-clinical and early diagnosis of diabetic cardiovascular dysautonomia and evaluating possible correlations between pubertal age, duration of the disease, and glycemic control.

Methods: The study included 35 patients with T1DM, aged 5–25 years, regardless of duration of the disease. Each patient was submitted to the following tests: "Deep breathing" and "Lying to standing" for the evaluation of parasympathetic system, "Tilt test"

and ´"Handgrip test" to analyze sympathetic system. The positivity of at least two of them was considered suggestive for DAN. Factors that could alter results (intake of coffee, alcohol, hearty meals, and drugs in the three days before tests) were excluded. The last administration of rapid-acting insulin therapy was made at least two hours before the exams. Patients were also submitted to auxological evaluation, pubertal staging according to Tanner, HR, BP and level of HbA1c measurements.

Results: In 8 of the 35 patients examined (23%), aged 12–16 years, we observed pathological involvement of autonomic nervous system. In 14 patients (40%) all tests were negative, in 13 (37%) results were borderline. No correlation was found with diabetes duration or glycometabolic control measured with HbA1c levels.

Conclusions: Our study shows an high frequency of preclinical alterations of DAN in diabetic pubertal patients. It would therefore be appropriate to introduce these tests, starting from adolescence, as screening for chronic complications of T1DM.

P36
Features of neuropathy manifestation in children with diabetes mellitus type 1

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Aim: to determine the features of manifestation of chronic neurological complications *i*n children with diabetes mellitus type 1 (DM1).

Methods: randomized retrospective study of 71 children with DM1 was conducted in the University clinic (Minsk) in 2002–2013 years. Group 1 (G1) - DM1 children complicated with neuropathy (N) (41 (58,5%) (girls (G) - 20, age at diagnosis $4{,}33 \pm 1{,}1$y / boys (B) 21, $6{,}6 \pm 1{,}5$); group 2 (41,5%) (G2) - control (30 children (G 15; $6{,}1 \pm 1{,}2$ ($p = 0{,}1$); B 15; $7{,}1 \pm 2{,}3$ ($p = 0{,}07$)). Other chronic complications of DM1 were the exclusion criteria in both groups. Children's age; duration of DM1; the average fasting (FG) and postprandial (PG) glucose, HBA1c levels, daily insulin doses were measured in N manifestation; electromyographic (EMG) results were evaluated in all children. Results were made by SPSS17.

Results: The age of diagnosis N G1 G $10{,}7 \pm 2{,}2$ y, B $11{,}8 \pm 4{,}2$, DM1 duration $4{,}5 \pm 2{,}4$ and $5{,}2 \pm 1{,}5$ y. G2 age during EMG G $11{,}4 \pm 1{,}5$ y ($p = 0{,}1$), B $12{,}5 \pm 2{,}7$ ($p = 0{,}4$); DM1 duration $5{,}1 \pm 1{,}2$ y ($p = 0{,}3$) and $5{,}2 \pm 1{,}4$ ($p = 0{,}1$). The average FG levels G G1 $8{,}1 \pm 2{,}1$ mmol/l, G2 $7{,}7 \pm 0{,}7$ ($p = 0{,}9$); B G1 $8{,}7 \pm 2{,}7$, G2 $8 \pm 0{,}97$ ($p = 0{,}8$); PG G G1 $9{,}2 \pm 1{,}1$, G2 $8{,}8 \pm 1{,}4$ ($p = 0{,}8$), B G1 $9{,}5 \pm 1{,}5$, G2 $8{,}7 \pm 1{,}9$ ($p = 0{,}5$). HBA1c levels G G1 $8{,}6 \pm 1{,}2$%, G2 $7{,}3 \pm 0{,}54$ ($p = 0{,}01$); B G1 $8{,}7 \pm 2$, G2 $7{,}7 \pm 0{,}5$ ($p = 0{,}01$). Insulin doses G G1 $1 \pm 0{,}1$ IU/kg, G2 $0{,}9 \pm 0{,}2$ ($p = 0{,}01$); B G1 $1{,}1 \pm 0{,}4$, G2 $0{,}9 \pm 0{,}3$ ($p = 0{,}003$). By EMG damaging of sensory neurons was in 10 (55%) G G1, motoneurons 1 (5%), mixed 9 (40%); sensory in 13 (62%) B G1, mixed 8 (38%) ($p = 0{,}2$; $p = 0{,}1$ respectively). In 10 (50%) G G1 nerve conduction velocity were in lower, 3 (15%) upper, 7 (35%) both limbs; B 12 (57%), 2 (9,5%) and 7 (33,5%) ($p = 0{,}3$; $p = 0{,}6$; $p = 0{,}1$) without clinical features of N.

Conclusions: Neuropathy was occurred after 4–5 years of manifestation of diabetes mellitus type 1 and pyre glycemic control in all children regardless of gender ($p = 0{,}01$; $p = 0{,}01$). While conducting EMG damages of sensory and motor neurons without clinical features were noted.

P37
Evaluation of diabetic median neuropathy in children with type1 diabetes using ultrasonographic imaging and electrophysiology

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Background: Diabetic neuropathy is recognized as the most common clinical picture of nervous system disorders caused by diabetes mellitus.

Objectives: To evaluate the relationship between the sonographically measured cross- sectional area(CSA) of the median nerve and nerve conduction study (NCS) in children with type1 diabetes(T1DM)complaining of diabetic peripheral neuropathy (DPN).

Material and methods: Forty adolescents with T1DM (mean age 15.2 ± 2.9 years, duration 8.4 ± 4.1 years) and 20 age matched healthy subjects(mean age of 13.9 ± 3.3 years) were enrolled in this study. The diabetic children were divided into 2 groups(with and without DPN). All participants performed NCS and sonographic measurement of CSA for the median nerve in the wrist. All NCS were done on both median nerves measuring the motor nerve conduction velocity (MNCV) and the motor latency from the elbow to the wrist joint.

Results: The mean median nerve CSA was larger in diabetic children with DPN compared to those without DPN and controls($0.073\,cm^2$, $0.072\,cm^2$,$0.043\,cm^2$ respectively, $P = 0.01$), but there was no significant difference between diabetic children without and with DPN($P = 0.79$). The mean value of median nerve motor latency was diminished in patients with DPN in comparison to patients without DPN and controls (3.5 ms, 3.4 ms, 2.96 ms respectively, $P = 0.005$). The increased median nerve CSA in the wrist was correlated with the median nerve motor latency($r = 0.735$; $p = 0.01$), duration of diabetes($r = -0.566$; $p = 0.009$) and HbA1c ($r = -0.733$; $p = 0.05$), nevertheless, with non significant correlation with median nerve MNCV ($r = -0.079$; $p = 0.741$).

Conclusion: Sonographic measurement of CSA of median nerve is a good alternative to nerve conduction study results of motor latency and motor nerve conduction velocity for the diagnosis and follow up of diabetic neuropathy. Moreover, the duration of disease and impaired glycemic control play an important role in the development of peripheral neuropathy.

P38
Peripheral diabetic neuropathy (PDN) in children and adolescents with type 1 diabetes mellitus (T1DM): correlation with glutamic acid decarboxylase autoantibodies (anti-GAD)

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Objectives: Anti-GAD autoantibodies are positive in 50-81% of T1DM patients at disease onset, however their titers decline over time. It is unclear whether the persistence of anti-GAD is associated with the development of PDN. The aim of our study was to identify patients with subclinical PDN and to assess the role of anti-GAD as a possible index of PDN.
Methods: 76 T1DM patients (mean age:13.75 ± 3.39 years, mean T1DM duration:5.5 ± 3.53 years, mean HbA1c:8.0 ± 1.5%) and 79 matched healthy controls were examined. 76.1% patients were asymptomatic, whereas 3 complained of numbness in the lower extremities. All T1DM patients were examined by a single neurologist with an electroneurogramm (ENG). In both patients and control groups vibration sensation thresholds (VST) in the upper and lower extremities were assessed by a single examiner using a biothesiometer. Anti-GAD titers were measured with radioimmunoassay method (RIA).
Results: VST values were significantly higher in patients compared to control subjects in all examined sites ($p < 0.001$). 24/76 (31.5%) of the patients had abnormal ENG values. The presence of positive anti-GAD was not associated with higher VST values or abnormal ENG ($p = 0.49$). In a subgroup of 29 patients with a long T1DM duration (>5 years) and poor metabolic control (HbA1c > 8.5%), 4/29 (13.8%) had abnormal ENG and 15/29 (51.7%) were positive for anti-GAD. No statistically significant correlation between the presence of anti-GAD and abnormal ENG was found in this subgroup.
Conclusions: PDN in pediatric populations with T1DM is usually asymptomatic. Anti-GAD, autoantibodies although involved in the pathogenesis of T1DM, may not be considered as a risk factor for the development of PDN.

Poster Tour 5: Acute and chronic complications V

P39

Continuous subcutaneous insulin infusion therapy benefits to the decrease in development of early atherosclerotic changes in children with diabetes mellitus type 1

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Introduction: Insulinotherapy with use of personal insulin pumps enables metabolic control improvement in patients with diabetes type 1 (T1DM). The disease is an important risk factor for early development of the cardiovascular diseases. The possible influence of the continuous subcutaneous insulin infusion (CSII) on the development of first atherosclerotic changes has not been studied so far.

Aim: The evaluation of influence of insulinotherapy change from multiple insulin injections (MII) to CSII on first atherosclerotic changes in arteries in T1DM children.

Material and methods: Thirty-two T1DM children were studied, aged 14,8 ± 2,5 yr (20 girls, 12 boys), suffering from the disease mean 3,8 ± 3,2 yr, initial HbA1c level - 8,33 ± 1,72%, treated so far with MII. Patients were examined firstly just before the beginning of CSII - "0" and then after 3 and 6 months of pump use. HbA1c was evaluated in parallel. Using ultrasonography we assessed intima-media thickness (IMT) in common carotid arteries and the flow-mediated dilatation (FMD), in the brachial arteries.

Results: HbA1c improved in the whole group from 8,33 ± 1,72% to 7,69 ± 1,48% in the second examination (p = 0,007), and in the third: 7,96 ± 1,46% (n.s.). An increase in FMD values was noticed: from 13,59 ± 7,57% to 18,75 ± 9,12% in the third examination after 6 months (p = 0,01). IMT value after 6 months decreased from 0,521 ± 0,052 mm to 0,491 ± 0,037 mm (p < 0,001).

Conclusions: Insulin pump therapy, together with metabolic improvement, is connected with lower IMT and higher FMD values in half-year observation after changing from multiple injections. It may indicate slower progression of morphologic changes in arteries and better endothelial function in this group of children with T1DM.

P40

Correlation between plasma myeloperoxidase (MPO) and myocardial performance index (Tei index) in Egyptian children and adolescents with type 1 diabetes mellitus (T1DM)

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Background: Diabetic cardiomyopathy is characterized initially by diastolic dysfunction and later systolic dysfunction. MPO, expressed in polymorphonuclear leukocytes is one of the promising cardiac markers.

Objectives: To assess plasma MPO, as a marker of oxidative stress, in relation to Tie index in a cohort of Egyptian children and adolescents with T1DM for early prediction of cardiac dysfunction.

Methods: Fifty type 1 diabetic patients (25 with and 25 without microalbuminuria) with mean age of 12.76 + 3.64 years and mean disease duration of 6.36 + 3.11 years in addition to 50 sex and age matched normal subjects were enrolled in this study. Albumin to creatinine ratio in urine, HbA1c and plasma MPO levels by ELISA, were measured. M mode echocardiography, pulsed and tissue Doppler were performed and Tei index was defined as the ratio of total isovolumic time divided by ejection time.

Results: Plasma level of MPO in diabetic patients was significantly elevated, compared with normal subjects (64.48 + 51.66 *vs.* 29.6 + 11.7 ng/ml; $P < 0.001$). Plasma MPO levels were positively correlated with left ventricular posterior wall thickness and aortic diameter. No significant difference was found between patients and controls regarding systolic functions assessed by conventional echocardiography. Left and right ventricular Tei indices were significantly increased in diabetic patients than controls by tissue Doppler. Tei index was positively correlated with duration of diabetes and HbA1c. MPO demonstrated a prediction value for left ventricular Tei tissue index with a sensitivity 80.43% and specificity 77.78%(AUC = 0.82, best cut off value 36 ng/ml).

Conclusion: Plasma MPO provide a good predictor of myocardial performance index for detection of cardiac dysfunction in T1DM. Tei index by tissue Doppler is more accurate than with pulsed Doppler and may be considered as a new echocardiographic parameter for the assessment of global ventricular function during patient follow up.

P41

Endothelial dysfunction in children and adolescents with type 1 diabetes

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Objectives: We evaluated the prevalence of early endothelial dysfunction, as measured by mean of reactive hyperemia (peripheral artery tonometry) (RH-PAT) in adolescents with type 1 diabetes, at baseline and after 1-year follow-up.

Methods: Seventy-three children and adolescents, ages 16 ± 3.5 yrs., with diabetes since8.9 ± 4.3 yrs., using either MDI or CSII, underwent RH-PAT endothelial function testing. BMI, blood pressure, fasting lipid profile, HbA1c, insulin requirement, physical exercise (h/wk), microangiopathic complications, dietary habits and body composition were determined in each child.

Results: We observed endothelial dysfunction in 56 patients with type 1 diabetes as evidenced by lower mean RH-PAT scores (1.26 ± 0.22 vs. 2.24 ± 0.48, p < 0.0001), showing higher HbA1c values either at baseline or as mean of the whole period since diagnosis (8.27 ± 1.24% vs. 7.37 ± 0.54%, p = 0.006; 8.25 ± 1.22% vs. 7.72 ± 0.82%, p = 0.034, respectively). According to therapy (CSII vs. MDI), HbA1c was still higher in patients with endothelial dysfunction (CSII n = 40, 8.40 ± 1.08 vs. 7.30 ± 0.58%, p = 0.049; MDI- n = 33, 8.14 ± 1.40% vs.7.46 ± 0.50% vs. p = 0.034, respectively). A higher percentage of patients with impaired endothelial function showed abnormal cardiac autonomic tests ((p = 0.02) and were more sedentary (< 4 h/wk of exercise) (p < 0.0001), than patients with normal endothelial function. After follow-up in 64/73 patients, we observed an even higher rate of endothelial dysfunction (81.8% vs. 76.7% at baseline), albeit a modest improvement in HbA1c (CSII n = 37, 7.98 ± 0.90 vs. 7.53 ± 0.98%, p = 0.049; MDI n = 27, 8.15 ± 1.85% vs.7.13 ± 0.57% vs. p = 0.043, respectively).

Conclusions: Adolescent with T1D displayed evidence of endothelial dysfunction. However good metabolic control (HbA1c ≤7.5%) and regular physical activity (at least 4 h/wk) play a protecting role.

P42

The genetic and clinical risk factors of hypertension and ''non-dipping'' phenomenon in adolescents and young adults with DMT1

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The aim of our study is the assessment of chosen genetic risk factors - ACE genotype: insertion/deletion (rs17997552), rs1800764, rs4459609 and RGS2 (rs2746071) and clinical factors of development hypertension and non-dipping phenomenon in children and young adults with T1DM.

Methods: 238 adolescents and young adults with T1DM: 103 females and 135 males, aged 8–30 years (mean 17.35 + 5.2) with diabetes duration 1–26 years (mean 7.72 + 6.2), with mean HbA1c 7.47% + 1.35%, were included to the study. 24-hour ABPM was undertaken in all patients. The results of the ABPM were analyzed in association with the polymorphisms of ACE and RGS2 genes and clinical data of patients.

Results: Arterial hypertension (HA) was recognized in 65 (27%) and ''non-dipping'' was reported in 111 (46.63%) patients. Subjects with HA were more frequently male (69.2% vs 30.8%, $p = 0.016$), have a longer duration of diabetes (9.72 ± 6.68 vs 6.97 ± 5.91 years, $p = 0.002$), and had significantly higher levels of total cholesterol (190.63 ± 43.43 vs 172 ± 36.67 mg/dl; $p = 0.005$), LDL cholesterol (106.75 ± 34.17 vs 93.31 ± 31.35 mg/dl; $p = 0.004$) and tendency to have higher triglyceride levels. Similarly subjects with ''non-dipping'' phenomenon were significantly older (18.64 ± 5.49 vs 16.22 ± 4.67 years $p = 0.002$) and have a longer duration of diabetes (9.42 ± 6.65 vs 6.23 ± 5.46; $p = 0.0002$). There was no association between disturbances of blood pressure and genotypes of ACE: rs17997552, rs1800764, rs4459609 and RGS2: rs2746071. In multivariate analysis of factors predisposing to HA, the variables that remained significant were male sex, age and total cholesterol level and factors associated with the presence of dipping phenomenon - age and duration of diabetes.

Conclusions: Development of HA and "non-dipping" in adolscents and young adults with DMT1 is not connected with genetic predisposition but rather due to clinical factors: sex, age, duration of diabetes and lipid profile.

Sponsored by grants:NN 402 279134, NCN NN519579938.

P43

Serum uric acid and hypertension in adolescents and adults: a relationship dependent on age and diabetes status

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The association between serum uric acid (SUA) and hypertension is well recognized in non-diabetic subjects. The reduced SUA levels found in patients with type 1 diabetes (T1D) may change the nature of the relationship between SUA and blood pressure. We hypothesized the associations between SUA and blood pressure would be stronger in non-diabetic subjects, and particularly so in the adult cohort.

We assessed the cross sectional and longitudinal relationships between SUA and SBP and DBP in adolescent and adults with and without T1D. Adolescent subjects with ($n = 256$) and without ($n = 78$) diabetes in Determinants of Macrovascular Disease in Type 1 Diabetes study, and adult subjects with ($n = 393$) and without ($n = 685$) diabetes in the Coronary Artery Calcification in Type 1 diabetes (CACTI) study had data available for SUA and blood pressure.

SUA was significantly lower in both adolescent and adult subjects with T1D compared to non-diabetics (adolescent: 4.55 ± 0.83 vs. 5.06 ± 0.98, adult: 4.86 ± 1.00 vs. 5.72 ± 1.35, $p = 0.0001$ for both). SUA was related to SBP and DBP in adult non-diabetics, and for SBP remained significant in a multivariable model, adjusting for age, race, gender, serum creatinine, waist circumference, smoking status and HbA1c ($\beta = 5.2 \pm 2.5$, $p = 0.04$). In adult non-diabetics, the 4th compared to 1st quartile of SUA was associated with progression of SBP ($\geq$1 step increase in JNC stage) in multivariable models ($OR = 2.0$, $p = 0.003$). In adult T1D subjects, no association was found between SUA and SBP or DBP univariately, but in a fully adjusted model the association with SBP became negative ($\beta = -8.1 \pm 3.6$, $p = 0.03$). No association was observed between SUA and SBP or DBP in adolescents with and without T1D.

In conclusion, adolescent and adult subjects with T1D have reduced levels of SUA, and the associations between SUA and blood pressure differ significantly based on age and diabetes status. Further research is needed to dissect the mechanisms responsible for these differences.

P44

Serum uric acid and insulin sensitivity in adolescents with and without type 1 diabetes

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Decreased insulin sensitivity (IS) is well documented in adolescents with type 1 diabetes (T1D). The association between serum uric acid (SUA) and decreased IS is well recognized in non-diabetic subjects. The reduced SUA levels found in patients with type 1 diabetes (T1D) may indicate a unique nature of the relationship between SUA and IS. There is a need for improved understanding of the relationship between SUA and IS in adolescents with and without T1D.

We assessed the cross sectional relations between SUA and estimated insulin sensitivity (eIS) in adolescents with and without T1D. Data on SUA and eIS were available for 254 youths with T1D and 70 young controls in the Determinants of Macrovascular Disease in Adolescents with T1D study cohort.

In adolescents with T1D, SUA at baseline was negatively associated with eIS in a multivariable model adjusting for age, sex, BMI, serum creatinine, SBP, HDL, LDL, HbA1c and smoking status ($\beta \pm SE$: -2.16 ± 0.58, $p = 0.0003$). Similar but stronger relationships were seen in adolescent controls (Figure 1). Moreover in a fully adjusted model, 4th quartile of SUA (controls: 5.7 ± 0.6 mg/dL,

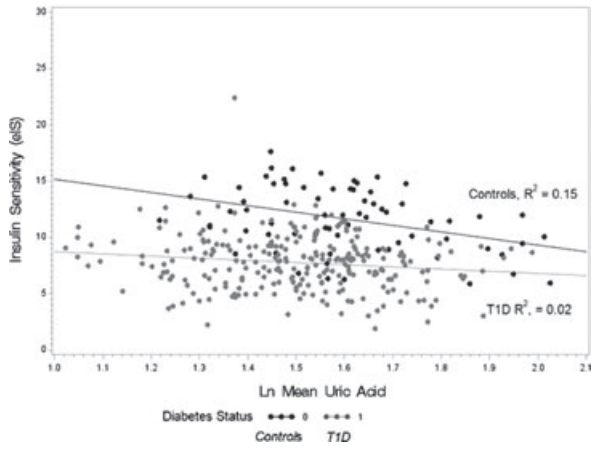

Fig. 1. Relationship between SUA and eIS in subjects wiht and without T1D.

T1D: 5.8 ± 0.9 mg/dL) was still associated with lower eIS than 1st quartile (controls: 3.7 ± 0.5 mg/dL, T1D: 4.0 ± 0.4 mg/dL) in both controls and subjects with T1D.
Despite adolescent subjects with T1D having reduced levels of SUA, an inverse association between SUA and IS remains significant, independent of other factors associated with reduced IS in other populations.

P45
Circulating endothelial progenitor cells (EPCs) in young patients with type 1 diabetes

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Type 1 Diabetes mellitus (T1D) can cause long term damage both to small and major vessels and affect endothelial repair mechanisms. It is well known that endothelial repair depends on the availability of circulating endothelial progenitor cells (EPCs), a sub-type of progenitor cells from bone marrow and peripheral blood able to differentiate into mature endothelial cells. EPCs were found to be decreased by 44% in T1D adults compared to controls and this reduction was found to be associated with diabetes complications (Kim 2012).
Objectives: We evaluated EPCs levels in T1D children and adolescents compared to healthy subjects and to T1D adults.
Methods: We enrolled 110 T1D patients without complications, followed at Meyer Children's Hospital Diabetology Unit and at Prato Hospital.
Group A: 54 subjects younger than 20 years (median age 14.4 yrs; range 7–19).
Group B: 56 subjects older than 20 years (median age 34 yrs; range 20–59).
We considered a control group of 22 subjects, 11 younger than 20 years (median age 12 yrs; range 5–19) and 11 older (median age 43 yrs; range 28–51). EPCs levels have been evaluated by flow cytometry using three antibodies conjugated with different fluorochromes (CD34-FITC, CD133/2-APC, VEGFR2-PE). The t-test was used to compare the results expressed as mean ± SD and values of $p < 0.05$ were considered significant.
Results: In group A median EPCs level was 15.6 ± 6.5 vs 3.9 ± 0.7 in healthy subjects ($p < 0.001$) and vs 9.3 ± 2.5 in group B ($p < 0.001$). No differences between group B and adult healthy subjects (10.30 ±2.2; p 0.20).
Conclusion: Our data showed increased EPCs value in young T1D patients in respect to controls and T1D adults. We speculated that high EPCs values could protect children and adolescents from the endothelial stress due to T1D and that the endothelial damage may develop after EPCs consumption. Future studies are needed to evaluate if EPCs work properly and the natural course of EPCs levels in T1D patients.

P46
Measurement of neutrophil gelatinase associated lipocalin in type I diabetic children with no microalbuminuria

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Background: Forty percent of type one diabetic patients develop diabetic nephropathy (DN) at sometime. The hypothesis of a tubular phase of diabetic kidney disease that precedes the manifestation of typical glomerular lesions has been suggested by some recent studies.
Aim of the work: To evaluate the presence of renal tubular affection preceding the development of microalbuminuria in type 1 diabetic children.
Methods: 57 type 1 diabetic children without microalbuminuria and normal estimated glomerular filtration rate, and 57 matched participants with no diabetes have been evaluated for their level of serum neutrophil gelatinase associated lipochalin.
Results: Children with type 1 diabetes had their mean serum neutrophil gelatinase associated lipocalin (sNGAL) significantly significantly higher than control. There was a positive correlation between sNGAL and both albumin creatinine ratio (ACR), and glycosylated hemoglobin level.
Conclusion: Renal tubular affection may precede microalbuminuria in type 1 diabetic children.
Keywords: Type 1 diabetes, Diabetic nephropathy, neutrophil gelatinase associated lipocaline, renal tubular affection.

P47
Type 1 diabetes, but not residual beta cell function and blood glucose, affect cytokine levels

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Objectives: Post meal hyperglycemia has been associated with low grade inflammation in adults with type 2 diabetes, and recently residual beta cell function (RBF) has been shown to associate with cytokine levels in T1D. Therefore, the objectives were a) to compare the levels of seven pro-inflammatory cytokines, high sensitive c-reactive protein (hsCRP), and the anti-inflammatory cytokine -transforming growth factor beta (TGF-β)-, in children with T1D and healthy controls; b) to compare the cytokine and hsCRP levels before and after meal-induced hyperglycemia; c) to test if RBF influences cytokine levels.
Methods: We included 84 (46 females) children with T1D, age 14.2 (11.2;15.7) years, T1D for 4.1(3.0-6.0) years, HbA1c 62(44;110)

mmol/mol, 32 children had stimulated C peptide above 10 pmol /l. All had a pre-meal blood glucose (BG) below 10 mmol/l, and a meal increase in BG of more than 10 mmol / l. Sixty-nine healthy children (37 females) served as controls. The cytokines and hsCRP were measured before and 90 minutes after a standard meal.

Results: Three of seven pro-inflammatory cytokines and hsCRP were significantly higher, and TGF-β was significantly lower in children with T1D with normal BG compared to healthy controls. TGF β decreased significantly 90 minutes after a standard meal, but so did the pro-inflammatory cytokines - tumour necrosis factor beta, tumour necrosis factor receptor type 1 and monocyte chemotactic protein 1. RBF did not associate to cytokine levels or hsCRP.

Conclusions: Children with T1D have increased pro-inflammatory cytokines and hsCRP and reduced TGF- β despite normal BG, indicating a constant low grade inflammatory state. High BG decreases TGF- β further, while some pro-inflammatory cytokines also decreases, the effect of which may outweigh each other. Post meal hyperglycemia did not seem to increase the pro-inflammatory state in children with T1D, neither did RBF seem to influence cytokine levels and hsCRP in this population.

P48
Persistence of β cell stress in the initial period following diagnosis of T1D in children

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Objectives: Emerging data suggest that islet autoimmunity in Type 1 Diabetes (T1D) is associated with endoplasmic reticulum (ER) stress that leads to proinsulin(PI) misfolding. ER stress attenuation may involve increases in ER protein folding chaperones such as heat shock proteins (HSP). ER stress contributes to β cell death and C-peptide (C-pep) loss. Sustained C-pep production in longstanding T1D is linked to reduced long and short-term complications. Agents designed to alleviate β cell stress may be favorable options for sustaining β cell function in new onset T1D, yet, β cell stress in the post-diagnosis period is not well characterized.

Methods: We examined 20 new onset T1D subjects (mean age 11.7 years, 50% Male, 90% White) at clinical diagnosis (dx) and after 6–11 weeks of follow-up during the honeymoon phase. We evaluated glycemia (by A1C), β cell function (random C-pep ELISA), β cell ER stress (PI:C-pep ratio). Serum HSP90 (ELISA) concentrations were also measured.

Results: Mean A1c at dx was 11.5%; at follow-up 7.6%. Relative to 17 matched controls, random C-pep concentration were significantly decreased at T1D onset ($p = 0.01$); however, 8.2 ± 1.4 weeks later C-pep increased significantly ($p = 0.007$) and was comparable to controls. PI at diagnosis did not differ from controls, but increased at honeymoon ($p = 0.01$). PI:C-pep ratio and HSP90 concentrations were elevated at dx in new onset T1D subjects. Despite improved glycemic control at follow-up, these elevations were sustained.

Conclusions: As expected, the honeymoon was associated with increased β cell secretory activity and increased C-pep. PI also has a striking significant increase, signifying an increased release of premature misfolded PI alongside improved insulin secretion. These data indicate that β cell ER stress is high at onset and persists in the honeymoon even after amelioration of dysglycemia and suggest novel therapeutic approaches to reduce β cell stress in new onset T1D should be considered.

Poster Tour 6: Acute and chronic complications VI

P49

Does diabetes mellitus type 1 influence 25(OH) vitamin D level in children and adolescents?

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Objectives: To compare serum levels of 25(OH)vitamin D between type 1 diabetic patients and healthy controls and look for correlations between its levels and disease duration, metabolic control and insulin dose.

Methods: A cross-sectional study of 73 diabetic patients (35 males) aged 11,34 ± 4,07 years and 23 healthy controls (12 males) aged 7,28 ± 4,72 years. Patients are divided in 4 subgroups according to disease duration: newly diagnosed; 6 months-5 years; 5–10 years and >10 years. Patients with evolution >6 months are divided in subgroups according to metabolic control: optimal (HbA1c ≤ 7,5%) and unsatisfactory (HbA1c > 7,5%). Serum levels of total 25(OH)vit D examined by electrochemiluminescence, HbA1c by immunoturbidimetric method /Roche diagnostics/. US Endocrine Society guideline is used to define vitamin D deficiency and insufficiency. Statistical analysis-SPSS 15.0.

Results: Level of 25(OH)vitamin D in controls is 27,63 ±9,74 ng/ml, in patients- 25,39 ± 8,14 ng/ml, p > 0,05. 35% of patients and 21% of controls have vitamin D deficiency. Vitamin D insufficiency is observed in 37% of patients and in 43% of controls.

Mean duration of diabetes is 0,04 ± 0,12 yrs (n = 15); 2,35 ± 1,4 yrs (n = 27); 7,05 ± 1,52 yrs (n = 24) and 10,70 ± 0,61 yrs (n = 7). The corresponding levels of 25(OH)vit D are: 23,74 ± 9,19 ng/ml; 26,86 ± 7,64 ng/ml; 25,50 ± 8,65 ng/ml and 22,89 ± 5,86 ng/ml, p > 0,05.

Mean HbA1c level in optimal control group (n = 18) is 6,98% ± 0,41, in unsatisfactory control group(n = 38) 9,18% ± 1,38. Levels of 25(OH)vit D are 25,95 ± 7,26 ng/ml and 25,69 ± 8,30 ng/ml respectively, p > 0,05. There is no correlation between metabolic control and vitamin D levels. Insulin dose (0,91 ±0,25U/kg) does not correlate with 25(OH)vitD level (r = 0,019, p = 0,845).

Conclusions: Presence of diabetes mellitus type 1 does not influence vitamin D metabolism. Level of 25(OH)vitamin D is not dependent on disease evolution, metabolic control and insulin dose.

Supported by: Grant from Medical University Sofia, Bulgaria.

P50

Evaluation of 25 HO vitamin D in children with type 1 diabetes mellitus and its correlation with the bone structure

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Aim: Prospective study evaluating 25 HO vitamin D level in type 1 DM children and the correlation with the bone structure.

Material and method: The lot included 22 children (13 F, 9 M) with type 1 DM with different duration of evolution: 5 cases in the first year since DM onset,15 cases with the duration of DM between 1–10 yrs. 13 patients from the studied lot were on insulin pump treatment and 9 cases on 5/6 injections daily. For the associated pathology 5 cases were treated with L-Thyroxine (1 girl 11 yrs, was on specific diet for celiac disease. 1 case presented diabetic nephropathy. We measured HbA1c, total and ionic serum calcium level, alkaline phosphatase, 25 HO vitamin D. Bone density was evaluated by lumbar and hip DEXA examination in all children older than 12 years.

Results: Depending on the 25-HO vitamin D levels, the patients were divided in 3 groups: sufficiency (> 30 mg/L) = 4 cases, insufficiency (10–30 mg/L) = 16 cases and deficiency (< 10 mg/L) = 2 cases. Lumbar Z score was : normal = 12 cases, osteopenia (Z score: - 0,5 - 2) = 4 cases and osteoporosis (Z score > − 2) = 7 cases. Hip evaluation revealed: normal aspect = 16 cases, osteopenia (Z score: - 0,5 - 2) = 5 cases, osteoporosis (Z score > − 2) = 1 case. HbA1c levels ranged between 6–6,9% (8 cases), 7–7,9% (7 cases), 8–8,9% (3 cases), 9–9,9% (2 cases), > 10% (2 cases).

Discussions: All cases with associated diseases presented at least, vitamin D insuficiency. We could not establish a positive correlation between the serum level of the vitamin D active metabolite and the severity of the bone affection.

Conclusions: 25-HO vitamin D should be measured even since the onset of type 1 DM and also an oral supplement of vitamin D should be given to all cases diagnosed with vitamin D insuficiency. Vitamin D should be measured in România in all children with type 1 DM, twice per year, at the end of summer and at the end of spring.

P51

Vitamin D status and its determinants in children and adolescents with type 1 diabetes

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There is an increased prevalence of vitamin D deficiency in North European countries. The purpose of this study was to evaluate the vitamin D status in children with type 1 diabetes in Belgium and to study the effect of gender, ethnic origin, age, obesity, metabolic control and season on 25-OH vit D concentrations.

All children with type 1 diabetes, with a regular follow up during 2006 and 2008 at Diabetes Clinic of the Children's University Hospital of Brussels were studied at the moment of their annual screening. Serum levels of 25-hydroxyvitamin D (25(OH)D) were measured by a commercial immunoassay. 207 patients (111 boys and 96 girls; 155 Belgian and 52 Magreb) were included in the analyses. Their age ranged between 1.9 and 18.5 years and their BMI - z score between −1.53 and 2.49.

The overall prevalence of vit D deficiency (< 10 ng/ml) and insufficiency (< 20 ng/ml) were 31 % and 72 %, respectively. A seasonal fluctuation was seen: mean(SD) values of vitD were lowest in winter and highest in summer (12.7(6.0) vs 19.5(8.3) ng/ml; p < 0.0001). Boys had significantly lower vitD concentrations than girls (14.4(7.4) vs 16.8(8.0) ng/ml; p < 0.05). Magreb patients had significantly lower vitD concentrations than autochthonous patients (11.4(5.5) vs 16.8(7.9) ng/ml; p < 0.001). The vitD level correlated negatively with the BMI z-score (r = −0.22; p = 0.01). No correlation between vitD and age or metabolic control. In multiple logistic regression, low vitamin D status was significantly associated with the winter season (p < 0.0001) and increased adiposity (p = 0.05).

Our results suggest that a poor vitamin D status is common among both autochthonous and allochthonous children with type 1 diabetes in Belgium, an European country without food fortification with

vitamin D. Increased adiposity was found to be a risk factor for a poor vitamin D status. Vitamin D supplementation during winter should be considered in pediatric patients with type 1 diabetes.

P52
Intermittent hypoglycaemia impairs memory in a mouse model of poorly controlled type 1 diabetes

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Recent studies indicate that the combination of type 1 diabetes (T1D) plus severe hypoglycemia (HYPO) may be particularly deleterious to neurons. This study examined whether intermittent HYPO effected cognitive function in a rodent model of chronic T1D and the potential biological process contributing to this.

T1D was induced using streptozotocin (STZ:125 mg/kg i.p.) and mice given insulin replacement (Linbit® implants) to maintain weight despite chronic hyperglycemia (fasting glucose (FBG):24.9 ± 0.9 mmol/l). HYPO was induced with i.p. insulin (2 episodes per week for 4 weeks; FBG, T1D:3.5 ± 0.3 vs Control:3.2 ± 0.2 mmol/l). Four groups (n = 8/group) of C57bl6 mice (20-25 g) were studied.T1D (STZ alone) and T1D + HYPO, and Control (FBG 6.8 ± 0.1 mmol/l; +/− HYPO).Cognition was assessed by spontaneous alternation and novel object recognition (NOR) tasks 7–10 days after the last hypoglycemic episode. Subsequently brain tissue was examined for markers of oxidative stress (glutathione assay and heme oxygenase 1 (HO-1) and NAD(P)H:quinone oxidoreductase 1(NQO1) transcript levels) and lipid peroxidation (TBARS assay).

T1D significantly reduced % alternation ($p < 0.05$) and impaired performance in the 24 hr NOR task ($p < 0.05$), tests of spatial and long-term memory respectively. HYPO further impaired cognitive ability in the NOR task in T1D mice only. T1D was associated with increased total and reduced glutathione within the hippocampus ($p < 0.05$). HYPO induced lipid peroxidation within the hippocampus, which was further enhanced in T1D animals. T1D resulted in significant increases in HO-1 and NQO1 mRNA in hypothalamus ($p < 0.05$), an effect augmented following HYPO in T1D, but not Control mice.

In summary, T1D in rodents induced deficits in working and long-term memory that were associated with oxidative stress and lipid peroxidation. These cognitive and biological changes were further exacerbated by intermittent HYPO. We conclude that HYPO in T1D may have long-term effects on brain function.

P53
Hypoglycaemia in children with type 1 diabetes mellitus

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Objectives: Hypoglycaemia is a common complication of insulin treatment in type 1 diabetes mellitus. Symptoms vary with each individual, and it is common for patients to be unaware when their glucose is low. This study aimed to assess hypoglycaemia in our patients and the determinants of its occurrence.

Methods: Sixty-five parents of type 1 diabetic children from a Diabetic Clinic in a second level hospital completed a standard clinical interview, anthropometric evaluation and laboratory work-up.

Results: The mean age of the patients was 12.4 ± 3.5 years, with average diabetes duration of 4 ± 2.4 years. All the patients referred hypoglycaemic events. The most part (43.1%) occurred during the morning and 95.4% of the children had symptoms. The most frequent were weakness (73.8%), trembling (58.5%) and sense of hunger (47.7%). Approximately 33.8% mentioned neuroglycopenic symptoms but only 16.9% were admitted in the Emergency Room. The lower levels of capillary glucose varied between 10-64 mg/dL, with 56.9% of the patients having ≥1 episode per week. Living in rural area was a risk factor for recurrent hypoglycaemias (86.5%, $p = 0.01$), however there was no relation with gender, parental education, diabetes duration or patient age. Lower levels of HbA1c were associated with recurrent hypoglycaemias (8.3 ± 1.3%, $p = 0.01$). About 70% of glycaemias < 40 mg/dL occurred in patients using intensive insulin therapy ($p = 0.003$) and they were also associated with longer diabetes duration (4.6 ± 2.3 years, $p < 0.001$).

Conclusions: It is difficult to optimize glycaemic control in a child as the risk of hypoglycaemia is always present. Increased duration of diabetes is a well-known risk factor for hypoglycaemia, but we could only associate it with hypoglycaemia's severity. Strict glycaemic control with intensive insulin management was associated with severer hypoglycaemias, as well as achieving lower levels of HbA1c could be the result of more frequent hypoglycaemic episodes.

P54
The effects of diabetes duration on hypoglycemia symptom intensity and prevalence of impaired awareness of hypoglycemia

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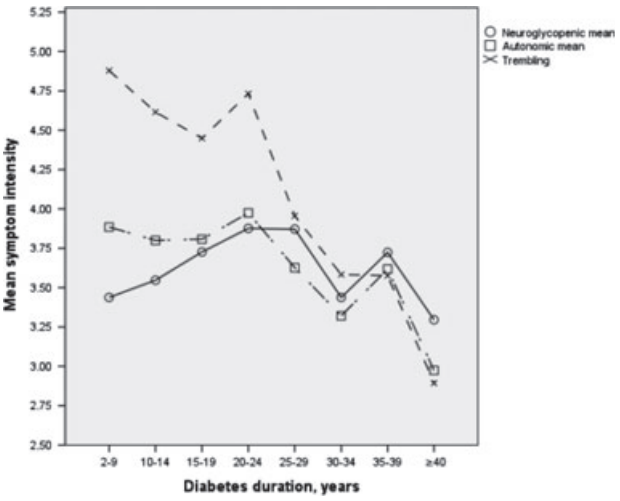
Objectives: Diabetes duration influences hypoglycemia symptoms and prevalence of impaired awareness of hypoglycemia (IAH); viz. a diminished ability to perceive onset of hypoglycemia. By questionnaire, hypoglycemia symptoms and prevalence of IAH were assessed in an outpatient population with type 1 diabetes.



Methods: Symptom presence and intensity were measured by the Edinburgh Hypoglycaemia Scale, using a Likert scale of 1 to 7. Hypoglycemia awareness was assessed by the method of Gold et al., based on the question "*do you know when your hypos are commencing?*", using a scale from 1 to 7 (1 = always aware, 7 = never aware; ≥ 4 = IAH).
Results: The response rate was 70% (445/636). IAH was present in 17% (CI: 14-21%). With progressive diabetes duration, the prevalence of IAH increased (from 3 % for duration 2–9 years to 28 % for duration ≥ 30 years, p for trend < 0.001), the mean intensity of autonomic (A) symptoms declined (p for trend < 0.001) (Fig.1), the intensity of trembling and hunger decreased ($p < 0.001$ and $p = 0.004$, respectively), while the mean intensity of neuroglycopenic (NG) symptoms did not change ($p = 0.55$). The mean (SD) ratio of NG/A symptoms was higher in IAH than in aware subjects (1.16 (0.43) vs. 1.01 (0.33), $p = 0.001$).
Conclusions: With progressive diabetes duration, the prevalence of IAH rises and the intensity of autonomic symptoms, particularly trembling, declines. Neuroglycopenic symptoms predominated in those with IAH.

P55
Fear of hypoglycaemia amongst parents of children with type 1 diabetes

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Objectives: Intensive insulin therapy improves glycaemic control potentially at the expense of increasing episodes of hypoglycaemia. Parental anxiety surrounding hypoglycaemia may result in behaviours to avoid hypoglycaemia at the expense of glycaemic control. The aim of this study was to

1. determine if parental hypoglycaemia fear is associated with worse glycaemic control and increased resource utilisation and
2. identify risk factors for increased hypoglycaemia fear in parents of children with type 1 diabetes.

Methods: Parents of children attending the diabetes outpatient clinic were asked to complete a modified Hypoglycaemia Fear Survey (HFS). Demographic data, as well as a computer print out of number of phone contacts and mean glycosylated HbA1c were also collected.
Results: 106 parents (73 mothers, 33 fathers) completed the questionnaire. Mean patient age was 11.1 years (SD 3.7) and time since diagnosis was 4.8 years (SD 3.2). Almost half (52%) were male and 48% of patients were on insulin pump therapy. Fear of hypoglycaemia was highest amongst parents of 6–11 year olds, followed by 0–5 year olds and over 12 year olds respectively. Parents of children with HbA1c less than 7.5% had less hypoglycaemia fear. Previous seizures and increased frequency of phone calls to the diabetes team were not associated with increased hypoglycaemia fear.
Conclusions: Fear of hypoglycaemia is associated with worse glycaemic control. It is highest amongst parents of 6–11 year olds, but is not affected by previous severe hypoglycemia, or associated with increased contact with the diabetes team.

P56
Parenting stress of parents of young children with type 1 diabetes mellitus is related to fear of hypoglycaemia but does not seem to influence HbA1c levels

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Objectives: Parents of children with diabetes mellitus (DM) have higher parenting stress compared to healthy subjects (Powers et al, 2002). Fear of hypoglycaemia (FoH) is one of the possible stress inducing factors. We investigated whether parenting stress in parents of young children with DM was related to FoH. In addition, we evaluated whether parenting stress and FoH were related to the metabolic control as reflected by HbA1c levels.
Methods: Parents of 30 children (17 boys) with at least 6 months of DM were recruited from our Childhood Diabetes Centre. Mean (SD) age of the patients was 8.9 (2.5) yrs (range: 3.9 - 12.7 yrs), age at diagnosis 5.6 (2.7) yrs (0.7 - 10.6 yrs) and duration of diabetes 3.3 (2.2) yrs (0.6 - 9.5 yrs). The parents filled in the short version of the Nijmegen Parenting Stress Index (NOSIK, De Brock et al, 1992) and the Parent's FoH scale (HFS-P, Clarke et al, 1998). The HbA1c value from the medical records nearest to the date of participation was used.
Results: Compared to normative data 8 (27%) parents had a low, 16 (53%) a mean and 6 (20%) a high parenting stress index. Parenting stress was inversely related to the age of the child ($r = -.42$, $p = 0.023$) and the age at diagnosis ($r = -.41$, $p = 0.023$), but not to the duration of DM ($r = .04$, $p = 0.811$). Parenting stress was positively related to the FoH scale ($r = .45$, $p = 0.012$). FoH was not related to the actual age nor to the age at diagnosis. HbA1c levels were 7.9 (0.8) % (6.4 - 9.5 %). Even after correction for child's age, HbA1c levels were not related to parenting stress ($r = .15$, $p = 0.41$), nor to FoH ($r = .16$, $p = 0.40$).
Conclusions: Parenting stress in parents of children with DM is higher in younger children and is, amongst other factors, influenced by FoH. Parenting stress nor FoH seem to influence metabolic control as reflected by HbA1c levels. Parents of young children with DM should be provided with adequate support in order to reduce parenting stress and fear for hypoglycaemia.

P57
Impact of hockey and hockey-type exercise on nocturnal heart rate variability and glycemia in young athletes with type 1 diabetes

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Type 1 diabetes (T1D) is associated with hypoglycemia and premature autonomic disturbances - both which have been implicated in sudden death in youth. Habitual exercise has been demonstrated to improve heart rate variability (HRV; a surrogate of autonomic function), both in individuals with and without previously-noted autonomic disturbances. The acute effects of a single bout of exercise on subsequent nocturnal HRV are currently unknown. As such, the present study examined the impact of a single bout of intermittent high-intensity exercise (IHE) on nocturnal HRV in 10 rep-level hockey players with T1D and 10 non-diabetic teammates. T1D participants and their controls were matched as closely as possible in terms of age ($\bar{x}$=15.1 years, range: 13–17), BMI ($\bar{x}$=22.8 ± 1.8 vs 22.2 ± 1.9), VO2max ($\bar{x}$=53.3 ± 5.4 vs 56.7 ± 6.7 mL*O2/kg), and years playing

($\bar{x}$=9.7 ± 2.7 vs 10 ± 2.9), respectively. HRV was analyzed from 12 am-6 am on 3 nights; following a hockey game, following an IHE bout on a cycle ergometer (which simulated a hockey game in a controlled setting), and following a non-exercise day. An average blood glucose change of −2.3 ± 3 mmol/L was observed with the lab IHE bout, while the change during a hockey game was insignificant ($\bar{x}$ Δ -0.2 ± 4.2 mmol/L). There was one incident of nocturnal hypoglycemia after a hockey game (lasting 225 min). In both groups, no significant differences in HRV were noted between nights, but a general trend toward higher HRV after the non-exercise day was evident. Surprisingly, HRV (SDNN, RMSSD, HF) tended to be higher in T1D participants across all nights when compared to the non-diabetic controls. SDNN, used as an estimate of overall HRV, was 50% greater for those with T1D after the non-exercise day when compared to the controls ($p < 0.05$). Given that a decrease in SDNN has been associated with sudden cardiac death, the observed increase in the T1D athlete's SDNN suggests that regular vigorous exercise may help to reduce the risk of sudden cardiac death.

P58

An unusual pattern on continuous glucose monitoring (CGM); a case of recurrent nocturnal hypoglycaemia and daytime hyperglycaemia in evolving type 1 diabetes prior to the initiation of insulin therapy

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Introduction: We report a case of daytime hyperglycaemia and nocturnal hypoglycaemia in the absence of exogenous insulin demonstrated using CGM.

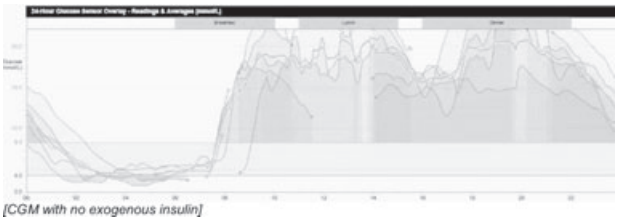

Fig. 1. CGM with no exogenous insulin.

Case report: Our subject was a 3 year old girl presenting with osmotic symptoms. Initial investigations demonstrated varying blood glucose levels from 4.4 to 16.7 mmol/L. Further investigations confirmed the presence of endogenous insulin production (insulin 24 mU/L and C-peptide 681 pmol/L whilst blood glucose 3 mmol/L) and impaired glucose tolerance with a blood glucose of 11.5 mmol/L at 90 minutes on oral glucose tolerance testing. Anti-GAD antibody titres were positive at 5.0 u/ml (ref. range 0–1 u/ml); MODY and AKT2 mutations were negative. CGM prior to insulin therapy showed daytime hyperglycaemia and nocturnal normal/hypoglycaemia.
Ongoing management has been with modified insulin regimes as long-acting insulins have exacerbated the nocturnal hypoglycaemia.
Conclusion: Nocturnal hypoglycaemia in evolving type 1 diabetes in the absence of exogenous insulin is noteworthy and this case may represent the first clinical manifestation. Previous studies of animal models and cultured human β cells have identified that prolonged hyperglycaemia can increase insulin secretion from β cells during subsequent hypoglycaemic episodes. This presentation may be explained by previous experimental studies or may represent a novel phenotype.

Poster Tour 7: Obesity

P59
Adhesive molecules in children with simple obesity and new-onset type 1 diabetes

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Higher levels of adhesive molecules is reported in diseases characterized with inflammation, e.g. obesity and type 1 diabetes. These molecules considered to be are potential markers of disease progression: atherosclerosis as well as insulitis.
The aim of this paper was to evaluate sICAM-1 and sVCAM-1 concentrations in children with simple obesity and type 1 diabetes.
Material and methods: a total of 136 children, 3–18 yrs., M = 66/F = 74 with simple obesity (group I, N = 99) and new onset DM1 (group II, N = 37). Control group (III) comprised of 20 healthy, normostenic children without autoimmunological disease, infection, dyslipidaemia, hyperglycemia and positive family history of autoimmunity or diabetes. sICAM-1 and sVCAM-1 concentration was measured.
Results: sICAM-1 concentration in group I was 593,99 ± 132,99 ng/ml and was higher than in group II (280,75 ± 78,30 ng/ml) (p = 0,000) and III (266,33 ± 51,98 ng/ml) (p = 0,000). sVCAM-1 concentrations in groups I and II were comparable: 744,67 ± 186,65 ng/ml and 759,51 ± 158,95 ng/ml, respectively, but significantly higher than in control group: 627,50 ± 159,52 ng/ml (pI:III = 0,01, pII:III = 0,004).
Conclusion: Metabolic disorders accompanying obesity as well as hyperglycemia contribute the rise of adhesion molecules levels as a marker of endothelium activation.

P60
Metabolic syndrome and its components in adolescents with type 1 diabetes mellitus

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Objectives: The metabolic syndrome (MS) is an important risk factor for cardiovascular disease. The aim of this study was to evaluate the prevalence of MS diagnosed according to IDF definition and MS individual components in adolescents with type 1 diabetes.
Methods: The study included children with T1DM aged 10 to 18 years. In all subjects the lipid profile, HbA1c level, the waist circumferences were measured. Body mass composition was examined by bioimpedance method, and 24 h automatic bloo.

Age at Diagnosis (years)	Number	Baseline BMI %	% Overweight or Obese
0 - 5	60	69 ± 23	32
6 - 12	97	63 ± 25	23
13 - 17	38	67 ± 28	39
≥ 18	2	66 ± 10	0

[Baseline BMI Percentile by Age, 2003–2012]
In patients diagnosed from 2008–2012, baseline BMI% (67 ± 24, n = 174) was higher than those diagnosed in 2003–2007 (54 ± 28, n = 23; p = 0.02). BMI% increased by 2.3 percentage points from baseline to 1 year from diagnosis among 139 patients diagnosed in 2008–2012 with paired BMI points (p = 0.02).
Conclusions: 23-39% of patients are considered OW or OB, six months from diagnosis. Mean baseline BMI% has increased over the past 5 years and BMI% continues to increase by 1 year from diagnosis. Further research is needed to evaluate treatment and prevention strategies targeting excess weight gain in this population.

P61
Clinical profile of metabolic syndrome in a pediatric endocrine clinic of a developing country

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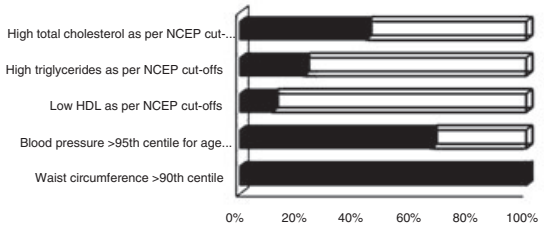
Aims: To describe the clinical profile of children with metabolic syndrome in a pediatric endocrine clinic of a developing country.
Methods: Retrospective review of case records of children evaluated for obesity and metabolic risks from September 2012 to May 2013.
Results: Out of 30 subjects evaluated for obesity, 18(60%) satisfied the criteria for pediatric metabolic syndrome (mean age 10.6 ± 3.5 y,11:7 m:f). The mean screen time was 3.3 ± 1.5hours, 94.4% admitted to consuming junk food at least once per day.

Table 1: Percentage occurrence of metabolic risk factors in study sample



	Waist circumference >90th centile	Blood pressure >95th centile for age and sex matched references	Low HDL as per NCEP cut-offs	High triglycerides as per NCEP cut-offs	High total cholesterol as per NCEP cut-offs
abnormal	100	66.7	11.2	22.2	44.4
normal	0	33.3	88.8	77.8	56.6

All subjects had Acanthosis nigricans, 21% had skin tags. The mean Body mass index (BMI) Z-score was 2.7 ± 0.7. The mean fasting blood sugar, serum insulin and Homeostatic model for assessment of insulin resistance (HOMA-IR) were 111.3 ± 18.2 mg/dL, 40.8 ± 24.1mIU/ml and 11.4 ± 7.4 respectively. Significant co-relation was present between BMI for age Z-score and HOMA-IR (r = 0.57, p < 0.05) & waist circumference and serum insulin levels (r = 0.76, p < 0.05). Polycystic ovary syndrome was diagnosed in two girls based on Rotterdam criteria. None of the subjects had glycosylated hemoglobin in the diabetic range. Advice on change of dietary habits and increasing physical activity given to all children; None were initiated on metformin therapy.
Conclusion: Children with obesity must be screened for metabolic syndrome, when clinically appropriate. Early intervention is the key in prevention of future metabolic risks.

P62

Metabolic syndrome prediction using body composition index in Korean adolescents

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Objectives: The prevalence of metabolic syndrome has been increased along with the childhood obesity. Metabolic syndrome has been reported to increase the risk of cardiovascular disease or type 2 diabetes. The aim of this study was to provide the cut-off values of body composition indices to predict metabolic syndrome risk in Korean adolescents.
Methods: A total 900 adolescents between the age of 10 and 19 years old were included in this study, obtained from the Fifth Korea National Health and Nutrition Examination Survey (KNHANES V-1, 2010) that conducted by Korea Centers for Disease Control and Prevention. The results of blood test and blood pressure were obtained as well as anthropometric data and body composition data. The criteria for metabolic syndrome that we used were presence of central obesity, waist circumference $\geq$90 percentile for age and gender and 2 or more among followings: (1) fasting glucose $\geq$ 100mg/dL (2) triglyceride $\geq$110mg/dL (3) HDL-C level $\leq$ 40mg/dL 10–15 years of age, and $\leq$ 40mg/dL in male and $\leq$ 50mg/dL in female 16–19 years of age (4) systolic blood pressure or diastolic pressure $\geq$ 90 percentile for age and gender.
Results: The prevalence of metabolic syndrome were 3.4% in total, and 41.7% among obese adolescents. Among five component of metabolic syndrome, waist circumference and triglyceride showed the higher predictability. In subgroup analysis by gender and puberty, the predictability was higher in body mass index (BMI) and fat mass index (FMI) compare to percent body fat.
Conclusion: Application of cut-off values of body composition indices in the screening of metabolic syndrome might be helpful for the management and prevention of obesity related complications in adolescents.

P63

Body mass index trajectory among children with type 1 diabetes

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Objectives: Obesity has been postulated as an etiology behind the observed increased rates of T1D. Basal-bolus regimens may also contribute to more rapid weight gain following diagnosis, further increasing future cardiovascular risk. We compiled a 10 year database of all new T1D pediatric patients at one institution to assess 1) BMI percentile (BMI%) at baseline (six months from diagnosis); 2) change in BMI% over time.
Methods: Data were extracted from the electronic medical record. All patients were managed at one diabetes program using a basal-bolus regimen with either an insulin pump or multiple daily injections. BMI% were calculated using US CDC growth charts. Baseline BMI% was calculated six months after diagnosis to minimize impact of new onset diabetes. Statistical comparisons were performed using two-tailed and paired t-tests.
Results: Mean BMI% for all patients at baseline (n=197, 37% female) was 66 $\pm$ 25 (z-score + 0.55). 29.4% of patients were overweight (OW) or obese (OB) (BMI $\geq$ 85%) at baseline. Similar baseline BMI% were present across all age groups. Adolescents had the highest percentage of OW/OB.

Age at Diagnosis (years)	Number	Baseline BMI %	% Overweight or Obese
0 - 5	60	69 $\pm$ 23	32
6 - 12	97	63 $\pm$ 25	23
13 - 17	38	67 $\pm$ 28	39
$\geq$ 18	2	66 $\pm$ 10	0

[*Baseline BMI Percentile by Age, 2003–2012*]
In patients diagnosed from 2008–2012, baseline BMI% (67 $\pm$ 24, n =174) was higher than those diagnosed in 2003–2007 (54 $\pm$ 28, n = 23; p = 0.02). BMI% increased by 2.3 percentage points from baseline to 1 year from diagnosis among 139 patients diagnosed in 2008–2012 with paired BMI points (p = 0.02).
Conclusions: 23–39% of patients are considered OW or OB, six months from diagnosis. Mean baseline BMI% has increased over the past 5 years and BMI% continues to increase by 1 year from diagnosis. Further research is needed to evaluate treatment and prevention strategies targeting excess weight gain in this population.

P64

Body composition chart and the type of diabetes mellitus

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Objectives: There are some cases of diabetes difficult to categorize to certain type in pediatric diabetic patients, along with the increasing prevalence of type 2 diabetes. The aim of this study was to apply body composition chart in pediatric diabetes patients to choose proper treatment modality.
Methods: We conducted a retrospective study from 2005 to 2012 with patients who were visited Konkuk University Medical Center with the diagnosis diabetes mellitus. The medical records were reviewed and the anthropometric and indices of body composition were obtained. Subjects were grouped by the type of diabetes and gender. Body composition chart plotting fat free mass index (FFMI) and fat mass index (FMI) was constructed.
Results: All body composition index including body mass index, FFMI and FMI were higher in type 2 diabetes compare to type 1 diabetes, in each gender. FMI was the only significant determinant of diabetes type. Six atypical cases by body composition chart were figured out including non-obese type 2 diabetes showing suboptimal growth related to relatively lower insulin secretion and type 1 diabetes with insulin resistance resulted from obesity.
Conclusions: Body composition chart analysis might be a useful tool in detection and management of atypical pediatric diabetic patients.

P65

Epicardial adipose tissue thickness in children and adolescents with type 1 diabetes mellitus

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Objectives: To evaluate the relationship between metabolic syndrome (MS),and epicardial adipose tissue (EAT) in type 1 diabetic children and adolescents.
Methods: Thirty type1diabetic children and adolescents (15 males and 15 females, mean age 12.88 $\pm$ 1.8 years) recruited from Diabetes Clinic, Children Hospital, Ain Shams University were compared to 30 matched healthy controls. Anthropometric parameters, HbA1c,

lipid profile and microalbuminuria were measured. The EAT thickness was measured by echocardiography on the free wall of the right ventricle from parasternal long and short-axis views. The MS was determined using the IDF consensus definition of MS in children and adolescents.

Results: Our study showed significantly increased waist hip ratio ($P = 0.0001$), height SDS ($P = 0.034$), waist circumference (WC) ($p = 0.013$), WC percentile ($P = 0.023$), BMI percentile ($P = 0.01$), Cholesterol ($P = 0.001$), triglycerides ($P = 0.05$), LDL ($P = 0.001$), HbA1C ($P = 0.001$) and EAT ($P = 0.001$) in patients with type 1 diabetes compared with controls. Type 1 diabetic Patients with high risk of MS (8 females and 1 male, with WC $\geq$ 90th percentile, triglycerides $\geq$ 150 mg/dL, HDL-C $<$ 40 mg/dL, Systolic BP $\geq$ 130/diastolic $\geq$ 85 mmHg) showed significantly increased age, BMI, WC, systolic BP, diastolic BP, microalbuminuria and EAT ($P < 0.01$)compared with patients without risk for MS. Significant correlation was shown between EAT and age ($r = 0.534$, $P = 0.002$), BMI ($r = 0.495$, $P = 0.005$), WC ($r = 0.676$, $P = 0.0001$), systolic BP ($r = 0.55$, $P = 0.002$), diastolic BP ($r = 0.57$,$P = 0.001$), cholesterol ($r = 0.839$,$P = 0.0001$), triglycerides ($r = 0.624$,$P = 0.0001$), LDL ($r = 0.873$, $P = 0.0001$), and HDL ($r = -0.432$, $P = 0.017$) in diabetic patients. WC was the most sensitive variable correlated with EAT in type 1 diabetic patients detected by multiregression analysis.

Conclusions: Epicardial adipose tissue thickness increased in type 1 diabetic children and adolescents especially in those with high risk for metabolic syndrome.

P66
Omentin-1 in childhood diabetes

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Background: Omentin is a relatively novel adipocytokine that stimulates insulin-mediated glucose uptake in human adipocytes.

Objectives: To assess the plasma level of omentin-1 in children and adolescents with type 1 and type 2 diabetes mellitus (DM) in relation to various clinical parameters.

Patients & methods: This study included 30 diabetic patients; divided into;

Group A: 15 patients with type 1 DM and

Group B: 15 patients with type 2 DM.

Ten age and sex matched healthy individuals served as controls. Data collected regarding; age, sex, disease duration and anthropometric measures. Patients were further subdivided according to their BMI into; patients at risk for obesity and overweight and none obese patients. Laboratory investigations included; RBS, HbA1c% and fasting plasma omentin by ELISA.

Results: There was a significant decrease in plasma omentin level in group B(14.06 ± 2.78 ng/ml) and group A (15.0 ± 1.88 ng/ml) compared to controls (26.3 ± 5.43 ng/ml) ($P < 0.001$) with no significant difference in its level between both patients´ groups($p = 0.29$). The best cut off level of plasma omentin to differentiate diabetics from controls is 21.5 ng/ml with 90% sensitivity and 100% specificity. There was a significant inverse correlation of plasma omentin with BMI ($r = -0.51$, $p = 0{,}004$) and HbA1c% ($r = -0.46$, $p = 0.011$) only in diabetics with no significant correlation to age or disease duration ($p > 0.05$). There was a significant decrease in plasma omentin in overweight and obese in comparison to none obese patients in both group A and B ($p = 0.37$ and 0.047 respectively).

Conclusion: Plasma omentin level is significantly decreased in both type 1 and type 2 diabetes mellitus with significant decrease in overweight or obese patients. Plasma omentin level inversely correlated to both BMI and HbA1c%.

P67
Multidisciplinary assessment for bariatric surgery in adolescents: a pilot project from a national referral service

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Introduction: Obesity has medical, social, psychological, familial and dietary underpinnings. We report the results of multidisciplinary assessments in adolescent bariatric surgery patients in the UK. Aim Assessment of physical and psychological well being in obese adolescents before and after bariatric surgery and comparison to conventional treatment in the obesity clinic.

Methods: 2 F, 2 M, mean age 14 yrs (12-18 yrs) were selected for bariatric surgery. Mean BMI 43 (31–51). They were jointly assessed by a paediatrician, paediatric surgeon and child psychiatry team. Assessment by dietetics and child psychiatry looked at as binge patterns, night eating, comorbid psychopathology and family functioning. A variety of psychometric tests were used including :Quality of life score (Impact on weight on Quality-Kids IWQOL) this is a tool which assesses the impact of a child's weight on their quality of life in 4 domains: This tool has been shown to have good internal consistency and to be responsive to both weight loss and social support and intervention. The subject were also assessed using Becks Anxiety inventory (BAI) both before and after bariatric surgery. Operations were performed by a paediatric surgeon and experienced adult bariatric surgeon.

Results: All surgical patients lost weight over 3 months. Mean loss - 10 kg/m2 (5–17 kg/m^2). The non surgical group had a mean gain + 1.9 kg/m2 (−4 - 10 kg/m^2). Improvement in clinical parameters was also seen: All patients reported improvement in their well being. IWQOL improved mean scores in the body esteem domain increased from 48 to 81. BAI scores reduced from 22.5 to 5 in 2 patients. (Thus suggesting a reduction from a moderate to a minimal level of anxiety.

Conclusion: Multidisciplinary assessment is important in selecting patients for bariatric surgery. Bariatric surgery is effective in reducing BMI with coexistent benefits in terms of both physical and mental health.

Poster Tour 8: Obesity and puberty

P68

Changing parenting style: educational groups for the management of childhood obesity

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Objectives: The treatment of CO (childhood obesity) is characterized by a low retention rate and its success depends on the modification of nutritional habits and lifestyle of the entire household. A recent review indicated that interventions aimed at changing parenting styles are effective in the management of CO.
The aim of this study is to compare the results of an experimental treatment (therapeutic education group sessions with parents and children managed by a multidisciplinary team) with a traditional one (individual ambulatory sessions managed only by a pediatrician).
Methods: 35 obese children (15 M; mean age: 10,9 years ± 1,6; age range: 8–13 years old; mean BMI: 26,6 ± 3,2; mean BMI z-score: 2,1 ± 0,4) were enrolled in 12 months. The experimental protocol consists of a first visit, conducted separately by the pediatrician, the clinical psychologist and the nutritionist; a food record module is given to the families, with the request of compiling a food diary for 2 weeks; after that families come for the second meeting with the multidisciplinary team; the food diary is valuated and nutritional and behavioural counseling is given in group. The follow up meetings consist in 2 hours monthly group sessions aimed at changing parenting style and family behaviours, encouraging the acquisition of healthy nutritional habits and lifestyle.
Results: At 12 months it has been observed a BMI z-score and a BMI reduction of 0,35 and 4,6 units respectively. Retention rate was 48,3%, vs a BMI z-score and BMI reduction of 0,39 and 3,7 units respectively for the control group ($n = 54$), and a retention rate of 17,2%. ($p < 0.05$). Moreover, the experimental protocol has the advantage of optimizing the time spent by the team in the clinical practice.

	Experimental (n.35)	Experimental (n.35)	Control (n.54)	Control (n.54)
	Retention rate (%)	Weight loss (BMI; BMI z-score)	Retention rate (%)	Weight loss (BMI; BMI z-score)
T3m	77,1	BMI: - 1,4 z-score: - 0,25	48,3	BMI: -2,7 z-score: - 0,30
T6m	60,0	BMI: -4,6 z-score: -0,35	31,0	BMI: -3 z-score: - 0,36
T12m	48,3	BMI: - 4,6 z-score: -0,35	17,2	BMI: - 3,7 z-score: - 0,39

Conclusions: Although this method had successful results in terms of weight and retention rate, further studies have to be implemented to assess the efficacy on a wider sample and with a longer time follow up.

P69

Sub-clinical inflammation in adolescents with T1D on CSII – role of nutritional status, metabolic control and insulin pump therapy characteristics

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Objectives: Sub-clinical inflammation is associated with obesity and components of metabolic syndrome. Aim of the study was to determine sub-clinical inflammatory status in T1D adolescents on CSII and its association with their nutritional status (BMI, waist circumference-WC), metabolic control (A1c, blood glucose (BG) variability), insulin resistance (IR) as determined by eGDR and characteristics of insulin pump therapy (daily insulin dose, day-to-day variability in daily insulin dose).
Methods: 38 T1D adolescents (age 18.4 ± 3.0 years; 19 girls) on CSII were studied. Subjects were matched for sex, age and T1D duration. IR was determined by eGDR. Data on the last 3 weeks of insulin pump therapy were abstracted by CareLink software (Medtronic). Cytokine profile (IL-1α, IL-1β, IL-2, IL-4, IL-6, IL-8, IL-10, IFNγ, EFG, MCP1, TNFα and VEGF) was determined by Evidence Investigator Biochip Analyser (Randox, UK).
Results: Obese vs. normal-weight subjects had larger WC (93 ± 2 vs. 78 ± 2 cm; $p < 0.001$), higher daily insulin dose (59.8 ± 2.6 vs. 47.1 ± 2.9 U/day; $p < 0.001$) and were more IR as estimated by eGDR (7.24 ± 0.53 vs. 9.50 ± 0.43 mg(kg^{-1} min^{-1}); $p < 0.001$). BMI and WC correlated positively ($rs = 0.48$; $p = 0.002$, $rs = 0.604$; $p = 0.001$), whereas eGDR negatively with day-to-day variability in daily insulin dose ($rs = -0{,}696$; $p < 0.0001$). IL-6 levels were higher in obese subjects (1.60 ± 0.16 vs. 1.19 ± 0.11 pg/mL; $p = 0.0469$) and correlated with BMI ($rs = 0.377$; $p = 0.02$) and average BG ($rs = 0.449$; $p = 0.006$). TNFα levels correlated positively with BG variability ($rs = 0.365$; $p = 0.034$). IL-2 levels correlated negatively with WC ($rs = -0.671$; $p < 0.001$) and positively with eGDR ($rs = 0.530$; $p < 0.01$).
Conclusions: Obesity, visceral obesity and IR as estimated by eGDR correlate with day-to-day variability in daily insulin dose. Several parameters of sub-clinical inflammation (IL-6, TNFα, IL-2) correlate with measures of nutritional status and metabolic control, but not characteristics of insulin pump therapy.

P70

Does impaired fasting glyacemia among obese children predict co-morbidity development – preliminary results from FOCUS, a follow-up study

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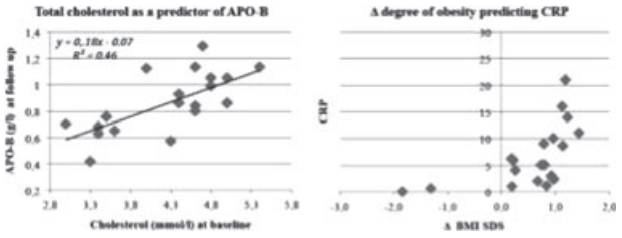
Objectives: Obesity co-morbidities may appear early in life. In adults, impaired fasting glycemia predicts type 2 diabetes and other obesity co-morbidities. The aim of this study is to identify factors in obese children that could predict early development of obesity related co-morbidities.

Methods: Children who previously have been treated for obesity are included. Exclusion criteria is bariatric surgery. Currently, follow-up measurements have been conducted in 20 subjects. Subjects undergo extensive examinations during two days including both oral and intravenous (FSIVGTT) glucose tolerance tests. Results presented are median and range.
Results: The age at follow-up was 21.4 years (17.4-26.2). 20% were males. Median follow-up time was 6.3 years (4.8-13.2). BMI SDS at baseline was 3.5 (2.6-4.0) and correlated with BMI at follow-up; 41.4 (25.7-62.2) kg/m2 (R2 = 0.28). 90% remained obese. At baseline 15.8% had impaired fasting glycemia (IFG). At follow-up 60% had IFG and 15% had IGT. Only one subject had developed T2D. Fasting glucose at baseline did not correlate with 2 h OGTT, AIR, Si measured with FSIVGTT at follow-up. Total cholesterol at baseline correlates with future total cholesterol (R2 = 0.53) and APO-B (R2 = 0.46). HbA1C at baseline correlated with total cholesterol and APO-B at follow-up with R2-value of 0.20 and 0.22 respectively. BMI at follow-up correlated with CRP. However, the difference in degree of obesity was a better predictor, and an exponential relationship between Δ BMI SDS and CRP at follow-up was observed.



Conclusion: Most study subjects remained obese 5–13 years later and 60% have developed IFG. HbA1C and total cholesterol at baseline correlated with APO-B and total cholesterol at follow-up. An increase in the degree of obesity is stronger associated with high levels of CRP than BMI at follow-up. However so far, IFG in children does not predict obesity co-morbidities. Since the study is ongoing, more data will be presented at the congress.

P71
Dysglycemia in obese adolescents: variants and dependence of excess weight degree

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Objectives: Pediatric Metabolic Syndrome (MS) mainly incomplete in studies. Dysglycemia is a key component of MS. The same time just IFG and DM are recommended markers for it´s diagnosis with a neglecting of insulin resistance (IR) and area under the glycemic curve (AUC), which might lead to the MS hypodiagnosis.
Methods: 208 adolescents aged 10 to 17 were examined with a OGTT and analysis AUC as well as fasting insulin level with calculation insulin sensitivity indices (HOMA-IR, ISI-FFA, McAuley, Quicki, revised-Quicki). Children were grouped by the BMI SD: 1 gr.- BMI +1-2SD; 2 gr.- BMI +2-3SD; 3 gr.-BMI + > 3SD. Statistica7 software was used for the data analysis.
Results: In overweight children we established just IFG (3,7 ± 7,01 %). IFG (9,00 ± 5,66 %) and IGT (1,00 ± 1,97 %) were diagnosed in 2 gr. and IFG (14,47 ± 7,13 %), IGT (6,58 ± 4,96 %) and DM2 (1,44 ± 1,14 %) were detected in severely obese. The analysis of the glycemic curve shown it's diabetic shape in 86,82 ± 2,34% kids with concomitant fasting IR. The AUC values were increased to 823,7 ± 112,04 units with a significant difference in-between groups (P1,2 = 0,52; P2,3 = 0,04; P1,3 = 0,02). All insulin sensitivity parameters are demonstrated a valid (P < 0,01) decreasing of values from group to group as well as increasing IR measured by HOMA-IR (2,96 ± 1,54; 4,81 ± 2,18; 6,17 ± 2.09). 52.0 ± 9,27 % were insulin resistant in 1 gr, 86,49 ± 3,38 % in 2 gr., 95,66 ±2,32 % in 3 gr. The strong association in-between fasting HOMA-IR and AUC was established (r = 0,46; P < 0,05) and allowed to clustery data. IR was also linked with cardiac geometry (r = 0.45, P < 0.05) and diastolic function (r = − 0.42, P < 0.05).
Conclusions: The strong association between dysglycemia and degree of excess weight was discovered in adolescents. Recommended parameters aren't sufficient for the dysglycemia detection as a MS component. It might reveal hidden disorders and explain existence of cardiovascular risk markers in metabolically healthy obese.

P72
Correction of Vitamin D deficiency in children with diabetes in puberty improves HbA1c and BMI

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Aim: Vitamin D deficiency is a known association with type 1 diabetes. Vitamin D is essential in adolescents during their pubertal growth spurt. We studied the incidence of vitamin D deficiency in our paediatric diabetic service population and the impact of correction of Vitamin D on their glycaemia control.
Methods: Serum Vitamin D levels, bone profile and serum PTH levels were measured in children with symptoms of aches, bone pain, exhaustion, and tiredness and correlated with their diabetic control in a paediatric diabetic service in 2012.
Results: In a district general hospital with a total diabetic case load of 95 children a prospective observation study was undertaken over a period of six months. 34 children (29 Caucasian, 5 Asian) with Type 1 diabetes had vitamin D deficiency. There was equal male female distribution with a mean age of 11.5 (range 3–17) years. There were 9 outliers of which 7 were female, and 80% of the children in the deficient group were in their early teens. Mean Vitamin D levels were below 14 ng/dl (Range: 4.4-29.8 ng/dl). 30 children who had insufficiency i.e. < 20 ng/dl received a modified Stoss regime of 160,000 units of Dekristol capsules as a stat dose and repeated if clinically indicated. There was an improvement in HbA1c levels of 7.96 mmol/mol (6%) between the pre and post vitamin D treatment. Interestingly there was an improvement in BMI at 0.5Kg/m2. No difference in male to female ratio or ethnic differences observed. In children who were not treated with vitamin D levels >20 ng/dl, there was no difference observed in their HbA1c levels or BMI although the numbers were small.
Conclusion: The study showed that children during the rapid turnover teenage years may need added vitamin D for maximising growth as shown through BMI and also very importantly better control of their diabetes with improvement in their HbA1C levels.

P73

This abstract has been withdrawn.

P74

Measuring preferences for diabetes management among adolescents with type 1 diabetes

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Objectives: When children with diabetes become adolescents, many experience difficulties in controlling diabetes according to recommendations and in integrating diabetes treatment in their lives. The objective of the TODS (Teenagers with Diabetes Sweden) study was to conduct a national survey to gain a better understanding of the main drivers and barriers in the way of seeking and providing optimal treatment among adolescents with type 1 diabetes.
Methods: All adolescents in the SWEDIABKIDS database with type 1 diabetes born in 1995, 1996 and 1997 (age 15–18) were sent an invitation to complete an online questionnaire. The questionnaire was developed in a collaboration of several experienced experts in adolescents with diabetes and survey experts. A discrete-choice experiment was included to investigate preferences for treatment effects and administration in order to estimate the relative importance of the various treatment characteristics. The questionnaire content was tested in focus groups and subsequently adjusted according to the input received.
Results: This resulted in a unique new survey instrument which will provide novel insights. Final results are forthcoming. The study will result in identification of preferences for different aspects of diabetes treatment as well as identifying key barriers to keeping up with a diabetes regimen.
Conclusions: Adolescents with type 1 diabetes face several difficulties in controlling blood sugar levels which result in poor glycaemic control. We examine this group's particular challenges with keeping good control of their diabetes. Using discrete-choice experiments we seek to identify which treatment parameters weigh most heavily in the choice between treatment alternatives. These new and important insights can enable a better understanding of how to improve support for obtaining treatment goals.

P75

Do oral contraceptives have an influence on metabolic control in adolescent girls with DMT1?

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Objectives: The aim of our study was to investigate the frequency of oral contraceptives (OC) in adolescent girls with DMT1 and their possible influence on parameters such as metabolic control, insulin dosage, BMI, blood pressure or lipids.
Methods: Data from adolescent girls with DMT1 in Germany and Austria (n = 14806, age 14–17,9 yrs) from the DPV-Wiss data base (317 centers) until March 2012 were evaluated. Data on the frequency of OC-use were compared with repeated representative survey-data from the federal health department and the KIGGS study.
Results: 17,2 % of the DMT1 girls took OC, which is lower compared to the background population (39%) or the KIGGS-Study (23%). There was a significant difference between girls with/without migratory background (10,4% vs. 18%, $p < 0{,}0001$). There was another difference between the girls in the new and old federal states and in Austria. We also found out that girls taking oral contraceptives smoked more often. Regarding the metabolic parameters there was a significant difference in the insulin dosage ($< 0{,}005$), hypertension ($p < 0{,}0001$) and dyslipidemia ($p < 0{,}0001$) and OC. The HbA1c value was significantly better in the group with OC. There was no significant difference in the BMI.
Conclusions: The frequency of OC use in our study was lower compared to the background population. There is an influence on factors (smoking, hypertension, lipids, but not BMI), which may lead to cardiovascular diseases later in life. Therefore these young girls should be monitored carefully, education related to smoking may be helpful and alternative contraceptives should be taken into account.

P76

Mother-daughter team approach for starting preconception counseling at puberty in girls with diabetes: implications for dyadic analyses and clinical practice

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Preconception counseling (PC) significantly and inexpensively reduces risks of reproductive-health complications. Our validated technology-based PC intervention, READY-Girls, is tailored for female teens with type 1 (T1D) and type 2 (T2D) diabetes and targets decision-making regarding effective family planning and seeking PC. Our teen-focused research was instrumental in changing the ADA's Practice Recommendations to specify that PC should "Start at puberty . . . " This requires support from teens' mothers.
Objectives: To provide both teen girls and their mothers with PC knowledge, and provide mothers with sex-communication training. This paper presents results of a feasibility study in mothers and discusses the importance of mother-daughter dyadic analyses (from a biostatistician perspective) and implications for program delivery (from a researcher/clinician perspective).
Method/Results: Using a mixed-methods design with 10 mothers of daughters with T1D, the major theme from one-on-one interviews: "I know nothing about diabetes/pregnancy risks and PC". Mothers were then given READY-Girls intervention. Knowledge and health belief scores significantly increased post-intervention ($p < .05$).
Conclusion: Mothers can play a vital role in weaving cultural-social influences into their discussions regarding reproductive-health with their daughters and reinforcing PC. Mother-daughter team approach for starting PC at puberty in girls with diabetes is feasible. The discussion will include the importance of conducting mother-daughter dyadic analyses to explore possible mediating and moderating roles of mother-daughter communication and support about reproductive health on the relationship between READY-Girls intervention and sustainable outcomes. This research could set new standards of practice for self-management education of adolescent females with diabetes.

Poster Tour 9: Diabetes care, education and psychosocial issues I

P77

Partial remission of type 1 diabetes: determinants and influences on diabetes outcome

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Objectives: To evaluate the characteristics and potential determinants of partial remission (PR) in a type 1 diabetes (T1D) pediatric Belgian cohort.
Methods: We retrospectively analyzed records from our center of 242 children (aged 8.8 ± 3.8 years) diagnosed with T1D between 1994 and 2008. Clinical and biological features were collected at diagnosis and during follow-up. PR was defined as insulin dose-adjusted A1C (IDAA1C) ≤ 9 according to definition by Mortensen et al. (2009): A1C (%) + [4 × insulin dose (IU/kg/day)]. Statistics: Spearman's method, Mann–Whitney U test, Fisher's exact and chi-square tests. $P < 0.05$ was considered significant.
Results: PR occurred in 56.2% of patients and was significantly more frequent in boys (55.1%) than in girls (44.8%). Among remitters, mean PR duration was 279 days (78 and 409,5 for 1st and 3rd quartiles, respectively). No differences in PR duration were found between girls, boys or age subgroups. At diagnosis, patients had an A1C at 10.4 ± 2.8% and 25.6% presented DKA. PR was significantly more frequent in non-DKA (82.3%) than in DKA (17.6%) patients. Overall, no correlation was found between features at diagnosis (age, A1C, height z-score, BMI z-score, anti-GAD65, IA2 or insulin antibody titers) and PR duration or A1C at 2 years post-diagnosis. Only in age group 5–8 years, A1C levels were significantly correlated to PR duration. PR duration and A1C at 2 years post-diagnosis were not different in patients presenting at least 1 episode of grade 3 severe hypoglycemia (39.7%), compared to patients without severe hypoglycemia. Also, no correlation was found between PR duration and presence of diabetic complications, due to low numbers ($n = 11$, including microalbuminuria, retinopathy and neuropathy).
Conclusions: In our study, PR occurred more frequently in boys than girls and was influenced by absence of DKA at diagnosis. However, no strong correlations could be made between PR duration, diabetes control and patient features.

P78

Symptoms at time for diabetes diagnosis correlate to metabolic control after one year of disease duration

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Objectives: To explore if HbA1c values already at diagnosis predict HbA1c levels after one year of duration in patients with type 1 diabetes.
Methods: Data registered in the Swedish paediatric diabetes quality registry, SWEDIABKIDS, at time for diagnosis and after one year of duration on all patients (n = 4161) diagnosed between 01-11-2005 to 05-02-2012, with a diabetes duration from 10–14 months was analyzed.
After one year 379 (9%) patients had HbA1c > 70 mmol/mol.
Results: After one year of duration those with HbA1c > 70 mmol/mol less frequently were treated with insulin pump compared to those with HbA1c < 70 mmol/mol (15% and 23% resp., $p < 0.001$). Among those with multiple injection therapy the proportion of fast- or direct acting insulin was lower in those with HbA1c > 70 compared to those with HbA1c < 70 mmol/mol (53% and 55% resp., $p < 0.001$). No difference was found regarding use of insulin glargine compared to determir.
At time for diagnosis the children with HbA1c > 70 mmol/mol after one year, compared to those with HbA1c < 70 mmol/mol, had higher HbA1c (101 mmol/mol and 94 mmol/mol, $p < 0.001$) and were older (11.9 ± 4.1 years and 10.5 ± 4.8 years resp., $p < 0.001$) and more often reported weight loss ($p < 0.02$), polyuria ($p < 0.05$) and had both lower base excess ($p < 0.05$) and standard bicarbonate ($p < 0.05$). The proportion of children with pH < 7.3 was also higher in the high Hba1c group, 24 % and 18 % respectively, $p < 0.02$.
Conclusions: Already at one year of duration there are patients presenting with poor metabolic control. At time for diagnosis symptoms which can indicate poor metabolic control one year later can be recognized. These children's high HbA1c after one year might be explained by the fact that they do not come into remission phase and this can be due to socioeconomic factors but also to a more serious disease. It is important to early identify this group of patients as HbA1c at one year of duration predicts complications later in life.

P79

Multiple daily injections in children with type 1 diabetes with onset before 5 years of age

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Objectives: To compare the metabolic control of children with DM1, diagnosed before the age of 5 under conventional therapy (CT) and multiple daily injections (MDI) in the first 2 years of diagnosis.
Methods: Retrospective analysis of the clinical records of children diagnosed with DM1 between January 2006 and March 2009. The variables studied were: glycated hemoglobin (HbA1c), total daily dose of insulin (TDD), average blood glucose, body mass index (BMI) and stature, in the first and second years of disease. Statistical treatment in SPSS 17® ($p = 0.05$).
Results: 10 children (aged 3.0 ± 1.3 years) were treated with CT and 10 children (aged 4.0 ± 1.8 years) with MDI.
Comparing the first two years of illness in the CT group, there was a significant increase in HbA1C (7.2 ± 0.9% versus 7.9 ± 0.9%; $p = 0.003$) and TDD (0.53 ± 0.12 vs. 0.69 ± 0.14%; $p = 0.001$), without significant variation of average blood glucose (179 ± 40 vs. 181 ± 31 mg/dl). In the MDI group there were no significant variations of HbA1C (8.0 ± 0.9% vs 7.6 ± 0.6%; p = ns), average blood glucose (155 ± 27 vs 148 ± 27 mg/dl; p = ns) or TDD (0.69 ± 0.21 vs. 0.76 ± 0.11%; p = ns) although in the 2nd year average blood glucose was significantly lower (148 ± 27 vs 181 ± 31 mg/dl; $p = 0.02$).
No significant variation of the sds of body mass index and stature were found. There were no severe hypoglycemia episodes.
Conclusions: Over time the MDI group showed a reduction, although not significant, of HbA1c, without significant variation of TDD and presented the best blood glucose values without severe hypoglycemia. This treatment is possible in toddlers despite multiple insulin

injections, however the ideal treatment is continuous subcutaneous insulin infusion from the onset of the disease.

P80
C-peptide, glucagon, gastrin, bombesine and VIP secretion in preschool children with type 1 diabetes

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Objectives: Stimulated serum C-peptide during a mixed meal tolerance test (MMTT) is the gold standard measure of endogenous insulin secretion in type 1 diabetes (T1D). Previous studies have demonstrated mostly inhibitory effects of elevated plasma glucose levels on gastrointestinal endocrine secretion.
Aims: To determine the levels of C-peptide, glucagon, gastrin, bombesine and VIP during MMTT in preschool children with T1D.
Methods: We studied 37 T1D patients (17 girls and 20 boys, mean age 4.9 ± 0.6y). Age diagnosis median 3 y (0.8-4y), diabetes duration (0.2-3.9y). All children with type 1 diabetes (T1D) treated with multiple daily injections (MDI) of insulin. HbA1c was 8.9%. We performed a standard MMTT without insulin. We measured serum glucose, C-peptide, and also glucagon, gastrin, bombesine, VIP at 0 min, 60 min and 90 min, following a liquid mixed meal (standard breakfast).
Results: Serum C-peptide values were fasting - 0.49, 60 min - 0.57 and 90 min - 0.54 nmol/l. 32% T1D were CP negative. Serum glucose median was fasting 7.8 mmol/l, 90 min - 18.3 mmol/l. Glucagon values were high: 0 min 346.21, 60 min - 330.12 and 90 min - 315.51 pg/mL (the normal range is 50–100 pg/mL). Serum gastrin levels were elevated too: 0 min - 140.73, 60 min - 282.58 and 90 min - 217,38 pg/mL (the normal range in children is 10–125 pg/mL). Serum bombesin values were: 0 min 47.53, 60 min - 49.92 and 90 min - 38.37 pg/mL. Serum VIP values were 0 min - 13.14, 60 min - 13.52 and 90 min - 37.73 pg/mL (the normal range is 75–190 pg/mL).
Conclusions: The endogenous insulin secretion in preschool children with type 1 diabetes is significantly decreased. The acute changes in glucose concentrations during MMTT increased the release of glucagon, gastrin, bombesin, and reduced of VIP secretion.

P81
Basal C-peptide behavior and its clinical significance in Romanian children with type 1 diabetes

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Objectives: Even if measuring stimulated C-peptide is the most adequate method for assessing residual insulin secretion, the basal C-peptide measurement correlates with the stimulated one, and thus we can accept its usefulness in practice. Our main aim was to analyze the relationship between residual insulin secretion and diabetes duration, daily insulin dose and glycemic control in a cohort of Type 1 Diabetic children from Romania.
Methods: We enrolled 446 children diagnosed with Type 1 Diabetes (1–18 years old) admitted in our Medical Center between 2008 and 2012. We analyzed the continuous relationship between variables using correlation and regression analysis and also, the cohort was divided in two groups regarding to basal C-peptide value (< 0.2 nmol/L and ≥0.2 nmol/L) and analyzed respectively.
Results: We found that 115 individuals (25.8%) had C-peptide levels ≥0.2 nmol/L. We observed inverse and significant correlations between C-peptide and diabetes duration ($r = -0.38$; $p < 0.001$), daily insulin dose per kg ($r = -0.37$; $p < 0.001$) and HbA1c ($r = -0.17$; $p = 0.0002$). Between the two groups (C-peptide < 0.2 nmol/L and ≥0.2 nmol/L) we found significant differences for diabetes duration, daily insulin dose and HbA1c (Table 1).

C-peptide	Number	Daily insulin dose (UI/kg)	Diabetes duration (years)	HbA1c (%)
<0.2 nmol/L	331 (74.2%)	0.52 ± 0.28	3.9 ± 3.45	8.75 ± 1.83
≥0.2 nmol/L	115 (25.8%)	0.78 ± 0.26	1.1 ± 1.51	7.96 ± 1.97
p	-	<0.001	<0.001	<0.001

In the group of patients with elevated C-peptide 49.57% of the patients reached the ISPAD recommended HbA1c target (7.5%) compared to only 26.59% in the group of patients with C-peptide < 0.2 nmol/L ($p < 0.001$).
Conclusions: Basal C-peptide values are clearly influenced by Diabetes duration and C-peptide levels are having a significant influence on the daily insulin dose and glycemic control in Romanian Type 1 Diabetic children. Patients having an elevated C-peptide are more likely to meet the recommended HbA1c targets (< 7.5%).

P82
Factors influencing the quality of glycemic control in children and adolescents with type 1 diabetes, after five years of full and equal access of self-monitoring supplies

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Objectives: The metabolic instability during growth in children and adolescent with type 1 diabetes causes a glycemic variability difficult to manage. A full and equal access to self-monitoring blood glucose supplies since 2008, in Romania, allows a personalized approach to therapy of type 1 diabetes in children and adolescents.
Methods: 65 patients with type 1 diabetes (32 girls) were analyzed by a complete history, clinical exam, Tanner staging, daily insulin requirements, number of glycemic tests per day, HbA1c measurement and a evaluation of family socio-economical status.
Results: No statistically significant differences of HbA1c between boys and girls, age of onset of disease or Tanner stages, although there was noticed a slight deterioration of glycemic control during puberty. 57 patients was treated by 4 or 5 daily insulin injections and 8 patients by pumps, but the average of HbA1c values were similar in the two groups. Human insulins were used in 12 patients, insulin analogs in 32 and combinations in 21 patients, with no differences between groups. Statistically significant differences were found between the group with a good adherence (30 patients), defined in terms of diet, minimum 3 tests per day of self-monitoring blood glucose and daily adjustment of insulin doses, group with satisfactory (25 patients) and group with poor adherence (10 patients). We found no significant differences between groups with low (20 patients), medium (30 patients) or high (15 patients) socio-economic status.
Conclusions: In terms of equal access for all children and adolescents with type 1 diabetes at personalized treatment and self-monitoring measures, results of this study indicate the essential role of adherence to therapy in achieving adequate glycemic control and, to a lesser extent, age at onset, duration of disease, pubertal stage, the type of insulin or administration thereof, or even socio-economic status.

P83

Level of metabolic control of Bulgarian type 1 diabetes mellitus patients aged 0–18 yrs. Bulgarian National Society for Paediatric Endocrinology Project

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Objectives: To evaluate the actual level of HbA1c in Bulgarian patients with type 1 diabetes aged 0–18 years and to analyze its relationship with the following factors: sex, age, duration of disease, current insulin regimen, type of insulin preparation, family social status and educational level of parents.
Methods: A cross sectional study conducted in the period February-August 2012. The level of HbA1c was examined in a cohort of 815 patients /420 boys/ using the same standardized method- HPLC /Bio-Rad/ and same device in one Central lab. Special questionnaire about social and educational status was used for all the parents.
Results: The average level of HbA1c for the group is: 9.0 ± 1.948%: 23% of the patients are with excellent control (HbA1c < 7.5%); 33.7% are with HbA1c < below 8%. But 27% are with poor control - HbA1c >10%. No difference is found between sexes. 77% of the patients are on insulin analogues, but their HbA1c is still high: 9.05 ± 2.0%; Patients in teen age and longer duration have the highest HbA1c; The highest levels of HbA1c are found in patients with lower social and educational level of their parents- this makes social factors and educational status of the parents crucial for the success of treatment.
Conclusions: Better education and motivation of our patients are needed. The most vulnerable are the patients in teen age and with low social and educational status of the parents.

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How improper glycaemia duration influence Hba1c, BMI and BP in type 1 diabetic (DM1) children?

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Hypothesis: Longer duration of improper glycaemia negatively influence HbA1c, BMI and blood pressure (BP) in children with DM1.
Materials and methods: 42 pts. were included into the CGMS study, 7–17,5 yrs. (x = 12,1 ± 3,1 yrs), DM1 duration 1–5 yrs., CSII (N = 27)/MDI (N = 15). BMI, HbA1c, BP were measured. Mean insulin requirement from last week before the study was calculated. CGMS monitoring took 5 days. AUC [mg/dl] >140 mg/dl and < 70 mg/dl were.
Results: HbA1c for whole group was 7,41 ± 1,68%, BMI 19,60 ± 4,38 kg/m2, SBP 107,28 ± 12,99 mmHg, DBP 68,13 ± 12,95 mmHg, insulin requirement 0,89 ± 0,56 IU/kg. AUC >140 mg/dl was 27,76 ± 19,01 mg/dl, AUC < 70 mg/dl 0,25 ± 0,43 mg/dl. A trend was marked that in CSII children HbA1c was lower than in MDI (7,11 ± 1,25% vs. 7,95 ± 2,22%), whereas BMI in CSII was higher than in MDI (20,08 ± 4,84 kg/m2 vs. 18,73 ± 3,37 kg/m2), as SBP and DBP (108,68 ± 13,08 mmHg vs. 104,62 ± 12,89 mmHg; 71,40 ± 12,71 mmHg vs. 61,85 ± 11,34 mmHg, p = 0,048). AUCs did not differ, however in CSII AUC > 140 mg/dl lasted less (25,75 ± 19,13 mg/dl vs. 31,25 ± 18,93 mg/dl), and AUC < 70 mg/dl more (0,27 ± 0,51 mg/dl vs. 0,21 ± 0,28 mg/dl) time. AUC >140 mg/dl correlated with BMI (r = −0,60, p = 0,053). If AUC >140 mg/dl exceeded mean value, HbA1c was higher (7,66 ± 1,91% vs. 7,25 ± 1,56%), BMI lower (19,19 ± 5,17 kg/m2 vs. 19,72 ± 3,85 kg/m2) as BP (SBP: 107,06 ± 12,93 mmHg vs. 109,23 ± 10,63 mmHg; DBP 62,50 ± 11,74 mmHg vs. 70,90 ± 11,08 mmHg, p = 0,041). AUC < 70 mg/dl correlated with BMI and DBP: r = 0,40, p = 0,010 and r = 0,52, p = 0,001, respectively. In children where AUC < 0,25 mg/dl both HbA1c, BMI and BP were lower: 7,31 ± 1,71% vs. 7,72 ± 1,72% i 19,14 ± 4,64 kg/m2 vs. 20,50 ± 3,63 kg/m2, SBP: 108,00 ± 10,27 mmHg vs. 109,10 ± 15,16 mmHg; DBP: 65,26 ± 10,42 mmHg vs. 72,70 ± 14,67 mmHg, p = 0,062. Insulin requirement was comparable in both groups.
Conclusions: 1. Longer time spent in improper glycaemia negatively influence HbA1c. 2. Shorter hypoglycemias gives lower BMI and blood pressure.

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Cross-sectional survey and comparison of anterior-posterior decade of glycemic control in type 1 diabetic children and adolescents

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Aims: To compare of anterior-posterior decade glycemic control with improvement of diabetes management.
Methods: This cross-sectional clinical-based survey enrolled 158 T1DM children on September 2011 to May 2012(Group A) in Beijing children's hospital of more than one year management and compared with 123 T1DM children who were recruited in Asia and the West Pacific Region T1DM Study on September 2001 to May 2002 (Group B) in Beijing children's hospital.
Results: There is no complication in both two groups. The average of HbA1C was 8.3 ± 1.53 %, better than ten years before 9.9 ± 1.85 % (P = 0.000). The ratio of optimal and suboptimal HbA1C in group A and B were 15.0 %, 52.5 % VS 10.6%, 25.2%, P = 0.000. The ratio of insulin injection twice daily in group A and B were 43.0% VS 92.6%, respectively and the ratio of MDI and CSII were increasing significantly ten years after (P = 0.000). The frequency of SMBG between 60–120 times per month and over 120 times per month in group A was 45.5% and 37.8%, while 0.8%, 0 in group B respectively, P = 0.000. HbA1C was positive correlation with age, duration, insulin dosage per day and diabetic care costs by family while inverse correlation with frequency of SMBG in liner correlation and regression analysis. It was showed that duration was the most important factor. Socioeconomic factors included household income and parents' knowledge and educational levels did not affect glycemic control significantly. About half of diabetic children whose household income were lower than the average level and their diabetic care costs were over 1/3 household income.
Conclusions: There were younger and more girls in type 1 dibetic children. The frequency of SMBG and the ratio of MDI and CSII were increasing significantly ten years after. Duration was the most important factor of glycemic control. There was no complication in children. Glycemic control would be better due to improvement SMBG.

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Glycemic control, BMI-SDS and blood pressure in 5,019 patients with 18,406 visits in 2012 – centre differences in the SWEET project

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Objectives: To compare clinical data from electronic health records in different pediatric diabetes centres throughout Europe within the SWEET consortium (www.sweet-project.eu) in 2012.

Methods: The SWEET Online platform allows presently fourteen centres from thirteen countries to connect to one unified anonymized diabetes database. Aggregate data is de-identified and exported for longitudinal health and economic data analysis. HbA1c, body mass index (BMI) and blood pressure of all uploaded patients visiting their center in 2012 was analyzed. Standard Deviation Scores relative to gender and age (SDS) for BMI and systolic and diastolic blood pressure are calculated from the WHO standards (2007).

Results: While the total data base comprises 8,500 children (median 607 (range: 214 to 1,339) patients per center overall) in 2012 the 14 centers uploaded data from 358 (27 to 537) patients. The median age was 14.0 years and diabetes duration was 5.0 years. Striking differences in average HbA1c (mean of the annual individual median: 8.0 (7.4 to 9.3%), elevated BMI-SDS +0.46 (+0.17 to +0.70) and blood pressure (mean of median SDS per center: systolic: +0.38 (−1.0 to + 0.66); diastolic: +0.29 (−0.51 to + 0.59)) were found between centers. Only two centers had an average HbA1c below the ISPAD target of 7.5%. Six centers had an average HbA1c 0.5% above the mean of the other centers (range overall −1.00% to +0.89%).

Conclusions: Despite improvements over time this study reveals significant outcome differences between large international pediatric diabetes centers. It appears that centers achieve goals in different aspects of care. Therefore, such international benchmarking data will now be used in quality control circles to exchange best practices.

Poster Tour 10: Diabetes care, education and psychosocial issues II

P87

Using a 'patient safety' approach to facilitate improvement in clinical outcomes in type 1 diabetes in children

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Objectives: To improve clinical outcome for children with type 1 diabetes by adopting a health improvement approach used in national patient safety programs that focus on monitoring change of measures through an integrated patient management system.

Methods: The Scottish Patient Safety Programme[1] introduced new tools into clinical practice to improve service quality and reduce risk, particularly in acute medical care. We used these tools to facilitate change and improvement in clinical outcome in our paediatric diabetes service. These included: written aim; construction of driver diagram identifying the 3 primary drivers of monitoring, knowledge sharing and emergency care to inform secondary drivers; agreed targets for outcome measures; 'run charts' to monitor progress; patient safety briefs at team meeting (identifies those children - admitted in DKA in past month; no HbA1c recorded within last 6 months; HbA1c > 110 mml/mol; active social work concerns). Demographic, clinical and HbA1c data, is accessed from national IT system ('live' since April 2012).

Results: All children (age < 18 years) currently attending our service are included in the routine analysis (n ~ 250). Monitoring the proportion of children with HbA1c < 58 mmol/mol showed little change in first year, 19 % in Sept 2012 vs 20% May 2013, those with HbA1c > 75 mmol/mol has reduced from 50% to 31% in the same time period. The number of episodes of DKA in those with known diabetes has reduced from 16 to 10 in consecutive years.

Conclusions: Using tools from the Scottish Patient Safety Programme, and adoption of an IT system, allows the clinical team to prioritise areas of service needing attention, as well as identifying individual children at risk. Regular review of 'run charts' allows the monitoring of improvement in clinical outcome against targets, and the impact of interventions. Early results of important clinical measures are encouraging.

[1]www.scottishpatientsafetyprogramme.scot.nhs.uk

P88

The impact of type of diabetes practice on glycemic control in young adults (YA) with type 1 diabetes (T1D)

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We evaluated whether differences exist in HbA1c between YA with T1D seen in pediatric, adult, or mixed (pediatric and adult in same location) diabetes centers. Our source was the T1D Exchange Clinic Registry, which includes >25,000 T1D patients from 70 centers in the U.S. Data were collected by chart review and patient questionnaires. Analyses focused on 3636 YA 18–25 years old with T1D duration ≥2 years (49% female, 81% white non-Hispanic, 54% students). YA were seen in adult (17%), mixed (34%), and pediatric (49%) centers. YA cared for in adult centers had lower mean HbA1c over the prior year compared to mixed centers (8.4 ± 1.7% v 8.7 ± 1.8%, $p = 0.003$); most recent HbA1c was also lower (8.4 ± 1.7% v 8.7 ± 1.9%, $p = 0.001$, Table). There were no differences in mean HbA1c over the past year between adult and pediatric centers ($p = 0.12$) or mixed and pediatric centers ($p = 0.14$). Most recent HbA1c may be slightly higher for YA from pediatric vs adult centers ($p = 0.05$); however, there was no difference between mixed and pediatric centers ($p = 0.17$). Very few YA (16%) met the HbA1c goal of < 7%. Most YA with T1D between 18–25 years of age in the registry were seen in pediatric centers. YA seen in adult centers had lower HbA1c than those seen in mixed centers. Independent of type of diabetes practice, YA with T1D 18–25 years of age infrequently achieve target HbA1c. These data support the need for improved care and continued research into ways to improve glycemic control in emerging adults with T1D.

	HbA1c Past 12 months			Most Recent HbA1c		
	Total N	Mean (SD)	% with HbA1c <7%	Total N	Mean (SD)	% with HbA1c <7%
All Centers	3615	8.6 (1.7)	14	3584	8.6 (1.8)	16
Adult Centers	616	8.4 (1.7)	17	610	8.4 (1.7)	19
Mixed Centers	1214	8.7 (1.8)	15	1195	8.7 (1.9)	16
Child Centers	1785	8.6 (1.6)	13	1779	8.5 (1.7)	14

[Mean HbA1c by Type of Participant]

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Correlation between personality traits and glycosylated hemoglobin (HbA1c) of pediatric adolescent patients with type 1 diabetes mellitus (T1DM)

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Objectives: We sought to identify whether associations between various personality traits and glycemic control (HbA1c) exist among teenagers(particularly vulnerable to poor glycemic control) with T1DM.

Methods: This is a cross-sectional single center study examining the association of HbA1c and personality subtypes(Neuroticism, Extroversion and Psychoticism). English speaking T1DM patients with ages between 12 and 17 years were invited. Those with developmental delay, cognitive impairment or severe mental illness were excluded. Qualifying subjects completed three questionnaires at their scheduled diabetes care clinic visit:Junior Eysenck Personality Questionnaire(81 questions), State Trait Anxiety Inventory(40 questions) and Center for Epidemiologic Studies Depression Scale(20 questions). Their most recent HbA1c was also collected. SPSS statistical software version 20 was used for analysis. Results were reported as mean, standard deviation(SD) and Pearson correlations. P value of < 0.05 was a prior determined to represent a significant association.

Results: Participants included 100 T1DM subjects between the ages of 12 and 17(M = 14.6; SD = 1.46). Based on self-reported race/ethnicity, there were 82% White, 11% Black, and 7% other subjects; 96% identified as non-Hispanic/Latino. Forty-seven participants were males. Most recent HbA1c ranged from 6-16% (M = 9.5%, SD = 2%).Extroversion was significantly positively correlated with HbA1c (r = .25; p = .01). Neuroticism and Psychoticism were not significantly correlated (Neuroticism r = 0.18; p = 0.06, Psychoticism r = 0.07; p = 0.49).
Conclusion: Extroverted T1DM patients are maybe less likely to attend to their diabetes management, resulting in an increase in HbA1c suggesting the need for additional support in such patients. The mechanism of association between extroversion and more elevated HbA1c remains to be determined. Personality subtype is a non-modifiable factor, its prior knowledge can guide us deliver better diabetes care.

P90
Mother, father and child distribution of responsibility for diabetes management, and it's association to glycemic control

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Objectives: The association between higher age and higher HbA1c among children with type 1 diabetes may partly be explained by an unclear distribution of responsibility for the diabetes management tasks. The purpose of this study was to
1) analyze differences between mothers' and fathers' reports of perceived distribution of responsibility, and
2) analyze associations between these reports and the children's HbA1c level.
Methods: Both parents of 85 children answered a questionnaire including the following items: ''*who decides and adjusts the insulin doses*'', ''*who remembers the need for blood glucose measurements*'', ''*who decides what the child should eat for mealtimes and snacks*'' and ''*who brings along extra food in case of low blood glucose*''. Gender differences were tested by exact marginal homogeneity tests. Associations between the reports and HbA1c were tested by ANOVA.
Results: The children's mean age were 10.2 yrs (range 1.6-15.9), mean diabetes duration 3.9 yrs (SD 3.0) and mean HbA1c 8.1% (SD 1.0). Significantly different reports were identified between mothers and fathers with mothers more often reporting ''mother or mother and child'' and fathers more often reporting ''mothers and fathers or mother, father and child'' as responsible for the management tasks. Significant differences in mean HbA1c was identified between answer categories on ''who decides and adjusts the insulin doses'' among both mothers ($P = 0.016$) and fathers ($P = 0.045$), with the lowest HbA1c in the category where ''the mother or the mother and the child'' was reported as responsible. Among the fathers a significant difference in mean HbA1c was identified between answer categories on ''who decides what the child should eat for mealtimes and snacks'' also with the lowest HbA1c where ''the mother or the mother and the child'' was reported as responsible ($P = 0.012$).
Conclusions: The study identified an often unclear distribution of responsibility for management tasks related to children's type 1 diabetes.

P91
Self-care behaviors and glycaemic control in adolescents with type 1 diabetes: impact of consistent parenting support in the medical and psychosocial dimensions of self-care

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There is some evidence that autonomy supportive parenting practices have some impact on diabetes control in adolescents with DT1. Consistent health messages from both parents is important for the adolescent in order to adopt positive and autonomous health behaviors. Moreover glycaemic control is better in adolescents who define their self-care behaviors as encompassing both a psychosocial and a medical dimension, than in those who strictly define it in relation to disease management.
We hypothesized that glycaemic control (HbA1c) is associated with consistency of parenting practices between the parents and within the 2 dimensions of self-care (diabetes management and psychosocial life issues).
We used a mixed-methods design which included both qualitative and quantitative analyses of 31 semi-directive interviews with adolescents aged 13 to 15 years. After quantification of qualitative data, we compare the parenting support consistencies with HbA1c using first Kruskall-Wallis test and then Fischer exact tests as a way of triangulating our results.
Our results showed a linear trend between the HbA1c level and 4 types of parenting support consistencies. Median HbA1c level was the lowest when the consistency was present in both dimensions of self-care. Moreover, it was a significant difference according to HbA1c levels regarding the consistency only in the diabetes management, and in both dimensions. Further, only the adolescents with good control reported a parental consistency in the ''non directive guidance'' type of support.
Our results support that glycaemic control is associated with consistency of parenting support not only in the management of diabetes but also in psychosocial life issues. We recommend that diabetes care in paediatric patients include more systematically a dimension of family work in order to strengthen the parents' capacity to effectively and adequately support their adolescents' emerging self-care capacity.

P92
Low education and socioeconomic status in families of prepubertal, poorly controlled type 1 diabetic children

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Objectives: The management of diabetes in prepubertal children is completely dependent on the parents´ treatment decisions and presents a unique set of problems. The aim of the study was to identify the family factors affecting metabolic control of prepubertal children with type 1 diabetes.
Methods: During the routine visit in the outpatient clinic 88 parents of type 1 diabetic children under nine years of age filled in *Beck*

Depression Inventory, Quality of Life Questionnaire, General Self-Efficacy Scale and a questionnaire specially prepared for this study on psychological, social, demographics and disease-related topics. At the same time other data was collected: sex of a child, age, diabetes duration, HbA1c, BMI, daily insulin dose. Families were divided into two groups depending on children metabolic control: HbA1c < 7% and HbA1c ≥ 7%. Statistical analysis was performed using Shapiro-Wilk normality test, Student t-test (unpaired, 2-tailed), Mann–Whitney U test, Chi-square tests.

Results: 36% (32/88) of children had HbA1c ≥ 7%. There was no difference between groups with HbA1c < 7% and HbA1c ≥ 7% in age (6,8 ± 1,8 vs. 6,5 ± 2,0 yrs; p = 0.51) and diabetes duration (2,6 ± 1,6 vs. 2,9 ± 1,9, p = 0,448); respectively. In comparison with well controlled subjects, in families of children with HbA1c ≥ 7% parents had lower education (p < 0,05), more parents were employed as physical than office workers (p = 0,004) and family income was lower (p = 0,013). In the group with HbA1c ≥ 7% there were more single parent families than in families of well controlled subjects (p = 0,008). There were no between group differences in: depressive symptoms, quality of life and self-efficacy.

Conclusions: Families of prepubertal children with poorly controlled type 1 diabetes may require particularly careful screening for problems. Additional help, including financial and psychological support, more re-education should be individually tailored according to each patient´s needs.

P93
Help 'difficult' adolescents with type 1 diabetes to improve metabolic control: the Peter Pan Project

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Objectives: For youth with type 1 diabetes (T1D), transition into adolescence is often associated with poor adherence to treatment, with an increased risk for psychological disorders, including depression, anxiety, eating disorders. Worse glycemic control (HbA1c >9.1%) seems to be associated with a greater risk of overall psychological maladjustment, and a greater risk of affective dysregulation. We hypothesize that if we want to ameliorate glycemic control in patients with T1D we have to work first on the emotional well-being. The aim of the present study was to evaluate the effectiveness of an educational intervention on affective dysregulation and glycemic control in teenagers with T1D with HbA1c >9.1%.

Methods: Teenagers (n = 20) on CSII (n = 10) or MDI (n = 10), with HbA1c 9.1-10% were randomized to an Intervention Group (IG) or Control Group (CG) arm for 3 months. After 2 months´ washout, participants crossed over to the other arm for 3 months. The primary outcome was the HbA1c levels between arms. IG undergo to specific meeting every 15 days with a psychologist and a pediatric diabetologist. At baseline and after 3 months HbA1c, insulin requirement, body mass index and specific validated questionnaire for affective well-being (PNAS) were evaluated for each patient.

Results: We show the preliminary data of the first 3 months. At baseline, patients aged 12–22 yrs. (mean 15.8 ± 3.8 yrs.) with T1D from 1 to 18 yrs. (9.6 ± 5.1 yrs.), BMI was 20.7 ± 2.7 kg/m2, and insulin requirement 0.90 ± 0.24 U/kg/day. HbA1c significantly improved in IG (8.57 ± 0.87% vs 9.16 ± 0.63%, p = 0.022), but not in CG (9.19 ± 1.06% vs 9.21 ± 0.75%, p = NS). PNAS scale is under evaluation.

Conclusions: The present data are only preliminary and collected in a small group of patients. However, they seem very encouraging. An educational intervention specifically aimed at treating affective disorder determined a significant improvement in HbA1c in patients with T1D, with longstanding impaired glycemic control.

P94
Life expectancy of type 1 diabetic patients in Pointe-Noire

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Introduction: The management of type 1 diabetes in developing countries is still difficult. Life expectancy of type 1 diabetic patients is very short in these countries. Poor families are struggling against the double burden of poverty and type 1 diabetes. The mobilization of policies and education is necessary for the improvement of patients life quality.

This study was conducted in the service of diabetology in Pointe-Noire.

Aim: To appreciate life expectancy and management of type 1 diabetic patients in Pointe-Noire.

Patients and methods: It is a prospective study conducted from July 2012 to March 2013 (9 months) among type 1 diabetic patients followed-up in our service. Studied parameters age, sex, duration of diabetes, social status, regularity of treatment.

Results: In total 42 patients were included, 23 females (54.8%) and 19 males (45.2%). The mean age was 18.14 years (ext. 7–34 years) and the mean duration of diabetes was 43.76 months (ext. 3–207 months). Patients social status: students/pupils (57.1 %), workers (11.9%), sellers (2.4%), unemployed (23.8%) and private-employed (4.8%). Treatment was supported by father/mother (66.7%), uncle/brother/aunt (14.3%), patients (14.3%) and others sources (4.8%). The social status of the person supporting insulin was: unemployed (23.8%), sellers (2.4%), workers (16.7%), farmers (2.4%), private-employed (38.1%), pensioners (9.5%). The mortality was (14.3%) (n = 6), mean age 18.16 years (ext 15–23),mean duration of diabetes 54.66 months (ext 13–123 months). Interruption of treatment in 83.3 %. Mortality was higher in poor families. Mean HbA1c- 11.78 %.

Conclusion: Life expectancy of type 1 diabetic patients in Pointe-Noire is very short, as in many developing countries. The difficult access to insulin, 90 years after its discovery is the major cause of interruption of treatment. The conditions of poverty make life expectancy of type 1 diabetic patients shorter.

P95
A mathematical model to predict HbA1c levels from mean blood glucose in young type 1 diabetic patients

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Background: Analysis of mean glucose (MG) profiles (premeal, postmeal, bedtime) and HbA1c in the DCCT defined a linear regression equation: HbA1c(%) = 2.17 +0.028xMG(mg/dl) (Diabetes Care 2002). As Hilman has shown that in T1D HbA1c was more strongly influenced by preprandial glycemia (Diabetes Care

2002), we calculated, in a previous study (Rev Med Brux 2010), another equation (HUDE1) predicting HbA1c from MG (premeal, bedtime): HbA1c(%) = 3.84 +0.024xMG(mg/dl). However some patients were enrolled more than once which is a possible bias because of the biological variation of glycohemoglobin.

Aim: To define the relationship between preprandial (+at bedtime) MG and HbA1c in a cohort of young T1D patients enrolled only once.

Methods: The study included 294 T1D patients with a median age of 14.7 yr and a median diabetes duration of 6.2 yr. The median (interquartile range) number of daily HBGM was 4.2 (3.9-4.7). HBGM, between 2 visits (about 2 months), have been downloaded from the meters. HbA1c was determined with the HPLC system (Menarini HA 8160) whose deviation from the DCCT was < 0.1%. A mathematical model (HUDE2) was developed to predict HbA1c from MG. Bland-Altman analysis was used to compare HbA1c of the lab and the 3 predicted HbA1c: DCCT, HUDE1, HUDE2.

Results: Median BG was 157 mg/dl (8.7 mmol/l) and median HbA1c was 7.2% (55 mmol/mol). There was no mean bias for HUDE 2; in the DCCT, mean underestimation was −0.7%; in HUDE1, mean overestimation was 0.3%. The agreement limits (±1.96 SD) were between 1.2% and −1.2%; this means ±1.2% around 0.0%. For the DCCT, AL were between 0.6% and −2.1%, i.e. ± 1.35% around −0.7%. In HUDE 1, AL were between 1.6% and −1.0%, i.e. ±1.3% around 0.3%. Using stepwise regression analysis, only HUDE2 was maintained in equation.

Conclusion: The HUDE2 equation defines the best relationship between MG and HbA1c. Predicted HbA1c of 7% corresponds to a MG of 137 mg/dl vs 172 in the DCCT! This helps to fix good targets for BG.

Poster Tour 11: Diabetes care, education and psychosocial issues III

P96

The glycoalbumin/hemoglobin A1c ratio represents the glycation gap: the need to measure only glycohemoglobin

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Objectives: The biological variability of hemoglobin A1c (A1C), the hemoglobin glycation index (HGI) or the glycation gap (G-gap), has been known to be a non-glycemic and risk factor of the diabetic complications independent of A1C. However, this variability may be affected by the existence of non-glycohemoglobins (GHb) in the measurement of A1C, such as the NGSP and the Japan Diabetes Society (JDS) units. To clarify that the glycoalbumin (GA)/ A1C ratio represents the G-gap, we examined the effect of the corrected(c-) A1C values by eliminating the each constant amount of non-GHb from the NGSP or the JDS units.

Methods: 749 type 1 diabetic Japanese children with simultaneous measurements of GA and A1C were examined to determine whether a significant relationship between the GA/A1C ratio and the G-gap using either IFCC, NGSP or JDS units exists. Of these, 396 patients were examined more than five times for the same relationships to assess the consistency of the G-gap within individuals. The c-NGSP and c-JDS values were obtained by subtracting the value of intercept in the NGSP-IFCC and the JDS-IFCC master equations as the constant non-GHb amount from each respective NGSP and JDS value.

Results: At enrollment, the inverse relationship between the GA/A1C ratio and G-gap was highly significant if using the IFCC units ($R^2 = 0.95$). While the relationship using the NGSP and the JDS units were relatively weak ($R^2 = 0.69$ and 0.72, respectively), the correlation coefficients were improved by using the c-NGSP and c-JDS values ($R^2 = 0.96$ and 0.96, respectively). Furthermore, each highly significant inverse relationship was observed between the mean GA/A1C ratio and the mean G-gap obtained individually over time if using the IFCC, c-NGSP or c-JDS values.

Conclusions: The GA/A1C ratio calculated by the IFCC, c-NGSP or c-JDS values in regular medical practice represents the G-gap as a non-glycemic determinant of the progression of complications independent of A1C.

P97

Evaluation of DCA Vantage for rapid in-clinic measurement of HbA1c on capillary blood in young type 1 diabetic patients

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Objectives: Rapid in-clinic measurement of glycated hemoglogin (HbA1c) allows to determine the level of metabolic control within a few minutes on capillary blood. We have evaluated the new DCA Vantage™ (Siemens) based on latex agglutination inhibition immunoassay methodology, replacing the DCA 2000 + ™. It provides results in 6 min.

Methods: The study included 120 unselected young type 1 diabetic patients, with different degrees of metabolic control. The DCA Vantage™ was compared with the HPLC system (Menarini HA 8160) whose deviation from the DCCT was < 0.1 % across the clinical range. Bland-Altman analysis was used for assessing agreement between the two methods.

Results: The mean underestimation of the DCA Vantage™ was −0.40 %. The agreement limits (±1.96 SD) were between 0.14 % and - 0.93 %; this means ± 0.53 % around −0.40 %. Coefficient of variation was 1.4%.

Conclusion: The DCA Vantage™ underestimates slightly HbA1c levels; however, it is necessary to keep in mind that the maximal underestimation can reach −0.93%. The device met the acceptance criteria of having a coefficient of variation < 3 % in the clinically relevant range.

P98

Accuracy and precision evaluation of the CONTOUR® NEXT LINK 2.4 blood glucose monitoring system

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Objectives: To assess the accuracy and precision of the CONTOUR® NEXT LINK 2.4 blood glucose monitoring system (BGMS) in the laboratory.

Methods: Accuracy was evaluated by testing fingerstick blood samples from 100 subjects in duplicate using 3 test strip lots (N = 600). Samples also were tested in duplicate on a YSI 2300 STAT Plus™ reference analyzer. Accuracy was assessed per ISO 15197:2003 criteria (≥95% of results within ±0.8 mmol/L [15 mg/dL] or ±20% of reference at glucose concentrations < 4.2 mmol/L [75 mg/dL] and ≥4.2 mmol/L [75 mg/dL], respectively) and ISO 15197:2013 criteria (≥95% of results within ±0.8 mmol/L [15 mg/dL] or ±15% of reference at glucose concentrations < 5.6 mmol/L [100 mg/dL] and ≥5.6 mmol/L [100 mg/dL], respectively). Precision was assessed with 3 test strip lots and 10 meters, using 5 blood glucose levels.

Results: Accuracy testing showed 100% (600/600) of BGMS results met ISO 15197:2003 and ISO 15197:2013 accuracy criteria. Also, 99% (594/600) of results were within ±0.6 mmol/L (10 mg/dL) or ±10% of reference (Table). Precision testing showed a pooled coefficient of variation (CV) of 1.3%-1.4% for blood glucose concentrations 4.5-18.5 mmol/L (81.2-334.1 mg/dL) and 2.0% for the 2.2 mmol/L (40 mg/dL) blood glucose concentration.

Conclusions: The CONTOUR® NEXT LINK 2.4 BGMS, which wirelessly communicates with a new Medtronic insulin pump, met and exceeded ISO 15197:2003 and ISO 15197:2013 accuracy criteria and also demonstrated precision with a low CV.

Table. Summary of CONTOUR® NEXT LINK 2.4 BGMS Accuracy Results

Glucose concentration	Number of results within specified error limits			
<4.2 mmol/L (<75 mg/dL; n = 78)	±0.3 mmol/L (±5 mg/dL)	±0.6 mmol/L (±10 mg/dL)	±0.8 mmol/L (±15 mg/dL)[a]	±1.1 mmol/L (±20 mg/dL)
	65 (83.3%)	75 (96.2%)	78 (100%)	78 (100%)
<4.2 mmol/L (<75 mg/dL; n = 522)	±5%	±10%	±15%	±20%[a]
	396 (75.9%)	517 (99.0%)	522 (100%)	522 (100%)
Total (N = 600)	±0.3 mmol/L (±5 mg/dL) ±5%	±0.6 mmol/L (±10 mg/dL) or ±10%	±0.8 mmol/L (±15 mg/dL) or ±15%	±1.1 mmol/L (±20 mg/dL) or ±20%
	461(76.8%)	592 (98.7%)	600 (100%)	600 (100%)
<5.6 mmol/L (<100 mg/dL; n = 186)	±0.3 mmol/L (±5 mg/dL)	±0.6 mmol/L (±10 mg/dL)	±0.8 mmol/L (±15 mg/dL)[b]	±1.1 mmol/L (±20 mg/dL)
	160 (86.0%)	183 (98.4%)	186 (100%)	186 (100%)
<5.6 mmol/L (<100 mg/dL; n = 414)	±5%	±10%	±15%	±20%
	307 (74.2%)	411 (99.3%)	414 (100%)	414 (100%)
Total (N = 600)	±0.3 mmol/L (±5 mg/dL) or ±5%	±0.6 mmol/L (±10 mg/dL) or ±10%	±0.8 mmol/L (±15 mg/dL) or ±15%[b]	±1.1 mmol/L (±20 mg/dL) or ±20%
	467(77.8%)	594 (99.0%)	600 (100%)	600 (100%)

BGMS, blood glucose monitoring system; ISO, International Organization for Standardization.
[a]ISO 15197:2013 accuracy criteria.
[b]ISO 15197:2013 accuracy criteria.

P99

Comparative evaluation of glycemic control in children and adolescents with diabetes after the implementation of self-monitoring tests distributed through CDiC program in Bangladesh

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Objectives: Self-monitoring of blood glucose (SMBG) is known to be one of the important tools for diabetic care. A prospective study was done to evaluate the effects of SMBG on glycaemic control of children and adolescents with diabetes.

Methods: Three hundred and forty two diabetic children and adolescents (154 Males and 188 females) between the ages of 2 to 17 years were included in the study who regularly visited the CDiC Diabetes clinic during January 2010 to January 2011. Glycosylated haemoglobin (HbA1c) was evaluated quarterly. The study was done by comparison of two groups one receiving intensive education combined with SMBG (171) and the other receiving only intensive education (171).

Results: Mean age at registration was 13.5 ± 3.2 years and mean duration of diabetes was 23.76 ± 32.3 months. Initial values of Mean HbA1c was 10.8 ± 2.8% and after 1 year was 10.0 ± 2.4%. Metabolic control measured quarterly by glycosylated hemoglobin (HbA1c) improved substantially in two groups, SMBG group showed significantly lower HbA1c (9.5 ± 2.2) levels than other group (10.5 ± 2.4) ($p = 0.000$). Although male showed more downward trend lower HbA1c levels than female patients but was not found statistically significant.

Conclusion: Self-monitoring of blood glucose was found to be associated with better glycaemic control in Children and adolescent with diabetes.

P100

Essential oils in ambient air reduce pain during self-monitoring of blood glucose among children with diabetes

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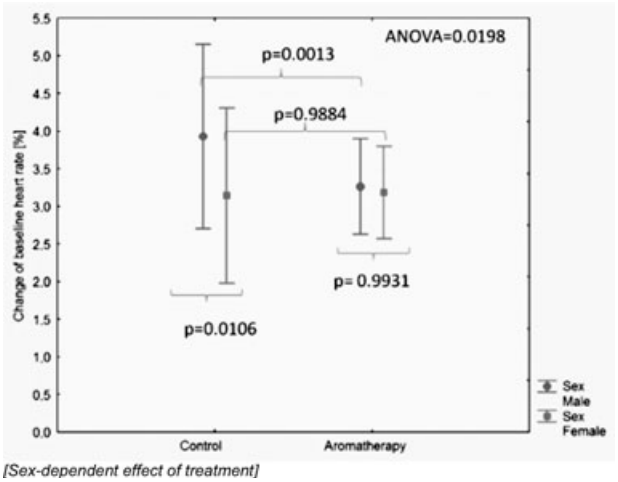
Objectives: An evaluation of the analgesic properties of two essential oils during SMBG in diabetic children.

Methods: The study covered two weeks for control group and one week for each oil application (orange and lavender). Diabetic children consecutively hospitalized at our Department for a period of one month were a study group. The measurements were performed among hospitalized patients four times per day in shared room during SMBG. Pain intensity was evaluated by visual analog scale (VAS) and change of baseline heart rate (ΔHR%) measured by pulse oximetry. The aromatherapy device spread evaporating essential oils in the testing room.

Results: We included 73 children with diabetes and performed 647 individual measurements of pain intensity and ΔHR%. Girls reported higher VAS scores ($p = 0.0036$, Me 0.5 (IQR 0–1) vs 0 (IQR 0–0.5)). Both age and duration of diabetes correlated with ΔHR% ($r = (-0.14)$, $p = 0.0005$; $r = (-0.12)$, $p = 0.0025$). Negative correlations were also noted for VAS/age ($r = (-0.12)$, $p = 0.0030$) and VAS/duration of diabetes ($r = (-0.12)$, $p = 0.0034$). Aromatherapy did not significantly alter the VAS score ($p = 0.40$), while ΔHR% was decreased with borderline significance ($p = 0.0639$). After adjustment for patient's age and sex lower ΔHR% was associated with essential oil application ($p = 0.0252$). Aromatherapy did not have any influence on VAS scores in multivariate analysis ($p = 0.35$).



[Sex-dependent effect of treatment]

Conclusions: Girls indicated higher pain intensity on the VAS, even though their ΔHR% was smaller. Aromatherapy decreased autonomic response to a painful stimulus by lowering ΔHR%, but did not affect perception of pain reported by VAS.

P101

Feasibility and successful use of a home computer spread-sheet program designed to help make insulin dose calculations and adjustments to insulin regimens in children with type 1 diabetes

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Objectives: This pilot study evaluated whether a computer spread-sheet program (CSSP) designed to make insulin dose (ID) calculations and adjustments in response to individualized dosing parameters and blood glucose (BG) patterns improves glycemic control (GC) in children with type 1 diabetes (T1DM), and to assess its feasibility and satisfactoriness to patients and parents.
Methods: 7 children, 3–18 yrs with T1DM for >1 yr participated. Subjects were required to check BG regularly and were on injection basal-bolus regimens. BG was entered before each meal. The CSSP calculated ID based on BG and carbohydrate to be eaten. 10% adjustments to basal or bolus ID were made based on BG patterns. Hemoglobin A1c (HbA1c) was before and after 1mo. Frequency of adjustments, hypoglycemia (hypo), ketones, emergency room (ER) visits, decisions to override the CSSP and average pre-meal BG were recorded. A 4 item survey (5 point scale) was completed to assess satisfaction and perceived benefit of the CSSP.
Results: HbA1c before (8.49 ± 0.89%, mean ± SD) and after 1mo (8.47 ± 1.03) did not differ. CSSP made dose adjustments for all subjects. Hypo occurred 4.4 ± 2.3/mo with no severe hypo. No ketones or ER visits occurred. 4 of 7 subjects chose to override the CSSP at least once. Average pre-meal BG before (136 ± 54 mg/dL) and after 1mo (152 ± 48) did not differ. Ease of use was (4.7 ± 0.51). The CSSP aided in making more frequent ID adjustments (4.8 ± 0.41). Subjects agreed with ID changes made by the CSSP (4.7 ± 0.51). All but 1 subject reported they would use CSSP again. One subject used CSSP beyond 1 mo.
Conclusion: This pilot study demonstrates successful use of a home CSSP designed to make individualized ID calculations and adjustments in patients with T1DM. Although there was no significant change in GC after 1mo, patients and parents found the CSSP to be a safe, easy tool for T1DM self-management. Follow up studies are indicated to determine if changes in GC are observed over longer periods of time.

P102

Self-management and social identity - new understandings and their implications for diabetes smartphone apps

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This paper explores the psycho-social factors influencing teenagers' engagement with the day-to-day management of type-1 diabetes and assesses the potential for smart-phone apps to constitute successful interventions in that context. Ten in-depth exploratory interviews and two focus groups were conducted with 14–18 year-old outpatients from a hospital clinic in London, UK. Textually orientated discourse analysis (Fairclough 2003) was used to elicit the systems of meaning that underpinned the young people's talk and to understand what the mobilisation of these discourses was achieving in the texts. Two key findings emerged: the importance of discourses connected with social identity and the notion that activities related to identity formation and maintenance are sometimes seen as antithetical to good diabetes self-care. The implications for future phone apps are discussed.
Digital technologies seem, on the face of it, to present an opportunity to reduce the embarrassment and stigma of blood tests and injections by associating self-management with symbols core to youth identities. However, most existing apps are designed to facilitate the tracking of key self-care variables (blood sugars, carbohydrates consumption, insulin etc.) The data indicates that this function will only be of significant use to teenagers when data-entry has been automated, and even then it will principally be used to satisfy parents and doctors rather than as a management tool by teenagers themselves. The findings emphasise the role of inter-personal relationships and identity-negotiation and indicate that the particular difficulties experienced by teenagers might be the result of their prioritising such issues over blood-sugar control. The study suggests that if they are to make a significant difference to teenagers' lives, diabetes apps need to enable them to manage their diabetes in ways that minimise interruptions to social immersion and are consistent with the demands of identity-work.

P103

Insulin bolus dose calculator: a web app to create an insulin dose spreadsheet

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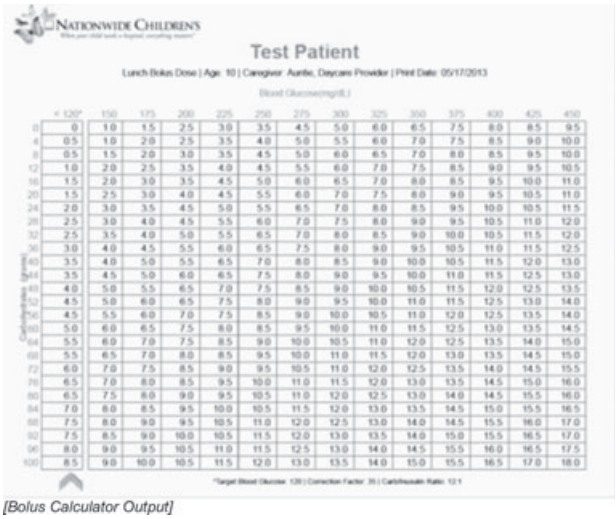
Objectives: To provide a simple tool to determine insulin bolus dose in patients with diabetes mellitus.
Methods: A web-based app was developed that produces a customized insulin dose spreadsheet. A simple step-by-step question/answer format gathers information regarding insulin:carb ratio, hyperglycemia correction factor, and blood glucose target parameters to construct the individualized spreadsheet. It is designed as a "widget" that can be incorporated into any web page.
Results: The spreadsheet allows easy and rapid look up of insulin dose based on blood glucose and carbohydrates to be eaten. It can be used on the computer, printed, or e-mailed for use off-line. The spreadsheet can be created and printed in the physician's office or at home. If dosing parameters change between visits, the app can be accessed from home to modify dosing parameters, or the physician office can make modifications and email the new spreadsheet to the family from within the app. This app has the potential to increase adherence and decrease errors. It provides a quick and easy reference for patients, day care providers, or school personnel. Several charts can be created incorporating different dosing parameters and labeled for different times of the day.
Conclusions: An insulin bolus dose web-based app is available at www.nationwidechildrens.org/diabetescalc as another option to help support adherence to accurate bolus dosing in T1DM. This app is freely available to include on any web page.



[Bolus Calculator Output]

P104

E-Health: stipulation of mobile phone technology in adolescent diabetic patient care

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E-health (Electronic health) is becoming prime target of wireless communication technology and particularly Mobile phone is contributing significant outcome to enhance the health of adolescent diabetic patient (ADP). The objective of this study was to test whether adding mobile application for patient care compared with control cases would reduce Glycated Hemoglobin (HbA1c). Fifteen ADPs (study cases, n = 15) were selected for mobile phone coaching through text messaging, live chats or calls to consultants. ADPs of the control site (n = 12) were continued with their standard diabetes health care from consultants. Primarily ADPs were enquired for demographic and social characteristics, frequency of mobile phone use, general health information and diagnosis of type 2 diabetes. Further the level of Hb1Ac, in both the groups, was measured in a regular interval of 3 months. After 15th months, percentage of mean improvement in Hb1Ac level was compared between mobile users and control cases. More than 7% improvement in Hb1Ac was observed among the patients having mobile phone and they made regular interaction with consultant. The differences were small but a trend of positive improvement was observed among ADPs using mobile phone. This shows that e-health may contribute to prevent complexities in medical care and the cautious use of Mobile phone technology would be an asset for self care management in ADPs.

P105

Development of video-based behavioural intervention to optimize self-management in children with poorly-controlled type 1 diabetes; "VIG-Diabetes"

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Objectives: To develop a validated psychology based behavioural modification tool, 'VIG', for use within a busy paediatric diabetes out-patient clinic.

Method: Video interaction guidance, 'VIG', is an evidence-based and empirically grounded psychology technique used to support goal setting and behaviour change. VIG involves video feedback of positive clips of interactions between patients and health care professionals (HCPs) as an effective way of teaching communication skills to them. Acceptability of VIG to patients, parents and HCPs was explored using information leaflets and questionnaires. The HCPs underwent VIG training.

The technological development of the intervention involved establishing efficient methods to video record consultations in a clinic setting with access to instant review and immediate feedback to the patients without altering the 'flow' of the routine clinic. Ethics approval was granted.

The patient population group identified as appropriate for the study were aged 13–18 with type 1 diabetes of duration >1 year and HbA1c >80 mmol/mol. Three young people were recruited. Each took part in three VIG sessions at one or two weekly intervals. During a VIG session, a routine clinic appointment was videoed. Appropriate video clips were selected to play back to the subject to enhance positively their communication skills. Validated self-efficacy questionnaires were used.

Results: HCPs and young people were willing to take part in VIG. The process was completed within 30 minutes per session. Through working in partnership in identifying the positive aspects of the interaction the young people were able to explore difficult aspects of managing their diabetes.

Conclusions: We have demonstrated that it is possible to carry out this novel VIG intervention to support behaviour change within the current diabetes clinic with existing staff. To date the young people recruited to this study have reported positive experiences of VIG.

Poster Tour 12: Diabetes care, education and psychosocial issues IV

P106

Insulin adjustment for blood glucose and carbohydrate content of meals from day 1 of diagnosis in children and adolescents with type 1 diabetes improves glycaemic control by three months in a home based education programme

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Objectives: Evidence suggests that glycaemic control in the first 6 months following diagnosis predicts long-term glycaemia - a 'legacy effect'. The setting of optimal glucose targets through pre- and post-meal insulin adjustment is a major factor in attaining lower blood glucose concentrations. We explored insulin adjustment for blood glucose and carbohydrate meal content ('CHO Counting') from 'Day 1' of diagnosis in a home education programme.

Methods: We compared in a case controlled cohort study the best HbA1c obtained in the first year of diagnosis in patients diagnosed from July 2012 to date with patients managed since 2001 to 2011.All children and adolescents (aged < 18 years) were started on multiple daily injections (MDI) and received a standard home based education programme delivered from Day 1. 'CHO Counting' previously was not routine until >3 months after diagnosis. In the new cases 'CHO Counting', aided by a bolus calculator blood glucose meter (Accu-Check Aviva Expert Meter®) was initiated on Day 1.Comparison was made between three cohorts (2012/13; 2001/11; 2010/11) in the lowest HbA1c and the time achieved using a T-test.

Results: The lowest HbA1c was achieved at 3 months post diagnosis in the 2012/13 cohort, and 6 months for both the 2001/11 and 2010/11. Currently 16 children (12 male & 4 female, mean age 8.8 ±3) have completed the new education package beyond 6 months; There is a significant improvement in median HbA1c (mmol/mol) in the cohort receiving early 'CHO Counting': 2012/13, 51.0 ; 2001/11, 60.9; 2010/11, 57.5; $p < 0.003$.

Conclusions: 'CHO Counting' can be introduced at the onset of diabetes in patients using MDI and has a significant impact on glycaemia by 3 months. This approach can be used effectively in a home based education programme. This addition to a 'New Patient Education Programme' may have a major effect on long-term glycaemia.

P107

Recovery of premorbid BMI trajectory without overshoot during the first year of treatment of children with type 1 diabetes

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Objectives: Excess weight gain is a problem in type 1 diabetes and may be related to the insulin treatment. We have investigated BMI recovery in children during the first year following diagnosis of type 1 diabetes.

Methods: During the period 2005–2011 180 children < 18 years of age were diagnosed with type 1 diabetes at Uppsala University Hospital. All were started on a multiple injection treatment with insulin aspart and detemir. Growth curves from the school health services including measurements of weight and height preceding the onset of diabetes were available for 161 (89%). Weight and height prior to diagnosis and during the first year of treatment were recalculated into BMI standard deviation scores (BMISDS).

Results: Prior to the onset of diabetes the BMISDS was 0,40 ± 1,25 (mean ± SD), decreased to −0,63 ± 1,28 at presentation and was fully recovered without overshoot one year after presentation when it was 0,53 ± 1,02.

BMISDS at one year was directly proportional to and highly predicted by BMISDS prior to onset of diabetes ($R^2 = 0,57$; $p < 0,001$). BMISDS at one year was also inversely correlated with age ($R^2 = 0,04$; $p < 0,001$) but could not be predicted by gender, daily insulin dose, HbA1c at one year, HbA1c at presentation or by ketoacidosis at presentation.

HbA1c at one year was 51 ± 11 mmol/mol. HbA1c was positively correlated with daily insulin dose at one year ($R^2 = 0,15$; $p < 0,001$) and BMISDS prior to onset of diabetes ($R^2 = 0,10$; $p < 0,001$), negatively correlated with age ($R^2 = 0,03$; $p < 0,05$) but not related to gender, BMISDS at one year, HbA1c at presentation or ketoacidosis at presentation.

Conclusion: During the first year of treatment of type 1 diabetes in children it is possible to achieve good metabolic control without excess weight gain.

P108

Kids in Control of Food (KICk-OFF) in Kuwait

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Objectives: To pilot an educational program Kids In Control Of Food (KICk-OFF) for children and adolescents with T1D in Kuwait and to train a team of educators a and dietitians in the principles of KICk-OFF. Evaluation included

a) acceptability to families in a different culture

b) identification of changes required to make it more culturally appropriate.

Methods: A 5 day education program has recently been introduced in Dasman Diabetes Institute. Using practical, interactive teaching techniques it aims to improve carbohydrate counting, insulin adjustment and self management. The first course was taught jointly by the teams from Sheffield and Kuwait, in English language for English-speaking participants. Prior to this, the Kuwait team attended a teaching skills training course, organized in Sheffield to better understand principles of educational theory and practice. This included time in a secondary school observing experienced teachers.

Results: Twenty four patients aged 11–16 years' old, have completed the course. The curriculum was well written and user friendly even in a different culture. There was very positive feedback from parents who expressed great satisfaction with the course content and objectives. Children appreciated being with other children. Some adaptations are required to meet local requirements: omission/ modification of the alcohol management section, fasting Ramadan and addition of local foods to practical sessions. The Kuwait team developed confidence in their abilities and plan conducting further courses in Arabic.

Conclusion: Structured education, providing knowledge and skills training to young people with diabetes, is an essential component

of self-management. The course was developed for use in the UK, but has recently been introduced in Kuwait and has been found to be largely applicable to their population. All participants completed the 5 consecutive days; they were active learners and willing to apply the KICk-OFF principles.

P109
Functional intensified insulin therapy in paediatrics practice: current situation in France through the AJD´s summer camps

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Introduction: Functional Intensified insulin Therapy (FIT) consists in flexible food intake, associated with carbohydrate counting and insulin dose calculation. Studies about FIT in real life are scarce in children with type 1 diabetes (T1D). Our study evaluated FIT practice and real life experience compared to standard insulin treatment (SIT) in 803 children attending summer camps in July and August 2012, using a questionnaire.
Methods: We compared clinical characteristics, and real life experience in 167 (20,9%) children and adolescents who reported practicing FIT, to those of 636 who reported practicing SIT. We also described FIT practice and real life experience by children and their parents, using a complementary questionnaire. Results were described using median and interquartile range.
Results: Children in the FIT group were older (13,7 years [11,9-15,4] versus 12,8 years [10,9-14,7], $p < 0,05$), and more often girls (sex ratio 0,84; $p < 0,05$) than subjects using SIT. Diabetes duration (5,1 years [2,6-8,0]), insulin dose (0.94 U/kg [0,78-1,11]), insulin regimen (pump 41,5%, multiple daily injections 42,3%, other 16,2%), HbA1c (8.1% [7,4-8,9]), and BMI z-score ($0,73 \pm 1,07$) were similar in the 2 groups. Adolescents were very satisfied with FIT practice.
Conclusion: This overview could be a basis for the development of a standardized training FIT program, in children and adolescents with T1D.

P110
Food and nutritional intake of Portuguese adolescents with and without type 1 diabetes

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Studies were performed in Portugal, to characterize the eating habits of teenagers, but there are no studies that have evaluated and compared the food intake of adolescents with and without diabetes in order to identify possible risk factors and assess the need for more effective nutritional education strategies and guidelines.
Objectives: Compare food and nutritional intake of adolescents with and without type 1 diabetes.
Methods: Descriptive, cross-sectional and retrospective study. The participants were 31 adolescents with Type 1 DM (45.2% girls) from APDP with average 15.58 years and 47 adolescents without diabetes (61.7% girls), from secondary schools in Lisbon with average 15.47 years. The food intake were assessed by direct application of a semi-quantitative food frequency questionnaire. Demographic data, BMI, waist circumference and body fat were collected. Overweight and obesity were defined according to CDC criteria. To study the food and nutritional intake between the groups it was used linear generalized models analysis, adjusting for confounding factors and energy.
Results: Contribution of the total carbohydrates and sugars to total energy intake was significantly lower among boys with diabetes, but significantly increased the total and saturated fats; in girls with diabetes, the protein contribution was significantly higher, and total carbohydrates, sugars, total and saturated fats found to be lower only after adjustment for confounders. The sugar, sugary foods and drinks intake, was lower among adolescents with diabetes ($p < 0.05$), and sweeteners and foods with modified sugar content and / or fat intake frequency was different between the two groups ($p < 0.05$). The prevalence of overweight and obesity was 28.5% and 13.8% in girls with and without diabetes respectively, and 17.6% and 11.1% in boys with and without diabetes.
Conclusions: Is important to intervene, particularly in adolescents with diabetes, especially boys, to promote healthy food choices.

P111
Does a group self-management education programme affect the dietary choices of 11–16 year-olds: evidence from the KICk-OFF cluster randomised trial

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Objectives: KICk-OFF (KO) is a 5 day group self-management education course for 11–16 year olds with type 1 diabetes. The course potentially provides participants with the freedom to widen their dietary choices. As part of a large cluster randomised controlled trial designed to test its effectiveness, information was collected on participants' diet to examine whether this was the case. In addition, baseline data provides a snapshot of the current dietary choices of 11–16 year olds with type 1 diabetes.
Method: Dietary information was collected from 275 participants using the Food Intake Questionnaire, a validated recall questionnaire that assesses dietary intake on the previous day.
Results: Few differences existed between groups at baseline for the dietary variables: almost all participants ate breakfast before leaving home in the morning (94%). The average number of positive foods eaten (out of total of 22) was 7.2 and negative foods was 6.8 (total = 28). The most popular items included milk (90%), fruit (78%), biscuits (77%), all fizzy drinks (75%), crisps (69%), vegetables (63%). Over a third had eaten takeaway food (35%) the night before. At two years, although the average number of positive and negative food markers had decreased slightly (6.2 and 5.9 respectively) and this did not differ between groups, there was some evidence that the KO group differed from controls in some of their individual choices, for example a greater percentage chose low-sugar items (91% vs 84%), ate salad (59% vs 44%) and biscuits (76% vs 62%). Interestingly, the percentages eating fresh vegetables and fruit were similar between groups.
Conclusion: There is some evidence that course has given participants the freedom to widen their food choices as the percentages eating particular foods has increased in the KO group relative to the controls. Structured education programmes such as KO are important enablers, and can help people with type 1 diabetes have more choice in what they eat.

P112

The impact of adherence to the nutritional education on glycemic control and quality of life in children and adolescents with type 1 diabetes mellitus

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Objectives: The aim of this study was to evaluate the impact of nutritional education on the glycemic control and quality of life (QoL) in children and adolescents with type 1 Diabetes Mellitus (T1DM).

Materials and methods: 80 subjects with T1DM aged 10.61 ± 4.32 years participated and were classified into two groups, A (n = 26), patients with fixed daily carbohydrate intake, and B (n = 54), practicing carbohydrate counting. According to insulin schedule, they were categorized into Conventional Therapy (CT) (n = 12), Multiple Daily Injections (MDI) (n = 56) and Continuous Subcutaneous Insulin Infusion (CSII) (n = 12). The glycemic control was assessed by HbA1c. QoL was measured by PedsQL™ 3.0 Diabetes Module questionnaires for children and their parents. Physical activity (PA) was classified to sedentary (n = 33), light (n = 27) and moderate to vigorous (n = 20) exercise by calculating metabolic equivalents according to Compendium of Physical Activities Tracking Guide.

Results: In the entire cohort, mean HbA1c was 7.72% ± 1.14 and did not differ between groups (A:HbA1c = 7.56% ± 1.28, B:HbA1c = 7.79% ± 1.08, p = 0.442). Dietary compliance, regardless of the dietetic intervention applied, had positive impact on glycemic control (adherent group: HbA1c = 7.48% ± 1.00, non-adherent group: HbA1c = 8.46% ± 1.24, p = 0.001). Irrespective of diet, no effect of the intensity of PA and type of insulin therapy on glycemic control was noted. The children's and parents' answers to the PedsQL™ questionnaires differed significantly (p = 0.000) with children reporting more satisfaction than their parents. Within each group, children reported significantly higher levels of QoL than parents (A:p = 0.016, B:p = 0.002).

Conclusions: Dietary adherence, regardless of the dietetic plan, has a great impact on glycemic control. According to children their QoL was satisfactory, while according to their parents' report it was good. Parents expressed more concerns for the chronic illness and the uncertainty for their children's future.

P113

The effect of gluten free diet on metabolic control and clinical parameters in children with type 1 diabetes and celiac disease

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Objectives: Studies so far did not submit clear evidence in regard to the impact of gluten free diet (GFD) on metabolic control and clinical parameters in children with type 1 diabetes (T1DM) and celiac disease (CD). The aim of the study was long- term observation of GFD effect.

Methods: The symptoms of CD, anthropometric parameters, hypoglycemic episodes, total daily dose of insulin (TDD) and HbA1c were assessed in children with T1DM and CD 1 year before, 12 and 24 months after the beginning of GFD. Patients matched in sex, age and diabetes duration comprised on control group.

Results: We analyzed 33 patients with T1DM and CD, mean age 8.6 ± 3.6 yrs and 33 control subjects. There were no significant differences in HbA1c levels, weight-SDS and height-SDS, as well as BMI-SDS and TDD between the groups at the baseline. Patients with T1DM and CD had significantly lower HbA1c level after 12 and 24 months of GFD application (7.18 ± 0.9% vs. 7.84 ± 1.4%, p = 0.02 and 7.11 ± 0.8% vs. 7.65 ± 0.9%, p = 0.01, respectively) and statistically greater BMI-SDS after 12 and 24 months (0,54 ± 0,8 vs. 0,11 ± 0,6, p = 0,01 and 0,57 ± 0,8 vs. 0,14 ± 0,6, p = 0,01, respectively). Significant symptoms´ reduction were observed in T1DM and CD patients after 1 year of GFD apply (p = 0.008). There were no differences between the groups in the frequency of hypoglycemia, high-SDS and TDD in any time point.

Conclusions: Malnutrition is not the symptom of celiac disease. It seems important to point out caloric value of GFD. GFD in long-time observation improves metabolic control and reduces complaints of CD.

P114

Applying the Objective Structured Clinical Examination (OSCE) as tool to train dietitians on Motivational Interview Counseling Skills: Kuwait's experience

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Objectives: The main objective of this pilot study was to determine the dietitians' level of satisfaction with respect to the Objective Structured Clinical Examination (OSCE) administered in the Nutrition Department at Dasman Diabetes Institute (DDI). This tool was presented as the team members were participating in a program that was aimed at teaching non-technical skills called Motivational Interviewing (MI) instead of the traditional counseling skills.

Methods: A pilot study was conducted for 3 dietitians from DDI who took part in a training program in MI. We conducted two OSCE sessions to assess and evaluate skills in counseling using Human Patient Simulator (HPS). The two sessions lasted for 30 minutes each and then we conducted a feedback session. Each station had a trained assessor as an examiner who evaluated each candidate against a predetermined check list, the examined dietitian and a Human Patient Simulator who followed a patient's script. The first OSCE run had been recorded in order to give feedback to the examined dietitians. Afterward, the second OSCE conducted assessed the same competencies, taking in to consideration the feedback that had been received from the first OSCE.

Results: The results showed that all dietitians were comfortable using HPS as part of their training. They all found that the HPS scenario was a good educational opportunity they had experienced. All dietitians agreed that recording and feedback allowed them to reflect on their performances.

Conclusions: Evaluating the dietitians' interviewing skills is required for better services in diabetes care. Applying patient-centered counseling simulation sessions increased the dietitians´ confidence and motivated them to use the skills acquired in their future communications with patients.

P115

This abstract has been withdrawn.

Poster Tour 13: Diabetes care, education and psychosocial issues V

P116

The mSCOFF for screening disordered eating in pediatric type 1 diabetes

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Objectives: To determine if the modified SCOFF (mSCOFF) is a valid screening tool for the detection of disordered eating in adolescent females with type 1 diabetes (T1D).
Methods: Cross-sectional pilot study of adolescent females with T1D (n = 43). Participants completed the modified Eating Disorder Inventory (mEDI) and the mSCOFF, both of which have been modified for use in the diabetes population. The mEDI has been validated for use in T1D. Results of the mSCOFF were compared to those of the mEDI to determine its sensitivity and specificity.
Results: The mSCOFF had a sensitivity of 80% (95% CI 44-97%) and specificity of 90% (95% CI 76-98%) using a cut-off of one or more positive answers. Agreement between the two questionnaires was substantial (K = 0.68, 95% CI 0.43-0.94).
Conclusion: In this pilot study, the mSCOFF showed good sensitivity, and specificity for the detection of disordered eating in adolescent females with T1D.

P117

Celiac disease does not influence quality of life and depressive symptoms in children with type 1 diabetes

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Background and aims: As many studies show, depressive symptoms are common among youths with type 1 diabetes. Diagnosis of coeliac disease in type 1 diabetic children can add more stress, deteriorating quality of life and triggering depression, anxiety and social phobia. The aim of this study was to asses if there is any difference in quality of life and frequency of depressive symptoms among children with type 1 diabetes and celiac disease in comparison to youths with type 1 diabetes alone.
Material and methods: 24 children with biopsy-proven celiac disease (group A) and type 1 diabetes were compared to 48 type 1 diabetic children matched 1:2 for age and time of diabetes diagnosis (group B). The mean age in both groups was 13.6 years. All children were treated with insulin pumps. Diabetes and celiac disease were diagnosed at least 1 year priori. During the routine visit in the outpatient clinic patients were asked to fill in Children's Depression Inventory (Polish version),. Patients from age 11 and above were asked to answer questions in Quality of Life Questionnaire. Daily insulin dose was downloaded from insulin pumps. At the same time, other data such as sex, age, diabetes duration, HbA1c and BMI was collected.
Results: There was no difference between group A and B in diabetes duration (5.8 ± 3.2 vs 5.7 ± 2.8 years, respectively, p = 0.804) HbA1c (7,8 ± 1.5 vs. 7,7 ± 1.2%, p = 0,756); insulin requirement: (0,84 vs. 0,86 IU/kg, p = 0,580) and BMI (21,5,± 2.8 vs. 20,4 ± 3.1, p = 0,146). There was no difference between groups in the frequency of reported depressive symptoms indicated by scores ≥13 in CDI (OR 0.91, 95% CI 0.3 to 2.6). There was also similar quality of life in both groups (p = 0.589).
Conclusions: The results of the present study suggest that celiac disease has not significant impact on psychosocial functioning (measured by quality of life and depressive symptoms) in patients with type 1 diabetes.

P118

Perception of quality of life in children/adolescents with type 1 diabetes and their parents evaluated with KINDL-R questionnaire: multiple daily injection vs continuous subcutaneous insulin infusion

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Objectives: To evaluate whether there was a relationship between the method of administering insulin (MDI vs CSII) and the quality of life perceived by children/adolescents with T1D and their parents and the management of T1D.
Methods: 33 patients (age 7–16, 11 CSII, 22 MDI) and their parents were asked to complete the KINDL-R, a questionnaire aimed at evaluating both general and diabetic-specific quality of life. Clinical data regarding glycaemic control during the last 3 months were collected from medical records.
Results: No significant differences emerged between the marks scored by patients treated with CSII vs MDI. However, patients treated with CSII reported higher scores in wellness and family life while their parents had the opposite feeling. There was a good concordance with parents for items such as school, chronic disease and diabetes in adolescents with both CSII and MDI, while children with CSII had opposite perceptions to their parents.

SUB-SCORES	7-12 YEARS CSII	13-16 YEARS CII	7-12 YEARS MDI	13-16 YEARS MDI
Physical	−0.28	0.50	0.29	0.55
Emotional	0.25	0.50	0.32	0.76*
Self-esteem	−0.24	0.20	0.38	0.45
Family	0.49	0.95*	0.10	0.27
Friends	−0.28	−0.58	0.45	0.41
School	0.29	1.00*	0.07	0.71*
Disease	−0.05	1.00*	0.60	0.94*
Diabetes	0.37	1.00*	0.67*	0.86*
TOTAL	0.32	0.80	0.52	0.69

[Concordance scores between patients and parents]
CSII patients presented lower glycaemic mean and lower A1c, and performed more measurements per day. A1c showed weak inverse correlation with the total score of the questionnaire.
Conclusions: Paediatric patients treated with CSII seemed to have a better perception of their physical and psychological wellness and family relations. Children showed very weak concordance with their parents, whereas adolescents displayed more agreeing opinions. Perceiving a higher quality of life leads to a better management of T1D.

P119

The relationship between parent–child interaction, parental distress, HbA1c and quality of life in young children with type 1 diabetes

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Objectives: Taking care of a child with type 1 diabetes (T1DM) can be stressful and could have a negative effect on family interaction, which could lead to suboptimal HbA1c levels and decreased quality of life (QoL). However, research on family interaction and psychosocial factors in young children with T1DM is scarce. Therefore, the aim of the present study was to examine whether the quality of parent–child interaction and parenting stress were associated with HbA1c and QoL of children with T1DM.

Methods: 121 families with a young child (0–7 years) with T1DM were approached to be observed during home-visits to assess parent–child interaction during mealtime (including glucose monitoring and insulin administration) with the OKI-DO rating scales (Nieuwesteeg et al., submitted). Questionnaires assessed parental distress and child QoL. HbA1c was locally determined at the hospitals. Pearson correlation coefficients were calculated to examine the strength of the relationships.

Results: 77 families (64%) were observed during the meal of whom 70 families (91%) completed the questionnaires. Emotional involvement of parents and expressed discomfort of the child during glucose monitoring and/or insulin administration was related to suboptimal HbA1c levels ($r = 0.23$ and $r = 0.23$, respectively). More parental distress was related to lower (diabetes-specific) QoL (r ranged from -0.27 to -0.54).

Conclusions: Maybe parental emotional involvement causes suboptimal HbA1c levels, but, most probably, suboptimal HbA1c levels urges parents to be more emotional involved. The expressed discomfort of the child might be due to needle-phobia, which could cause the parents to postpone or omit injections which could result in more suboptimal HbA1c levels. Future research should examine the causal relationships to develop evidence-based interventions which should focus on the quality of parent–child interaction and parental distress to be able to improve the HbA1c level and QoL of the child.

P120

Quality of life in children with type 1 diabetes mellitus and healthy peers: how good do parents know their kids?

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Objectives: To compare parent proxy-reports with self-reports of child's QL of children with type 1 diabetes (DM1) and healthy peers, and to examine whether these comparisons differed between children with DM1 and healthy children. Also, we examined whether these comparisons between self- and proxy-reports differed between boys vs girls and fathers vs mothers.

Method: A total of 69 children with DM1 and 265 healthy children (age 8 to 12) and their parents completed the PedsQL. Agreement in child's QL of patient-self reports (boys/girls) and parent-proxy-reports (fathers/mothers) was compared through mean differences and correlations. We conducted multilevel analyses to take into account dependencies between assessments within families.

Result: Compared to parents as proxies, healthy children reported lower QL, including physical ($\beta = 0.52$), school ($\beta = 0.20$), and emotional ($\beta = 0.17$) problems, whereas children with DM1 reported better emotional ($\beta = -0.18$) and social functioning ($\beta = -0.26$). Parents agreed more with children with DM1 than with healthy children on most QL domains ($\beta = -0.26$ to -0.39). Mothers agree more with their children than fathers ($\beta = -0.11$ to -0.27). Also, on a relative level parents agreed more with their DM1 children ($r = 0.53$ to 0.72) than with their healthy children ($r = 018$ to 0.38), with mothers agreeing more with their children than fathers on social functioning ($r = 0.72$ vs $r = 0.53$). Finally, fathers and mothers agreed more with their sons with DM1 ($r = 0.61$ to 0.83) than with their daughters with DM1 ($r = 0.33$-0.50) on most domains.

Conclusion: Parents tend to overestimate the QL of healthy children and underestimate the QL of children with DM1, but the difference between self and proxy-report was less between parents and children with DM1, indicating that parents are better proxies for children with DM1 than for healthy children. In general, mothers agree more with their children than fathers, but both fathers and mothers are best proxies for their sons with DM1.

P121

Joining support group improves psychosocial status and quality of life of people with T1DM of low socioeconomic background

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Objectives: Individuals with Type 1 Diabetes from lower socioeconomic background have compromised psycho-social status in resource poor setting. The effect of support groups on this has not been established. This study was designed to see the effect on psycho-social status of Indian individuals from lower socioeconomic status with Type 1 DM after joining support group.
Methods: Forty people (22 male and 18 female, 11–22 years) from low socioeconomic status were evaluated for psycho-social well being before and one year after joining a support group. Key parameters assessed included

i Awareness about diabetes
ii Quality of life
iii Behavioral impact and self confidence.

Results: Joining of support group was associated with improved knowledge of disease (95.5% from 13.6%, $p < 0.01$), contentment with current quality of life (90% from 10%, $p < 0.01$) and reduction in depressive symptoms (9% from 72.2%, $p < 0.01$). Joining the group was also associated with improved confidence from 22.7% to 95.5% ($p < 0.01$).
Conclusion: Joining a support group significantly improves psycho-social status and quality of life of Indian individuals with Type 1 Diabetes from lower socioeconomic background.

P122

Evaluation of the implementation of quality of life in routine care of adolescent with type 1 diabetes: appreciated but difficult

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Objectives: Monitoring quality of life (QoL) improves wellbeing and care satisfaction of teenagers. Next step is to implement in routine care. We evaluated the implementation of DAWN MIND Youth (DMY) in 11 Dutch hospitals. Teenagers complete the MIND Youth-Questionniare (MY-Q) and its outcomes are discussed in the consultation with the diabetes team. In addition, parental wellbeing can be assessed. Experiences of diabetes teams, teenagers and parents are essential to increase the usage of DMY.
Methods: 36 out of 65 diabetes team members completed an online survey and 10 teams were interviewed about their experiences with DMY and its implementation.
A selection of 69 teenagers and 89 parents were invited to fill in an online survey about their experiences with the MY-Q and the conversation, of which resp. 29 and 66 did.
Results: *Diabetes teams*: 2 out of 10 teams successfully implemented DMY. The MY-Q is often used as a screening tool (94%); teams appreciated to discuss and confirm their feelings about the teenager (85%). Even though 92% reported DMY as a high valued addition to routine care, most hospitals did not continue the usage due to logistical problems (esp. time pressure). Still, all teams want QoL to be part of routine care in the nearby future.
Teenagers and parents: 79% of parents and 41% of teenagers appreciate the usage of the MY-Q. An additional 41% of teenagers is neutral. For 86% of teenagers and 80% of parents DMY is no waste of time. 85% of teenagers feel themselves heard. Of the 40 parents whose wellbeing was assessed, 80% regard this as a contribution to pediatric diabetes care. All parents whose wellbeing was discussed (23%) found this beneficial. Teenagers (62%) and parents (79%) recommend DMY to other hospitals.
Conclusion: DMY is highly appreciated by teenagers, parents and diabetes teams, but difficult to implement. More effort should be paid to resolve logistic problems to facilitate dissemination of QoL in routine care nationwide.

P123

Health related quality of life measurement in young people with diabetes. The DISABKIDS questionnaire

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Objectives: The DISABKIDS questionnaire has been developed simultaneously in seven countries in Europe including Sweden and is being evaluated for routine health-related quality-of-life (HRQoL) assessment in association with the Swedish national pediatric diabetes registry (Swediabkids) and thereby inclusion in regular clinical practice.
The aim of the study was to determine the reliability of the DISABKIDS chronic generic and the diabetes modules.
Methods: Children and parents completed the questionnaire during a routine visit to six diabetes clinics. In total, 120 families completed the DISABKIDS questionnaire in the clinics and completed a re-test at home after one month. Four measures of reliability were made: Test-re-test intraclass correlation coefficients (ICC); Split-half reliability correlation, Bland & Altman plots and Cronbach's alpha.
Results:

i The principle measure of reliability is the test-retest ICC. It was found that both the child and proxy versions gave consistent results on all eight DISABKIDS domains confirming that the test measures stable aspects of the patients experience.
ii Split-half reliability for the generic HRQoL module was very satisfactory ($r = 0.930$) for the children and for the parents ($r = 0.953$). Spilt-half calculations for the diabetes module also demonstrated very satisfactory reliability ($r = 0.848$ and $r = 0.903$).
iii Due to the spread of scores Bland-Altman plots were calculated. It was found that only 6 of the data points were beyond the 95% CI (1.96 SD) indicating good reliability.
iv Internal consistency of the scores within the diabetes module demonstrated that the DISABKIDS items deliver consistent scores.

Conclusions: The DISABKIDS questionnaire is a reliable instrument for the repeated measurements of HRQoL in clinical routine in children with diabetes.

P124

Health-related quality of life and its determinants in type 1 diabetic Portuguese adolescents

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Objectives: Type 1 Diabetes is a chronic disease that demands daily and individualized treatment. Our aim was to evaluate health-related quality of life (HRQL) perception in adolescents with type 1 diabetes mellitus (T1DM) and to identify its determinants.
Methods: A total of 42 Portuguese T1DM adolescents (aged 13–19), from a tertiary care diabetic clinic, enrolled the study. Portuguese version of Diabetes Quality of Life Questionnaire (DQOL) and standardized written interview was applied.
Results: DQOL total score and its three dimensions (Satisfaction, Impact, Worry) were overall elevated, with the majority of results over 75th percentile. Better HRQL perception is related to improvement in HbA1c trend levels ($p = 0.009$). Only 5% classified their health as 'poor' and it was related to type of insulin regimen ($p = 0.034$). We found no relations between HRQL and age, gender, years of illness, number of diabetic ketoacidosis episodes and frequency of self-monitoring blood glucose.
Conclusions: Type 1 Diabetes has a significant impact in HRQL and it is related with metabolic control and type of regimen. It is important periodic HRQL assessment to improve clinical care.

P125

Effect of fasting during Ramadan on different metabolic parameters and quality of life in type 1 diabetic patients

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Objectives: Was to evaluate the effect of fasting on the metabolic parameters, frequency of hypoglycaemic attacks, lipid profile in T1DM. Also to compare the effectiveness of different insulin protocols.
Methods: This prospective study included 60 patients recruited before Ramadan, according to the following :diabetics aged more than 8 years who had T1DM for more than one year. Patients with recurrent hypoglycemia, or long term related complications, were excluded. Outcome measures included assessment of quality of life, number of hypoglycemic episodes or DKA during fasting, Changes in HbA1C, and lipid profile after fasting and weight and BMI pre and post Ramadan. Prior to inclusion, Ramadan focused Patient Education was done prior to Ramadan, patients were given intensive education and written instructions on insulin adjustment, home glucose monitoring.
Group 1: 26 diabetics using 70% of the pre-Ramadan dose, divided as: 60% as insulin glargin given in the evening and 40% as Regular insulin given in 2 doses (at Suhur and at Iftar).
Group 2: 34 diabetics using 70% of the pre-Ramadan dose divided as: 60% insulin NPH in the morning and 40% regular insulin, given in 2 doses (at Suhur and Iftar).
Results: The total insulin dose given by the end of Ramadan was significantly lower than the total dose given before; $p < 0.05$. There was no report of severe hypoglycemia or ketoacidosis. There was no significant change in HbA1c ($p = 0.473$), BMI and lipid profile at the end of Ramadan($p = 0.06$). Daily insulin doses did not differ between treatments but compliance with recommended time of injection was better with insulin garalgine. Hypoglycaemia incidence and frequency were significantly lower with insulin garalgine, $p < 0.001$.
Conclusion: *Type 1 diabetics can safely fast, if they received proper education*. Fasting has no significant effect on diabetes control or lipid profile. We recommend that fasted patients switched to long acting insulin with lower risk of hypoglycemia.

Poster Tour 14: Diabetes care, education and psychosocial issues VI

P126

Structured diabetes education at the time of diabetes diagnosis - you're going to reap just what you sow?

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Objectives: To evaluate the effect of structured diabetes education at the time of diabetes diagnosis for long term quality of diabetes control.

Methods: Follow-up of all new insulin treated diabetes cases from the time of diagnosis and every three months by measuring HbA_{1C} and insulindose in units per kg body weight. Diabetes education changed under autumn 2011 (carbohydrate estimation and adjusting of insulin ratios). We compared the proportion of patients with HbA_{1C} below 58 and 53 mmol/mol (7.5 and 7.0% DCCT) in 6 months intervals excluding the first 3 months after the diagnosis before and after the change of education. Proportions were compared with Paerson Chi-Square, mean insulindose by one-way ANOVA.

Results: The number of new patients 2009, 2010, 2011 and 2012 were 30, 23, 22 and 34, respectively. The proportion of patients with HbA_{1C} below 58 and 53 mmol/mol tended to be higher 4–9 and 10–15 months after the diagnosis for those diagnosed under 2011 and 2012 compared to 2009 and 2010 (see Table 1). The mean insulindose tended to be lower 10–15 months after the diagnosis for those diagnosed under 2012 ($p = 0.12$). The mean difference for 2009, 2010 and 2011 compared to 2012 was −0.22; −0.28 and −0.22 U/kg, respectively.

Conclusions: Structured diabetes education at the time of diabetes diagnosis increased the proportion of patients who achieve good metabolic control during the first 15 months after the diabetes diagnosis and will hopefully track even at later follow-up. Good metabolic control seems to reduce the insulin requirement and may be due to a longer period of residual betacell function.

P127

Implementation of hospital based home care for children newly diagnosed with diabetes

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Objectives: The purpose of this study is to give a cultural understanding of barriers, facilitators and local leadership for a systematic implementation of a person-centred care in diabetes. The hypothesis was a theoretical model to handle, modulate and comprehend the contextual complexity when hospital based home care (HBHC) was implemented in care practice.

Methods: The contextual effects on the implementation practise have been explored and evaluated at cultural levels through a fieldwork consisting of qualitative interviews with the facilitator and ethnographic observations of meetings were the diabetes teams are discussing the implementation. The fieldwork has pursued throughout the implementation process, and in this study the focus is on the initial organizational change and the systematic uptake of HBHC. The methods have been aiming to capturing the cultural context that might enable or obstruct the implementation practice.

Results: The outcome of the study indicates that cultural barriers in the care practise and between the professionals working in the diabetes teams are central to highlight. Cultural barriers in the care practise are primarily the diabetes team's perceptions of what responsibility the patient and the family should take for the diabetes in their everyday life. Another central barrier are the power relations between the professionals and how the local leadership are developed in these interactions.

Conclusions: Through an increased focus on contextual complexity and cultural barriers our study highlights the significance of the implementation processes concerning the diabetes team's perceptions of patient and family and the power relations between the professionals. Both perspectives are central when handling, modulating and comprehending a systematic implementation of a person-centred care in diabetes.

Table 1. The mean difference for 2009, 2010 and 2011 compared to 2012

Year of diagnosis	HbA1C mmol/mol (% DCCT)	4–9 months after diagnosis HbA1C <58 (<7.5%)	4–9 months after diagnosis HbA1C <53 (<7.0%)	10–15 months after diagnosis HbA1C <58 (<7.5%)	10–15 months after diagnosis HbA1C <53 (<7.0%)
2009	Count (%)	21/29 (72.4%)	16/29 (55.2%)	16/29 (55.2%)	11/29 (37.9%)
2010	Count (%)	16/23 (69.6%)	10/23 (43.5%)	11/23 (47.8%)	7/23 (30.4%)
2011	Count (%)	17/22 (77.3%)	15/22 (68.2%)	12/19 (63.2%)	9/19 (47.4%)
2012	Count (%)	32/34 (94.1%)	28/34 (82.4%)	14/16 (87.5%)	10/16 (62.5%)
	Chi-Square; Linear association	$p = 0.077$; $p = 0.022$	$p = 0.016$; $p = 0.007$	$p = 0.077$; $p = 0.036$	$p = 0.22$; $p = 0.092$

HbA_{1C} <58 and <53 mmol/mol at 4–9 and 10–15 months.

P128

Assessment of overall performance of specialized kindergarten for children with diabetes

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Purpose: To estimate efficiency of rehabilitation of children of preschool age with diabetes of 1 type in the conditions of specialized kindergarten.

Methods: children are included in research with the diabetes type 1 at the age of 3–7 years visiting specialized kindergarten from 1996 to 2012 years. Diabetes compensation on indicators of the current glycemia (data of diaries of self-checking) was estimated; to level of glycated hemoglobin. The number of sharp complications at pupils, satisfaction degree from visit of kindergarten of parents was analysed. Degree of satisfaction was estimated by results of questioning of parents.

Results: In the analysis of diaries of self-checking average values of a postprandial glycemia in 1996–2003 corresponded 10.5 ± 2, mm/L; in dynamics decreased to 8.4 ± 2.0 mm/l in 2004–2012. Level of glycated hemoglobin in dynamics decreased with $8.9\% \pm 2.0$ to $7.6\% \pm 1.5$. For working hours of specialized kindergarten it wasn´t noted hospitalization of pupils with heavy gipoglikemiya. Episodes of an easy hypoglycemia which could be stopped enteralny reception of carbohydrates are noted at 80% of children in the first years of work of kindergarten during physical activities. In recent years thanks to ultrashort analogs, a pump therapy, a balanced diet their quantity decreased below than 25%. Episodes ketoacidosis were noted during intercurrent diseases. In only 16 years concerning a decompensation in a hospital it was hospitalized 10 patients visiting kindergarten. When questioning parents degree of satisfaction corresponded to 7–9 points on 10 mark scale and is confirmed with high attendance of establishment.

Conclusions: visit of kindergarten promotes active integration of children into society, keeping disease compensation, allows to prepare for training at comprehensive school.

P129

Engaging young people in structured education

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Structured education is now an essential part of diabetes care, Group education sessions aim to meet this requirement but achieving good attendance is very challenging. Since 2008 our group education programme has targeted times during each child's development when major changes are occurring in their lives. In 2011 a staff member was appointed Diabetes Educator to maximize the effectiveness of this programme.

In 2008 an evening for 13–14 year olds (school year 8) and their parents was introduced focusing on topics for teenagers with diabetes. Annual attendance has varied; 29% in 2009/10 to 48% 2011/12. In 2011 an all day session was introduced to prepare children for the move to secondary school and 55% of 11 year olds (Year 6) attended. 40% of these children then attended the year 8 evening during the academic year 2012/13 which was 40% of the total attendees at that session. 55% of the other attendees had been diagnosed with diabetes since the Year 6 day. In 2012 there was 78% attendance at the Year 6 day showing an improvement on the previous year.

In 2011 we attempted to run a session for 17 year olds pre transition to adult services but cancelled this due to a very poor response. In 2012 we introduced an evening for 15–16 year olds (Year 10) focusing on more challenging topics relevant to this age group. 11 attended (33% of those invited). 6 (55%) had attended a Year 8 evening previously and 3 (27%) had been diagnosed with diabetes since the Year 8 evening.

Whilst it remains very difficult to attract teenagers to education sessions those who attend have either been to a previous group or are relatively newly diagnosed. We concluded that attendance at group education at the beginning of diabetes care may have a beneficial effect on future attendance. So in 2013 we held a 'FunDay' for children aged 7–9 (66% attended) and an 'activity' afternoon for younger children and parents to meet (77% attended). Group education is now actively promoted from diagnosis.

P130

Teaching self-management is not enough: evaluation of learning drives improvement!

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Objectives: To develop objective assessment tools to evaluate proficiency for well-day, sick-day, and pattern self-management skills in patients with T1DM and to utilize this information to improve diabetes education.

Methods: Vignette-based assessments were developed to evaluate sick day and basic and advanced (pattern recognition) well-day diabetes self-management skills. Each questionnaire was administered to 20 random T1DM patients at baseline and then to an additional 20 random patients every month. A similar approach was used to evaluate proficiency after initial inpatient education for new onset T1DM. Interventions to improve diabetes education were made based on identified knowledge deficiencies. The data was noisy due to small sample number and some variation in which patients were assessed.

Results: Baseline scores indicated suboptimal diabetes management knowledge. This information drove changes including dedicating additional time for teaching and changing emphasis in our teaching. We developed new self-management tools and adopted teaching methodologies such as reiteration of important concepts and review of case scenarios. Well-day and sick day management skills score showed an improvement trend in response to targeted modifications in our diabetes education program (Fig. 1).

Fig. 1. Sick day and well day management skills scores (diabetes skills scores).

Conclusions: Our baseline efficacy of diabetes education was less than anticipated. Objective measures are essential to evaluate learning effectiveness and to direct subsequent improvements.

P131

Evaluation of multiple educational programs on improvement of quality of life and metabolic status (HbA1c) in adult type 1 diabetic patient

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Aim: The present study was aimed to evaluate the outcome of diabetes educational programs in adult type 1 diabetic patients (T1D).
Methods: Diabetes educational programs were conducted at DiaCare for every 3 months with next 2 years follow up on improvement of quality of life (QOL) and HbA1c in T1D (n = 127, Age 15–20 years, HbA1c >8%). An epidemiological study were conducted on various parameters such as age, gender, duration of diabetes, diet, family history of diabetes, daily glucose monitoring frequency and hypoglycemic events (in past three month). The QOL was assessed by using 15 set diabetes quality of life (DQOL) questionnaire in 96 consecutive patients at Baseline and then at 6, at 12 and at 24 months after education program, decreased in DQOL score noted as improvement in QOL. The average HbA1c level was estimated before and after the programs (At 6, 12 and 24 months).
Results: A total 71.65% (n = 91) patients were responded to study at end of 24 months. The prevalence of T1D was higher in men than in women. The overall DQOL score was significantly ($P < 0.05$) decreased at 6 month from 65.79 ± 3.65 to 52.31 ± 3.51 (20.76% reduction), further more continuous reduction in average DQOL were noted at 12 and 24 months after educational programs. Patients exhibited greater satisfaction and diminished impact of diabetes after the educational programs were noted at 6 months after educational programs and it was maintained up to end of study. The HbA1c level was significantly ($P < 0.001$) decreased at 6 months (8.79 ± 1.88 Vs 7.28 ± 1.1) and at 12 months (8.79 ± 1.88 Vs 6.99 ± 0.46) and further reduction was continued at 24 months (8.79 ± 1.88 Vs 6.71 ± 0.51). The numbers of hypoglycemic events were decreased and frequency of self-monitoring of blood glucose increased after educational programs.
Conclusion: Results of present study revealed that the appropriate counseling and education to diabetic can improve QOL, HbA1c and help to decrease the impact of diabetes in T1D patients.

P132

Effects of diabetes education on glycemic control in children and adolescents with type 1 diabetes mellitus

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Objectives: The purpose of the study was to assess the impact of a diabetes self-management education program on glycemic control in children and adolescents with type 1diabetes mellitus (T1DM).
Methods: Eight patients aged 7–16 years, 5 on intensive insulin regimen and 3 on continuous subcutaneous insulin infusion, attended the program. Education was delivered by an endocrinologist and a diabetes educator, (biologist- person with T1DM). The program was held over a 12-month period at sequential sessions of 2 weeks. Education included topics such as general knowledge about the disease, insulin therapy and insulin pumps, nutrition, exercise, carbohydrate counting, glycemic index and management of hypoglycaemia. Fasting blood glucose, HbA1c, body weight and hypoglycemia incidents were recorded at baseline and at the end of the program.
Results: There was a significant decrease in the mean high blood glucose level from 302.5 ± 74.4 mg/dL at baseline to 225 ± 46.3 mg/dL 12 months later ($p = 0.011$), especially in patients aged more than 10 years ($p = 0.030$). A significant reduction in hypoglycaemic episodes was also observed from 58.63 ± 33.248 episodes in the preceding 4 month period before enrollment in the education program (baseline) to 27.500 ± 19.464 episodes during the last four months ($p = 0.005$) of the intervention. Mean HbA1c decreased from $7.64 \pm 1.14\%$ at baseline to $7.14 \pm 0.67\%$ at the end of the program ($p = 0.206$).
Conclusions: Even though, due to small sample size, no statistically significant decrease in HbA1c was detected, it is obvious that structured diabetes education improves glycemic control in patients with T1DM as observed by the significant decrease in the number of hypoglycemic incidents. Continuous education could lead to significant clinical outcomes regarding diabetes self-management and play an important role in the treatment of diabetes and growth in children and adolescents.

P133

Current practice of diabetes education in children and adolescents with type 1 diabetes in Germany and Austria: an analysis based on the German / Austrian DPV database

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Background: Diabetes education with regularly trainings of patients and their parents are an essential part of diabetes care with effects on diabetes outcome. The objective of our study was to describe current practice of diabetes education in Germany and Austria with regard to training frequency, patient age, diabetes duration, migration background and diabetes therapy in a large cohort of pediatric patients with diabetes mellitus type 1 (T1DM).
Method: We analyzed data from 28.337 patients with T1DM and complete data 2011 in the multicenter DPV registry using SAS 9.3.
Results: In 2011 28.337 patients with T1DM were documented (52.72% male, age: 14.27 [10.48–18.11] years (median [interquartile range]), diabetes duration: 4.98 [1.99–9.58] years, migration background: 16%, multiple daily injections: 65%, insulin-pump therapy: 35%). In total 14.393 diabetes trainings (0.51/patient/year)

were documented. Young pediatric patients were trained more often and predominantly inpatient than older patients (0–6 years: 0.58, 6–12 years: 0.55, 12–18 years: 0.46 vs. >18 years: 0.52; <18 years; inpatient: 54.99% vs. 42.13%). Most trainings were documented with short diabetes duration (up to 1 year: 0.78, up to 2 years: 0.50 vs. >2 years: 0.45) and for multiple daily injections (0.53 vs. insulin-pump therapy: 0.48). There was no difference in training frequency with regard to migration background. Center specific education tools were used more frequently than published education programs (58% vs. 42%).

Conclusion: In our cohort of T1DM patients training frequency was highest in younger patients and during the first year of diabetes. Patients with multiple injections were trained more often than patients with insulin pump therapy. Diabetes education of younger patients (<18 years) and their parents took place more often in clinics compared to older patients. Some institutions preferred center specific education tools, while other relied primarily on published education programs.

P134

Diabetes resource nurse – a possible function to improve support for children with type 1 diabetes at school

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Objectives: Although Sweden has legislation underlining the specific need for diabetes care in school, a nationwide study in 2008 demonstrated deficiencies in the support of self-care management in school-aged children with type 1 diabetes. The aim of this study was to evaluate the effect on support of self-care management in school by a diabetes resource nurse available for school personnel.

Methods: A position as a diabetes resource nurse has been tested in Jönköping County Council for three years (2010–2013) to offer the school staff necessary knowledge about diabetes. The diabetes resource nurse visited the schools to give information in the child´s daily environment. After the first study year a questionnaire was answered by 27 parents were the diabetes resource nurse had visited their child´s school and by 58 parents where the nurse had not.

Results: Before the visit 60 % of the children had no member of staff at the school with principal responsibility to support diabetes self-care, after the visit the number was 18 %. After the visit 85 % of the children with diabetes had an individually written action plan for hypoglycemia compared to 62 % before the visit ($p = 0.031$). Parents were significantly less worried during their child´s school day after a visit of the diabetes resource nurse ($p = 0.015$). No differences were seen in HbA1c between the groups in this first analysis but this will be evaluated again after a longer follow up period.

Conclusion: The preliminary result of the intervention shows that a diabetes resource nurse can successfully improve the support children with type 1 diabetes receive at school. A new questionnaire is currently being analyzed to evaluate the results after the three years during which the diabetes resource nurse has performed 180 school visits. Further studies are needed to clarify which grades benefit the most from the support of a diabetes resource nurse and to inquire the school personnel´s experience of the resource nurse´s work.

Poster Tour 15: Diabetes care, education and psychosocial issues VII

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Diabetes nurse specialists with smaller caseloads are associated with better clinical outcomes, reduced hospital admissions and reduced length of hospital stay

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Introduction: Recommendations for good practice in the organization of diabetic services for children have been published in the United Kingdom. The Royal College of Nursing of the United Kingdom recommends that a pediatric diabetes nurse specialist (DNS) with children's and diabetes training has a maximum caseload of 70 children per nurse whole time equivalent. We report the results of an audit in which a number of outcomes such as rates of admission, length of stay in hospital and standards of good clinical practice were examined in relation to pediatric diabetes nursing caseload.

Methods: The admission notes for all patients aged 0–16 with Type 1 diabetes mellitus admitted to the hospital between January 2011 and December 2012 were reviewed. Between January 2011 and December 2011, there was 1 whole time equivalent DNS to 94 patients and between January 2012 to December 2012, there was 1 DNS to 58 patients.

Results: We reviewed 124 patient-admission notes (8 repeat admissions). Admission rate was 32% in 2011 and 19% in 2012 ($p = 0.02$). The median hospital length of stay for was 2.9 days in 2011 compared with 1.8 days in 2012 ($p = 0.04$). Adherence to DKA guidelines were 87% in 2011 and 100% in 2012 ($p = 0.01$). Patients´ mean age on admission was 11.3 years (range 5–16 years), with 70% males. There were no significant difference in age at presentation between 2011 and 2012. Average HbA1c was 8.65% in 2011 and average HbA1c was to 8.5% in 2012 ($p < 0.05$)

Conclusions: Children with diabetes under the care of DNS with smaller caseloads appear to have better clinical outcomes such as reduced hospital admission rates and length of stay compared to those with larger caseloads of patients. Continued patient and staff education is essential for improved compliance and overall standards of diabetes care.

P136

Parents' experiences of two different approaches to diabetes care in children newly diagnosed with type 1 diabetes

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Objectives: To explore parents' experiences of two different approaches to diabetes care in children newly diagnosed with type 1 diabetes.

Methods: The study design was qualitative. Parents were recruited prospectively from participants in RCT evaluating hospital-based care (HBC) and hospital-based home care (HBHC) in relation to the onset of diabetes in the child. The trial was conducted at two paediatric centres in Sweden. Interviews were conducted with 36 parents: 21 mothers and 15 fathers to 23 children, eight to ten months after the child's diabetes onset. All interviews were audio-recorded and transcribed verbatim. Data were analysed with a constant comparative method.

Results: Parents in the HBC group felt safe in the hospital environment while parents in the HBHC group experienced a relaxed environment, providing individualized accessibility and possibilities for situational learning. Keeping contact with the ward contributed to parents feeling secure and connected after transfer to HBHC. Compared to hospital care, HBHC was considered more flexible in promoting normality, and involvement and included continuous reality-preparing, health-creating support. For all parents, the transition to home was followed by a gradual discharge including a range of feelings from ambivalence and hesitation to feelings of being prepared and ready to face daily life. Parents subsequently struggled to adjust to the new situation, although some faced the challenges with growing confidence. Parents in the HBHC group felt supported through the availability, prolonged continuity and directed feed-back they received after discharge.

Conclusions: The preliminary findings showed that parents in the HBHC group experienced a more tailored and family-centred support, both during the stay in hospital-based home care and after discharge than parents in the HBC group. However, regardless of diabetes care approach, many parents felt insufficient readiness to leave the health-care setting.

P137

School problems in children and adolescents with type 1 diabetes

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Objectives:: To identify the school problems of children with type 1 diabetes at primary and secondary school taking into account the perceptions reported by children and parents.

Methods: This was a cross-sectional survey carried out at nine public hospitals in Serbia with a cohort of 280 children. Parents were personally informed about the objectives of the survey and the necessity to involve their children.

Results: The mean age of patients was 13.97 ± 3.18 years (range 7.0–19.92) with the mean diabetes duration was 5.32 ± 3.60 years (range 0.1–19.3) and the mean HbA1c was 8.39 ± 1.85 (range 5–19.4). The majority of children were >15 yr old 42.2 %, than 11–15 yr 36.1 % and 7–10 yr 21.7 %. Male (141) and female

(139) gender were equally represented. The frequence of children who went to primary school was 165 and to secondary school was 105 ($p < 0.001$). At school, the frequency of children with diabetes underwent glucose monitoring during the day was 137, which they usually performed without any assistance (85.9 % vs 14.1 %; $p < 0.001$). 36.2 % of children required insulin administration during the school day ($p < 0.001$). 10.9 % of children had one, or more than one, hypoglycemic episode at school ($p < 0.001$). In 6.1 % of the responses of children, thay had available glucagon at school and 10.0 % ($p < 0.001$) of children knew there was somebody at school who was able to administer glucagon if needed. Children's major concerns included influence of disease on school activity was: impact on secondary school choice 23.8 % ($p < 0.001$), impact on success in school 12.9 % ($p < 0.001$), impact on relationship with school friends 6.8 % ($p < 0.001$) and impact on relationship with school teachers 8.6 % ($p < 0.001$).

Conclusion: The population group agreed that discriminatory behavior still occurs but we hope that it has been diminishing in recent years.

P138

Improvement in school performance of lower socio economic class people, after availability of resources

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Objectives: To evaluate the improvement in school performance in lower socio economic class children with diabetes, when they are empowered with resources and proper diabetes education.

Method: 34 children were evaluated through a questioner about their school performance in different parameters. Out of 34, 20 male and 14 female children were there, aged 7–18 years mean age of male children 16 years and female 14 years. All of them are provided with a self evaluation questioner about their school performance before implementation of CDiC (Changing Diabetes in Children) program and change after one year of CDiC enrollment.

Questions about scholastic performance – Before CDiC and after CDiC

i Missing school days
ii Participation in outdoor games at school
iii Taking part in extracurricular activity in school
iv Answering question in class
v Performance in Exams
vi Interest in studies

Result: With the availability of resources to people with T1DM improvement in all parameters especially in their school performance and interest in studies took place. In most of them absent days from school reduced from more than 5 days /month to less than 2 days/month, about 50% of them were not participating in outdoor games which number reduces to only 2, performance in exams before CDiC were poor to average in more than 50% which was increased to excellent in about 40% of children, interest in studies was increased in 60% children. These changes are significant.

Conclusion: Poor resources and lack of diabetes education leads to uncontrolled diabetes. When these children were provided support in terms of insulin, glucometer and strips, investigations along with education empowerment, the significant improvement was seen in various parameters studied.

Our study shows that resource availability improves overall scholastic performance in individuals with Type 1 Diabetes.

P139

Specially developed training program for public school teachers on fundamentals of diabetes, diabetes nutrition education and obesity in children – a novel approach in Kuwait

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Objectives: Childhood obesity and diabetes has been on the rise in the state of Kuwait. Ministry of Education realized the importance of introducing a nutrition education programs in schools to help children make lifestyle improvements and introduce healthy eating practices earlier in life. A nutrition education program was designed at Dasman diabetes Institute to train teachers on delivering nutrition topics and their relation to diseases. Special emphasis was given to empower teachers, improve their knowledge about diabetes and obesity in children and improve their skills in assessing nutritional status.

Method: Seven groups of home economics teachers ($n = 198$) were selected from intermediate and secondary public schools to join a one month training program about fundamentals of diabetes nutrition. Each group included 30 teachers. Teachers' knowledge about diabetes and obesity was assessed at their first visit. Training sessions included formal lectures, small group sessions, role play, interactive workshops and cooking demos. Teachers were also trained on collecting anthropometric measurements, 24-hour recall; body mass index calculations, basic and advanced carbohydrate counting, management of hypoglycemia, as well as attending healthy cooking classes. A written post assessment was conducted at completion of the month.

Results: Gain in teachers' knowledge and awareness about diabetes, nutrition management of diabetes and obesity had significantly improved ($p < 0.005$). Confidence in managing hypoglycaemia was reported. Running a one day diabetes nutrition awareness campaign at worksite was accomplished by 30% of the teachers attending the training program.

Conclusion: Conducting nutrition education training programs improved teachers' knowledge in diabetes and obesity, as well as it enhanced the teachers' delivery techniques. Long term impact of this training program on school children is yet to be measured.

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The effect of educational diabetes programs for 'diabetes novice' healthcare providers

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Aims: It is the Education and Training Department's strategy to assist healthcare providers inside and outside the Dasman Diabetes Institute and to provide them with updated knowledge regarding diabetes care and management. The aim of this pilot is to provide evidence about the importance of training the healthcare providers, who have different experiences and come with various educational backgrounds, and to provide them with the knowledge and skills required for safe and effective services to people with diabetes in the outpatient clinics.

Methods: Basic Diabetes Knowledge and Skills Workshop, it was planned and delivered by Diabetes Nurse Educators at Dasman Diabetes Institute (DDI). The course was adapted from the

international Diabetes Federation (IDF) curriculum for healthcare professionals. Nine nurses who are newly employed at DDI and novice to diabetes attended this course. The workshop took place over six days; two hours per day. The educators used different teaching methods for delivering the contents such as interactive lectures, practical sessions and small group activities. Formative assessments with constructive feedback and evaluation were designed to meet the needs for this workshop.
Results: Data from pre and post questionnaires were analyzed. Results demonstrated significant changes in the participants' knowledge with a p-value < 0.00001. There was very positive feedback from participants who expressed the great benefit of the workshop. Most of the learners stated that, the sessions met the objectives remarkably well; also they expressed satisfaction with the course content and objectives.
Conclusion: This pilot workshop confirmed the need of structured education, providing knowledge and skills training to healthcare professionals who are novice to diabetes regardless of their previous experience is an essential component of personal development in order to be able to help people with diabetes in their diabetes self-management.

P141
Challenges in meeting the pediatric diabetes best practice guidelines at a district general hospital in Yorkshire: a review of the changes that need to be made and their financial implications

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Introduction: This business plan focuses on the need to improve the current pediatric diabetes service provision at a District General Hospital Trust (DGH) in Yorkshire to be in line with the payment by results (PBR) best practice tariff. This tariff is based on recommendations by NICE and the Department for Health and was set by the regional tertiary centre.
Objectives: The main change that requires implementation by the DGH would be to create a 24 hr diabetes service staffed by trained professionals. This would allow the trust to meet the best practice tariff and have the additional benefit of reducing hospital admissions for young people with diabetes and reducing their length of stay if admission was required.
Method: The strengths and failings of current service provision were examined. The case for change looked at 6 specific aspects: risk management; productivity and cost effectiveness; recruitment and retention of staff; modernization of service provision; patient choice and implementation of national guidance.
Three options for implementation of proposed change and their consequences were then examined: no change to current practice (option 1); a 24 hr on call service staffed by specialist nursing staff (option 2) and a 24 hr on call service staffed by a combination of trained medical staff and nurses (option 3).
Results: The additional cost to the trust of implementing option 2 was £30560 versus a cost of £86020 to implement option 3. The financial incentive for meeting the PBR best practice tariff would be £30340. The additional savings that could be made by the trust by reducing admission rates and length of admissions was calculated to be between £21846 and £159552.
Conclusions: The most cost effective option was option 2 which involved setting up a 24 hr on call service staffed by specialist nursing staff. This service would meet current government recommendations and the PBR best practice tariff. This option was presented to the trust and is currently being reviewed.

P142
Rehabilitation of teenagers with diabetes in the conditions of the children´s camp

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Purpose:: To estimate efficiency of the program of rehabilitation of teenagers with diabetes in the conditions of a children´s recreation camp.
Methods: In research it is included 200 teenagers 12–17 years, being on vacation in the children´s recreation camp 'Eaglet' of the Samara region in 1999–2012. Extent of compensation of a disease about 3 weeks of stay on vacation according to self-checking diaries (definition of glucose of blood on the Optium Xceed device not less than 4 times per day), to level of glycated hemoglobin was estimated. Existence of sharp complications of diabetes is defined during summer holiday, degree of satisfaction by stay in camp.
Results: During stay in children´s camp under control of doctors children´s of endocrinologists stabilization of a glycemia and compensation improvement that was shown in decrease in average daily fluctuations of glucose of blood for 20% (±5%) and to decrease in level of glycated hemoglobin for 1% (±0.3%) is noted. It is noted any sharp complication of diabetes: ketoacidosis, the heavy hypoglycemia which have demanded intravenous administration of glucose and the subsequent hospitalization. Mild of a hypoglycemia were rather frequent in the first days of rest, after decrease in a dose of insulin their quantity decreased to 1–2 per day. The best indicators of compensation and lower interest of hypoglycemia managed to be reached at patients on a pump therapy. More than 60% of children are adjusted on repeated rest in a recreation camp.
Conclusions: The outdoor activities in group of contemporaries with elements of interactive training at Diabetes school are an optimum method of rehabilitation for teenagers with diabetes that formed a basis to start development of the regional program of social adaptation of children with chronic diseases, including with diabetes, in the Samara region.

P143
Respecting the adolescent diabetes patient as an autonomous person – what does it imply? Assessing and managing decision capacity for care decisions and self-care

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Objectives: Analysing the ethical implication of viewing adolescent patients as autonomous decision makers in the diabetes care setting.
Method: Ethical analysis on the basis of video recordings of care meetings.
Results: Adolescent diabetes patients tend to be quite capable of reasoned and informed decision making in care meetings, but are known for weak adherence to decisions made in these meetings. This is often due to particular psychological features of a sort (impulsivity, submission to momentary temptations and peer pressure, lack of consideration for long-term perspectives, etc) that could be argued to undermine the assumption of adolescents as autonomous and decision competent persons, requiring the respect prescribed by

standard health care ethics. At the same time, the non-adherence is possible to thematise during care meetings, thus becoming a part of autonomous decision making regarding the handling of factors that are a threat to adherence. Examples of such possibilities from the video recorded care meetings are described.

Conclusion: The seeming lack of decision making competence in the management of self-care of adolescent diabetes patients need not be a reason to apply less of respect for these patients as autonomous persons. This will depend on how non-adherence is addressed in care meetings and applied in shared decision making.

P144

The moral psychology of person centred adolescent diabetes care: two potentially conflicting ethical dimensions of shared decision making for sustainable self-care

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Objectives: Addressing challenges to person centred care (PCC) and shared decision making (SDM) in pediatric diabetes care in view of self-care adherence among teenagers and young adults.

Methods: Ethical analysis on the basis of video recorded care meetings.

Results: At the same time, teens and young adults that have serious problems in adhering to an ideal self-care regimen continue to have so even when listened and accommodated to with regard to broad life-situation factors and seemingly involved in decision making on how to handle self-care challenges in their day-to-day reality. On the basis of a video study of real adolescent diabetes care meetings, we suggest that certain combinations of moral and psychological considerations support the idea that the application of PCC and SDM to this and other areas of care sharing some similar features may in its standard form systematically undermine the goals of care – also when these are adjusted to the person centred perspective. This is due to a hitherto unnoticed tension between the ethical requirements of SDM in its standard form, and more long term needs actualized by the context of a care area dominated by self-care measures supposed to be handled by people with diminished albeit developing capacities for taking responsibility in a way that supports them in the fostering of empowering and emancipating capacities in this respect. This tension is analysed on the basis of health care ethical theory, with illustrations from the mentioned video study, in terms of a challenge for adolescent diabetes care to develop sustainable forms of PCC and SDM solutions in order to balance adequately considerations of respecting and promoting the adolescent diabetes patient as a person, and at the same time recognizing him or her as in need of long term fostering of virtues to support responsibility. This may involve less of a focus on autonomous choice than what is otherwise often stressed in PCC and SDM.

Poster Tour 16: Diabetes care, education and psychosocial issues VIII

P145

Person-centred diabetes care in adolescent patients with immigrant background

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Objectives: In northeastern Gothenburg, roughly half the population is of foreign origin. The diabetes registry SWEDIABKIDS indicate a need for improving the degree of metabolic control in adolescents with diabetes from this area. In general, the health in this part of Gothenburg is poor compared to the rest of Gothenburg – the lifespan being 9 years shorter than in the west. In 2008, a new hospital – Angered Local Hospital – was established in the area for the purpose of improving the health in northeast through the provision of local and multidisciplinary specialist care.
Aim: An out-patient diabetic clinic for children was established at Angered Local Hospital in 2012 to provide care via a multidisciplinary diabetes team and develop an evidence-based, person-centred approach to care. The clinic was established in collaboration with The Queen Silvia Children's Hospital & GPCC (University of Gothenburg Centre for Person-centred Care; a multidisciplinary academic research team specialized in Philosophy, Linguistics, Psychology, Health Economy & Environmental Medicine).
Methods: Focus is put on challenges in providing diabetes care, where divergent perceptions of the illness across different cultures impact on the interaction between healthcare providers and patients. The intervention structure is based on information received from video recordings and interviews with young immigrant patients and diabetes team members. The following areas were identified as vital to successful provision of diabetes care in a multicultural population: health literacy and illness perception, self-care, and confidence in healthcare providers.
Results: The project has so far resulted in the following care structure: flexibility in terms of frequency and arrangement of visit, home visits, collaboration with schools, social services and non-profit organizations and group activities. The service further includes work with interpreters to address language barriers as well as cultural differences.

P146

DAWN MIND YOUTH Questionnaire (MY-Q) as a health related quality of life tool in teenagers with type 1 diabetes in routine clinical care in Brisbane, Australia

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There is a high burden of quality of life (QOL) concerns for children with Type 1 diabetes (T1D). Currently the Diabetes Attitudes Wishes and Needs, Monitoring Individual Needs in Diabetes (DAWN MIND) Youth Questionnaire (MY-Q) is being trialed as a heath related quality of life (HRQoL) tool for assessing diabetes-related QOL in youth with T1D in routine clinical care.

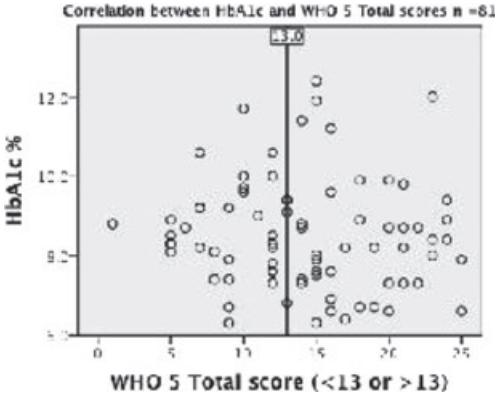

Fig. 2. Correlation between HbA1c and WHO 5 total scores.

Objectives: Our aim is to identify and explore the trend of HRQoL for Adolescents with Type 1 diabetes. Self reported outcomes from the World Health Organisation (WHO) 5 well-being component of the MY-Q were analysed and compared with HbA1c, for youth (14–18 years of age) with T1D from the 2 pediatric tertiary centers in Brisbane, (The Royal Children's and Mater Children's Hospitals).
Methods: Youth aged between 14–18 years (Mean 15 yrs, SD + 1.46), presenting at their routine diabetes outpatient appointment were invited to complete the MY-Q by a member of their treating team between April 2012–April 2013 (n = 81, 34 males, mean HbA1c 8.5%, SD + 1.4). A total score of 13 or less is indicative of symptoms of low mood that warrant further investigation. Results were analysed by comparing the WHO 5 total scores with HbA1c to observe for any relationship between low scores and HbA1c. (scores $\leq$13, n = 38) (scores >13, n = 43)
Results: There was no significant difference between the two groups for gender ($p = 0.186$) or HbA1c ($p = 0.212$). Minimal correlation between HbA1c and WHO 5 total scores was observed $r = -0.069$ (see Fig. 1).
Conclusion: Youth living with T1D experience sub optimal psychosocial well-being irrespective of their HbA1c which was not significantly affected by QOL concerns. It is important for diabetes clinicians to realize that psychosocial well being cannot accurately be determined by observation without asking the relevant questions. Previous assumptions of greater psychosocial issues being experienced predominantly by adolescents with poorer glycemic control may need to be revised.

P147

Improving adherence through enhancing resilience: protocol of the resourceful adolescent program

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Objectives: Diabetes is a complex condition that includes both illness specific challenges as well as the developmental challenges of the adolescent phase. It's likely that much of the poor outcome of

individuals is due to co-morbid psychosocial issues. Our aim in this paper is to detail the Resourceful Adolescent Program as a group intervention to improve the emotional health and well-being of adolescents and improve parental collaboration to improve treatment adherence. A pilot study was conducted to evaluate the effectiveness of the RAP A and RAP P and determine the feasibility of progressing to a randomized control trial.

Methods: Adolescents aged between 13–14 years and their parent/s were invited to participate in the RAP weekly for 6 weeks. An observational pre - post study design was implemented, with measures completed both by adolescents and parent informants, to assess diabetes related and psychosocial domains. Key findings on the feasibility of conducting a larger scale RCT intervention study will also be reported.

Results: This presentation will detail the process and experiences of two groups that piloted the RAP program with 7 adolescents and 7 of their parents. Parent satisfaction with the program was high and adolescent satisfaction was moderate. Significant challenges with recruitment and retention were experienced.

Conclusion: Whilst improved resilience, emotional well-being and parental collaboration is clearly advantageous for adolescents with T1D significant challenges with recruitment and retention were encountered in piloting the Resourceful Adolescent Program in the clinical setting. Despite these challenges we are encouraged to continue to incorporate the RAP program into our system of care such that everyone transitioning to the adolescent diabetes service has the opportunity to undertake the RAP. Further strategies to improve recruitment and retention are required to determine the effect of this program on adolescent health outcomes.

P148

Children, adolescents and young adults with type 1 diabetes (T1D) in the TEENS study: treatment characteristics and A1c outcomes in a sample of US youth

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Objectives: Despite availability of insulin analogs and advanced diabetes technologies, there are substantial gaps between A1c targets and outcomes in youth with T1D. The TEENS Study aims to assess factors related to glycemic control in an international sample of T1D youth; data from 499 US youth (53% male), age 8–25 years old (y/o) are currently available.

Methods: In a cross-sectional, observational study, 25 pediatric centers collected data from patient interview, medical record review, and patient/parent surveys. There were 130 (26%) children (8–12 y/o), 247 (50%) teens (13–18 y/o) and 122 (25%) young adults (19–25 y/o). A1c, obtained at study visit, was measured using A1cNow™ (Bayer). Target A1cs were $< 7.5\%$ for youth ≤ 18 y/o (ISPAD) and $< 7\%$ for 19–25 y/o (ADA).

Results: Patients had a mean age of 15.4 ± 3.9 yrs, T1D duration of 7.4 ± 4.4 yrs, and A1c of $8.5 \pm 1.6\%$. Overall, 24% achieved A1c targets; 32% of 8–12 y/o, 23% of 13–18 y/o, and 16% of 19–25 y/o. Almost a third (31%) had A1c $\geq 9\%$; 18% of 8–12 y/o, 37% of 13–18 y/o, and 33% of 19–25 y/o. Treatment characteristics by age and A1c target attainment appear in Table 1.

Conclusions: Younger patients were more likely to achieve A1c targets. While some aspects of contemporary management were associated with target A1c levels (BG checks and CGM in all youth; pumps in older youth), carb counting and exercise were not. Overall, new approaches are needed to improve A1c outcomes in youth with T1D.Study sponsored by Sanofi.

P149

Developing and evaluating a structured diabetes education programme for adolescents with type 1 diabetes in Saudi Arabia

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Introduction: Type 1 diabetes (T1D) is a chronic condition that leads to serious complications in adolescents due to their poor metabolic control (IDF), 2009). The prevalence of T1D is increasing in Saudi Arabia (SA) (IDF, 2011). Evidence highlighted education is improved metabolic control (ISPAD, 2012), adolescents are unable to achieve optimal glycaemic control (Chaney et al., 2010). The Structured Diabetes Education Programme SDEP is a vital aspect of diabetes management in making a real difference to the lives of adolescents with T1D in SA.

Aims: To measure, the effect of SDEP on self-care behaviour, knowledge and short-term glycemic control of adolescents with T1D in SA; to explore whether SDEP is feasible in SA and acceptable to adolescents, their families and HCPs.

The study hypothesis is that a SDEP, would be feasible and acceptable in SA and would have a positive impact on knowledge, self-care behavior and glycaemic control in adolescents with T1D.

Study design:: A mixed methods pilot study using a pre/post evaluation design

Sample, Setting and Recruitment::

i A convenience sample of 20 adolescents aged 13–17 years, will be recruited from the pediatric diabetes outpatient clinics in two large teaching hospitals in SA.
ii Four family members c)4 health professionals invited to participate in a qualitative face-to-face interview

The Intervention: A Structured Diabetes Education Programme (SDEP) developed specifically for adolescents with type 1 diabetes in SA

Data Collection: Two questionnaires, face-to-face interviews and measurement of HbA1c levels.

Table 2. Treatment characteristics by age and A1c target attainment

	8–12 y/o		13–18 y/o		19–25 y/o	
	At A1c target	>A1c target	At A1c target	>A1c target	At A1c target	>A1c target
BG Checks/day	7.1 ± 1.7	6.4 ± 2.1	5.3 ± 1.9	4.2 ± 2.0	4.1 ± 1.9	3.5 ± 2.1
Pump Use	71%	73%	74%	58%	63%	54%
CGM USe	14%	7%	12%	7%	11%	6%
USe of CARB ctg	93%	97%	79%	88%	84%	79%
Activity 30 min/day	41%	41%	19%	26%	16%	17%

Results: Adolescents self-care behaviour ($p < 0.006$) and knowledge significantly improved ($p < 0.046$) and HbA1c levels reduced from 9.39% to 8.70% from pre -to post intervention. Thus, SDEP is feasible and acceptable in SA.
Conclusion: This study suggest that SDEP may lead to large improvement in diabetes knowledge, self-care behaviour, as well as HbA1c in SA.

P150

Self-care in adolescent with type 1 diabetes: a complex process supported by five pillars: the disease management, the parental coherence, the conciliation of identities, the autonomy of decision and the attachment

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The adolescence, during which glycemic control is more precarious, is characterized by the development of the autonomy and includes the construction of the *self-care*. In the field of the pediatric diabetology, the definition of the *self-care* is often reduced to the autonomous behavior in disease management, not taking enough account of the other essential dimensions, as the psychosocial life and the development's needs.
We realized 2 successive studies:

i a qualitative study to explore the signification of *self-care* in young patients, and
ii a study by mixed methods, with adolescents from 13 to 15 years old, to verify the existence of links between the glycemic control and (1) the declared *self-care*, and (2) the parental support.

The results of the study 1 show that the behavior of *self-care* managed by young patients is always supported by the parents and are described in a perspective of health promotion by responding to three purposes of take care: psychosocial life, physical health and diabetes. The results of the study 2 show that in adolescents with an optimal HbA1c, the importance of a *self-care* built from the autonomy of decision and not only the autonomy of realization. This *self-care* includes behavior of diabetes management not only to satisfy the requirements of medical care but also in a salutogène perspective to take care of its psychosocial life. Our results also underline the importance of a coherent support between the parents and adapted to the adolescent needs at least for the management of the diabetes and if possible also for its psychosocial life.
In conclusion, the *self-care* in adolescent with DT1 is a complex process supported by five pillars: the disease management, the parental coherence, the conciliation of identities, the autonomy of decision and the attachment. It is important that we considered them to support the process of *self-care* during our medical and educational support of the adolescents with DT1 and their two parents.

P151

Go Team! Feasibility and acceptability of shared medical appointments in youth with type 1 diabetes

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To examine feasibility and acceptability of a shared medical appointment (SMA) model for patients between 13-18 years of age with type 1 diabetes (T1D).
An alternative clinical care approach for youth with T1D was desired. SMA literature was reviewed, SMA experts were consulted, and a multidisciplinary panel designed 'Team Clinic'' for youth with T1D. Clinic staff was educated about SMA clinic availability and encouraged patients to attend. Team visits began in January 2013 and include physical exams, youth-driven facilitated discussion, goal setting, and provider review of plan with family. Medical chart review and questionnaires were completed to assess feasibility and acceptability of SMA.
Thirty-eight patients participated in Team Clinic (x age =15.82 yr, 47% female, 60% white non-Hispanic) with ~4–5 patients per clinic. Team Clinic appointments lasted ~2 hours. Satisfaction questionnaires found 92% of youth would like to attend another SMA and would recommend SMA to other patients. All patients reported learning from others in the group. When compared to regular appointments, 90% of youth felt more comfortable. Of patients seen in SMA, ~42% made appointments to return to Team Clinic.
All staff participating in Team Clinic reported SMA format was energizing and teen–teen interactions allowed more open participation in the visit. All clinic staff requested to participate in future SMA and felt it was a more efficient use of clinic resources. Parent feedback was positive with support for SMA and desire for their youth to attend future SMA.
The SMA model is feasible and acceptable in youth with T1D, providers, and parents. When compared to regular visits, patients felt more comfortable in SMA and would like to return for additional SMA. Group visits may be a successful clinical care model for adolescents and young adults in the transition time period. Additional studies examining impact on diabetes management and metabolic outcomes are needed.

P152

Transition from children's to adult diabetes clinic - patient's views

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Background: The best method of providing transition of young people with diabetes is a complex and much debated subject. There is a dearth of empirical evidence on the best approach to the transition process. Involving patients is an integral part of designing and delivering this service.
Aims: To obtain input from young people with diabetes regarding the current transition service in Medway Maritime Hospital and also invite suggestions for improvement.
Methods: Young people over 16 years and adults up to age of 25 years were included. We distributed survey questionnaires via the pediatrics diabetic clinics, and also posted them to patients who were in an adult service.
Results: There were 200 patients between the age of 16 yrs and 25 yrs available, with 68 responses. The current system (one joint appointment with the pediatrician and the adult physician, then

straight to a young adult clinic) was popular (46.3%). Most (44.1%) would like to stay for 1 year in the clinic but few longer than that. A significant number (71.2%) want the adult doctor to be present in the clinic. Interestingly few (3%) were interested in a psychologist being present. This may reflect a lack of understanding of the difficulties in the transition process by the patients. It may also reflect the lack of knowledge of how a psychologist can support them. The best time to hold the clinic seems to be at routine clinic times. Most would like the appointment to last between 20–30 minutes. A diabetic nurse run clinic was preferred by 48.4% (51.6% did not want it). The best age to be transferred was between 16–19 yrs.

Conclusions: Patient input and experience can give useful insight when designing a model for transition for young people with diabetes.

P153
Transition from pediatric to adult care for patients with type 1 diabetes

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Objectives: Transition plays an important role in diabetic care; a structured plan is mandatory to avoid the drop out of young adult patients and the worsening of their health. Patterns of transition vary by location and health care delivery system, and are influenced by local practices, resources and national policies. The aim of the study was a psychological evaluation of patients in transition in order to create an efficacious care pathway to accompany them.

Methods: 118 subjects were divided into 2 groups:

i 85 adolescents; 42 M; age range:16–21 years; mean age:18.7 ± 1.5; mean HbA1c: 8% ±1.4; mean age at diabetes onset: 8.9 ± 4.5 years;
ii 33 young adults; 14 M; age range: 21–27 years; mean age: 23.8 ± 2.2; mean HbA1c: 7.8% ±0.6; mean age at diabetes onset: 8.9 ± 4.1.

Both groups were tested by REM-71 for evaluating defensive mechanisms, CIDS for measuring compliance, and SCL-90-R for screening psychopathology.

Results: REM-71 showed healthier and more functional psychological defense mechanisms to chronic illness in A compared with B. CIDS showed improved compliance to diabetes care in A compared with B. SCL-90-R did not show psychopathological profiles in both groups. Older patients presented more dysfunctional profiles than younger ones, and the majority of patients in both groups showed an intense fear of separation from the pediatricians and anxiety in meeting adult physicians.

Conclusions: Our data suggest the need for differentiated psychological supports to patients, and sometimes to their families, in order to facilitate the adaptation process, support the autonomy of young patients and prevent risky drop-out. Moreover, our data have suggested us to establish a joint out-patient clinic, in which a mixed pediatric and adult physician team meets the patient two o three times before the end of transition in order to facilitate his/her relationship of care with the new medical staff.

P154
Outcomes of a rural model of extended adolescent diabetes care to mid 20s without transition to adult services

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Objectives: Transition of adolescents to adult diabetes services is a difficult resource intensive process that frequently results in poor clinic attendance, poor glycemic control and recurrent hospital admissions. Ending pediatric diabetes team care is usually imposed by bureaucratic decisions at a time of great risk. The purpose of this study is to evaluate a model of extended adolescent diabetes care that purposefully does not encourage transition to adult care until their mid 20s.

Methods: Gippsland Paediatrics manages most diabetic youth and young adults in a rural region of Australia comprising 95 000 people. Since establishing the multidisciplinary care team approach in 2006, we have offered patients extended adolescent care into mid 20s in order to support them through their time of greatest risk.

This observational study examines how the patients over 18 years have responded to extended adolescent care in terms of adherence to follow up and metabolic control. We measured the attendance to clinic, frequency of appointments, average HbA1c over time, hospital admission rates and rate of severe hypoglycaemia.

Results: 32 patients (10 female, 22 males) aged 18 to 28 comprise the cohort of extended adolescent care. 28/32 (87.5%) were managed with insulin pump therapy. Attendance to clinic or medical appointment averaged 5.0 visits per year missing scheduled appointments at an overall rate of 0.49 per year. Mean Hba1c is currently 8.0% (SD 1.34, median 7.8%). Hospital admission rate was 6/146 patient years (all DKA) with no severe hypoglycaemia and no deaths. No patient was lost to follow up and 3 were transferred.

Conclusion: Our extended adolescent care model has resulted in good adherence to follow up, few hospital admissions and reasonable glycemic control in a difficult patient group. The model of maintaining pediatric team care until mid 20s provides a solution to known difficulties with traditional transition to adult care models through this age group.

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P155
The presence of stressful life events in the year before the diagnosis

Time (min)	Glucose (mmol/L)	Insulin (pmol/L)	C-peptide (pmol/L)
0	3.5	14	189
30	8.6	80	576
60	12.6	117	857
90	14.1	107	1119
120	13.9	107	1102

OGTT results

The peak glucose 13.9 was regarded as diagnostic of diabetes mellitus(DM). GAD and islet-cell antibodies were negative. Urine osmolality was normal. The combination of optic atrophy and DM, confirmed on OGTT was considered diagnostic of WS. Furthermore, we propose the differential response observed in c-peptide and insulin represents a biochemical correlate of the molecular defect underlying DM in WS.

Mutations of the WFS1 gene account for 90% of cases. WFS1 normally encodes structural properties and function of mitochondria and the endoglycoside molecular chaperone, Wolframin. Impaired function of Wolframin results in accumulation of protein within the endoplasmic reticulum(ER), ultimately triggering apoptosis. For insulin, Wolframin is essential for movement of insulin from the ER. However, the cleavage product of pre-proinsulin, C-peptide, is not reliant on Wolframin.

Conclusion: We present the insulin and c-peptide responses observed in OGTT of a patient with WS. We propose the differential rise in insulin and c-peptide observed represents a biochemical correlate of the underlying molecular pathology in WS.

P156
Family role in treatment adherence of type 1 diabetes: research data from Greek population

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Objectives: Purpose of this study was to describe treatment adherence of Greek children with T1DM, as well as to identify family and other factors affecting children's self- care.

Methods: Children (N = 108,boys: 49.1%, age range:8–18 years) with Type 1 diabetes, completed data of adherence (the Self Care Inventory Scale) and parent collaborative involvement (the Collaborative Parent Involvement Scale) during a 3-month follow up at two Children and Adolescent Diabetes Centers of Athens, Greece. Demographic characteristics and Hemoglobin A1c (HbA1c) were also tested and assessed. Statistical methods included descriptive statistics and logistic regression modeling.

Results: Mean age of the sample was 12.9 years (± 3.01) and mean disease duration was 5.5 years (± 3.08). The majority of the participants report good adherence to the treatment (81.5%) with mean levels of Hemoglobin A1c at 7.9%. Univariate analyses revealed as significant predictors of good adherence maternal professional status (p=0.001), multiple dose injection (MDI) therapy (p=0.043) and parent collaborative involvement (p = 0.029). Logistic regression analysis showed that the children with high levels of parent collaborative involvement were four times more likely to be more adherent to diabetes regimens, adjusted for the age of the child, parental history of DM, educational and marital status.

Conclusions: Findings suggest that family support and collaboration between youths with type 1 diabetes and their caregivers may be central to effective management of the disease. Interventions should be designed in order diabetes specialist nurses and the diabetes teams encourage and sustain the family to be involved to the management of childhood diabetes.

P157
Clinical study of behavioral problems among children with type 1 diabetes mellitus (T1DM) in Minia governorate, Egypt

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Introduction: Egypt has an intermediate incidence of T1DM (5%–9.99%) between Arab countries. Diabetes impacts the life style, personality, overall emotional & physical well being of the child. Children with a chronic disease are twice as likely as healthy children to have a psychological problem.

Aim of the study: to trace out the frequency of behavior disorders among children with TIDM and to correlate them with different demographic and metabolic control.

Subjects and Methods: This study was a cross sectional study carried upon fifty children with T1DM who attended Diabetes outpatients' Clinic, Minia University Children's Hospital, Minia governorate. Another fifty children age and sex matched from the same families were taken as a control group.Diabetic patients were subjected to: complete history taking, clinical examination, laboratory investigations.All studied children were subjected to the Revised Behavior Problem Checklist (RBPC) to rate problem behavioral problems.

Results: Based on RBPC ratings: the frequency of behavioral disorders was significantly higher in diabetic children than the control (P = 0.001). Motor excess was the commonest disorder followed by socialized aggression and attention problems. Males were more significantly affected than females.The poor controlled patients significantly had different behavioral disorders.

Conclusion: Behavioral problems were significantly presented in children with T1DM.

P158

Emotional distress of teenagers participating in the TEENDIAB study and their parents: health related quality of life and diabetes specific anxiety

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Objectives: The TEENDIAB study investigates genetic and environmental factors that influence the development of autoimmunity and type 1 diabetes (T1D) during puberty and adolescence. The longitudinal study enrols 1500 children (TEENs) aged 8–12 with a first degree relative with T1D. For the first cohort emotional distress and health related quality of life (HrQoL) of TEENs and their parents are assessed during the first year.

Methods: The cohort of 213 TEENs (48% girls, mean age 10.03 ± 1.2 yrs) and their 184 parents completed psychometric questionnaires at study entry (t0), after 6 (t6), and 12 months (t12): fear of screening procedure and fear of TEEN developing diabetes (each VAS 0–10 min - max) and Kidscreen 27 on HrQoL (self and proxy report).

Results: At (t6)195 TEENs and their parents participated, at (t12)164 TEENs(dropout rate: 8%/20%). Mothers rated their fear of screening (t0)1.6±1.9, (t6) 1.5±2.2, (t12) 2.0±1.8; fathers (t0) 1.4±1.5, (t6) 0.7±2.2, (t12) 1.9±1.7; TEENs (t0) 2.2±2.0; (t6) 1.8±1.9, (t12) 1.8±1.7. Fear of TEEN being diagnosed with diabetes: mothers (t0) 3.1±2.3, (t6) 2.2±2.6, (t12) 2.7±2.1; fathers (t0) 3.1±2.0, (t6) 1.9±2.9, (t12) 2.8±2.1; TEENs (t0) 3.1±2.6, (t6) 2.9±2.4, (t12) 2.5±2.2. The overall low levels of fear didn't increase over time. TEENs assessed their HrQoL more positive compared to national norms on subscales ''psychological well being'' and ''school''. Between (t0) and (t12) there was a positive shift on subscale ''parents'' from TEENs' perspective (51.6±10.1 vs. 54.1±8.9; p=0.002) and parents' perspective (51.7±6.2 vs. 52.8±5.9; p=0.03). No significant negative impact on either subscale of Kidscreen could be identified in self- and proxy-report.

Conclusions: No negative impact on emotional well-being of TEENs could be identified during the first year of participation in the TEENDIAB study. This may be explained by the overall low level of fear of diabetes in this self selected sample of families. BMBF: Kompetenznetz Diabetes.

P159

Study of behavioral and psychological disturbances in preschool, school aged and adolescent type 1 diabetic patients

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Objectives: To study the behavioral and the psychological disturbances in preschool, school aged, and adolescent type 1 diabetic patients in relation to glycemic control and microvascular complications.

Methods: A case- control study was conducted on 60 children, and adolescents with type 1 diabetes mellitus recruited from Diabetes Clinic, Children Hospital, Ain Shams University. They were 20 preschool aged 3 to 6 years, 20 school aged 7 to 12 years, and 20 adolescents aged 13 to 18 years. Sixty healthy control subjects with comparable age and sex were subdivided into three similar groups. All patients were subjected to clinical assessment and glucose monitoring, mean glycated hemoglobin, and urinary microalbumin, behavioral and psychological assessment using a questionnaire: Pediatric behavior rating scale; appropriate for use in children and adolescents aged 3 to 18 years.

Results: All patients had significantly increased behavioral disturbances namely atypical behavior ($P = 0.0001$), irritability ($P = 0.0001$), grandiosity ($P = 0.0001$), aggressive behavior ($P = 0.003$), affect disorder ($P = 0.0001$), disturbed social interaction ($P = 0.0001$) compared to controls. Atypical behavior ($P = 0.003$), irritability ($P = 0.0001$), affect disorder ($P=0.003$) were significantly increased in school aged patients compared to controls while in adolescent patients irritability ($P = 0.023$) was significantly increased. Hyperactivity was increased in school aged diabetic children compared to diabetic preschool children and adolescents ($P = 0.037$). Disturbed social interaction was clinically evident in optimally controlled diabetic patients compared to suboptimally controlled patients ($P = 0.009$).

Conclusions: behavioral and psychological problems are common in type 1 diabetes in different age groups and may influence their glycemic control and compliance to treatment suggesting the potential value of interventions that address child behavior.

P160

Psychological and family features in adolescents with type 1 diabetes and poor glycaemic control

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Objectives: To describe psychological and family features in adolescents with type 1 diabetes and poor glycaemic control (HbA1c: 10,19%+/−1,48%).

Patients and methods: From the total adolescent population with type 1 diabetes treated in a Chilean health service (110) was selected a group (7 female and 3 male between 12 and 17 years old) with poor glycaemic control. Patients and their parents participated in a systemic intervention (weekly 90 minutes sessions for 6 weeks) and share their experiences of living with DM1 or parenting an adolescent with DM1. Dialogue was analysed qualitatively. Adolescents completed the Pediatric Quality of Life Inventory (PedsQL) 3.0 Diabetes Module, Body Shape Questionnaire and Children´s Depression Inventory. Parents completed PedsQL 3.0 Diabetes Module for parents and 2.0 Family Impact Module.

Results: ADOLESCENTS' PYCHOLOGICAL FEATURES: Poor quality of life related to DM1 (90%), Excessive concern about future complications and premature death (70%), Missing information about DM1 basic care (10%), Depressive symptoms (33%), Risk of eating disorders (33%), Suicidal ideation (40%), Difficulty in identity development (80%), Difficulty in disease acceptance (40%), Difficulty in achieving autonomy from parents (50%), Interference of DM1 in peers relationships (50%), Concerns about sexuality and drug abuse (100%), Difficulties in life planning (20%).

FAMILY FUNCTIONING FEATURES: Excessive concerns about DM1 children's treatment and future (85%), Symptoms of anxiety (35%), Depressive symptoms (21%), High levels of family conflict related to DM1 (57%), Disagreement about the role of parents and children in DM1 care (57%), Minimization of child difficulties regarding DM1 (28%).

Conclusions: The intervention identified several psychological and family features that interfered with optimal glycaemic control in adolescents with type 1 diabetes. The integral care of these patients should include regularly this type of intervention.

P161
Importance of psychological intervention in paediatric patients with type 1 diabetes

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Objective: Children with Type 1 diabetes (T1D) have significant psychological difficulties resulting in poor glycaemic control and diabetes self care. In this study we aimed to ascertain if specialised psychological intervention improved glycaemic control and self-care for children with T1D.

Methods: This was a retrospective case notes analysis in a large teaching hospital involving 30 children with T1D who received psychological input between August 2009 and August 2010. Data was collected after review of case notes and electronic patient records and analysed using SPSS (version 17). We collected data for one year prior to psychological intervention and compared with data for one year after psychological intervention.

Results: Of the 30 patients, regular psychological input was required by 57% of children and 43% had a single contact. Family therapy was provided to 50% whilst a combination of family and individual sessions were provided to 40% of children. The main indications for referral were needle phobia (19/30), difficulty in coping with diagnosis (13/30) and behavioural issues around diabetes management (10/30). Our study demonstrated that psychological intervention was associated with significant improvement in diabetes self care in the form of blood glucose monitoring (improvement in 8 children; $p = 0.018$), meal time insulin boluses (improvement in 7 children; $p = 0.016$) and insulin self injections (improvement in 12 children; $p = 0.007$) when analysed using McNemar-Bowker test. Psychological intervention was also associated with an 80% reduction in emergency admissions secondary to poor glycaemic control. There was a reduction in mean HbA1c, of the study population, from 9.45% to 9.30%, however, this reduction was not statistically significant ($p=0.605$).

Conclusion: Psychological intervention in children with T1D was associated with a significant improvement in diabetes self care and reduction in emergency admissions.

P162
Depressive symptoms in Portuguese adolescents with type 1 diabetes

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Objective: Several studies showed that type 1 diabetes (T1M) increases the risk of having depressive symptoms in adolescents. On the other hand, depression has been associated with poor glycemic control and increased hospitalizations among young type 1 diabetic patients. Our aim is to identify the prevalence of depressive symptoms in a group of Portuguese adolescents diagnosed with T1M.

Methods: From 125 patients followed in our tertiary care diabetic clinic, 42 were eligible (diagnosis of diabetes for more than 6 months) and accepted to enroll the study. Depressive symptoms were assessed with the validated Portuguese version of *Children's Depression Inventory* (CDI). In the Portuguese CDI version a score ≥ 33 is indicative of elevated depressive symptoms.

Results: From the 42 patients studied 24 (57%) were boys, the mean age was 14.7 (SD 2.0) and were diagnosed T1D for a mean time of 5.7 years (SD 3.4). Considering CDI results the mean answering score was 21.1 (SD8.4). Only 6 (14.3%) patients had score ≥ 33. Their age was significantly younger than the rest of the group ($p< 0.05$). These patients had no differences in gender, years of illness, HbA1c values, number of hospitalizations and social or family-related variables.

Conclusions: Depression is a common psychiatric disorder and late childhood seems to be the typical age of onset. A recent study enrolled in Portuguese healthy adolescents reported a prevalence of depressive symptoms of 11% which is slightly lower than the results obtained in T1D patients. Further large studies should be done to clarify the relationship between T1D and depressive symptoms and its determinants.

Poster Tour 18: Diabetes care, insulin and other treatments

P163
Dietary habits and physical activity status of children with type 1 diabetes mellitus compared to healthy control subjects

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Objective: Treatment regimens of children with Type 1 diabetes mellitus (T1DM) are tailored to optimize blood glucose, support normal growth and body weight management, minimize diabetes-related complications and increase quality of life. Aim of this study was to evaluate dietary intake in a sample of children with T1DM in Greece, a country keeping at least some of the components of the healthful Mediterranean diet, and compare them with a group of non-diabetic children (healthy controls).
Methods: The sample consisted of 32 children, 16 with T1DM and 16 age-, body mass index (BMI)- and sex-matched healthy controls. Two 24-hour recalls were taken from each one and they were analyzed in order to estimate children's nutrient intake. Physical activity was measured using the Self-Administered Physical Activity Checklist for Greek children. Information about their HbA1c values for the past 12 months was also collected.
Results: There was a statistically significant difference between T1DM children and healthy controls in the time spend in sedentary activities (130 ± 104 vs. 67 ± 46 min/day; $p = 0.03$) as well as in their total daily energy intake (1685 ± 299 vs. 2012 ± 592; $p = 0.05$). There was also a tendency for children with T1DM to have lower consumption of saturated fat ($p = 0.08$) and higher fiber intake ($p = 0.18$). Moreover, in comparison with similar studies it seems that the diabetic children of our study consume a higher percentage of monounasaturated fat in their diet. Within T1DM group, girls had significantly higher HbA1c values compared to boys ($p = 0.036$) and boys had the tendency to be more physically active ($p = 0.19$).
Conclusion: The results in this study indicate that children with T1DM consumed a healthier diet but spent more time in sedentary activities compared to the control group. However, their dietary habits do not totally comply with the relevant guidelines; therefore, more intensive educational activities are recommended.

P164
Sports participation in children and adolescents with type 1 diabetes mellitus (DM)

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Objectives: Participation in physical activity offers many health-promoting benefits for children and adolescents with DM. In literature, there are conflicting data on the influence of sports participation on metabolic control as reflected by HbA1c levels. We inventorized the sports participation of children and adolescents with DM followed in our outpatient childhood diabetes clinic and studied the relationship with HbA1c levels.
Methods: All patient with DM in our center aged 7–20 yrs, with duration of DM of at least 1 yr, were invited to fill in a structured questionnaire on the participation at sports activities. The occurrence of hypoglycemia was asked for, as well as the adjustments done to prevent hypoglycemia. HbA1c levels of sports participating patients were compared with those of who didn't.
Results: 73 children (36 boys) completed the questionnaire. Mean (SD) age was 13.6 (3.3 yrs) and duration of DM 4.9 (3.0) yrs. 53 (73%) patients exercised at least once a week, of which 16 on a competitive level. Age and duration of DM in patients with or without sports activities were comparable. HbA1c levels were similar: 66 (10) mmol/mol in sporting vs 70 (13) mmol/mol in the others. Of the sporting patients 30% never experienced any trouble during exercise due to adverse effects of DM, 43% rarely, 23% sometimes, 4% often. All subjects informed trainer and/or other players about having DM. 74% is well aware of high or low BGL during exercise, 4% isn't and 23% needs reminding. In general 42 % adjusted insulin dose before exercise and 41 % reported adding carbs before exercise. 11% took no preventive measures.
Conclusions: Children and adolescents with DM are able to participate in sports activities even on a competitive level. Few subjects experience difficulties during exercise. Sports participation did not influence HbA1c levels. All patients with DM must be encouraged to participate at sports activities and to take adequate precautions to prevent hypoglycemia.

P165
The JuniorSTAR half-unit pen is easy to use, easy to carry, easy to dial back, and suited to the lifestyle of young patients with type 1 diabetes

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Objectives: Half-unit dose increment pens have been important in providing greater flexibility to achieve target insulin doses for younger pediatric patients with diabetes. JuniorSTAR (Sanofi) is a reusable, half-unit pen weighing ~32.9g, developed for young patients.
Methods: This was a non-comparative study of JuniorSTAR in 167 insulin pen users from five European countries. It was rated for 18 attributes on a five-point scale. Participants: nurses working with T1DM patients (n=109); parents of children with T1DM aged 0–5 (n=16) and 6–12 (n=20); and adolescents with T1DM aged 13–18 (n=22) years.
Results: JuniorSTAR performed well across all attributes tested. It was rated easy and convenient for everyday use by 93% of patients and 93% of nurses and by 88% of patients and 92% of nurses, respectively. 81% of patients and 86% of nurses also found it easy to carry on a daily basis. Easy dial back was reported by 78% of patients and 92% of nurses. When dialing back, 91% of patients and 89% of nurses agreed that the mechanism that does not leak insulin makes dialing back easy. 95% of patients and 93% of nurses agreed that JuniorSTAR's dialing-back mechanism gives flexibility in dialing the correct dose. The large dose display and legible numbers were easy to read (98% of patients and 95% of nurses) and 90% of patients and 89% of nurses found the pen sufficiently robust to withstand the daily demands of children. Furthermore, 93% of patients and 84% of nurses found the injection force suitable for young patients. The Sanofi insulin cartridges were easy to change for 83% of patients and 65% of nurses. Overall, 84% of patients and 88% of nurses considered JuniorSTAR well suited to the lifestyle of a young T1DM patient.

Conclusions: JuniorSTAR was well received by young T1DM patients and nurses. This study demonstrated that JuniorSTAR is easy to carry, easy to read, easy to dial back, convenient, and suited to the lifestyle of young T1DM patients. Study sponsored by Sanofi.

P166
I-port indwelling catheter alleviates injection pain in children with diabetes

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Objectives: Some children find insulin injections painful, which may be a barrier to multiple daily injections. Insuflon can decrease injection pain but needs to be inserted manually. A new design, I-port, comes with an inserter and has a 90° angle of the catheter. The aim was to investigate user-friendliness and pain when using this device.

Methods: Eleven children aged 3–11 years used the device for 21.1 ± 12.5 (mean, SD) days. Three children used Insuflon and 8 ordinary injections with pens. All used the abdomen, and 3 used EMLA local anesthetic cream before insertions.They scored user-friendliness on a Likert scale graded 1–5 and pain on a 10 cm VAS scale with faces. Parents scored on VAS for children < 6 years. Historical controls with the same type of VAS scale (Hanas, J Pediatr. 2002;140:315–20) were used.

Results: On the Likert scale (higher is better), insertion easiness scored 4.5, adhesive does not come off 3.9, no skin irritation 3.5, no pain experience 3.5, no insulin leakage 4.7, discreet design (not visible when clothes on) 3.8, easiness to remove 3.5, overall satisfaction 4.0 and wanting to continue with this device 4.2. When comparing with current injection system, I-port overall satisfaction was 2.9 and pain experience was 2.2 (2.5 = same as previous injection system). On the VAS scale, insulin injection pain scored 0.6 ± 1.0 (range 0–5.2) cm and insertion pain scored 2.7 ± 3.3 (range 0–9.9) cm.

When comparing I-port with the historical controls, the injection pain for I-port tended to be lower in relation to Insuflon (0.6 ± 1.0 vs. 1.1 ± 0,8 cm, p = 0.24), while it was significantly lower in relation to injections with a pen needle (0.6 ± 1.0 vs. 2.4 ± 1.5 cm, p = 0.001). The insertion pain was similar to Insuflon (2.7 ± 3.3 vs. 2.2 ± 2.0 cm, p=0.63).

Conclusions: Children who find injections painful experience at least the same pain alleviation with I-port as with Insuflon. The inserter is appreciated, and problems with insulin leakage are low.

P167
Investigation of efficacy and safety in switching to insulin glulisine (GLU) from other rapid-acting insulin products (Ra) in children with type 1 diabetes

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Objective: To investigation of efficacy and safety in switching to insulin glulisine (GLU) from other rapid-acting insulin products (Ra) in children with type 1 diabetes (T1D).

Methods: Twenty six children with T1D (female/male: 15/11, mean age: 12.5±5.5 years, insulin treatment regimen: CSII/MDI: 8/18) were included. Ra in all the patients was changed to GLU and observed for 6 months after they previously finished the 6-month treatment with Ra. We analyzed change of the mean value of plasma glucose (PG) in before/after meals, HbA1c, frequency of hypoglycemia/month, insulin units/day, and obesity degree in the 6-month observation period.

Results: The mean value of HbA1c was decreased from 7.6% to 7.4% (P=0.003), and mean PGs after breakfast and supper also improved from183 mg/dL to 153 mg/dL (P=0.004) and 203 mg/dL to 164 mg/dL (P< 0.001), respectively. Further, the mean frequency of hypoglycemia was reduced from 6.9 to 4.1 times/month (P< 0.001), while the insulin units administered and change in obesity degree were stable with statistically non-significances.

Conclusions: Amongst children with T1D, the prescription switching from Ra to GLU did not require the increase of insulin units, could maintain the degree of obesity and improved in HbA1c, post-breakfast/supper PGs and frequency of hypoglycemia with statistical significances. Simple prescription change from Ra to GLU might be one of good treatment options to improve glycemic control in children with T1D.

P168
Life threatening allergy to human insulin treated with changing insulin types

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Objective: We report a case of severe human insulin allergy cured by changing insulin types.

Methods: An adolescent diabetic gradually developed urticaria and angioedema to human regular (HR) insulin, with dramatic improvement on switching to lispro. Further improvement occurred when human NPH (HN) insulin was switched to glargine. Symptoms reappeared when he shifted back to HN and again resolved on shifting to glargine.

Results: A 16-year old type 1 diabetic on HR and HN insulins developed urticarial reaction 5 years after diagnosis. Itching increased in frequency and severity. Severe angioedema developed 1.5 years later requiring emergency room (ER) management. He was put on regular antihistamines. Investigations showed a markedly elevated total IgE. Specific tryptase test to common allergens revealed allergy to mixed moulds and eggs. Their elimination didn't improve symptoms and itching continued to increase in severity with an increase in antihistaminic dose. Months later, he developed abdominal pain with positive occult blood in stools. A severer attack of angioedema developed 6 months later. He was put on regular steroids with the antihistamines. HbA1c fluctuated between 9.6–10.4%. Patient reported daily development of itch few minutes after injecting HR. He was switched to insulin lispro with dramatic improvement. After 2 days, steroids and daily antihistamines were stopped and he needed an antihistamine only once a week. Glargine was used to improve premeal control with further improvement that he needed occasional anti-itch lotions. Two-month later HbA1c dropped to 8.7%. Months later, he used HN, and presented again with angioedema. On switching back to glargine, all symptoms resolved

Conclusion: In an allergic diabetic, presence of positive tests for other allergens should not exclude insulin allergy. Severe allergy to HR/HN may develop years after initiating treatment and may be reversed by switching to insulin lispro and glargine.

P169

Protective potential of sodium orthovanadate and *Trigonella foenum-graecum* on membrane linked functions in diabetic female rats: a behavioral, biochemical and ultrastructural study

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Objective: The present study has been planned to observe, the effect of sodium orthovanadate (SOV) and *Trigonella foenum graecum* seed powder (TSP) administration has been studied on blood glucose and insulin levels, membrane linked enzymes (monoamine oxidase, Ca^{2+}ATPase), intracellular calcium ($Ca^{2+)}$ levels, lipid peroxidation, membrane fluidity, behavioral test and ultra-structural studies of neurolipofuscin accumulation in brain 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 (15mg/100g b.wt.) and rats were treated with 2IU insulin, 0.6mg/ml SOV, 5% TSP in the diet and a combination of 0.2mg/ml SOV with 5% TSP separately for 21 days. Learning behavioral was tested in a Morris water maze and ultrastructural studies of brain region by MRI.

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 membrane linked enzymes, intracellular Ca^{b+} levels, lipid peroxidation, membrane fluidity and neurolipofuscin accumulation in diabetic rats. Ultrastructural studies of the frontal cortex of exposed rats revealed that the changes were more pronounced in the diabetic treated rats in terms of presence of neurolipofuscin, vacuolization and lysosomal degradation.

Conclusion: Present results showed that lower doses of SOV (0.2mg/ml) could be used in combination with TSP to effectively counter diabetic alterations without any toxic side effects.

P170

Protective potential of metformin on membrane linked functions in diabetic aging female rats

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Objective: The emerging view is that diabetic brain features many symptoms that are best described as accelerated brain aging. Diabetes mellitus leads to functional and structural changes in the brain which appear to be most pronounced in the elderly. The objective of this study was to investigate protective potential of metformin on membrane linked functions and glucose transporter in diabetic aging female rats.

Methods: Young (3 months) adult (12 months) and aged (24 months) rats will be diabetic by using alloxan monohydrate. After metformin was given i.p dose 200mg/Kg for one months to both control and diabetic aging rats. Learning was tested in a Morris water maze. A detailed study was carried on membrane linked enzymes, membrane fluidity, lipofuscin, antioxidant enzymes, glucose transporter, bcl-2 and DNA degradation to identify the antidiabetic and antiaging role of metformin using biochemical, molecular and histiochemical study.

Results: Present study shows that there was a similar pattern of increased lipid peroxidation, neurolipofuscin, DNA degradation and monoamine oxidase activity and a decrease in membrane fluidity, Na^+ K^+ ATPse, Ca^{2+} ATPase, sueroxidase dismutase and glutathione S-transferases activities, glucose transporter-4 (GLUT4) in both aging and diabetes. Metformin was found to be an effective treatment in stabilizing and normalizing the membrane functions; therefore this therapy can be considered an alternative to be explored further as a means of diabetic and aged related disorders control.

Conclusions: The cumulative deficits in learning and membrane functions in aged diabetic rats indicate that the effects of diabetes and ageing on the brain could interact. The results of this study will be useful for pharmacological modification of the aging process and applying new strategies for control of age related disorders including metabolic syndrome.

Poster Tour 19: Epidemiology I

P171

Continuously rise in incidence of childhood type 1 diabetes in Shanghai, China during 1997–2011

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Objective: To investigate the incidence of Type 1 diabetes mellitus (T1DM) in children and adolescence (0–14 years old) in Shanghai, China during 1997–2011.

Methods: According to the principle of capture–recapture method, data were collected from hospitals with diabetes and pediatric departments (the primary source), insurance companies and schools (the secondary source).

Results: The average annual population at risk (0–14 year) consisted of 1,412,097 children. There were 483 cases from the primary source, 477 from the secondary source, with a total of 625. From 1997 to 2011, the average crude incidence rate was 2.95/100,000 per year (95%CI 2.72–3.19) and ascertainment corrected incidence rate 3.25/100,000 per year(95%CI 3.01–3.5).

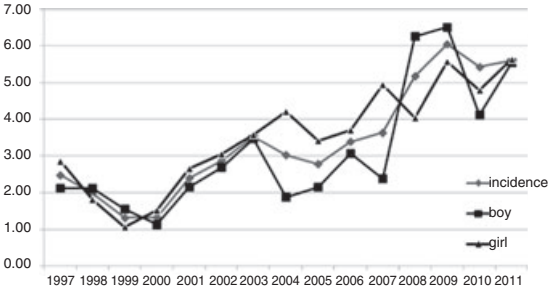

Figure 1 Incidence of Childhood Type 1 Diabets in Shanghai, China during 1997–2011

Conclusions: The incidence of childhood T1DM in Shanghai, China (1997–2011) has been rising at a faster pace than the period 1980–1991, 1989–1993 and 1994–1996, respectively 0.72/100,000, 0.96/100,000 and 1.92/100,000. Adequate health-care resources to meet these children's needs should be made available.

P172

Dramatic rise in the incidence of type 1 diabetes in children 0–14 years old: results from the Kuwait Scottish eHealth Innovation Network

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Objectives: a) To establish the incidence of childhood-onset type 1 diabetes in the age group 0–14 years in Kuwait using electronic health records for children < 15 years between 1 January and 2011 and 30 December 2011.

Methods: Prospective data collection, through the Childhood-Onset Diabetes e Register (CODeR) to record children and adolescents (0–14 years) newly diagnosed with diabetes in Kuwait. Via using Apple iPad devices, clinicians were able to use the web-based platform to enter data which were tagged with a unique civil identifier.

Results: In 2011, we identified 313 children and adolescents with diabetes, 154 were boys and 159 were girls with a sex ratio of 0.96. There were 49, 78 and 127 children with newly onset diabetes in the age group 0–4, 5–9 and 10–14 respectively. Two hundred and seventy two (88%) patients had type 1 diabetes (T1D), 8% had type 2 diabetes (T2D) and 4% having either secondary diabetes, monogenic diabetes or the type of diabetes was unknown. Out of the 272 subjects with type 1 diabetes, one hundred and ninety nine were of Kuwaiti nationality for whom denominator census figures were available(2011). The incidence rate of type 1 diabetes was 37.1 per 100000 children 0–14 years (95% confidence interval [CI] 32.2–42.0). This represents a 1.7 fold increase in the incidence rate of T1D (20.9 per 100000 [95% CI 18.8–23.0]) in the same age group in the 1990s[a]. The age specific incidence of type 1 diabetes for the age group, 0–4, 5–9 and 10–14 were 15.9, 36.4 and 62.6 respectively.

Conclusion: The incidence of childhood-onset type 1 diabetes has increased dramatically over the last two decades. The electronic software has proved to be an invaluable innovation in the area of Pediatric Diabetes Epidemiology and may support continuous surveillance of childhood-onset diabetes in Kuwait.

Shaltout A., et al. Further evidence for the rising incidence of childhood type 1 diabetes in Kuwait. Diabetic Medicine 2002; 19.522–525.

P173

Epidemiological characteristics of type 1 and type 2 diabetes mellitus in children of the Azerbaijan Republic

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Diabetes is one of the most common chronic diseases among children and youth.

Aim: To assess main epidemiological characteristics (prevalence, mortality) of type 1 and type 2 diabetes mellitus in children of the Azerbaijan Republic in 2012 year.

Materials and methods: The research was based on registry of the primary patients during 2012 year.

Results: In 2012 year, the ministry of health of Azerbaijan reported 107 new cases (including both type 1 and type 2) of diagnosed diabetes among Azerbaijanians aged one to 18 years, bringing the total number of cases in children and youth to 600. 53 of them boys and 54 girls aged 0–18 years with diabetes mellitus type 1. Children were divided into the following groups 0–3 years, 4–6 years, 6–12 years, 13–15 years and 16–18 years. The total number of children in Azerbaijan for 2012 year was 2539700. The overall prevalence of diabetes mellitus type 1 in Azerbaijan was 4.2 per 100,000. Incidence per 100,000 by age group was as follows: group of 0–3 years 1.2, 4–6 years 2.1, 6–12 years 5.3, 13–15 years 4.4 and 16–18 years 3.5/100,000. Incidence for boys was 4.0 and for girls

4.4. Specific weight of diabetes by 2012 year on the relation of total of all patients with diabetes was made by 17.8%. Diabetes mortality after establishment of the diagnosis was revealed 2.8%. In the last two decades, type 2 diabetes has been on the rise among children and youth globally. The incidence of children and youth aged 18 and under with type 2 diabetes was not higher among azeri children and youth than among Asian, African and Caribbean, and Caucasian children and youth. In the Azerbaijan Republic, the incidence of type 2 diabetes is 0.08 cases per 100, 000 person-years in children.
Conclusion: The main incidence of diabetes mellitus type 1 was in children with age group of 6–12 years and a minimum national incidence of type 2 diabetes rate of 0.08 new cases per 100,000 children under the age of 18 years.

P174
Epidemiologic features of childhood diabetes type 1 in North Egypt-Delta region 18 years retrospective study (1994–2011)

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Background: Diabetes mellitus type 1 (DM-T1) is the most common metabolic disease in childhood. An interplay between genetic susceptibility and environmental factors may account for the pathogenesis of DM-T1.
Objectives: To describe epidemiologic features including age, sex and residence and their impact on DM-T1 incidence in north Egypt-Delta region.
Methods: 1600 patients (891 female and 709 male) were diagnosed at or referred to Mansoura University Children's Hospital-Endocrine and Diabetes unit as having DM-T1 during the period 1994–2011. The age at DM-T1 diagnosis range was 0–18 years. Patients were originated from urban and rural regions of North Egypt-Delta region. The patients were categorized into four age groups; (0–2, 2–5, 5–10, and 10–18) years.
Results: Age-adjusted incidence rates of DM-T1 in 1996, 2006, and 2011 were 0.7, 2.0, and 3.1/100.000 respectively, while age-adjusted prevalence rates of DM-T1 in the same years were 1.9, 15.5, and 26.8/100.000 respectively. The prevalence rate of DM-T1 in Dakahlia only was 41/100.000 by 2011. Significantly higher incidence of DM-T1 was observed in rural areas compared to urban areas (935 vs. 665 p 0.000) and in females compared to males (891vs.709 p 0.000). The incidence of DM-T1 peaked at group aged 5–10 years, and at 12 years in females and 10 years in males. Significantly more children were diagnosed during winter months (p=0.009).
Conclusion: The incidence and prevalence rates of DM-T1 were increased by passage of time. Higher incidence of DM-T1 was observed in rural areas and female predominance was evident. Seasonality in DM-T1 diagnosis was documented with a peak in winter.

P175
Epidemiology of childhood diabetes in western part of Libya (1989–2013)

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Childhood diabetes is a common disease, and it is on the increases worldwide. This study involves a large cohort of 4120 diabetic children and adolescents beings diagnosed and followed up at Paediatric Endocrine and Diabetes Department, Tripoli Medical Center between 1st of Jan 1989- 31st Dec 2013 [25 years].

At diagnosis, various parameters such as, age, presentation (preketotic, ketotic), sex, weight, height, BMI, residency, family history of diabetes, birth weight, breast feeding, HbA1C, thyroid function tests, celiac disease antibodies, Hepatitis B, C and HIV viruses were checked, growth parameters were assessed as time went. We have looked at menarchal age in girls, prevalence of hypertension among diagnosed patients, school performance, and Ramadan fasting, final height and school performance achieved among diagnosed patients.
Results showed equal sex incidence, 24% presented in diabetic ketoacidosis, HbA1c was raised at diagnosid in most of children, breast feeding had no influenced on diabetes incidence, most of adolescents & young adult fasted Ramadan quiet safely, 5 % had had associated autoimmune diseases, Recently we have observed steady increasing in type 2 diabetes in children & adolescents.
The task of managing childhood diabetes is good metabolic control, preventing morbidity and mortality, and assuring good quality of life.

P176
Epidemiology of children with type 1 diabetes

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Type1 diabetes mellitus(T1DM) is a multifactorial disease that progresses through different environmental triggers on the basis of genetic susceptibility.
In this study, we investigated the epidemiology of patients with T1DM that has been following up at Pediatric Endocrinology Clinics of Kecioren Training and Research Hospital in Ankara in Turkey.
Methods and results: 92 patients were included. 50 of the patients were boys (54.3%) and 42 were girls (45.7%). The mean age during the study was 2.75–18years/12.7 ± 4.20). The mean duration of T1DM was 0.2–13.50 (3.08 ± 3.03) years.
73(79.3%) of the patients had good family support, 10 had (10.9%) medium and remaining 9 (9.8%) had poor degree of family support. 1 patient was under the state protection.
The mean age at initial diagnosis was 9.66 ± 4.49(0.45–17.6) years. The onset of T1DM were occurred mostly in seasons of winter and spring,as30cases(32.6%) and 28 cases (30.4%) respectively. The most frequent symptom at admission during the first diagnosis of T1DM was weight loss in23patients(25%) followed by abdominal pain and vomiting in 20 patients (21%). 36 of the patients (39.1%) had diabetic ketoacidosis (DKA), 23(25%) had ketosis and 32 (34.8%) had hyperglycemia at the initial admission.
The meanHbA1clevel at initial diagnosis was11.8±2.9%(6.9–19). 14 patients(37%) were diagnosed asT1DMat the first clinics that they had applied. However 4(47.8%) and12 (13%) patients were given the correct diagnosis at the second and third applied clinics respectively. 15 of all patients were treated with an insulin pump subcutaneously.
Conclusion: Onset of T1DMin our patients were the most frequent symptoms of weight loss followed by abdominal pain and vomiting. Unfortunately the duration between onset of symptoms and correct diagnosis was longer than 3 weeks and about 40% of them had DKA at initial diagnosis. So although some national programmes are performed on increasing the awareness about T1DM nowadays, this study indicates the necessity for further ones.

P177

This abstract has been withdrawn.

P178

Incidence rates of childhood type 1 diabetes mellitus (T1DM) in Liguria region, Italy, from 2006 to 2011

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Objective: T1DM is a serious chronic disease in children, whose incidence is increasing worldwide. Liguria is the second Italian region with the highest incidence of T1DM, preceded only by Sardinia. We evaluated T1DM incidence rate (IR) in Liguria in 2006–2011 period and the relationship between socio-demographic and clinical variables and clinical onset in children.
Methods: We considered patients diagnosed between 01/01/ 2006 and 31/12/2011 aged < 15 years. We used two sources (primary and secondary): primary source were Registers Unit of Pediatrics from the Hospitals of the 4 provinces of Liguria and secondary source was the review of data from patients enrolled in the lists of protected classes in the five Local Health Units. Incidence rates were standardized on the local population and the world´s population in 2010, according to direct standardization.
Results: During 6 calendar years,192 cases of T1DM in subjects aged 0–14 years were diagnosed. The standardized rate by age and gender based on the world's population was 16.82/100,000/year, with a standardized rate for females of 14.52/100,000/years and for males of 18.97/100,000/years. The adjusted IR for completeness of ascertainment (crude IR/degree of ascertainment) was 17.04/100,000/year. Clinical onset in ketoacidosis (DKA) has been reported in 38% of cases. BMI-SDS was significantly lower in patients with DKA at onset of T1DM (P = 0.002). No significant difference was found in the seasonal onset and among classes of age at diagnosis.
Conclusions: We report an increased incidence of T1DM in Liguria, higher as compared with local previous data. We still observed a high frequency of DKA at T1DM clinical onset. The regular monitoring of new cases of T1DM is essential as part of a regional network for pediatric diabetes. Epidemiology allows the identification and the study of environmental pathogenetic factors and the development of diagnostic and therapeutic protocols.

P179

Type 1 diabetes in children with non Swedish background - clinical and socio-demographic status at disease onset differs from native Swedish children

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Objective: To compare clinical and socio-demographic status at diabetes onset in children born to immigrant families with children born to families with Swedish born parents.
Design: Observational nationwide population based case–control study on prospectively recorded registry data.
Setting: All children with diabetes in Sweden and their families during the years 2000–2010.Patients: 879 children with diabetes born to immigrant parents out of a total of 13,415 diabetic children were assigned the cases and to these we added 2,627 children, matched for gender, age and year of onset with Swedish born parents, the control group.
Main outcome: The proportion of capillary pH< 7.30 was higher in the 879 immigrant children 25.8 % compared to the controls 16.4 % (p = 0.000) and the HbA1c was higher 94.6 and 88.0 mmol/mol respectively (p = 0.000). Using two regression models for low pH (< 7.30) and HbA1c at disease onset we could not see any significant influence for socio-demographic but for biological parameters.
Conclusions: Children born to immigrant families have higher capillary pH and HbA1c at diabetes onset. Immigrant families possess lower socio-demographic living conditions but this does not seem to be related to the worse metabolic start at diabetes onset.

Poster Tour 20: Epidemiology II

P180

National prevalence estimates of childhood type 1 diabetes in Germany

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Objectives: Up-to-date prevalence data are a basic requirement for allocation of health care resources in diabetes care. Aim of this study was to provide updated estimates on the national prevalence of type 1 diabetes (T1DM) in children and adolescents < 15 years in Germany using a model-based approach and data from long-term running incidence registers.

Methods: For 2008, prevalent cases were taken from three regional incidence registers (Baden-Württemberg 1987–2008, North Rhine-Westphalia 1996–2008, Saxony 1999–2008) altogether covering about 41% of the childhood population < 15 years in Germany and a nationwide register for cases < 5 years (1993–2008). Case registration was performed according to the EURODIAB criteria, completeness of ascertainment was >94% for all registeres. National age- and sex-specific estimates (per 100,000) were derived by applying Poisson regression models to age- and sex-specific regional prevalence data. National prevalence estimates for the age-group 0–14 years were age- (and sex-) standardized.

Results: By 31.12.2008, 6791 patients with T1DM < 15 years (3483 boys) were registered by the regional registers and 1211 children < 5 years (660 boys) were registered by the national register. The national prevalence rate was estimated as 148.1 (95%CI 140.1-156.6). There was no difference in the prevalence among boys and girls. The national age-specific prevalence estimates for the age-groups 0–4, 5–9, 10–14 years were 37.5 (35.0–40.3), 152.8 (135.4–172.5) and 253.9 (226.4–284.8) among boys, and 32.6 (30.2–35.3), 151.4 (134.0–171.1), 260.2 (231.9–291.9) among girls.

Conclusions: The estimated prevalence of about 150 per 100,000 sets Germany among the countries with a high prevalence of childhood T1DM. Based on the current estimate, there are about 15,600–17,400 0-14-year-olds with T1DM in Germany. To provide local, optimal specialized care for this large group of young T1DM patients poses a challenge even to the German health care system.

P181

Incidence of childhood type 1 diabetes in Germany: a nationwide survey over a period of ten years

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Objectives: A wide variation in incidence of type 1 diabetes in children younger than 15 years has been reported. Long-running registries covering a whole nation are available in few countries only. This is the first survey to provide national estimates for childhood diabetes in Germany.

Methods: Case registration was done according to the EURODIAB criteria. Data were collected in three regional registries (Baden-Wuerttemberg, North Rhine-Westphalia, Saxony) covering about 41% of the childhood population < 15 years in Germany and a nation-wide registry (< 5 years) for two five-year periods 1999–2003 and 2004–2008. Hospital records were the primary data source. Completeness of data was estimated by the capture-mark-recapture method in each registry using various secondary data sources. Incidence data were age- and sex-standardized, expressed per 100,000 per year (and 95%-CI). Poisson regression analysis was used to provide national estimates of the incidence and its trends.

Results: The degree of ascertainment was ≥ 94% in all registers. The national incidence estimates for the two periods were 19.4 (95%-CI 18.8-20.0) and 22.9 (22.2–23.6), respectively. This corresponds to an annual increase of 3.4% (2.2–4.6%). The annual rise for the 0- to 4-year-olds was 3.4% (2.2–4.6%), for the 5- to 9-year-olds 3.7% (1.0–6.4%) and for the 10- to 14-year-olds 2.9% (0.3–5.6%) with no significant difference between age groups ($p = 0.8$). The annual increase was 3.7% (2.3–5.0%) for males and 3.1% (1.7–4.5%) for females with no sigificant difference between boys and girls ($p = 0.4$). The most recent national age-specific incidence rates (2004–2008) were 17.1 (16.6–17.7) for 0- to 4-years-olds, 25.4 (24.0–26.8) for 5- to 9-years-olds, and 26.2 (24.9–27.7) for 10- to 14-years-olds.

Conclusions: The expected rise in incidence could be confirmed. Germany can be considered as a country with high incidence of childhood diabetes with an overall incidence rate of 23 per 100,000 per year.

P182

Epidemiology of emergency and critical states in T1D in children and adolescents in Moscow In the 1997–2011 years

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Objective: To study the incidence and outcomes of urgent and critical states in diabetes DT1 in children and adolescents in Moscow.

Methods: We studied the incidence and outcomes in patients with Knicks DM1 to 18 years: DKA in Moscow from 1964 to 2011. Discussed in detail during the past 15 years, from 1996 to 2011. 2878 patients with DKA. Results were processed using the methods of descriptive statistics calculated average value, standard deviation and confidence interval, for determining the mean error for $p < 0.05$.

Results: There is a marked trend toward significant growth in the number of children and adolescents with type 1 diabetes (R2 = 0,7),

also expressed the upward trend of children in emergency state at different periods of T1D (R2 = 0,8) and to an increase in the manifestation of type 1 diabetes in DKA phase (R2 = 0,5). The average percentage of children and adolescents with T1D manifestation in the phase of the DKA of all hospitalized patients DKA to 18 years was 61,4 ± 8,2%. The average of the frequency of DKA by 1000 all children and adolescents with type 1 diabetes, during the analyzed period was 81,6 ± 22,4 patients (from 57 to 131 patients). The average frequency of DKA in children and adolescents with T1D 1,000 newly diagnosed patients was significantly ($p < 0.05$) higher at 249 ± 59,3 (scatter data 173–370). For every 1,000 children and adolescents with T1D at different periods of the disease DKA revealed at an average of 58,6 ± 17,7 patients.

Conclusions: 1. The frequency of DKA in the general population of children and adolescents with type 1 diabetes by 1000 patients was significantly lower than that calculated in the same population of children and adolescents with T1D.

2. Authentic overall annual growth rate of DKA in children and adolescents in the 1000 patients with a large spread of hospitalized DKA annually.

3. During the period from 1996 to 2011., a mortality rate of DKA in Moscow children and adolescents totaled 0,06 ± 0,03%.

P183
Epidemiology of type 1 diabetes mellitus in Mauritius

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According to the World Health Organisation and the International Diabetes Federation, there is an increasing concern for the rising incidence of Type 1 diabetes mellitus (T1D) worldwide.

Objectives: To determine the incidence of T1D in Mauritian children ≤14 years of age from 01/01/2004 to 31/12/2008 and to analyse its trends in Mauritius over the 5-year period.

Methods: The collaboration and support of the Chief Medical Record Officers of the five regional hospitals of Mauritius were sought in order to identify all cases of Type 1 patients aged < 15 years diagnosed during the period 2004–2008. Data was collected by means of a questionnaire which was filled by the investigator. Doctors involved in the management of T1D were invited to participate in the questionnaire survey. The participation of private paediatricians and that of a diabetologist were also requested, to identify all Type 1 patients following treatment in the private sector for the same defined period. Ethical clearance was obtained from the local authority, Ministry of Health and Quality of Life, and an informed written consent was obtained from each doctor for their participation in the survey.

Results: The age-standardized average incidence rate in Mauritius is 4.94/100000/year. In boys and girls; it is 4.59 and 6.63/100000/year respectively. The male to female is approximately 1:1. The disease is more frequent among people of Indian origin. The incidence rate shows that both sexes have experienced an increase of more than 2.5 fold since the period 1990–1994. The maximum rise in T1D was observed in the age group 5–9 years.

Conclusions: The findings of this study have highlighted that the incidence rates, during the period 2004 to 2008, are the highest ever recorded in Mauritius. Furthermore it is the highest in the South-East Asian region for the period 2003 (IDF, 2003). The incidence in T1D, in Mauritius, is increasing and the management of this disease needs to be urgently addressed.

P184
Birth seasonality in Japanese children with type 1A diabetes

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Background: Although birth seasonality in type 1 diabetes (T1D) has been reported from several countries, it has poorly been studied in Japan.

Methods: We studied birth seasonality in 1,422 patients with childhood onset (onset age < 18 years) type 1A diabetes (T1AD). Statistical difference was analyzed using the Walter and Elwood method between the patients and Japanese general population obtained from 15,680,228 individuals. Furthermore, we examined a possible association between birth seasonality and onset age using the ordered subset analysis (OSA).

Results: No significant difference in birth seasonality was observed between the 1422 patients and general population ($p = 0.124$). OSA identified 2.5 and 15.5 years of age as the cutoff points for disease-onset. Patients with onset age between 2.5 and 15.5 years (n = 1,119) showed no significant deviation of birth months (corrected-$p = 0.126$). In contrast, patients with early- (onset age < 2.5 years, n = 99) or late-onset T1AD (onset age > 15.5 years, n = 204) showed significant deviation of birth months (corrected-$p = 0.008$ and 0.030, respectively); in both groups, births were most frequent in July with the observed-to-expected ratios of 1.97 and 1.68, respectively.

Conclusions: We found birth seasonality in Japanese patients with early- and late-onset T1AD. The results imply that perinatal exposure to some seasonally-varying environmental factor(s) is involved in the development of T1AD. In contrast, significant birth seasonality was not observed in patients with age at onset between 2.5 and 15.5 years. This age group (from infancy to early teens) is the peak for T1D onset in the Japanese population. These results indicate that in this age group, development of the disease is facilitated by other genetic or environmental factor(s) rather than perinatal seasonally-varying environmental factor(s).

P185
Is type 1 diabetes in children caused by modern living conditions?

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Objectives: Increased hygiene has been suspected as one contributing cause of Type 1 diabetes (T1D). We therefore asked if related modern life style increases the risk of T1D.

Methods: The ABIS study, All Babies in Southeast Sweden, has followed an unselected group of children from birth 1997–1999 and onwards with regular follow ups. This report is based on questionnaires from initially 16 051 children of whom 107 have later on developed type 1 diabetes. The parents answered questionnaires at the birth of their child and then after 1, 2–3, 5–6 and 8 years. A number of parameters possibly related to hygiene and socio-economy were analysed both with univariate and in regression models.

Results: From the univariate analyses of the questionnaire at birth children who later developed diabetes (the probands) had been hospitalized more often in the neonatal period, 15.8% vs 9.5% of controls ($p = 0.030$).
In the 2–3 year questionnaire repeated episodes of gastroenteritis had been more common in the probands, 30.3 % vs 12.8% in the controls ($p = 0.000$). Pneumonia had also been more common in probands 2 episodes, 18.9% vs 7.1% in controls ($p = 0.050$).
In the 8 year questionnaire there was a tendency to more episodes of gastroenteritis among probands than among the controls, 24% vs 9.4% ($p = 0.065$). 80.8% of the probands had siblings compared to 91.0% of the controls ($p = 0.068$).
The bivariate regression model showed in the 2–3 year questionnaire that pneumonia was more common in the probands (OR 2.5, 95% CI 1.2-5.2) as was gastroenteritis (OR, 1.7 95% CI 1.1-2.7).
From the 5–6 year questionnaire gastroenteritis continued to be more common among probands (OR 1.8, 95% CI 1.0-3.3).
Conclusions: Our results do not support that hygiene related parameters as part of our modern lifestyle play an important role for the etiology of T1D, but rather that problems in the gut may be of interest.

P186

Children, adolescents, and young adults with type 1 diabetes (T1D) in the TEENS study: contemporary outcomes in a sample of US youth

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Objectives: Achieving optimal glycemic control remains challenging for youth with T1D. The TEENS Study assesses factors related to glycemic control and outcomes in an international sample of T1D youth; data from 499 US youth (53% male), ages 8–25 years old (y/o) are available.
Methods: In a cross-sectional, observational study, 25 pediatric centers collected data from patient interview, medical record review, and patient/parent survey. A1c was measured using A1cNow™ (Bayer).
Results: There were 130 (26%) children (8-12y/o), 247 (50%) teens (13-18y/o), and 122 (25%) young adults (19-25y/o) with T1D of 4.7±2.8, 7.2±4.0, and 10.6±4.5 years, respectively. Patients were mainly Caucasian (83%), had educated parents (71% attended university), and most lived with both parents (69% overall; 81% for 8-12y/o, 75% for 13-18y/o, 44% 19-25y/o). Mean A1c was 8.5±1.6%. In the 3 months prior to study, 20 patients (4%) had DKA, yielding a rate of 17/100-pt-yrs; 35 patients had severe hypoglycemia (either seizure/coma or assistance with oral Rx), yielding a rate of 64/100-pt-yrs. Treatment characteristics appear in the Table.
Conclusions: Many patients experienced acute complications and co-morbid conditions. Younger patients used intensive therapies more often than older patients and had lower A1cs. Nonetheless, across 25 US pediatric diabetes centers, glycemic control remains suboptimal for the majority of patients. Interventions are needed to improve outcomes.
Study sponsored by Sanofi.

	8-12 y/o	13-18 y/o	19-25 y/o
BG checks/Day	6.7 ± 2.0	4.4 ± 2.0	3.6 ± 2.1
Pump Use	72%	62%	56%
CGM Use	9%	8%	7%
Insulin Basal/TDD	46%	45%	49%
zBMI (<19y/o)/BMI(≥19y/o)	0.54 ± 0.98	0.78 ± 1.04	26.0 ± 4.7
Use of CARB ctg	95%	86%	80%
A1c (%)	8.2 ± 1.4	8.7 ± 1.7	8.6 ± 1.7
A1c<7%	14%	13%	16%
A1c 7.0–7.4%	19%	12%	16%
Alc 7.5–7.9%	20%	16%	9%
A1c ≥ 8.0%	48%	59%	60%
DKA rate Events/100-pt-yrs	12	24	7
Severe low BG rate Events/100-pt-yrs	67	77	33
Hypothyroidism	5%	12%	21%
Graves' disease	-	1%	3%
Celiac disease	11%	6%	7%

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Praevalence of atopy and allergy in children and adolescents with type 1 diabetes mellitus

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Objectives: In the last decade, an increase in the incidence of type 1 diabetes mellitus (T1D) has been observed worldwide, as well as an increase in the incidence of allergies in children. Both diseases are characterized by an imbalance between Th1- and Th2 cells. Studies conducted to find a correlation between T1D and atopic diseases are heterogeneous and controversial. Therefore, the purpose of the study was to investigate if children with T1D tend to have a greater risk to develop allergies than children without T1D.
Methods: 179 patients with T1D (mean age 14,5 years, ±6,3; mean duration of diabetes 6,5 years, ±5,0; mean HbA1c 8,25%, ±1,12) were asked to fill out a questionnaire about allergic symptoms (e.g. asthma, rhinitis, conjunctivitis, eczema). In addition, blood tests of each patient were taken to analyze sensitizations against 20 common allergens (Phadia-CAP).To compare our results, a control group of 88 healthy children (mean age 10,8 years, ±4,7) was asked to fill out the same questionnaire and was tested on the same allergens in the blood. To compare the number of patients with and without allergic symptoms and blood tests, respectively, chi-square tests were performed.
Results: According to the questionnaires, the control group reported slightly more allergic symptoms than our patients with T1D. However, the difference was not statistically significant ($p = 0.366$). On the other hand, allergen sensitization rates, as assessed by allergen-specific IgE serum antibodies, showed a tendency to be more often positive in T1D patients than those in the control group (44%; 31% respectively); ($p=0.059$).
Conclusion: Here, we report a higher rate of atopy among our patients with T1D than in a healthy control group. However, clinically relevant allergic disease, as assessed by questionnaires, was less frequently reported by T1diabetics. Our results may reflect the growing importance of environmental factors in causing the observed increase in both T1D and atopy.

P188

Causes of death in relation to glycemic control and long term complications in an unselected population of patients with type 1 diabetes

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Objectives: To describe the mortality and causes of death in relation to glycemic control and long term microvascular complications in patients with type 1 diabetes.

Methods: An unselected population of 451 patients was diagnosed as having type 1 diabetes before 35 years of age during the period 1983–1987 in a region of South East Sweden. These patients were followed from diabetes onset for 20–24 years. Data on cause of death was collected from medical records and the Swedish Cause of Death Register. Retinopathy was evaluated by fundus photography and albuminuria/nephropathy data was collected from medical records. Long term weighted mean HbA1c from diagnosis and during the whole follow up was calculated. Chi-2 and T tests were used for statistical analysis.

Results: In total 28(6%) patients had died of whom 68 % were male. Mortality in patients with diabetes onset before the age of 15 years was 4.5 % and 8.1 % in patients with onset at 15 years or older ($p = 0.12$). The most common causes of death were cardiovascular disease (6 cases), infections (5 cases) and diabetic ketoacidosis (4 cases). 9/28 (32 %) died before they had had diabetes for 15 years. Long term Hba1c was 77 mmol/mol (9.2% DCCT units)(95% CI 70–85 mmol/mol (8.6-9.9%)) in those who died and 65 mmol/mol(8.1 %)(95% CI 64-66mmol/mol(8.0-8.2%)) ($p < 0.001$) in those who survived. The prevalence of diabetic nephropathy was higher (31%) in patients who died compared to 3% in those who survived $p < 0.001$). Laser treatment for proliferative retinopathy was also more common, 47% and 12 %, respectively ($p < 0.001$).

Conclusion: During the first 15 years after T1D diagnosis the mortality is high. Long term HbA1c is significantly higher and long term complications are significantly more common in the patients who died.

Poster Tour 21: Genetics and immunology I

P189

Th17 cells in children with new onset type 1 diabetes - preliminary report

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Objectives: Type 1 diabetes is a disease of autoimmune pathogenesis in which different populations of immune cells plays an important role in the initiation and modulation of immune response against antigens of pancreatic islet β cells. TH17 lymphocytes are a new population of cells which are characterized by specific IL-17A secretion with proinflammatory action. It seems that Th17 cells as well as Th1 cells mediates beta cells autoreactivity by secreted proinflamatory cytokines. The aim of our study was to evaluate circulating Th17 in children with new onset type 1 diabetes and comparison to a group of healthy children.
Methods: The study group comprised 53 children, mean age 10.2 ± 5.5 years, with newly diagnosed type 1 diabetes. In all children were assessed C-peptide and anti-GAD and anti-IA2 antibodies to confirm autoimmune pathogenesis of disease and cell subpopulations were examined using flow cytometry. The reference group consisted of 20 healthy children. We analyzed the percentage of circulating CD4+IL17A+ and CD4+/CD3+/IL17A+ cells.
Results: In the blood of children with type 1 diabetes the average percentage of Th17 was higher but not statistically significantly than in healthy children. Interestingly, as we evaluated TH17 cells at different time points of disease progression during initial phase of diabetes (6, 30, 60 days from diagnosis of DM) we have noted gradual decrease in the absolute number of Th17.
Conclusions: The demonstrated differences of the analyzed population of immune system cells encouraging more detailed analysis of the observed dependence and study the potential importance of these cells in the development of type 1 diabetes.
Grant MNiSzW N N407 160740.

P190

Prevalences of antibodies to IA-2 and GAD at the time of diagnosis in children with type1 diabetes

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Objectives: Antibodies to IA-2Ab are frequently detected in T1D diagnosed in childhood. The frequency of IA-2Ab is reportedly decreased with long disease duration or in older children. In contrast, GADAb are frequently detected in adolescents and adults. The purpose of the present study is to examine the prevalences of these two β-cell autoantibodies and clinical characteristics according to positivity for one or both antibodies at the time of diagnosis in Japanese children with T1D.
Methods: The subjects were 48 Japanese children, 23 boys and 25 girls, 6.6±3.8 years of age at diagnosis with T1D disease durations ranging from 8 months to15 years. Their clinical forms of onset were abrupt in 41.7% and slow in 58.2%.We examined the prevalences of GADAb and IA2Ab and their titers at diagnosis and divided the patients into four groups,
group A: positive for both antibodies (40.4%),
group B: positive for neither GADAb nor IA-2Ab (12.5%),
group C: positive only for GADAb (19.1%),
group D: positive only for IA-2Ab (27.7%).
Patient characteristics analyzed in the four groups were: age, sex, form of clinical onset, function, and HbA1c levels.
Results: The prevalences of GADAb and IA-2Ab were 59.5% and 68.1%, respectively, and 87.5% of the patients had at least one of these antibodies, while 40.4% were positive for both. There were no significant differences in the five aforementioned items among the four groups. There were no correlations between the serum CPR level and GADAb and IA-2Ab titers.
Conclusions: The prevalences of GADAb and IA-2Ab were both high at the time of diagnosis in children with T1D. There was no relationship between the positivity for these antibodies and β-cell function. Furthermore, patients negative for these antibodies showed marked β-cell deterioration.These results suggest that if neither of these antibodies is detected at diagnosis, remarkable pancreatic β-cell destruction may already have occurred prior to the diagnosis of diabetes.

P191

Completeness of immunological testing at diagnosis of diabetes mellitus in the Paediatric Diabetes Registry in the Netherlands (PDR.NL)

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Objectives: Proper classification of diabetes mellitus (DM) has been increasingly relevant since only a clinical diagnosis of type 1 diabetes is not specific enough, given the wider spectrum of underlying causes, sometimes with therapeutic consequences. We studied in the new national database how Dutch paediatricians performed immunological testing in children diagnosed with diabetes between 1994 and 2012.
Methods: The Paediatric Diabetes Registry.NL* (PDR.NL) is initiated in 2012 to become a prospective national registry for children and adolescents with DM in The Netherlands. All hospitals were invited to submit an anonimised cross-sectional dataset of their patients to the central database. This dataset contains mainly the clinical and biochemical data at diagnosis. Thus far, from approximately 80% of Dutch patients data have been provided. In a randomly selected 1/3 of cases the original clinical data were reviewed. No significant errors of data quality were found.
Results: The data from 5606 patients, (50.8% = males) diagnosed from 1994 to 2012 were evaluated. A gradual increase from less than 50% to more than 70% was observed in the percentage of patients in whom any diabetes related antibody (either ICA, IA-2 or GAD65) had been tested at diagnosis or somewhat later. In these years, we also observe that the percentage antibody (at least 1) positive patients increased from less than 60% to higher than 80% of all patients who have been tested. From 2005 to 2012 this percentage is stable and close to 83% of tested patients.
Conclusions: These first data from PDR.NL show that Dutch pediatricians may increasingly aware of the need to perform proper

immunological screening at diagnosis of DM in the last 20 years. This awareness, combined with the availability in the early 2000's of new possibilities for antibody testing led to an increase of DM patients that can be classified as type1 DM.
*The registry is funded by the Dutch Diabetes Foundation.

P192
Type 1 diabetes mellitus precursors in infancy: role of the nutrition and glutamate dehydrogenase antibodies

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Objective: Discovery of precursors of type I diabetes (DM1) in infants is necessary for DM epidemy limitation.
Methods: 125 children aged 1 month to 6 years were examined and grouped: 1 gr. (6 kids, 3.8 ± 1.7 yr.) – newly diagnosed DM1 with antibodies to glutamate dehydrogenase (GAD AB); 2 gr. (19 kids, 3.6 ± 1.5 yr.) – newly diagnosed DM1 without GAD AB; 3. gr. (8 kids, 12.6 ± 12.2 mo.) – nondiabetic positive to GAD AB; 4 gr. (92 infants, 6.1 ± 3.1 mo.) – nondiabetic negative to GAD AB. The nutritional history, cow's milk protein antibodies (AB), IgE levels were studied as well as blood amylase and lipase levels.
Results: Family history DM1 was found in 16.6% of 1gr. children, in 42.1% of 2 gr., in 12.5% of 3 gr. and 10.8% of 4 gr. ($P_{1,2} \leq 0,05$; $P_{2,4} \leq 0,05$; $P_{3,4} \leq 0,05$).
Most of the diabetic children. (1 gr. – 66.6%; 2gr. 625%) were early formula fed (18.8 ± 10.0 days). Nondiabetic infants (3 gr. – 52.6%; 4 gr. - 68.4%) with were much later ($P_{1,2}$ vs. $P_{3,4} \leq 0,05$) introduced formula feeding (1.5 ± 0.5 months).
86% of GAD AB positive infants were fed by low adapted infant formula ($P_{1,3}$ vs$_{.2,4} \leq 0.05$) and 50% of them revealed an increasing IgE level ($P_{1,3}$ vs$_{.2,4} \leq 0.001$).
50% of nondiabetic GAD AB positive infants with early formula feeding had deviation of blood amylase ($P_{1,3}$ vs$_{.2,4} \leq 0.05$) and tendency to blood lipase level decreasing (1gr. – 66.6%, 3 gr. – 37.5%) tended to decrease ($P_{1,3}$ vs$_{2,4} \leq 0.05$).
Cow's milk protein antibodies level was significantly higher in diabetic GAD AB negative infants (21.05%). It was discovered that more than 91.0 % of diabetic and nondiabetic GAD AB positive infants' mothers had been consuming 1.0-1.5 liters of cow milk daily during feeding their babies ($P_{1,2,3}$ vs$_{.4} \leq 0,05$).
Conclusions: High level of maternal cow milk consumption during breast feeding and early low adapted formula feeding are risk factors for the GAD AB formation and DM1 presentation in early childhood as well as a disorders of exocrine pancreatic function.

P193
Prognostic significance of γδ T lymphocytes in type 1 diabetes in children

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Objective: The correlation between γδT count and a degree of first phase insulin secretion impairment in prediabetes was reported. The aim was to investigate γδT cells mean (%) in peripheral blood in patients with new-onset DM1 and evaluation of their prognostic power.
Patients, material and Methods: 41 pts with new-onset DM1 were included into the study: M=21/F=20, 3–17 yrs of age, x=11,4yrs, symptoms duration 0–120 days, x=30 days, ± DKA (N=13, 31,7% vs. N=28). Exclusion criteria: other autoimmune disease, neoplasm, inflammation. γδT cells were estimated by flow-cytometry. The control group: 14 healthy, normostenic children, with negative history of autoimmune disease or DM in family.
Results: γδT % in DM1 was lower than in controls (8,03±3,8 vs. 11,23±6,79, p=0,042). γδTCD25$^+$ was higher in DM1 group (x=0,15±0,75 vs. x=0,01±0,025). γδT and γδTCD25$^+$ correlated with clinical picture of pts: the smallest populations were found in pts with severe DKA (r=0,341, p=0,047) and long symptoms duration (r=−0,38, p=0,030), high HbA1c (r=−0,57, p=0,008) and low c peptide (11,60±6,52 vs. 7,49±3,60, p=0,019). After 1 year, further reduction of γδT was observed (x=6,13±2,15, p=0,067). According to ROC analysis, the most accurate prognostic factors for metabolic control after 1 year were % of: γδTCD4$^+$CD8$^-$, γδTCD4$^-$CD8$^+$ and γδTCD25$^+$ (the most sensitive); for metabolic control after 2 years: % of γδTCD25$^+$, IL-2 and symptoms duration; for remission estimation: Tγδ, "double negative" γδT, blood gases and c peptide.
Conclusions: 1. γδ T lymphocytes and subpopulations count in peripheral blood of patients with DM1 before treatment was an important prognostic factor in this disease. 2. γδT and "double negative" γδT cells, pH of the blood and c peptide concentration at presentation were the predictors of DM1 remission.

P194
Decreased CD127 expression on CD4+ T cells and elevated frequencies of CD4+CD25+CD127- T cells in children with long-lasting type 1 diabetes

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Objectives: The possible relations between autoimmune status of the type 1 diabetic (T1D) young patient with long lasting disease and predisposition to late diabetes vascular complications are not known. We set out to analyze for the first time CD127 expression on CD4+ and CD8+ T cells and enumerate CD4+CD25+CD127- T cells in long-lasting T1D in relation to comprehensively analyzed metabolic, inflammatory and vascular parameters.
Methods: We recruited 33 children with T1D, aged 14.3±2.6; mean diabetes duration: 7.0±2.8 yrs; HbA_1c: 8.8±1.5%. The control group included 52 matched peers. Flow cytometry analysis was performed to evaluate CD127 and endothelial progenitor cells expression. CRP, HbA_1c, VEGF, VE-cadherin, angiopoietin levels were also assessed.
Results: We demonstrated significantly decreased CD127 levels on CD4+, but not CD8+, T cells in T1D pediatric patients as compared to non-diabetic controls. Frequencies of CD4+CD25+CD127- T-cells were significantly enhanced in T1D children and correlated well with frequencies of CD34+CD144+ endothelial progenitor cells

and CD4+CD25- T cells. Levels of CD127 on both CD4+ and CD8+ T-cells in T1D patients were not correlated to each other or HbA_1C, BMI, age, LDL, hsCRP. CD127 levels on CD4+ T cells were significantly correlated to frequencies of CD4+CD25+CD127- T cells whereas CD127 levels on CD8+ T cells were significantly correlated to concentrations of VEGF and triglycerides.

Conclusions: Our data indicate that CD127 expression is differentially modulated on CD4+ and CD8+ T-cells in the course of T1D in young patients. Moreover, we demonstrated that, in contrast to recent-onset T1D, long-lasting T1D is associated with enhancement of T cells with regulatory phenotype.

P195
Frequency of glutamic acid dehydrogenase antibodies among pediatric Filipino type 1 diabetes mellitus

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Objectives: The GADA (glutamic aicd dehydrogenase antibody) is an important marker of Type 1 diabetes mellitus (DM1), with frequency that varies depending on the population and the duration of the disease. The aim of the study was to determine the frequency of GADA and its association with age, sex, BMI, age of onset, duration of the disease and family history of diabetes among pediatric Type 1 DM.

Methods: A hospital based cross sectional study was conducted among DM1 pediatric patients attending at the diabetic clinic in tertiary hospital. The GADAs were detected with commercial immunoprecipitation assays.

Results: A total of 68 pediatric diabetic patients consented and participated in the study of whom 40 (58.8%) male and 28 (41.2%) female. The prevalence of GADA in the study population was 30/68 (44.12%). There was no significant association in age, sex, BMI, > 2 years duration of diabetes and GADA. The age of onset ($P = 0.01$), < 2 years of disease duration ($P=0.01$) and family history of diabetes ($P = 0.03$) were significantly associated with GADA.

Conclusions: The frequency of GADA in pediatric Filipino DM1 is comparable to other Asian populations. GADA levels are strongly influenced by age at diagnosis, and early onset of the disease and family history of diabetes.

P196
Assessment of the occurance of the autoantibodies in children with diabetes type 1

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Diabetes mellitus type 1 is an autoimmune disease, which can occur with other diseases with the autoimmune background. Presence of autoantibodies in those autoimmne diseases can be used in screening.The aim of the study is an assessment of the occurance of the autoantibodies to pancreas (glutamic acid decarboxylase-65 GAD, tyrosine phosphatase IA-2, insulin Ins, zinc transporter ZnT8) and typical for other autoimmune diseases (thyroid peroxidase TPO, thyreoglobulin ATG, tissue transglutaminase tTGA) diagnosed in diabetes type 1 patients. The study was performed in 83 subjects, age from 2 to 18 years, who have been diabetes mellitus type 1 diagnosed. They were hospitalised in Pediatrics, Endocrinology and Diabetology Clinic with Cardiology Division. Medical University in Bialystok.The blood plasma has been examined to detect autoantibodies and patients medical records have been taken into consideration. Antibodies to insulin were the most frequent in examined patients (89,16%). The less frequent autoimmune antibodies were ZnT8 antibodies (65,06%); antiGAD antibodies (57,83%); IA2 antibodies (49,4%). Presence antithyroid antibodies was significant, TPO antibodies were detected in 16,87% and ATG antibodies in 13,25% examined subjects. tTGA antibodies were found in 9,64% examined patients. As a result 26 subjects of all group have been examined to find TSI antibodies and in 2 of them they have been found.

Conclusions: The frequency of occuring a higher titer of antibodies in patients with diabetes mellitus type 1 is higher than in general population. Taking into consideration the fact that diabetes mellitus type 1 is the risk factor to coincidence another autoimmune disease, screening which uses autoantibodies is a proper action. It can result in separating groups with a higher risk of other autoimmune diseases, monitoring them, and finally early detecting and treating. All this can prevent further complications.

P197
Interleukin-17 in childhood diabetes

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Interleukin −17 (IL-17) elevates the release of NO from the pancreatic β cells; thus driving the β cells to the apoptotic and necrotic pathway.

Objectives: To assess IL-17 level in patients with type 1 diabetes mellitus (T1DM) in relation to clinical parameters and metabolic control.

Patients and methods: This study included 30 children and adolescents with T1DM from the Diabetes Clinic Children´s Hospital, Ain Shams University and ten age and sex matched healthy individuals as a control group. Data collected regarding; age, sex and disease duration. Patients were further subdivided according to disease duration into;

Group A; 15 patients with newly diagnosed T1DM,

Group B; 15 patients with disease duration more than 5 years.

Laboratory investigations included; RBS, HbA1c % and IL-17 by ELISA.

Results: Group B were significantly older in age (12.8±3.09 years) than group A (7.5±3.15 years) ($p = < 0.001$). There was a significant increase in IL-17 level in diabetic patients (486.8±200.5pg/dl) compared to controls (78.5±43.52 pg/dl) ($p < 0.001$) with a significant increase in group B (588.0±238.2 pg/dl) than group A (385.7±67.7pg/dl) ($p = 0.004$) and no significant relation of IL-17 level in relation to sex in both patients and controls ($p > 0.05$). ROC curve revealed that IL-17 level of 285 pg/dl is the best cut off to differentiate diabetics from controls with a sensitivity of 0.97 and specificity of 100. There was a statistically significant direct correlation of IL-17 with age ($r = 0.37$, $p = 0.046$) and disease duration ($r = 0.76$, $p < 0.001$). No significant correlation between IL-17 and HbA1c% ($r = 0.27$, $p = 0.13$).

Conclusion: IL-17 level is markedly elevated in children and adolescents with T1DM compared to controls especially older patients with longer disease duration. Its level is not related to sex or metabolic control.

P198

First investigation of secreted frizzled-related protein 4 (SFRP4) in children and adolescents with type 1 diabetes mellitus (T1D)

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Objectives: SFRP4, an extracellular regulator of the wingless pathway, was recently identified as a potential marker of islet cell dysfunction and inflammation in type 2 diabetes (T2D). Not only were levels of SFRP4 elevated in patients with T2D in comparison with healthy adults, it was also shown that SFRP4 reduced glucose-stimulated insulin secretion in mouse pancreatic islet cells. Our aim was to measure SFRP4 in children and adolescents with T1D in order to investigate its role in autoimmune destruction of islet cells and insulin deficiency in T1D.

Methods: In 109 patients with T1D (53.2% female, age: 13.6±2.8 years, 5.8±3.5 years diabetes duration) and 21 healthy controls (61.9% female, age: 12.7±2.6 years) serum levels of SFRP4 were measured by ELISA.

Results: SFPR4 was lower in patients with T1D (21.5 ng/ml) than in healthy controls (25.3ng/ml), though insignificantly ($t=-1.550$, $p=0.134$). The diabetic group only differed significantly from controls in LDL-Cholesterol and C-reactive protein (CRP) levels, but there was no correlation of SFRP4 with these parameters, nor was there a correlation with age, body mass index (BMI), HbA1c, diabetes duration, islet cell autoantibodies or daily insulin dosage. Interestingly SFRP4 was lower in girls (19.5ng/ml) than in boys (23.9ng/ml) with T1D ($t=-3.115$, $p=0.002$). In healthy girls SFRP4 levels were insignificantly higher than in boys. In a linear regression analysis after inclusion of age, BMI, weight, height, CRP and diabetes status, sex remained the only significant predictor of SFRP4.

Conclusions: This is the first investigation of SFRP4 in children and adolescents with T1D. Unexpectedly SFRP4 levels were lower in patients with T1D than in healthy controls, though not significant, whereas in patients with T2D, levels of SFRP4 seem to be elevated. A possible explanation might be that after beta-cell destruction SFRP4 excretion of islets cells diminishes. It would be interesting to investigate SFRP4 levels at T1D onset.

Poster Tour 22: Genetics and immunology II

P199

Lower serum levels of vitamin D-binding protein and 25-hydroxyvitamin D during pregnancy in mothers whose children later develop type 1 diabetes

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Objectives: We aimed to test whether levels of vitamin D-binding protein (VDBP) and total or free 25-hydroxyvitamin D (25-OH D) differed throughout pregnancy between women whose offspring later developed type 1 diabetes (cases) and controls.

Methods: Serum samples drawn at three different time points in pregnancy were analyzed for total 25-OH D and VDBP in 113 women with a child who developed type 1 diabetes during childhood (cases) and from 221 randomly selected control women from the same cohort. VDBP and 25-OH D were analyzed by radioimmunoassay. Free 25-OH D was calculated. Linear mixed models and logistic regression were used for statistical analyses.

Results: Estimated mean difference throughout pregnancy in VDBP between cases and controls was −0.36 µmol/l (95% CI 0.04-0.67), p=0.025, in 25-OH D −5.71 nmol/l (95% CI −10.15, -1.28), p= 0.012. There were no differences in free 25-OH D between cases and controls −0.53 pmol/l (95% CI −1.57, 0.51), p=0.31. In third trimester of pregnancy lower maternal levels of 25-OH D were associated with increased risk of type 1 diabetes in children, OR 2.68 (1.16-6.16), p=0.013. In first and second trimester no such associations were found. The levels of total 25-OH D and VDBP both increased with increasing weeks of gestation. There was a tendency that the increase during pregnancy was less steep in cases compared to controls, but the interaction between case–control status and week of gestation at blood sampling was not significant. Free 25-OH D decreased significantly during pregnancy similarly in cases and controls.

Conclusions: In this first study on repeated measures of maternal vitamin D-binding protein and 25-hydroxyvitamin D during pregnancy and risk of type 1 diabetes in offspring, we found inverse significant associations with both, and differences in third trimester. However, free 25-OH D levels did not correlate with disease development in the offspring.

P200

Additional autoimmune diseases in patients with type 1 diabetes mellitus at diagnosis of diabetes

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Objective: The aim of this retrospective study was to evaluate the prevalence of organ-specific autoantibodies at diagnosis of type 1 diabetes mellitus (T1DM) and to determine the prevalence of additional autoimmune diseases.

Methods: 74 children (36 boys) diagnosed from January 2011. till April 2013. with T1DM at the Mother and Child Health Care Institute of Serbia were screened for autoimmune thyroid disease (thyroid peroxidase autoantibodies [TPOAb]) and celiac disease (tissue transglutaminase autoantibodies class IgA and IgG [TTGAb]). This period is taken because in January 2011. measurement of TPOAb and TTGAb were introduced in the hospital as analyses that can be done on regular basis.

Results: The mean age of patients was 8.9 years. Upon diagnosis of T1DM, TPOAb were measured in 66 patients, and TTGAb in 72 patients. Both analyses were done in 64 patients. In this group 14 (21.9%) had at least one antibody. 11 patients (17.8%) were positive for TPOAb, and 7 of 11 (63.6%) had diagnosis of autoimmune thyroid disease (AITD). There were 4 (6.2%) patients who were positive for TTGAb, of whom 3 (75.0%) had celiac disease (CD). In a patient who had high level of both TTGAb, diagnosis of CD was established without further investigations. In 3 patients who had elevated only one TTGAb, both *HLA* typing and intestinal biopsy were done. The *HLA*-DR3 allele was found in all of them. Analysis of intestinal biopsy specimen confirmed diagnosis of CD in 2 of these patients. There were no patients who had both AITD and CD.

Conclusions: Although group of patients is small, significant number of them (11 of 64, i.e. 17.2%) had additional autoimmune disease. Detection of TPOAb and TTGAb at diagnosis of T1DM is of great help in early treatment of AITD and CD, as well as in prevention of complications of AITD and CD. Early diagnosis of additional autoimmune disorder, especially CD is important to avoid poor metabolic control of DM because of untreated CD.

P201

Relation of the obesity-associated rs9939609 A variant with depressive symptoms and quality of life in type 1 diabetic children - a pilot study

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Objectives: The A allele of the single-nucleotide polymorphism (SNP) rs9939609 of fat-mass and obesity-associated (FTO) gene predispose to obesity and may be associated with a lower risk of depression independently of its effect on BMI.

The aim of this study is to evaluate the frequency of depressive symptoms in type 1 diabetic children (T1D) with AA genotype of the FTO gene polymorphism (rs9939609).

Methods: The analysis included 277 type 1 diabetic children (93 girls) with the mean age 13.1±2.9 years, the mean diabetes duration 5.6±3.1 years and the mean HbA1c 7.5±1.1%. Gene polymorphism analysis in the extracted DNA was made with the real-time PCR method using TaqMan 7900 HT by Applied Biosystems. During the visit in the outpatient clinic children filled in Polish version of Children's Depression Inventory (CDI) by Maria Kovac and Quality of Life Questionnaire. At the same time, other data was collected, including: sex, age, diabetes duration, HbA1c, BMI, daily insulin dose (TDD). Statistical analysis was performed using Shapiro-Wilk normality test, Kruskal-Wallis test and Chi-square test.
Results: There were carriers of the genotype of the FTO gene polymorphism (rs9939609): AA (n=62), AT (n=139), TT (n=76). No difference between groups AA vs. AT vs. TT was observed depending on the results of: age (p=0.897), diabetes duration (p=0.601), BMI (p=0.968), TDD (p=0.388) and HbA1c (p=0.878). Fifteen percent (14 girls, 28 boys) of all participants reported depressive symptoms based on CDI scores ≥13. The number of children with depressive symptoms was slightly higher in the group TT (20.6%) in comparison to the groups AA (16.9%) and AT (16.8%), however without statistical significance (p=0.857). The quality of life was similar in all examined groups (p=0.803).
Conclusion: In our study a decreasing trend in depressive symptoms was observed in type 1 diabetic children with FTO rs9939609 A gene polymorphism. Further studies including larger pediatric population are needed.

P202
IL-6 gene polymorphism in children and adolescents with type 1 diabetes mellitus: relation to diabetic microvascular complications

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Background: A common genetic polymorphism in the −174 promoter region of the IL-6 gene with three possible genotypes (GG, GC, and CC) is functionally important, since it influences the plasma concentration of the IL-6 protein.
Objectives: To determine the prevalence of IL-6 gene polymorphism and its association with microvascular complications in patients with type 1 diabetes mellitus (T1DM).
Patients and methods: This study included 50 patients with T1DM, their ages ranged from 8–18 years with mean age of 13.7±2.25 years. They were 38 females and 12 males. Their disease duration ranged from 2–16 years. Twenty five age and sex matched healthy controls were included. Patients with malignancy, connective tissue disease or apparent cardiovascular disease were excluded. Data collected regarding age, sex, disease duration, history of diabetic complications. Laboratory investigations included; mean HbA1c%, urinary albumin excretion (UAE), IL-6 polymorphism by PCR. Fundus examination and NCV were also done.
Results: The GC genotype was the most prevalent (52%) in patients. GG genotype was the most prevalent in the controls (60%). Patients with GG genotype had younger age at onset ($p < 0.05$) and longer disease duration ($P = 0.03$). All patients with GG genotype had disease duration > 5 years ($p < 0.001$). Females have earlier age at onset of diabetes in all genotypes ($p > 0.05$). None of patients older than 10 years had CC genotype. Patients with GG genotype had higher HbA1c% ($P = 0.02$). Most of the none complicated group (58.8%) were in the GC genotypes (P=0.399). There was no significant association between any of the genotypes with nephropathy, neuropathy or retinopathy.
Conclusion: The GC genotype is the most prevalent in patients with T1DM. GG genotype is assosciated with longer disease duration and poorer metabolic control. No significant relation of all genotypes to diabetic microvascular complications.

P203
Immunogenetics and clinical characteristics of patients with the most common organ-spesific autoimmune diseases: determination of risk and prognostic factors

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Objective: Many autoimmune disease often coexist in the same patient. Although there are large number of studies on autoimmunity againts the thyroid glands and small bowel in patients with T1DM, little is known about pancreatic beta-cell immunity in patients with autoimmune thyroiditis and celiac disease. We studied autoimmune markers in children patients with AIT, CD, T1DM and investigated interactions between 3 autoimmune diseases in the terms of clinical and immunogenetic characteristics.
Design and methods: Children(n:327) diagnosed with T1DM were screened for TPOAb, TgAb, TTGAb, HLA DQ, HLADR alleles. Children(n:135) diagnosed with AIT were screened for GADAb, ICA, IA, TTGAb, HLADQ, HLADR alleles.
Results: Of the 327children(174boys,153girls) with T1DM, 225(%68,8) had at least one islet cell antibodies, 51(%15,5) had at least one thyroid autoantibodies. In 41(%12,5) of children with diabetes there were positive for TTGAb, of whom 21(%51,2) had celiac disease. There were thyroid antibodies in 21(%41,1) of children with T1DM at onset of diabetes. HLA DRB1*03 allele was significantly higher than the others. In GADAb positive patiens, the average of TPOAb level was higher than negative patients group's. Of the 135 children(98girls,37boys) with AIT, 51(%37,7) associated with T1DM, 10(%7,4) had at TTGAb positive. 6 patients(%4,4) with AIT had at least one islet cell antibodies, of whom two (with Graves disease) had appeared diabetes. Of the all girl with AIT(n=98), 26(%26.5) had patients with AIT associated diabetes. Of the 37 boys with AIT, 25(%67,5) had diabetes. HLA DQB1*03 and HLA DRB1*11 were higher than the others.
Conclusions: Most of autoimmune antibody positive patients coexist with additional autoimmune diesases. Children with AIT, in particular male gender are prone to type 1 diabetes. In conclusion we suggest to screen islet cell antibody, especially GAD Ab in AIT and thyroid antibodies must be part of the initial screening onset of diabetes.

P204
Transglutaminas antibodies in Swedish children with type 1 diabetes in relation to HLA types and islet autoantibodies

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Objectives: To study the association of a celiac disease marker, tissue transglutaminase autoantibody (tTGA), to the the high risk HLA-genotype and the islet autoantibodies, including Zinc antibodies, in newly diagnosed Type 1 Diabetes (T1DM) children in Sweden.

Methods: A nationwide prospective cohort study for newly diagnosed T1DM children (0–18 years old) known as Better Diabetes Diagnosis (BDD) and involves diagnosed diabetes children from 95% of the clinical centers for pediatric diabetes in Sweden. Dried blood spots and serum samples were taken at diabetes diagnosis. tTGA, HLA-DQ typing, GADA, IA-2A, IAA and three Zinc transporter 8 autoantibodies were analyzed. All statistical analyses were done on SAS system.

Results: Out of 2707 clinical T1DM children 85 (3.1%) were positive to tTGA, and 63 (2.3%) had limit values. The distribution of the HLA genetic markers and islet autoantibodies by the tTGA shows in next figure.

n (%) tTGA positive tTGA limit values **tTGA positive and limit values**
DQ2/DQ8, N=787 41 (5.2) 22 (2.8) **63 (8.0)**
DQ2 N=456 22 (4.8) 16 (3.5) **38 (8.3)**
DQ8 N=1165 21 (1.8) 22 (1.9) **43 (3.7)**
non-DQ2/non-DQ8 0 1 (0.4) **1 (0.4)**
N=263
IAA 27 (2.7) 21 (2.0) **48 (4.7)**
GADA 61 (3.4) 39 (2.2) **100 (5.6)**
IA-2A 58 (2.8) 48 (2.3) **106 (5.1)**
Znt8 52 (2.8) 45 (2.4) **97 (5.2)**

Conclusion: A high prevalence of 5.4% of tTGA present a the T1DM diagnosis was found. The tTGA were more common in DQ2/DQ8 and DQ2 HLA-genotype, but very rare in non DQ2/nonDQ8. No differences were found according to the islet autoantibodies that were studied.

P205
Higher T1D incidence has not changed the relationship between HLA and the disease process!

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Background: The incidence of Type 1 diabetes (T1D) has more than doubled in Sweden during the last decades, and one could suspect that this depends on an increased penetrance of an etiological factor(s). There have been suggestions that some children nowadays get T1D without having the typical HLA risk genes, and also suggestions of differences in other characteristics. We therefore decided to study how HLA is related to symptoms and auto-antibodies at diagnosis, as well as C-peptide at diagnosis and one year later.

Material and methods: The BDD (Better Diagnosis of Diabetes) study is nationwide and includes in principle all newly-diagnosed patients who got T1D < 18 years of age. In 3709 patients symptoms at diagnosis were registered, HLA and autoantibodies were determined, as well as random C-peptide at diagnosis and in a non-selected group of patients about one year later.

Results: Classical risk HLA-types were found in 86% of the patients: DQ2 17%, DQ8 39 % and DQ2/8 30%. HLA-types without DQ2 or DQ8 were present in 14% including HLA-types regarded as protective representing 1% of the patients (DQ6 0.3% and DQ6/8 in 0.7%). GADA was most common in patients with DQ2, ZnT8A and IA-2A most common in DQ4, and IAA most common in DQ2/8. Patients with DQ6 were older at diagnosis, had milder symptoms, more C-peptide both at diagnosis and after one year, while there otherwise were small or no differences between patients with different HLA-types.

Conclusions: Although T1D has become much more common the relationship between HLA and the T1D disease process has remained very much the same.

P206
HLA alleles and diabetes autoantibodies in a group of Somali children with type 1 diabetes in the Twin Cities, Minnesota: a pilot study

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Objective: To describe human leukocyte antigen (HLA) alleles and diabetes autoantibodies in a group of Somali children with type 1 diabetes mellitus (T1DM) in the Twin Cities, Minnesota.

Methods: Somali children ≤19 years treated for T1DM at the University of Minnesota and Children's Hospitals and Clinics of Minnesota from Jan 1st to December 31st, 2012, participated. A blood sample from each participant was shipped to the Barbara Davis Center, CO, for analysis using the luminex sequence specific oligonucleotide (SSO).

Results: Fifteen children age 11.2±5.3 yrs participated. Their age at diagnosis was 7.3±4.4 yrs (mean±SD) and the duration of diabetes was 4.2±2.8 yrs. One young participant only had a sufficient blood sample for autoantibodies. Eight participants (57%) had high risk alleles (DR3/3, DR3/4, DR4/13), 5 (36%) had medium risk alleles (DR 3/13, DR 3/8), and 1 (7%) had a low risk allele (DR 1/1). As expected in this insulin-treated population, almost all participants (93%) had positive insulin autoantibodies All 15 participants were positive for at least 1 autoantibody besides insulin, and 7 (47%) were positive for >1 autoantibody: 53% had GADA, 33% had IA-2 and 20% had ZnT8 antibodies.

Conclusion: In this pilot study, we found that the majority of Somali children with diabetes carry high to moderate risk HLA alleles for T1DM, and are positive for at least one T1DM autoantibody. This is in contrast to what is more commonly seen for African-American populations in terms of their HLA distribution. Diabetes in Somali children is clearly autoimmune in origin.

P207
Distribution and relevance of HLA-DQ genotyping for the occurrence of celiac disease in children with type 1 diabetes mellitus

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Background: According to the ESPHGAN guidelines for diagnosing celiac disease (CD), patients with type 1 diabetes mellitus (T1DM) should be tested for HLA-DQ2.5/DQ8 as an initial screening.

Objectives: To investigate the clinical relevance and cost-effectiveness of HLA genotyping as an initial screening tool for the development of CD in children with T1DM.

Methods: In a Dutch cohort of 118 children (age 0–16 years at onset) with T1DM, diagnosed between January 1996 and January 2013, screening for CD using CD-specific antibodies and HLA-genotyping was performed.
Results: A complete dataset of 110 children was available for analysis. 9 Children had elevated CD-specific antibodies; in 7 patients the diagnosis of CD was confirmed. The mean age at diagnosis of T1DM in de patients with CD was 4.2 years and without CD 7.7 years, respectively. All children with T1DM and CD developed CD within 5 years after the initial diagnosis of T1DM. All patients with T1DM and CD were homozygote HLA-genotype DQ 2.5 positive, heterozygote DQ2,5 or heterozygote DQ2.5/ DQ8 positive. Only 14 of the 110 children (12,7%) were HLA-DQ2,5/DQ8 negative. HLA-genotyping at presentation of T1DM plus (bi)annual screening with CD auto-antibodies in the patients positive for one of the HLA-DQ2,5/DQ8 positive variants is almost twice as expensive as annual CD antibody screening alone in all patients during childhood.
Conclusions: This study shows that children with both T1DM and CD tend to be younger at diagnosis of T1DM. The risk to develop CD in children with T1DM is increased when they are heterozygote DQ2.5/DQ8, homozygote DQ2.5 or heterozygote DQ2.5. The implementation of HLA-genotyping as a first line screening tool has to be reconsidered since it is not distinctive nor cost-effective in childhood.

P208

Poor evidence of Enterovirus infection in newly diagnosed diabetic children in the area of Bologna (Italy)

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Objective: The incidence of Type 1 Diabetes (T1D) is increasing worldwide. Its rapid rise cannot be explained by genetics alone. Human Enteroviruses (HEV) are probably the most studied environmental factor in relation to T1D. Higher rates of HEV infection have been found in patients with T1D at diagnosis compared with controls. Aim of this prospective study was to evaluate the incidence of HEV and other viral infections at the onset of T1D in children diagnosed in the area of Bologna.
Methods: T1D patients diagnosed between April 2012 and April 2013 were tested for HEV, Adenovirus, Cytomegalovirus and Epstein-Barr virus (EBV) IgG and IgM. In case of IgG or IgM positive, the Real-Time PCR was performed on blood samples and on stool and saliva samples for HEV and on stool and nasal secretions for Adenovirus. For HEV RNA was extracted using the NucliSens easyMAG System (bioMerieux, Marcy l'Etoile, France) and a reverse transcription step was performed by RT-kit plus (Nanogen Advanced Diagnostics, Italy). cDNA was quantified using a Real-Time PCR assays (Enterovirus Real-Time Complete Kit, Nanogen Advanced Diagnostics, Italy).
Results: 25 consecutive T1D newly diagnosed children (range 1–14 yrs) were examined. 16 subjects (64%) were seronegative for HEV. 9 children (36%) were IgG positive and in these cases no HEV RNA was detected in the samples analyzed. In no cases IgM positive was found. In our cohort the most common IgG seroprevalence was for Adenovirus (84%). In one 17-month old child an active EBV infection was documented by serological tests and confirmed by PCR.
Conclusions: These preliminary data suggest that in our area a previous HEV infection can be excluded in the majority of newly diagnosed children. In fact, although HEV seroprevalence was 36%, no viral RNA was detected in blood, stool and saliva samples, indicating no active replication of the virus in these samples. Notably, in our case series the most common viral seropositivity was against Adenovirus.

Poster Tour 23: Genetics and monogenic diabetes I

P209

Case report: diagnostic utility of stimulated C-peptide and insulin in diagnosis of Wolfram syndrome (WS)

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Objective: To determine the role of the oral glucose tolerance test (OGTT) in the investigation of suspected WS.
Methods: We present the case of an 11 year old male, referred from eye clinic with optic atrophy and impaired fasting glucose(6.8 mmol/L). Parents also reported polydipsia and urinary symptoms. Electrophysiology confirmed optic nerve dysfunction;MRI brain showed attenuation of both optic tracts. The combination of impaired fasting glucose with optic atrophy suggested WS. We undertook an OGTT with paired glucose, insulin and c-peptide measurements.
Results:

Time (mins)	Glucose (mmol/L)	Insulin (pmol/L)	C-peptide (pmol/L)
0	3.5	14	189
30	8.6	80	576
60	12.6	117	857
90	14.1	107	1119
120	13.9	107	1102

[OGTT results]

The peak glucose 13.9 was regarded as diagnostic of diabetes mellitus(DM). GAD and islet-cell antibodies were negative. Urine osmolality was normal. The combination of optic atrophy and DM, confirmed on OGTT was considered diagnostic of WS. Furthermore, we propose the differential response observed in c-peptide and insulin represents a biochemical correlate of the molecular defect underlying DM in WS.
Mutations of the WFS1 gene account for 90% of cases. WFS1 normally encodes structural properties and function of mitochondria and the endoglycoside molecular chaperone, Wolframin. Impaired function of Wolframin results in accumulation of protein within the endoplasmic reticulum(ER), ultimately triggering apoptosis. For insulin, Wolframin is essential for movement of insulin from the ER. However, the cleavage product of pre-proinsulin, C-peptide, is not reliant on Wolframin.
Conclusion: We present the insulin and c-peptide responses observed in OGTT of a patient with WS. We propose the differential rise in insulin and c-peptide observed represents a biochemical correlate of the underlying molecular pathology in WS.

P210

Diabetes mellitus, deafness in 2 years old child: Wolfram syndrome?

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Introduction: Wolfram syndrome (WFS), also known as DIDMOAD (Diabetes Insipidus, Diabetes Mellitus, Optic Atrophy and Deafness), is a rare hereditary neurodegenerative disease. The exact prevalence of WFS is unknown or under-reported. The prevalence in childhood is 1 in 500 000. The incidence is greater in consanguineous parents. The pathogenesis of WFS remains unknown with mutation of WFS1 gene in chromosome 4P16.1. No diagnostic marker available with juvenile diabetes mellitus and optic atrophy remain the best available diagnostic criteria. Diabetic patients followed by optic atrophy in the first decade, cranial diabetes insipidus and sensorineural deafness in the second decade, dilated renal outflow tracts early in the third decade, and multiple neurological abnormalities early in the fourth decade. Death occurs prematurely often from respiratory failure associated with brainstem atrophy.
Purpose: To present a case of DIDMOAD syndrome in a child focusing on the diagnosis.
Case: A case of a 2-year old-girl with WFS was reported. She was initially referred from Gatoel Hospital Mojokerto to Dr. Soetomo Hospital with dyspnea (Kussmaul's respiration) and weakness. Constellation of prolonged condition of increased thirst, appetite and weight loss were noted. She was moderately malnourished (body weight 10 kg, height of 90.5 cm), other physical examinations were unremarkable. Complete blood count was normal, with hyperglycemia (386 mg/dL), blood keton (6.3 mmol/L), and pH 7.28, $paCO_2$ 13.0, paO_2 183.0, HCO_3 6.3, BE −17.9, SaO_2 99%. Since 10 months old she was diagnosed with bilateral sensorinueral hearing loss. Features of diabetic ketoacidosis (DKA) and deafness are consistent for WFS.
Summary: Any physicians caring for patients with juvenile diabetes should be aware of the WFS when concomitantly occur with sensorineural deafness.
Keyword: Type I diabetes mellitus, deafness, DIDMOAD syndrome

P211

Transient diabetes mellitus and impaired glucose tolerance in patient with Bloom syndrome

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Bloom syndrome is an extremely rare genetic disorder with incidence 1:7 000 000. The authors present the case report of patient with short stature (−4 SDS), mild cellular, and humoral immunodeficiency, skin changes (hypo- or hyperpigmentation) and with the finding of chromosomal breakages in the karyotype. By genetic examination the diagnosis of Bloom syndrome was confirmed due to homozygous mutation 1642C>T / Gln548X in exon 7 of BLM gene. Bloom syndrome is a autosomal recessive disorder caused by a mutation of the BLM gene (15q 26.1) which is followed by disorder of replication and reparation of DNA with multiple increased tendency to malignancies in comparison with a general population. Approximately, 10% of patients with Bloom syndrome may develop impaired glucose tolerance or type 2 diabetes mellitus.
Our patient with Bloom syndrome was admitted to hospital at the age of 8 years. Because of polyuria, polydipsia, hyperglycemia 20.1 mmol/L, and strong presence of glycosuria and ketonuria, the volume therapy and subsequent continuous intravenous insulin infusion were started. Within a day, however, the dose of intravenous insulin was sequentially decreased to a minimum until it was discontinued. In the next course, the concentration of serum glucose was in the reference range and mild impaired glucose tolerance was confirmed by oral glucose tolerance test. In laboratory findings, the antibodies typical for type 1 diabetes mellitus were negative, serum C-peptide and insulin concentration were slightly increased. In the presence, our patient with Bloom syndrome is on the diet with counting of carbohydrate units, and HbA1c, basal, and postprandial glucose levels are in physiological range.

P212

The immunological parameters in PAS III and in diabetes mellitus type 1

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Introduction: Type III PAS is composed of autoimmune thyroid diseases associated with endocrinopathy other than adrenal insufficiency. This syndrome is associated with organ-specific and organ-nonspecific or systemic autoimmune diseases.
Objectives: In type 1 diabetes dendritic cells (DC) and T-regulatory cells (Tregs) plays an important role in the initiation and modulation of immune response against antigens of pancreatic islet β cells.
Aim: Evaluation of circulating myeloid dendritic cells (mDC) and plasmacytoid dendritic cells (pDC), and Tregs in children with type 1 diabetes and compared to a group of children with PAS (Poliendocrine Autoimmune Sydrome) and healthy children.
Methods: The study group comprised 110 children, mean age 10 ± 5 years, with newly diagnosed type 1 DM and 11 children with recognized PAS III. In all children were assessed C-peptide and anti-GAD and anti-IA2 antibodies and cell subpopulations were examined using flow cytometry. The reference group consisted of 20 healthy children. We analyzed the percentage of immature myeloid DC BDCA-1 +/CD19- and plasmacytoid BDCA-2 +/CD123+ and T-regulatory cells as CD4+/CD25high/FOXP3+.
Results: The percentage of mature and immature DC and T-regulatory cells were in the same levels in children with DM in comparison with PAS and in higher levels as in control group. The anti-GAD antibodies were in higher levels in both patients group in comparison to control. The anti-IA2 antibodies were statistic significant higher levels in PAS patients in comparison to DM and healthy control group.
Conclusion: The anti IA2-antibodiews are involved in poliglandular autoimmune reactions in children with PAS.

P213

Type 1 diabetes, autoimmune thyroiditis, and selective immunoglobulin A deficiency in a girl with 18q deletion syndrome

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Diabetes mellitus type 1 is a polygenic disease that may coexist with other autoimmune disorders, e.g., Hashimoto's thyroiditis or/and immunoglobulin A deficiency, both also regarded as polygenic. We present a 5-year-old girl with a complex phenotype of 18q deletion syndrome, including short stature, microcephaly, facial dysmorphism, mental retardation, hypotonia, malformations of the hands and feet, hearing and vision impairment, structural heart defect, cleft lip, and palate. At the age of 3 the girl was diagnosed with diabetes mellitus type 1 [ICA 80 JDF (n:0), anti-GAD 409 U/ml (n: <10), C-peptide 0.77 ng/ml (n: 1.1–4.4) and hypothyroidism in the course of autoimmune thyroiditis [TSH >100 uIU/ml (n: 0.85–6.5), fT4 0.281 ng/dL (n: 0.9–1.7), anti-TPO >600.0 IU/ml, (n < 34)]. Molecular cytogenetic approach using CGH technique (Agilent, Germany) revealed the *de novo* chromosome 18 deletion, del(18)(q21.32-23) and duplication of a small region of chromosome 19, dup (19)(19p13). The girl suffered from recurrent infections due to immunoglobulin A deficiency (0.57 g/L (n: 0.7–4.0) diagnosed at the age of 4). Interestingly, she was also diagnosed with CD3+ CD4+ FoxP3+, CD3+ CD4+ FoxP3+ CD25+, CD3+ CD4+ CD25+ CD127low/neg T-regulatory cells deficiency found in flow cytometry (Becton Dickinson, NJ, USA). Some reports have suggested that this unique association of autoimmune disorders and immune deficiency in patients with 18qdel syndrome is not the matter of coincidence and that a loss of genes located on the long arm of chromosome 18 could play a role in the pathogenesis of autoimmunity including type 1 diabetes. This observation may suggest that there is a defective locus on chromosome 18 which may lead to monogenic form of autoimmune diabetes.

P214

Screening for mutations in children with a clinical diagnosis of maturity onset diabetes of youth (MODY)

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Objectives: The aim of the study is to determine the known and new mutations with a clinical diagnosis of MODY and clarifying the relationship between the genotype and the phenotype.
Methods: Patients with hyperglycemia that starts before the age of 25, autosomal dominant inheritance, the presence of vertical passage of the phenotype of similar diabetes in at least 3 generations, the presence of a significant C-peptide level in patients using insulin, are included in the study. A total of 11 genes are responsible for the 11 known types of MODY. There are a total of 83 exons in these 11 genes. The combination of all genes and exons are then sequenced by using new generation DNA sequencing technology.
Results: 42 patients were enrolled in the study. GCK gene mutation in 18 (%43), KLF11 gene mutation in 6 (%15), HNF1A gene mutation in 4 (%10), NEUROD1 gene mutation in 2 (%5), HNF1B gene mutation in 1 (%2), HNF4A gene mutation in 1 (%2), PDX1 gene mutation in 1 (%2), and HNF1A and HNF4A gene mutation in 1 (%2) of these patients were detected. No mutation was detected in 8 (%19) patients. Twelve different GCK gene mutations were identified in 18 patients, and eight of these mutations were previously unreported. The same KLF11 gene mutation was detected in 6 patients and this mutation was previously reported with familial transitive Type 2 diabetes mellitus. Three HNF1A gene mutations were determined in 4 patients, and one of the HNF1A gene mutation was previously unreported. One novel NEUROD1 gene mutation was identified in 2 patients and one novel HNF1B gene mutation was identified in 1 patient. One of our patients has obesity, hepatosteatosis and hypertension. We detected both HNF4A and HNF1A genes mutations. HNF4A mutation were given in HGMD database as diabetes mellitus type 2 causing mutation and HNF1A mutation was also described as a MODY mutation.
Conclusions: The most common types in our group is MODY 2. The known mutations are not found in 55% of our patients.

P215

The frequency of glucokinase, HNF1A and HNF4A gene mutations and their clinical aspects in suspected cases

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Aim: Incidence of glucokinase, HNF1A and HNF4A mutations and their clinical, laboratory characteristics were evaluated in patients with clinically suspected MODY.
Material and methods: 65 Turkish (34 female/31 male) children and adolescents with a strong family history of diabetes of any type, insulin independence, absence of auto antibodies for pancreatic antigens, and evidence of endogenous insulin production (detection of measurable C-peptide in the presence of hyperglycemia, low insulin requirement (0.5 units/kg/d), or a lack of ketoacidosis when insulin is omitted outside the honeymoon period were evaluated for glucokinase, HNF1A and HNF4A. Gene analysis were performed by Sanger sequencing.
Results: The mean age of the patients were 9.6 ± 4.5 (0.2–17.5) years, height SDS: 0.16 ± 1.67, BMI SDS: 0.55 ± 1.74. Family history of diabetes was 75% (n = 49), coincidental hyperglycemia was 84.6% (n = 55). Mean fasting glucose, postprandial glucose and HbA1c levels were 125 ± 115 mg/dl, 182 ± 125 mg/dl and 7.14 ± 2.62%, respectively. Basal and glucagon-stimulated C-peptide levels were 1.49 ± 1.19 ng/ml and 4.18 ± 4.22 ng/ml. Nine (13.8%) patients had glucokinase and 2 (3.0%) patients had HNF1A gene mutations. In 4 patients with glucokinase gene mutation, 3 different novel mutations (p.C230Y missense in a patient, p.C129X nonsense in a patients, and p.M331T missense in siblings patients) were found. In the two patients with HNF1A mutation; novel missense p.Q28H and p.R272G mutations were found.
Conclusion: Glucokinase gene mutation was the most frequent mutation and novel mutations were described. The patients without any mutations can be other forms of MODY syndromes or can be new mutations. Especially, further studies are needed in familial cases.

P216
Maturity-onset diabetes of the young (MODY) type 2 in infancy and adolescence: description of three families

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Objectives: Description of 3 families with MODY 2, due to mutation in the glucokinase (GCK) gene.
Methods: All patients were assigned to evaluation due to elevation of fasting plasma glucose (FPG) levels and had Family History (FH) of diabetes/or prediabetes. Exons 1A–10 and exon–intron boundaries of the *GCK* gene were screened for mutation by direct sequencing.
Results: Patients were asymptomatic and none of them presented micro or macroangiopathy. Patient 1 – RMCS, 8 y, male, normal BMI. FPG = 113 mg/dL, HbA1c = 6.4%, anti-GAD: negative, C Pep = 0.5 ng/mL and oGTT: Gluc.120' = 180 mg/dL. FH: mother with gestational diabetes (GD). Mutation: c.952G>A/Gly318Arg (exon 8) – patient and mother. Patient 2 – DMS,12 y, male, normal BMI. FPG = 115 mg/dL, HbA1c = 6.1%, anti-GAD: negative, CPep: 0.8 ng/mL, oGTT: gluc.120' = 168 mg/dL. FH: mother with GD. Mutation: c.106C4T /Arg36Trp (exon 2) – patient and mother. Patient 3 – TLR, 11 y, male, normal BMI. FPG = 120 mg/dl, HbA1c = 6.2%. Insulin Auto Antibodies, anti-GAD e ICA512/IA2: negative; Cpep = 1.34 ng/ml; oGTT: gluc. 120´ = 167 mg/dl. FH: father with glucose intolerance; sister, 6 years, with FPG = 112 mg/dl. Mutation: c.866A>G /Tyr289Cys (exon 8) – all affected members. The mutations had been previously described, and are related to MODY2 phenotype. All patients are being followed, without antidiabetic medication and with good metabolic control.
Conclusions: Clinical pattern of MODY2 is typical and similar in the majority of the patients. Noteworthy, the main signs are: lack of symptoms, fasting plasma glucose and HbA1c mildly elevated, glucose intolerance pattern on oGTT, negative pancreatic autoantibodies, and familiar history of disglycemia. Genetic diagnosis have important clinical implications in these cases, giving directions and orientations to treatment.

P217
A new *de novo* mutation in the GCK gene causing MODY2

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Background: Glucokinase (*GCK*) heterozygous inactivating mutations are responsible for MODY2, the commonest form of monogenic diabetes in Southern Europe. Clinical characteristics are strict autosomal inheritance, early age of onset, mild persistent hyperglycemia, glycated hemoglobin level (HbA1c) just above the upper limit, and absence of β-cell autoantibodies.
Objectives: *GCK* defects had been rarely reported as '*de novo*' mutations. We describe a novel *GCK* frameshift mutation arising '*de novo*' in 12-year-old Italian boy.
Case report: A 5.5-year-old boy was referred to our Center with mild fasting hyperglycemia (6.56 mmol/l), increased HbA1c (6.7%) and normal fasting C-peptide level (1.2 ng/ml). Oral glucose tolerance test (OGTT) showed impaired fasting glucose: the 2-hrs glycemia was 6.89 mmol/l, insulin level was 14 μU/ml. BMI was 18.4 kg/m^2. β-cell autoantibodies were negative. Parents were normoglycemic and family history was negative for hyperglycemia/gestational diabetes/overt diabetes mellitus. At age of 12.3 laboratory data confirmed: fasting hyperglycemia 6.78 mmol/l, HbA1c 6.5% and absence of autoantibodies. Based on this clinical parameters even in absence of family history, genetic testing for MODY2 was performed.
Results: Direct sequencing showed a novel frameshift mutation c.1103_1122_del19nt; p.R368fs27X on *GCK* exon 9. Mutation were absent in both proband's parents. Moreover, at physical examination, there was evidence of weight gain compared to previous years (BMI = 26.6 kg/m^2). As therapeutic option, only dietary prescription was handed out.
Conclusions: Up to now only 7 *de novo* mutations in MODY2 patients have been reported. It's important to analyze *GCK* in cases with clinical and biochemical features of MODY2, even in the absence of a family history of this disease. Autosomal dominant inheritance as strict diagnostic criterion for genetic testing should be reconsidered. This in order to avoid undiagnosed MODY forms, and to increase the epidemiological knowledge.

P218
Prevalence of *GCK* and *HNF1A* mutations in a cohort of Spanish children diagnosed with monogenic diabetes

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Objectives: The diagnosis of maturity onset dabetes of young (MODY) relies on clinical criteria, including early onset of

non-insulin-dependent, non-autoimmune diabetes with dominant inheritance, and confirmation at the molecular level. This study aimed to examine the genetic and clinical characteristics of a cohort of pediatric patients diagnosed with MODY.

Methods: Fifty-five patients referred for fasting hyperglycemia to a Paediatric Endocrinology Tertiary Hospital in 3.5 years, were screened for mutations in glucokinase (*GCK*) and hepatocyte nuclear factor 1α (*HNF1A*) genes by high resolution melting and sequencing. Clinical history and records of patients with positive mutations were reviewed.

Results: Mutations were detected in 19/55 cases (34.5%), 16/55 (29%) presented with *GCK* mutations, two of them novel. *HNF1A* mutations were identified in 3/55 (5.5%) probands. All patients had a positive family history of diabetes with at least 2 generations and 3 family members affected. Gestational diabetes was reported in 44.4% of cases. None of the probands had neonatal hypoglycemia or diabetes. The mean neonatal weight and height were 2900 g (−0.4 SD) and 47.7 cm (−0.8 SD), respectively. At diagnosis, they had BMI 0.13 ± 0.94 SD, median HbA1c 6.1 ± 0.7%, C-peptide 1.3 ± 0.7 ng/ml, insulin/glucose 0.25 ± 0.20 and HOMA 1.53 ± 1.44. Oral glucose tolerance test revealed fasting hyperglycemia in 18.7%, impaired glucose tolerance in 6.3% patients and both in 43.8%. Pancreatic auto-antibodies were negative except for one patient with the mutation *p.Arg229Gln* in exon 3 of *HNF1A* who needed insulinotherapy.

Conclusions: *GCK* mutations are the most prevalent in the studied cohort. None of the patients presented associated diabetic complications. Genetic testing is useful to confirm the diagnosis, infer prognosis and treatment choice.

Poster Tour 24: Genetics and monogenic diabetes II

P219
Diazoxide-responsive hyperinsulinemic hypoglycemia caused by a novel *HNF4A* mutation appeared *de novo*

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Background: The phenotype associated with heterozygous *HNF4A* gene mutations has recently been extended to include diazoxide responsive hyperinsulinemic hypoglycemia (HH) in addition to maturity-onset diabetes of the young (MODY).
Objectives: The baby girl was born at term to healthy parents with no history of diabetes mellitus; BW was 3800 g, BL 51 cm. In the first day of life she performed severe hypoglycemia (1.3 mmol/L); the mean rate of intravenous glucose administration required maintaining plasma glucose was 13 mg/kg/min. Within the first days of life she developed catheter sepsis. At the age of five days the further endocrine investigation was performed; in hypoglycemia (1.8 mmol/L) the level of insulin was stimulated (13.3 mIU/L) and capillary beta-hydroxybutyrate was suppressed (0.1 mmol/L); the diagnosis of hyperinsulinemic hypoglycemia was made. We started the treatment with diazoxide in increasing doses, due to a poor effect in two days the treatment was switched to octreotide administered in four daily doses. In combination with intensive maltodextrin diet fortification glycemia maintain in lower normal range.
Methods: In proband we performed molecular genetic testing of *ABCC8*, *KCNJ11*, and *HNF4A* gene using direct sequencing.
Results: In our proband the K(ATP) channel mutations have been excluded. Causative novel heterozygous mutation (Ser73delCCT) within the *HNF4A* gene was found; this mutation appeared *de novo*. Therefore diazoxide treatment was again administered and at the age of three months this treatment replaced octreotide. At the age of 12 months the girl is well thriven with no episodes of hypoglycemia, her psychomotor development is normal.
Conclusions: Even the family history of diabetes in our proband is negative, she will develop diabetes in the adolescency or young adulty and a risk for her children is 50% of recurrence of HH and diabetes. *The study was supported by IGA NT 11402*.

P220
HNF 1 alpha mutation in a patient with osteogenesis imperfecta type IV

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Objective: We present a case clinically diagnosed as osteogenesis imperfecta (OI) type IV and maturity-onset diabetes of the young type 3.
Case: Sixteen-year-old girl, admitted to our clinic due to recurrent extremity fractures and deformities since birth at the age of 7.7 years. She was treated with bisphosphonate from the age of eight and she developed obesity and impaired glucose intolerance at the age of 10 years. Metformin was initiated at the end of the first year of nutrition therapy because of ongoing insulin resistance and impaired glucose tolerance. During treatment HbA1c values were between 5.0 and 6.5 %. The parents were non-consanguineous. She was born 2800 gr. Similarly, her father suffered from OI and diabetes (from 30-year-old) and treated with insulin therapy. Also her father's two sisters were diagnosed with diabetes in mid of age 30.
Her weight was; 62.5 kg (SDS: +1.2), height; 142 cm (SDS: −2.42), BMI; 31 kg/m^2 (SDS: +2.6), she had blue sclera, deformities on extremities related to recurrent fractures. On laboratory studies; fasting and 2 h glucose and insulin levels were 170 mg/dl, 8.7 mIU/ml and 308 mg/dl, 26 mIU/ml, respectively. HOMA-IR was 3.6 and HbA1c was 10.2%. Urine ketone and diabetes autoantibodies (antiGAD, ICA, and IAA) were negative. Insulin analogue therapy was initiated. She had HNF1A missense c.1522 G>A (p.E508K) mutation. Insulin was switched to sulfonylurea based on the genetic result. The father was negative for the same mutation.
Conclusion: OI and MODY3 are known to occur due to mutations in different genes. In this patient, these disorders were thought to be coincidentally.

P221
Hyperglycemia and kidney disease: which MODY can be suspected?

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Introduction: Maturity-onset diabetes of the young (MODY) is a group of monogenic disorders characterized by mild hyperglicemia. Up to now 13 different gene mutations responsible for different phenotypes have been reported. Clinical characteristics may suggest appropriate genetic analysis.
Case: We report about a 16-year-old Italian girl who was referred to our Center for glycemic variability in patient with right kidney hypoplasia, bladder instability, mild fasting hyperglicemia (6.94 mmol/L, n.v. <5.5). Laboratory data showed absence of β-cell autoantibodies and HbA1c normal level (4.82%). Oral glucose tolerance test (OGTT) showed normal glucose tolerance, increased insulin response. Family history was positive for impaired glucose tolerance and diabetes mellitus in both parents pedigree. During follow-up hypoglycemia episodes followed by responsive hyperglycemia have been reported. Due to these clinical features, (dysglycemia and kidney abnormalities) *HNF1*β molecular sequencing and GCH Array were performed. Negative results induce us to consider other MODY among the 13 forms described up to now. Since kidney abnormalities have been described also in *HNF1*α/MODY3, we screened by direct sequencing *HNF1*α gene. We found a novel variant (c.226 G>A; p.Asp76Asn) both in patient and in her father, who was diagnosed as diabetic in adulthood. This missense change has never previously been reported in literature, and its biological role is still unknown.
Conclusions: The evidence of a significant family history of hyperglycemia and glycemic variability should be investigated in order not to miss cases of MODY. We suggest to consider genetic testing for MODY3 in patients with glycemic variability and kidney abnormalities even in absence of clinical diabetes, which in MODY3 patients usually develops later than other forms of monogenic diabetes.

P222

Identification of a novel mutation in an Egyptian infant with microcephaly, epilepsy, and permanent neonatal diabetes (MEDS) syndrome

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Here we describe an Egyptian female infant (deceased) fourth order of birth born to consanguineous healthy parents. The pregnancy was uneventful and she was delivered at term vaginally. At 2 months of age she presented with severe hyperglycemia and was diagnosed as infantile diabetes. On examination, she had microcephaly greater than −2.5 SD below the mean, developmental delay, hypotonia, epilepsy. At 4 months of age, the seizures were a combination of focal seizures with secondary generalization and generalized seizures. Electroencephalographs (EEG) showed polyspikes and slow waves with burst suppression pattern. Brain magnetic resonance imaging revealed microcephaly with simplified gyration, cortical atrophy, hypoplastic corpus callosum, cerebellar vermis hypoplasia, and delayed myelination. The diabetes and epilepsy were difficult to control despite treatment with clonazepam, vigabatrin, and sodium valproate and patient continued to have repeated pneumonias. No neurodevelopmental progress was noticed and she required intervention via nasogastric tube. No skeletal defects, liver or renal dysfunction were reported. Patient died at the age of 10 months of a lower respiratory tract infection complicated by therapy-resistant epilepsy and diabetes. Autopsy was denied by the parents. In the family, one more sibling died reported as having respiratory distress, but neither clinical data nor genetic screening were available. The parents also have a healthy daughter and a healthy son. Genetic analysis identified a homozygous missense mutation of the immediate early response 3 interacting protein 1 (IER3IP1) gene (exon 3 p.L78P c.233T>C) and parents are both heterozygous for this mutation. This gene mutation mostly leads to loss of activity resulting in apoptosis of neurons and pancreatic beta cells in patients implicating mechanisms of brain development and on the pathogenesis of infantile epilepsy and early-onset permanent diabetes.

P223

Transient neonatal diabetes: a report of three cases

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Transient neonatal diabetes mellitus (TNDM) is a rare but remarkable form of diabetes which presents in infancy, resolves in the first months of life, but then frequently recurs in later life. It is caused by overexpression of the imprinted genes PLAGL1 and HYMAI on human chromosome 6q24.

Objectives: To describe clinical features and laboratory manifestations of patients with TNDM and evaluate outcome of management.

Subject and methods: Clinical features, biochemical finding, mutation analysis, and management outcome of 3 cases from 3 unrelated families were study. All exon of KCNJ11, ABCC8 and INS genes were amplified from genomic DNA and directly sequenced. If the mutation of KCNJ11, ABCC8 and INS has failed to detect, methylation-specific PCR will be done to detect the loss of methylated region on chromosome 6q24.

Results: Three cases (one girl and two boys) onset at 23, 44, and 15 d of age with gestation age of 34, 40, and 40 weeks, with the birth weight of 2000, 2000, and 2300 g, respectively. All of them admisted with the feature of polydipsia, polyuria, macroglossia, and diabetes ketonacidosis, blood glucose of 30, 31.1, and 56 mmol/l, HbA1C of 6.8, 8.3, and 5.8%, respectively. Methylation-specific PCR of all patients showed loss of maternal hypomethylation at the TND differentially methylated region on chromosome 6q24, however one patient has heterozygous mutation in ZFP57, two patients has no ZFP57 mutation who has yet unidentified cause. After 18, 4.5, and 4.5 months of diagnosis (at 19, 5.5 and 5 months of age) they stop insulin. Now all cases have normoglycemic (fast blood glucose: 5.0, 5.9 and 5.4 mmol/L) at 3 years, 21 months and 11 months of age, one patient has mild development delay and two patients has normal development.

Conclusion: It is important to perform screening gene mutation for patients with diabetes before 6 months of age to control blood glucose and follow-up the patients.

P224

A case of transient neonatal diabetes in patient with DR3/DQ2 HLA

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Background: Transient neonatal diabetes (TND) is a rare condition that occurs within the first six months of life with hyperglycemia, low weight, dehydration. Anti-insula antibodies are absent and there isn't an HLA haplotype predisposing to T1DM. Genetically, three mechanisms have been shown to result in TND: uniparental disomy of chromosome 6 (UDP6), paternally duplication of 6q24, and a methylation defect at a CpG island overlapping exon 1 of ZAC/HYMAI.

Case report: A 15-day-old-girl, born by spontaneous deliver at the 37th week, with the weight of 2000 gr, after pregnancy course with threats of abortion, presented immediately after birth with macroglossia, cutaneous xerosis and hyperglycemia without ketosis. Insulin treatment was started intravenously at the dose of 0.01 UI/kg/h, and continued subcutaneously by insulin pump with the baseline speed of 0.05 UI/h, obtaining a good glycemic control. Insulin requirement rapidly decreased until discontinuation after 40 days of therapy. The insulin and C-peptide levels were below normal ranges. HLA showed a DR3/DQ2 haplotype compatible with T1DM. Finally, genetic testing was performed to the baby and her parents.

Results: Test for UDP6 was negative but the methylation test showed a lack of pure imprinting of ZAC gene in 6q24 in paternal and maternal alleles, which were both demethylated. Both parents have a rather normal pattern of methylation. Therefore it is a case of lack of maternal methylation allele which determines an overexpression of PLAGL1/ZAC and HYMAI genes within the 6q24 region and consequent TND.

Conclusions: Although the haplotype was suggestive for T1DM, the diagnostic suspicion of TND arose immediately because of patient's clinical presentation. Genetic investigation was necessary for diagnosis and establishing follow up of the patient.

P225

Neonatal diabetes in resource limited countries: experience from Sudan

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Method: Patients with neonatal diabetes diagnosed between 2006 and 2013 in our center were identified and clinically phenotyped. Genetic studies were done in molecular genetics units in Exeter and Cambridge Universities.
Results: In total, 9 cases were diagnosed; 3 (Wolcott Rallisons), one ABCC8 mutation, two KCNJ11 mutation, one Rogers syndrome, one Fanconi Bickel syndrome and one had Rabson Mandenhall syndrome. Therefore and unlike Western countries ABCC8 and KCNJ11 mutations constituted only 33.3% of the cases. Most cases were initially diagnosed as gastroenteritis, pneumonia or malaria. Three of the families lost 8 siblings with similar clinical presentation without specific diagnosis before.
Conclusion: Neonatal diabetes is not uncommon in Sudan. Many cases are possibly missed because of misdiagnosis. The genetic etiology is different from what was reported from the West and similar to reports from Arab countries with similar high consanguinity rate. International cooperation and help has greatly facilitated in specific diagnosis and management of these cases and this is highly appreciated.

P226

Neonatal diabetes in Wolcott–Rallison syndrome: a case report

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Wolcott–Rallison syndrome (WRS) is a rare autosomal recessive disorder characterized by the association of permanent neonatal or early-infancy insulin-dependent diabetes, multiple epiphyseal dysplasia and growth retardation, and other variable multisystem clinical manifestations.
Objectives: To describe clinical characteristics and genetic finding in the first Vietnamese patient with EIF2AK3 mutation.
Subject and methods: Clinical features, biochemical finding, mutation analysis and management in a 64-day-old-girl was studied. Based on analysis of a 64-day-old-girl's clinical symptoms associated with biochemical examination, the diagnosis of WRS was therefore made. Genomic DNAs were extracted from peripheral blood leukocytes from the patient and her parents with their informed consent for genetic studies. The coding and flanking intronic regions of the EIFAK3 gene was analyzed by sequencing.
Result: The patient had gestation age of 41 weeks, birth weight of 3200 g, and onset of the disease at 64 days of age. She was admitted with the features of convulsion, anemia, jaundice, diabetic ketoacidosis with pH of 7.27, HCO_3^- of 17.8 mmol/l, BE of −8 mmol/l, blood glucose 42.46 mmol/l, HbA1C 6.5%, total bilirubin 59.2 µmol/l, direct bilirubin 29.7 µmol/l, AST 3741.2 U/l, ALT 1927 U/l. PCR of CMV, EBV, HAV were negative. Abdominal ultrasound did not find any sign of cholestasis. Sequencing analysis of patient's EIF2AK3 gene has identified a homozygous missense mutation, p.R632W. The parents are carriers of heterozygous EIF2AK3 missense mutation, p.R632W. Now she is 18 months old, she has normal development, good blood glucose control with the insulin dose of 0.85 UI/kg/day, no jaundice, normal live function, not yet skeletal symptoms.
Conclusion: Combining mutation screening of EIF2AK3 gene with clinical manifestations and effective examination may provide a reliable diagnostic method for patients.

P227

Successful treatment with glibenclamide in case of neonatal diabetes with positive GAD autoantibodies

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Objectives: Pancreatic autoantibodies (ICA, a-GAD, IA2A) are very rarely seen in children with neonatal diabetes (ND).
Case report and methods: The girl was born from uneventful pregnancy on 40th gestational week, with birth weight 2500 g. Her parents are healthy, there are no relatives with diabetes. A day after vaccination, at the age of 3 months she presented manifestation of ND with DKA2, hyperglycaemia 34 mmol/l. Insulinotherapy was started in dose 1.0 U/kg, HbA1c - 10.1%, C-peptide 59.6 pmol/l (N 200–900). Also she was investigated on DM1-related autoantibodies: a-GAD - 92.6 IE/ml (N< 10), ICA - negative, IAA - 3U/ml (N< 10). She received insulinotherapy until 5 y.o., when genetic diagnostic on ND was performed. By the moment of this diagnostic HbA1c was 7.1%, C-peptide - 0.05 ng/ml (N 0.5–4), insulin daily dose - 0.6 U/kg.
Results: The molecular genetic testing revealed a heterozygous *de novo* KCNJ11 missense mutation, p.R201C. It was decided to change treatment on glibenclamide. Transferring process was performed using an outpatient protocol over 1 mth. The dose of glibenclamide after stopping insulin was 0,8 mg/kg, and was divided into 4 doses. After 3 mths of glibenclamide treatment daily dose was 0,6 mg/kg (divided into 3 doses), HbA1c - 6,3%, C-peptide - 0,54 ng/ml.
Conclusions: The presence of pancreatic autoantibodies should not exclude genetic testing for neonatal diabetes.

Poster Tour 25: Pumps and sensors I

P228
Multiple daily injection vs subcutaneous insulin infusion: a retrospective cohort study

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Objectives: Physiological insulin regimes are recommended by ISPAD. Continuous subcutaneous insulin injection pumps (SCII) have been developed to try and match physiological insulin profiles most closely. A retrospective cohort study was conducted to assess glycaemic control on individuals using multiple daily injections (MDI) of insulin and SCII. The aim was to assess whether the targeted treatment of a cohort of patients with pump therapy had resulted in significant improvements in HbA1c.
Method: An observational, retrospective cohort study compared two groups: patients who were treated solely with MDI regimes and those who were changed from MDI regimes to SCII therapy. All patients with type 1 diabetes mellitus who had been treated by the paediatric team at The Countess of Chester Hospital over a five year period from 2007-2012 were identified and their annual HbA1c values were noted. The mean change in these values was compared between the two cohorts over the interval.
Results: There was sufficient data available for 39 subjects to be included in either cohort; the majority of values were calculated as a percentage prior to mmol/mol becoming the standard unit of HbA1c. The cohort maintained on MDI therapy throughout the study period (n=20) had a mean rise in HbA1c of 0.13% (95% confidence interval -0.43% - 0.69%). The cohort which was switched from MDI to pump therapy had a mean rise in HbA1c of 0.54% (95% confidence interval 0.03% - 1.05%).
Conclusion: There is a trend for worsening HbA1c throughout both groups. Although not statistically significant in this study, there does seem to be a tendency for this to be generally worse in the group switched to pump therapy than those who remained on MDI. Our study did not support the evidence from previous randomised control trials that SCII therapy generally results in improvements in HbA1c amongst a paediatric population with type 1 diabetes.

P229
Insulin pump use in a psychologically distressed teenager – danger or lifesaver?

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Objectives: We present a female aged 17 years with type 1 Diabetes Mellitus (DM) from toddlerhood, currently managed on continuous subcutaneous insulin infusion (CSII). We describe her psychological difficulties that led to poor glycaemic control and assess whether CSII was effective for her, even though CSII was run only with basal insulin. Can CSII be appropriate for a distressed teenager?
Method: Blood sugar control and CSII use were collected using patient notes and pump downloads. She was assessed by a Clinical Psychologist using the Strengths and Difficulties Questionnaire.
Results: Initially she was on basal-bolus insulin, with HbA1c ranging 10 to 13%, with adverse events; multiple hypoglycaemic seizures and ketoacidosis. She maintained high blood sugars due to fear of hypoglycaemia.
She commenced CSII aged 15, adopting a strategy of high background basal insulin up to 98.5% of her total daily dose, neglecting meal / correction boluses and blood sugar checks. Nevertheless HbA1c improved from 13% to 9.4% and BMI remained between 20 -23. There has been a significant reduction in adverse events.
Several psychological and social factors prevented optimal DM management including attention from family and medical staff by being unwell. Her severe distress, with hyperarousal, was a trauma response to sexual abuse by her stepfather, denial of the abuse by her mother, and continuation of the relationship with the stepfather by her mother. The patient used avoidance, idealising, and denial as coping strategies for her lack of social support and poor interpersonal relationships.
Therapeutic intervention works to validate her emotions and promote self efficacy. It is hypothesised that amelioration of her psychological difficulties will improve self esteem and self care, thus improved diabetes management.
Conclusion: CSII, even if suboptimal, can allow time for psychological and social intervention for a distressed teenager with type 1 DM who otherwise has poor diabetic control.

P230
Factors related to glycemic variability and metabolic control in children with type 1 diabetes mellitus (T1DM) treated with continuous subcutaneous insulin infusion (CSII)

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Objectives: Glycemic variability plays an important role in the development of chronic diabetic complications and is considered a marker of quality of metabolic control. We aimed to measure glycemic variability in a group of children with T1DM treated with CSII and evaluate the factors influencing it.
Methods: 26 T1DM patients on CSII (17 females, 9 males), age 12.4 ± 4.8, diabetes duration 7.5 ± 4.1 years and HbA1C $7.6 \pm 0.7\%$ were enrolled. Data for each patient and visit (162 records) were collected. Number of bolus, insulin dose and proportion Basal/Bolus were obtained from pumps. Blood glucose profiles in the previous month were downloaded from meters (Accu-Chek Smartpix®): Mean glucose, standard deviation (SD), High Blood Glucose Index (HBGI) and Low Blood Glucose Index (LBGI). According to their lability patients were classified in low risk (HBGI ≤ 10 and LBGI ≤ 2.5) and high risk (HBGI > 10 or LBGI > 2.5). Number of daily bolus and blood glucose (BG) measurements, age and time of evolution of diabetes were correlated with HbA1C, mean glucose, SD, HBGI and LBGI.
Results: Mean glucose: 171.2 ± 29.8 mg/dl, SD:79.3 ± 16.2, HBGI:10.5 ± 4.9, LBGI: 2.3 ± 4.6. Number of daily bolus: 5.2 ± 1.6, insulin dose: 0.7 ± 0.1 U/kg/d, %basal: 48.8 ± 9.8. Number of bolus and BG measurements had a significant negative correlation with HbA1C, mean glucose, SD and HBGI ($p < 0.05$). Age and longer diabetes duration were significantly related with higher HbA1C and variability (SD) as well as increased risk of hyperglycemia (HBGI) ($p < 0.05$). Patients with lability low risk had significant lower SD and HBA1c, higher bolus dose and were younger than those with high risk ($p < 0.001$).

Conclusions: Number of bolus and frequency of glycemias per day are determinant in reducing glycemic variability and improving metabolic control in TD1M children on CSII. It is important to intensify education on these topics in adolescents and patients with a longer duration of diabetes to optimize their CSII treatment.

P231

Reduced acute complications, improved glycemic control and reported quality of life in young diabetic patients on continuous subcutaneous insulin infusion (CSII)

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Objectives: The use of CSII in very young children was initially limited. Its use has been associated with better long term glycemic control and reduced episodes of hypoglycemia. These are the criteria for continued use. The objective of this study was to evaluate the benefits of CSII on glycemic control, acute complications and quality of life of diabetic patients.

Methods: Retrospective analyses of data from patients with type 1 diabetes from our database that were started on CSII from 2007 to 2012 were done. Their glycosylated hemoglobin ($HbA1_c$), hypoglycemic episodes, diabetic ketoacidosis and reported quality of life were documented in the year before CSII and compared post-CSII.

Results: There were 17 patients, 9 males, 8 females with mean age at diagnosis of diabetes of 5.1(range 1.5–10) years. Mean age at CSII initiation was 9.94 (range 3–15) years and mean time taken for transferring a patient from MDI to CSII was 4.76 years. Mean basal insulin dose before CSII was 0.45 units/kg, decreased to 0.3 units/kg at CSII initiation. At 1 and 3 years post-CSII, 0.33units/kg and 0.38/kg respectively. Mean basal insulin was significantly higher in girls than boys (26. 8 vs 16.8, $p = 0.018$) before CSII initiation and not significantly different at start and 3 years post-CSII. Mean HbA1c was 66 before and at CSII initiation, decreased to 64.5, a month later and continued to improve 3 years post-CSII except in 3 patients > 12 years with initial decrease but no significant difference 3 years post-CSII. There was significantly less blood sugar excursions, diabetic ketoacidosis and hypoglycemic episodes post-CSII. Quality of life measured by flexibility, autonomy, socialization and sleep improved post-CSII.

Conclusions: CSII use was associated with improved reported quality of life. It is effective in providing lasting benefits such as optimizing glycemic control and reducing acute complications in children with type 1 diabetes particularly in younger children and girls.

P232

Experience with continuous subcutaneous insulin infusion (CSII) therapy in children with type 1 diabetes in Kuwait

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Objectives: To evaluate whether Continuous Subcutaneous Insulin Infusion (CSII) goals for metabolic control were achieved in children and adolescents with type 1 diabetes (T1D) in Kuwait.

Methods: We reviewed retrospectively the charts of 58 children and adolescents with type 1 diabetes who were on CSII at Dasman Diabetes Institute, Kuwait. Data collected included gender, age, T1D duration, date of CSII initiation, indications for pump initiation, BMI, HbA1c, insulin requirements (IR), lipid profile, DKA and severe hypoglycemic events (SH) at baseline, 3, 6 and 12 months during follow up.

Results: The total patient population was divided into 3 groups based on their age at analysis. The mean age of the group was 12.6 (standard deviation [SD]) 4.1 years with a sex ratio of male: female 0.9. The indications of CSII was better quality of life in 29, improvement of hyperglycemia in 17, recurrent DKA in 7, recurrent severe hypoglycemia in 3 and needle phobia in 2 children. 6.9%, 43.1% and 50% were below the age of 6 years, 6–12 and 13–19 years respectively. The mean A1c of the whole group was 8.5% (normal 6–8%) 69 mmol/mol (normal below 42 mmol/mol). It was 7.75, 8.2 and 8.9% in the age group 0–5, 6–12 and 13–19 respectively. There was a significant decrease of HbA1c in the age group less than 6 years at 9 months follow up, but levels gradually increased at 12 months. There was no significant difference in the age group 6–12 or 13–19 years after one year.

Conclusions: CSII is an acceptable form of therapy in our population and was effective in reducing the number of events of severe hypoglycemia and diabetic ketoacidosis. Improvement of glycemic control was only observed in the young age group. While in the older age group of adolescent patients it is hard to get better control.

P233

Efficacy of continuous subcutaneous insulin infusion (CSII) therapy in type 1 diabetes mellitus (T1D) in a large district general hospital in UK

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Objectives: To investigate if CSII therapy results in improved HbA1c control and to determine whether lifestyle choice for initiation of CSII results in improved glycemic control in comparison with other NICE recommendations.

Method: Retrospective, single centre, case note analysis of changes in glycated haemoglobin (HbA1c), hypoglycaemia, DKA rates on CSII therapy (mean duration 29mth, range 4–62) prior to March'13. Total T1D in our unit were 182, out of which 51 on CSII, previously on MDI were included. CSII started in the last three months and in adult transitional services were excluded. Data was collected for age, duration, indications, HbA1c values prior to start and recent value. Statistical analysis was carried out using paired T test from SPSS statistical tool

Results: Total T1D subjects on CSII included for data analysis 51, of which 22 (43%) boys and 29 (57%) females. Age range 2.09y to 19.32y with 10 to 15 yrs, 28 (55%) being largest group. Indications for CSII were 18 (35%) poor glycaemia control, 23 (45%) lifestyle choice, 5 (10%) recurrent hypoglycaemia and 5 (10%) combination of above. CSII was associated with a reduction in HbA1c (73.5 to 70.5, 95% CI −0.7 to 6.8, $P = 0.091$) but statistically significant change was noted in boys only ($N = 22$) from 79.9 to 72.1 (95% CI 1.46 to 13.9, $P = 0.006$). Girls ($N = 29$) HbA1c from 68.6 to 69.2 (95% CI −5.1 to 4, $P = 0.885$). Complication rates in preceding 12 months were DKA of 8(5%) and hypoglycaemia 3(1.9%). Statistically significant improvement in HbA1c was noted in children starting CSII for poor glycaemia control ($N = 18$) (83.39 to 74.39, 95% CI 0.02 to 0.8, $P = 0.002$) but not in the group started for lifestyle choice (63.91 to 65.57, 95% CI −7.2 to 3.8, $P = 0.543$)

Conclusions: Our study shows improved HbA1c in CSII patients but statistically significant only in boys. CSII started according to NICE

selection criteria of poor glycemic control has better improvement in HbA1c compared to lifestyle choice alone.

P234

Intensive insulin pump therapy improves glycaemic control and emotional well-being in children with type diabetes mellitus in whom multiple daily insulin regimen had previously been used to maximal effect

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Introduction: This study aims to look at the effect of glycaemic control, growth parameters and patient reported outcomes in children with type 1 diabetes mellitus in whom multiple daily insulin (MDI) regimen had previously been used to its maximal effect compared to continuous subcutaneous insulin infusion (CSII or insulin pump therapy).

Methods: This is a retrospective study comparing glycaemic control (HbA1C), growth parameters (height SDS, weight SDS and BMI SDS) and WHO-5 Well-being index score in 23 children with type 1 diabetes mellitus who had been on a MDI regimen compared to when they were commenced on continuous subcutaneous insulin infusion (CSII or insulin pump therapy) Data for at least 18 months pre-CSII period in only those patients who had received MDI before CSII were compared with data post-CSII period. Data was analysed using statistical software Statistical Package for the Social Sciences (SPSS 20, Chicago).

Results: The mean HbA1C +/− for the 18 month period before CSII (during MDI regimen) was 8.8% +/− 0.63 versus a mean HbA1C of 7.7% +/− 0.8 for the 18 month period after the first year of CSII. This improvement in HbA1C was statistically significant ($P = 0.04$). The mean HbA1C +/− for the 3 month period before CSII was 8.3%+/− 0.71 compared to a mean HbA1C of 7.1%+/− 0.69 for the 3 month period after CSII ($P = 0.01$). The mean WHO-5 Well-being index score was 58 in the 18 month period during MDI regimen compared to a mean WHO-5 Well-being index score of 86 in the period after CSII ($p = 0.03$). There were no significant differences noted in height SDS, weight SDS or BMI SDS in the 18 month period before and after CSII.

Conclusions: We conclude that implementation of intensive insulin pump therapy with CSII improves glycaemic control and emotional well-being in patients in whom MDI regimen had previously been used to its maximal effect. Future prospective studies are warranted to address the issues described.

P235

Efficacy of insulin pump therapy in children with type 1 diabetes mellitus in Kazakhstan: initial observations after 1 year

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Objectives: The Kazakhstan Ministry of Health initiated a country-wide program to provide insulin pump therapy (CSII) for 790 children with type 1 diabetes (T1DM) in February, 2012 in partnership with Medtronic, who agreed to train and support the healthcare providers, the patients (age 5–15 years), and their parents. The purpose of this study was to evaluate the effectiveness of CSII during the first year of therapy.

Methods: Data from 360 patients (51.4% boys) who completed 12 months of CSII therapy were analyzed. Initial A1C level was obtained from local laboratories and follow-up A1C values were measured by In2it™ analyzer. Clinic visits were every 3 months for routine diabetes care including CareLink report reviews, anthropometric measurements, therapy adjustments, and A1C determinations.

Results: The mean age at the start of CSII was 10.4 ± 2.8 years and mean diabetes duration was 4.1 ± 2.8 years (range, 2 months–13 years). Baseline mean daily insulin dose was 0.81 ± 0.21 U/kg (range, 0.12–2.95 U/kg), and decreased to 0.77 ± 0.13 U/kg (range, 0.2 to 2.3 U/kg) at 12 months. Baseline mean blood glucose level, obtained from pediatric endocrinology clinic records, was 11.56 ± 5.80 mmol/L, and decreased to 10.43 ± 4.17 mmol/L at 12 months (CareLink data). Separate calculations have been done for the group of patients with poorly controlled diabetes with initial A1C level $\geq 7.5\%$. Mean age was 10.22 years, mean duration of diabetes was 3.69 years, and duration of diabetes < 1 year was seen in 13.86% of patients at the start of insulin pump therapy. After 12 months of CSII, both mean A1C values and BG levels decreased by 0.75% and 1.92 mmol/l, respectively.

Conclusion: CSII was shown to improve glycaemia in children and youth in Kazakhstan, particularly in those with higher A1C levels and longer duration of diabetes at start of CSII. Collaborative efforts between Ministries of Health and industry can lead to programs that improve health of children with diabetes.

P236

Technical determinants of diabetes control in insulin pump therapy in children and adolescents

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Insulin pumps (IPs) are equipped with advanced functions to control blood glucose (BG). Intensive training and adherence are required for the optimum use of the technology. We aim to assess the association of various key elements in IP functions on BG control in children and adolescents. Patients with T1DM on IP therapy were approached to participate in the study. Patients had their HbA1c checked and IPs downloaded using Medtronic Care-link 3 software. Data over 8–12 weeks were collected. Patients were grouped based on HbA1c of $\leq 8\%$ and $> 8\%$ into controlled (group 1) and uncontrolled (group 2) respectively. Variables studied are; use of sensors, duration of sensor use, frequency of BG monitoring and bolus wizard use, frequency of correction boluses and frequency of cannula changing. 50 patients were enrolled (16 males). Median age was 12 years (2.3–17.1). 20 patients were categorized to group 1 and 30 to group 2. Median BG checks/day was 4.4 (2–11.4) and 3.2 (0.5–7.9) for group 1 and 2 respectively ($P = 0.021$). Frequency of bolus wizard use/day showed a median of 6 (3.9–12.9) and 4.15 (0.6–9) for group 1 and 2 respectively ($P < 0.001$). 6 patients (30%) of group 1 and 12 (40%) patients of group 2 used sensors during the study period. Group 1 used sensors for longer (mean of 5 vs 2.9 days/week). However, both observations were not statistically-significant. Patients of group 1 did more corrections compared to group 2 (3.9 vs 2.5) but the difference was not statistically-significant. There was no difference in the frequency of changing the infusion cannula in both groups (median of 3.5 days). We conclude that the frequency of BG monitoring and bolus wizard use has a positive

correlation with BG control in patients on IP therapy. Patients with better control tend to bolus more for glucose correction. This group also used sensors for longer period. However, larger number of patients is needed to confirm the association of these 2 variables on diabetes control.

P237

To pump or not to pump: a novel tool to successfully predict youth who will demonstrate appropriate usage of diabetes technologies

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Objectives: There has long been controversy as to which individuals will benefit most from commencement of advanced diabetes technologies such as continuous subcutaneous insulin infusion (CSII) or continuous glucose monitoring systems (CGMS), which require increased intensivity of management and education. Since higher usage correlates with HbA1c, we aimed to predict future usage of CSII and CGM using demographic, intra- and interpersonal factors.

Methods: Systematic literature review identified 13 predictive factors, from which a questionnaire-based tool was devised. This was distributed to 98 youth with type 1 diabetes; 50 of whom then commenced using CGMS and 48 of whom subsequently commenced CSII. Recommended usage was >5 days per week ($\geq 70\% =$ High Usage [HU]; $<70\% =$ Low Usage [LU]) at 3 months for the CGMS group. In the CSII group, HU $= \geq 5$ blood sugars per day and LU as < 5 blood sugars per day at 6 months from initiation. Binary logistic regression with forward stepwise conditional was used to utilize tool scales and calculate an applied formula.

Results: Final outcome data are available for 40 of each CGMS and CSII arms.

12 of the CGMS group demonstrated HU Vs 28 who had lower usage(LU) at 3 months. Overall metabolic control differed between groups [HbA1c 7.2% (HU) vs 7.8%(LU); $p = 0.009$]. 8 subscales of the tool generated a formula which predicted both high and low usage with 100% accuracy.

This formula was then applied to the CSII group, of whom 30 displayed HU and 10 LU at 6 months. This again predicted all individuals displaying both HU and LU with 100% accuracy. The formula was also 100% predictive for HU and LU in 20 patients for whom outcome data were available at 12 months.

Conclusions: Our tool resulted in successful prediction of those individuals who will and those who will not go on to demonstrate recommended usage of CSII and CGMS. The group of individuals demonstrating higher usage of CGMS had significantly improved metabolic control.

Poster Tour 26: Pumps and sensors II

P238

Relationship between basal insulin requirement and body mass index in children and adolescents with type 1 diabetes using insulin pump therapy

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In insulin pump therapy (IPT), it is recommended that basal insulin percentage for children and adolescents to be between 30–50% of the total daily dose. As patients with higher body mass index (BMI) are more insulin-resistant, we hypothesize that they require higher basal insulin compared to those with normal BMI. Children and adolescents with type 1 diabetes on IPT were approached to participate in the study. All patients had their weight (Wt), height (Ht) checked and BMI calculated on the day of the clinic visit. Subjects were categorized to normal Wt (NWt) and overweight (OvWt) based on BMI centile charts. Insulin pumps were downloaded using Medtronic Care-link 3 software and data over 8–12 weeks' period were collected. Basal insulin requirement is considered high if it exceeded 50% of the total daily dose. Selected variables included; HbA1c, total daily insulin requirement, daily basal insulin requirement and daily carbohydrate intake. The study was approved by the local research and ethics committee. Mann–Whitney *U*-test was used for analysis. A P-value < 0.05 was considered significant. 50 patients were enrolled (16 males) with a median age of 12 years (2.3–17.1). 14 patients were NWt and 36 were OvWt. There was no difference in the number of NWt and OvWt children using basal insulin requirements below or above the cut-off of 0.5 ($p = 0.860$). Higher basal insulin requirement was observed in older children. This observation showed a statistically-significant difference with a P value of 0.031. The demand for higher basal insulin was not correlated with patients HbA1c, daily insulin/kg or daily carbohydrate intake. According to the above data, BMI did not show a correlation with the basal insulin requirement in children and adolescents regardless of the total daily insulin, HbA1c or the daily carbohydrate consumption. Nonetheless, older children showed a higher requirement for basal insulin. Larger number of patients is needed to confirm this observation.

P239

The insulin on board setting in young pre-pubertal pumpers with good metabolic control does not match published pharmacodynamic data on insulin action time

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Objectives: Published data show insulin action time to be approximately 4-5h in prepubertal children. We began using 4h as default setting for insulin on board (IOB) in the pump, but then changed to 3h as families experienced the bolus guide not giving enough insulin when was IOB present. IOB was adjusted at visits according to parents' experience of the correction effect of a bolus when IOB was present.

Methods: Pumps, glucose meters and continuous glucose monitors (CGM) were downloaded at a routine visit.

Results: 21 prepubertal children aged 7.0±2.3 (±SD)(range 2–10) years with diabetes duration 3.0 ± 1.9 (0.5-7.7) years used the pump bolus guide for carbohydrate counting (CC) and correction boluses. 7 used CC and 15 used pumps from onset of diabetes. Their HbA1c was 53 ± 6 mmol/mol (7.0 ± 0.5%), and none experienced severe hypoglycemia with unconsciousness within the last 3 months. 6 used CGM with a mean glucose of 8.9 ± 3.8 mmol/l over the last month, the others took 10.1 ± 2.0 plasma glucose (PG) tests/day with a mean PG of 9.1 ± 1.7. Their total daily dose was 0.7 ± 0.1 U/kg/24h (range 0.5-1.0), and their percentage basal insulin was 38 ± 11%. 13 had their highest basal rate before midnight (159±39% of mean total hourly rate), 4 from 18–21 o´clock. The insulin:carbohydrate ratio (IC) was 13–42 in the 2–4 y olds, 17–33 in the 5–7 and 10–60 in the 8–10 year olds. 18 had a lower IC setting in the morning (gives more insulin). The insulin sensitivity factor (ISF) was 8–20 in the 2–4 y olds, 4–10 in the 5–7 and 3–9 in the 8–10 year olds. IOB was set to 2.6±0.5 h (range 2–3) and target BG to 5.3±0.4 mmol/l (range 5.0-6.0).

Conclusions: Prepubertal children seem to need lower settings for IOB than published pharmacodynamic data show. Half-hour increments of IOB are valuable for fine-tuning the insulin action time. It is possible to achieve good metabolic control using the bolus wizard for carbohydrate counting and correction boluses, and still have a low rate of severe hypoglycemia.

P240

Frequency of skin alterations in children and adolescents with type 1 diabetes and insulin pump treatment

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Objectives: Subcutaneous insulin infusion via insulin pump is common in children and adolescents with type 1 diabetes. Either steel or Teflon catheters are inserted in the abdomen, gluteal region, legs or arms, and remain in-place for at least 48 hours. The local fixation of catheters on the skin is performed with plasters, which may cause skin alterations. In addition, we hypothesize, that an extended period of insertion and particular choice of catheter may cause skin irritations.

Methods: In a single centre setting 65 patients with insulin pump treatment were asked to take part in a clinical observation with photo-documentation of the catheter insertion site and to answer a questionnaire. Fifty-four (83%) of these patients (26 female, 28 male) aged 3 to 20 years took part in the observational survey. A questionnaire about diabetes duration, duration of pump treatment, pump model, catheter material, type of insulin, time-interval between insertions and hygienic procedures were analyzed.

Results: 44,4% (9 female, 15 male) of patients showed local alterations of the skin. Scars were observed most often (54,2%, 6 female, 7 male), followed by lipo-hypertrophy (45.8%, 4 female, 7 male) and eczema (25%, 1 female, 5 male). Furthermore, hyper-pigmentation could be seen in 12.5% (1 female, 2 male) and 12.5% (1 female, 2 male) presented with lipo-atrophy. Two female patients (8.2%) showed subcutaneous infections requiring surgical treatment. In 54.2% (6 female, 7 male) the insertion region had to be relocated. None of the patients needed to switch to injections via syringe or pen due to skin alterations.

Conclusion: Based on our observations, skin alterations frequently occurred as a side effect of insulin pump treatment in children and adolescents. The relatively high frequency of lipo-atrophy is interesting and needs further investigation in a multicentre setting to clarify if there is a relationship with the continuous subcutaneous insulin infusion.

P241

Needle detachment from the Sure-T® infusion set as cause of hyperglycemia in 2 young children with diabetes mellitus (DM) treated with continuous subcutaneous insulin infusion (CSII)

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Objectives: The infusion set is the Achilles heel of CSII. The Sure-T® infusion set (Medtronic) has the thinnest steel needle. Hyperglycemia due to needle detachment from the infusion set has so far not been reported. We here report on 2 children with DM treated by CSII who developed hyperglycemia caused by Sure-T® needle detachment.

Case reports: The 1st patient developed DM at the age of 18 months. Treatment with SCII of Novorapid® with a Paradigm Veo pump using the Sure-T® infusion set (8 mm needle) was started shortly after diagnosis in January 2012. The catheter was inserted in the upper outer quadrant of the buttocks. On Christmas day 2012 the patient developed hyperglycemia (419 mg/dl). On replacing the infusion set the parents remarked that the needle was missing. An X-ray of the buttocks revealed the presence of 2 needles that were surgically removed. On January 11th, 2013 the patient developed the same problem. During a 2 hour lasting surgical intervention the needle couldn't be removed. The 2nd patient developed DM at the age of 5 2/12 yrs and was initially treated by insulin injections. At the age of 7 3/12 yrs treatment was changed to SCII of Novorapid® with a Paradigm Veo pump using the Sure-T® infusion set (8 mm needle). The catheter was inserted in the upper outer quadrant of the buttocks and replaced adequately. On December 17th, 2012 the patient developed severe hyperglycemia (515 mg/dl) which couldn't be resolved by correction boluses. On changing the infusion set the parents couldn't retrieve the needle. An X-ray showed the presence of a needle in the left gluteal region. The needle was surgically removed. Intensive consultation of the Medtronic representatives could not retrieve a cause for the needle detachment.

Conclusions: Needle detachment from the infusion set is a rare cause of hyperglycemia in children with DM treated by CSII. We would like to share these observations with the ISPAD community and are interested to hear from similar cases.

P242

Insulin pumps: what do adolescents and their caregivers know?

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Objective: The purpose of this study was to evaluate insulin pump knowledge in adolescents (ages 10–16 years) with type 1 diabetes and their caregivers.

Method: Twenty-two adolescents (M_{age}=13.68 years±1.73; 36.4% female; $M_{diabetes\ duration}$=6.44 years ± 3.28; $M_{pump\ duration}$=3.69 years ± 2.70; M_{A1c} =8.86% ± 1.25) and their caregivers (M_{age}=44.39 years±9.64; 86.4% female) completed the Test of Insulin Pump Knowledge at their Time 1 Study Visit. Scores can range from 0-100% with higher scores reflecting better knowledge. Incorrect answers were reviewed and an insulin pump facts newsletter was provided to aid in increasing knowledge. The Test of Insulin Pump Knowledge was re-administered 3 months later at the Time 2 Study Visit (N=16). Data collection is ongoing.

Results: Time 1 Study Visit scores ranged from 64-90% for adolescents and 67-91% for caregivers, whereas Time 2 Study Visit scores ranged from 61-91% for adolescents and 79-98% for caregivers. As expected, caregivers demonstrated better insulin pump knowledge (M=82.50) than adolescents (M=76.00; $t(21) = -3.81$; $p < 0.001$). Adolescents' insulin pump knowledge improved from the Time 1 Study Visit (M=74.81, SD=5.18) to the Time 2 Study Visit (M=79.31; $t(15)= -2.33$; $p < 0.05$). Caregivers' insulin pump knowledge also improved from the Time 1 Study Visit (M=81.19, SD=6.42) to the Time 2 Study Visit (M=87.50; $t(15) = -3.68$; $p < 0.01$).

Conclusions: This is the first study to assess insulin pump knowledge in adolescents and their caregivers. Our findings suggest that although many adolescents and caregivers have adequate insulin pump knowledge, a subset have significant knowledge deficits and would benefit from more intensive education intervention about their insulin pumps.

P243

Adequacy of the integrated glucose sensor and infusion set's sensor performance in the high insulin requiring population

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Objectives: The glucose sensor and infusion cannula of the Medtronic Integrated glucose sensor and infusion set are separated by 11 mm on the same platform.The feasibility of the device was demonstrated in type 1 diabetes patients with average insulin requirements.The goal of this study was to assess sensor performance in patients using relatively large insulin boluses.

Methods: Seventeen patients (16 with T1DM,1 with T2DM) participated in the 3-days study. An Integrated set and an Enlite sensor were inserted on opposite sides of the abdomen. There were two 12-h inpatient sessions (07:00 to 19:00) that included high-carbohydrate meals. During 3-days of device testing, insulin was only delivered via Integrated sets.

Results: Sensor performance of Integrated sets was evaluated based on 1173 paired sensor glucose-meter blood glucose values generated by 17 devices; performance of Enlite sensors was based on 1122 such values generated by 16 devices worn simultaneously.The average meal bolus during inpatient days was 13.1 ± 5.7U (range: 5.8–30 U; N= 90).The mean absolute relative differences (MARD) of Integrated sets and Enlite sensors were 14.9% and 15.4%,respectively (P=0.7). The clinical accuracy of Integrated sets was comparable to that of Enlite (99.2% vs.97.7% for Integrated set and Enlite, respectively; P=0.7) and stable throughout the device life. The percentage of Integrated set readings in the Clarke A+B zones was 98.6% on day 1 and 99.6% on Day 3. Comparable percentages for Enlite were 96.9% on Day 1 and 98.6% on Day 3.

Conclusions: The study demonstrated that sensor performance of the Integrated sensor and infusion set is not affected even when recurrent large boluses are delivered, suggesting that the device is

feasible for continuous glucose monitoring and insulin delivery in patients with high insulin requirements.The device has the potential to significantly reduce patients' burden related to diabetes management in a wide range of patient population.

P244
Successful treatment with CGM in a clinical setting

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Objectives: Continuous glucose monitoring (CGM) system has become an important tool to optimize the insulin treatment of children with T1DM. The extra costs in terms of personnel and economical resources motivates systematic evaluation and attention on outcome variables. The main objective of this study was to evaluate if the use of CGM in a clinical setting could reduce HbA1c on a group level.
Method: The study was conducted as a retrospective non-randomized analysis of data from patients under the age of 18 years with T1DM who received CGM. 500 patients aged 0–18 y are treated at the clinic of which 50% have insulin pumps. More than 100 patients have tried CGM on a short- or long-term basis. 57 patients (29 female, 28 male), 3–18 years of age and with ≥3 months experience of CGM were included in the analysis. A follow-up evaluation was performed 3–15 month after receiving CGM. The data were analyzed with the broken-line model, indicating if the slope of the curve favoured a decrease in HbA1c or not.
Result: Each data set (N = 57) was analyzed using a broken-line analysis and a linear regression. The observation time was 6–24 months before the breakpoint (introduction of CGM) and 6–15 months later, while the patients used CGM. Before introducing CGM the slope of the Hba1c was 1 ‰ (p=0.05) in average. However, after the introduction of CGM, HbA1c decreased 3 % (p=0.0038) during the following 15 months.
Conclusions: In children with T1DM, the use of CGM ≥3 months resulted in a significant improvement of glycemic control in a clinical setting.

P245
The correlation between glucose fluctuation and oxidative stress in different phases of type 1 diabetes children

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Objective: The purpose of this study is to analyze the correlation between glucose fluctuation and oxidative stress in different phase of type 1 diabetes(T1DM) children by continuous glucose monitoring(CGMS).
Methods: Grouping for T1DM children into Group A, acute metabolic disturbance period; group B, the honeymoon period and group C, the long standing period. The control group named as group NC. All of the subjects were wearing CGM for three consecutive days, collected 24 h urine samples at the same time. Blood stability parameters include: Mean blood glucose(MBG), mean amplitude of glycemic excursions(MAGE), continuous overall net glycemic action(CONGA), postprandial incremental area under the curve(IAUC). We evaluated oxidative stress by excretion rate of 24 hours urinary free 8-iso prostaglandin F2α(8-isoPGF2α/Cr).
Results: 1. The levels of oxidative stress: it was significantly lower of 8-isoPGF2α/Cr in NC group than in diabetic groups. The increasing order of it was group B, A and C.
2. The univariate analysis: Analyzing result of all subjects, 8-isoPGF2α/Cr was positive correlated with intraday glucose fluctuations, postprandial glucose fluctuations, MBG, fasting blood glucose and HbAlc. And 8-isoPGF2α/Cr was negative correlated with C-peptide and HDL-c.
3. The multivariate stepwise regression analysis: Relationships between 8-isoPGF2α/Cr and either MAGE or HDL-c remained significant after adjustment for the other markers of diabetic groups. CONGA and IAUC were performed the independent effects on 8-isoPGF2α/Cr in group B. While in group C, the independent impact of factor was HbA1c.
Conclusions: There was a correlation between oxidative stress and either glucose fluctuation or HDL-c in all phases of T1DM. The another key factor of activating oxidative stress was postprandial hyperglycemia in the honeymoon, while was chronic sustained hyperglycemia in the long standing period. High level of blood glucose may have a synergistic effect on oxidative stress activating.

P246
Self-experiences of using continuous glucose monitoring (CGM) in children and adolescents with type 1 diabetes and their parents

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Objectives: To explore parents and children's self-experiences of using continuous glucose monitoring (CGM).
Methods: Two questionnaires, one for parents and one for children and adolescents, 7–18 years of age, were constructed and sent to 153 families at the clinic where 500 patients with T1DM are treated. The open-ended questions dealt with reasons for the use of CGM and the advantages/ disadvantages with the system. The answers were analysed with a summative content analysis.
Results: 52 parents (28 mothers/24 fathers) and 19 children (8 girls/11 boys) answered the questionnaire. The preliminary results show that parents reasons for use of CGM were to feel safe and comfortable during nights, improve HbA1c, prevent hypo-/hyperglycemias and reduce the number of blood glucose monitoring (SBGM) tests. Both children and parents valued the reduced number of fingerpricks and the facility to check the glucose level without interrupting the child in his/her activities. Parents were secure that the CGM offers a possibility to achieve a better glycemic control and more stable glucose levels. This was accomplished by following glucose trends, trend arrows and low/high glucose alerts in order to prevent hypo-/hyperglycaemic events. They felt safer during nights. Disadvantages expressed by the children were fear of inserting the needle, pain when inserting and being disturbed by alarms while playing. Parents reported insertion pain and transmitter size as negative factors. The delay in subcutaneous glucose versus blood glucose was defined as a problem. SMBG was often performed after corrections due to hypo- or hyperglycaemia.
Conclusions: The preliminary analysis of our study supports the assumption that using CGM in comparison to use of SMBG in Type 1 diabetes in children and adolescents is beneficial and appreciated.

Poster Tour 27: Type 2 diabetes

P247

Average glycemic control of type 1, type 2 and other diabetes forms in 14 pediatric diabetes centres from 13 countries - data from the SWEET project

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Objectives: The SWEET Online platform allows presently fourteen European centres from thirteen countries to connect to one unified anonymized diabetes database. Several current Paediatric Investigational Plans (PIP) in type 2 diabetes are faceing problems in trial recruitement and question the feasibility of paediatric type 2 diabetes trials in Europe. Thus, diabetes types and metabolic outcomes of this large European pediatric diabetes network was analyzed.
Methods: Using the sweetconv tool aggregate data from local electronic health records are de-identified and exported for analysis of diabetes type and HbA1c for the current year 2012 from 14 centres in 13 countries (n=5,927 patients).
Results: All 14 centres reported overall 5,760 patients with type 1 diabetes with on average 3.5 visits per year, 12 centres reported 58 patients with type 2 diabetes (2.4 visits per year, 47 below age 18 years) and 10 centres had classified other diabetes types (n=109, 2.8 visits per year). Overall the median HbA1 was highest in type 1 diabetes (7.9%) compared to type 2 (7.2%) or other diabetes types (6.4%). In those patients with a diabetes duration above 1 year (i.e. beyond the remission phase) the ISPAD target of an HbA1c < 7.5% was reached in 35.1% (n=1,703) patients with type 1 diabetes, 56.4% (n=22) with type 2 diabetes and 67.0% (n=61) with other diabetes types.
Conclusions: The analysis of the SWEET-database reveals that the vast majority of pediatric diabetes patients in Europe are having type 1 diabetes. Youth with type 2 diabetes or other diabetes forms are only 1 to 2% of the pediatric patient population and have better glycemic control and fewer annual outpatient visits than those with type 1 diabetes. Large networks such as SWEET are needed to identify the necessary trial populations for assessing pediatric medicines for non-type 1 diabetes in Europe.

P248

Health status, regimen adherence, and psychosocial functioning of minority youth with type 2 diabetes

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Objectives: This study examined health status, regimen adherence, and psychosocial factors in minority youth with type 2 diabetes.
Methods: Thirty-six youth (M age=14 years, M duration=25 months) were recruited at their outpatient clinic visit. Patients were mostly low income, African American (54%), and female (61%); Hispanic (28%) and Caribbean black (14%) groups were also represented.
Results: Most youth (97.2%) had BMI greater than 85th %ile, with 58% greater than 99th %ile. Fifty % had high (>90th %ile) SBP, 27% high LDL, 36% high triglycerides, and 49% low HDL (< 10th %ile). Ninety-four % were prescribed oral medication and 48.5% were also prescribed insulin. Self-reported regimen adherence, as measured by the Self Care Inventory for Youth with T2D, revealed poor adherence (50% or less) for BG checks (47%), medications (31%), following meal plans (47%), and being physically active (31%). Over the past year, patients on average cancelled one clinic appointment and missed two appointments. HbA1c (M=7.8%) and zBMI (M=2.2) were unrelated to clinic attendance and psychosocial variables. However, better adherence was related to keeping scheduled appointments (r=−.57, p< .01), and was associated with greater family support (r=.65, p< .001), parental reminding (r=.48, p< .003), youth self-efficacy (r=.48, p< .004), social support for exercise (r=.48, p< .004), and quality of life (r=.33, p< .05). Twenty eight % of youth reported depressive symptoms and 57% did not talk with their friends about their diabetes.
Conclusions: These results indicate that many youth with T2D have increased cardiovascular risk and regimen adherence is inadequate. Better adherence is related to greater family support, youth self-efficacy, social support, and clinic attendance. Interventions to increase youth self-efficacy and family support, address depression and social adjustment, and maintain engagement with the health care team would likely be beneficial for this patient population.

P249

New risk factors for the development of type II diabetes in obese adolescent children: changes in glucose transporter 4 (GLUT4) trafficking and the expression of insulin-dependent protein kinase B(Akt2), Rab5 GTPase, c-CBL associated protein (CAP) in adipocyte cultures

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Objectives: Insulin-induced GLUT4 translocation to the plasma membrane involves:(1)Akt2 phosphorylation and Rab5 GTPase activation and (2)CAP phosphorylation.
Methods: Adipocyte primary cultures(AC) were developed from surgical adipose tissue biopsies from 66 lean(BMI < 85%) and

45 obese(BMI≥95%) pre-pubertal children(Groups A:2mos-7yrs & B:8–12 yrs) and adolescents(Group C:10-15yrs).Protein expression of GLUT4,Akt2,pAkt2,Rab5 &CAP was studied with Western Immunoblotting.Serum fasting insulin was determined by ELISA.

Results: In the AC of the ***lean children***: (1)GLUT4 decreased in the older vs. the younger pre-pubertal children(p=0.049), (2)Akt2&pAkt2 decreased in the older vs the younger pre-pubertal and pubertal children(p≤0.014), (3)Rab5 increased in the pubertal vs both groups of pre-pubertal children(p≤0.04) and(4)CAP increased in the children of Groups B&C vs the Group A children(p≤0.039). In the AC of the ***obese children***: (1)GLUT4 decreased in the older vs the younger prepubertal children and adolescents(p≤0.049), but GLUT4 increased (p=0.01) in the adolescents vs their lean, (2)CAP and Rab5 decreased and Akt2 increased in the adolescents vs the pre-pubertal groups A&B(p=0.015, p=0.036 & p≤0.03, respectively), (3)Rab5 increased in the Group A children vs their lean(p=0.017), (4)Rab5,pAkt2 and CAP decreased(p≤0.05) in the adolescents vs their lean. Serum insulin increased in the lean and obese children of Groups B&C vs Group A(p≤0.004).

Conclusions: The decreased GLUT4, Akt2,pAkt2 and Rab5 and increased serum insulin in the older lean pre-pubertal children may indicate the start of physiological ''insulin resistance'' of normal puberty. The obese pubertal children, though, who showed higher proteins levels of GLUT4 besides the lower levels of Akt2,pAkt2,Rab5 &CAP, in contrast to the lean, may have GLUT4 cytoplasmic retention, possibly causing decreased glucose uptake, glucose intolerance and subsequent type II diabetes during adolescence.

P250

Clinical and biochemical characteristics of youth with type-2-diabetes in Europe and the US

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Objectives: Because limited data are available comparing populations of youth with type 2 diabetes (T2DM) worldwide, the goal of this report is to compare cohorts of youth with T2DM in 2 population-based studies, in US and Europe.

Methods: Participants were youth with a clinical diagnosis of T2DM, < 20 years old at diagnosis. Data were collected according to the study protocols.

Results: Overall, cohorts were similar by sex (female 63 vs 62.4%), frequency of DKA (7.5 vs 9.9%) and HbA1C (7.2 vs 7.4%); European youth were older at diagnosis (14.5 vs 14.0 years), lighter (BMI 32.4 vs 34.6 kg/m2), had lower fasting C-peptide (FCP) (1.4 vs 4.1 ng/ml)) and higher frequency of positive diabetes autoantibodies (DA) [Glutamic Acid65 (GAD65) and Insulin-associate autoantibody-2 (IA2)] (21.6% vs 9.9% for either DA). Excluding participants with positive DA, differences remained in age at diagnosis, BMI, FCP and treatment regimens (Table). The proportion using metformin alone was lower in the European cohort (32.0 vs 47.6%) but combining lifestyle or metformin, the proportion was similar between studies (63.4 vs. 66.0 %); HbA1C was similar.

Conclusions: Despite some differences in characteristics, the proportion of youth managed with lifestyle or metformin and mean HbA1C was similar in the 2 studies. Limitations include differences in study methods and short diabetes duration. Sharing of methods and longitudinal follow up may enhance our understanding of the course of T2DM in youth.

Mean (SD) unless otherwise noted	Europe N = 812	US N = 370	p-value†
Age at Study Visit, years	15.7 (3.2)	15.4 (2.5)	0.113
Sex, N (%) Female	524 (64.5)	228 (61.6)	0.335
Age at diagnosis, years	14.5 (2.6)	14.0 (2.4)	0.006
DKA at presentation N (%)	8 (6.6)	33 (9.7)	0.294
Fasting c-peptide, ng/mL	1.43 (4.49)	4.07 (2.25)	<0.001
HbA1c, %	7.20 (2.12)	7.41 (2.26)	0.149
BMI (kg/m2)	32.4 (7.4)	35.5 (9.5)	<0.001
Treatment with metformin	261 (32.1)	176 (47.6)	<0.001
Treatment with metformin and lifestyle	515 (63.4)	244 (66.0)	0.402

[Cohort characteristics, A1C and treatment summary]

P251

Trial in progress: efficacy and safety of liraglutide in combination with metformin compared to metformin alone, in children and adolescents with type 2 diabetes (Ellipse)

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Objectives: While metformin (Met) and insulin are the only approved drugs in children and adolescents with type 2 diabetes (T2D), SEARCH and other studies report that mean HbA_{1c} levels are >9.0% in pediatric Met-treatment failures managed with add-on insulin therapy. Hence, there is an urgent unmet need for new therapies. GLP-1 receptor agonists, DPP-4 inhibitors and SGLT2 inhibitors are new classes of drugs with proven efficacy in adult T2D. Recently the PK/PD profile of the GLP-1 analog liraglutide was successfully characterized in adolescents with T2D. Ellipse is a phase 3a study that will assess the safety and efficacy of liraglutide in pediatric T2D subjects.

Methods: Ellipse (NCT01541215) is a 26-week, randomized, double-blind, parallel group, placebo-controlled, multi-center trial, followed by a 26-week open-label extension. Inclusion criteria: age 10–17 years, prior T2D therapy, ≥90 days of diet and exercise ± Met, HbA_{1c} 7–11% if no Met or 6.5–11% if Met-treated, BMI >85th percentile of general age-matched population. Pre-randomization, subjects will undergo 3–4 weeks of Met titration and an 8-week maintenance period. Subjects will be randomized 1:1 to receive add-on therapy with either liraglutide (maximum dose of 0.6, 1.2 or 1.8 mg based on tolerability and/or FPG) or placebo. Primary endpoint is change in HbA_{1c} from baseline to week 26 and secondary endpoints include changes in other measures of glycemic control, body weight and BMI. Safety endpoints include hypoglycemia, adverse events (AEs), serious AEs, growth velocity and pubertal progression, and routine clinical evaluations. It is planned to randomize 172 subjects from more than 20 countries.

Conclusions: Ellipse will provide insights into the safety and tolerability of adding liraglutide to Met in pediatric subjects with T2D.

P252

New drugs for children with type 2 diabetes – would you participate in multi-agent/ multi-company clinical trials?

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Background: The European Paediatric Regulation requires the agreement on the pediatric development via the so-called pediatric investigation plans (PIPs) or a waiver before filing the adult marketing authorization application. To date 16 PIPs from 11 different companies have been agreed for T2D (type 2 diabetes), with products mainly belonging to three classes: GLP-1 analogs, DPP-4 inhibitors ('gliptins'), or inhibitors of renal sodium-glucose co-transporter (SGLT2-inhibitors).

Almost 3600 pediatric T2D patients would be required to conduct the clinical trials agreed in the PIPs. As T2D is still a rare condition in children innovative approaches are required to address recruitment issues.

Proposal: One possibility could be multi-agent trials. They are more efficient than traditional trials as they have a shared control group. The trial needs to test each experimental arm against the control treatment to establish the efficacy of each individual drug. Two options exist, either a single-company study with multiple agents spanning different drug classes or multi-company studies with multiple agents within the same drug class using only one control group. Importantly, such trials would not be powered to detect differences in efficacy and safety between the various products. Furthermore, the safety and efficacy profiles of the various products within the same class may be expected to be similar. These two points may make such multi-agent, multi-company approaches acceptable for industry. A European Network of Paediatric Research (Enpr-EMA) for diabetes and endocrinology is currently being established. The aim is to develop a research infrastructure of investigators and centers with recognized expertise in performing clinical studies in children across the EU within this field.

Conclusion: Making high quality medicinal products available for children with T2DM requires a common effort between companies, learned societies, investigators and regulators. The aim is clear: having more therapeutic options at hand to controlling T2D in children and reduce off label use. The ways to achieve this may be manifold, multi-agent multi-company approaches could be a promising one. Furthermore, the strengthening of a functional research infrastructure will help to make pediatric clinical trials more feasible.

P253

Brachial artery flow-mediated dilation in youth of type 2 diabetes mellitus

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Background: Brachial artery flow-mediated dilation (FMD) has been reported to be effective for early detection of atherosclerotic lesions. Decreased %FMD is found in type 2 diabetics, suggesting that diabetes causes dysfunction of vascular endothelial cells, and would lead to early atherosclerotic changes. Few studies have evaluated the incidence of major vascular complications in youth with type 2 diabetes from the standpoint of early atherosclerosis. Therefore, we measured FMD; along with several other important parameters for determining progression of atherosclerosis, such as lipid profiles and biomarkers of inflammation.

Methods: 30 patients with type 2 DM (15 males and 15 females; 17.1 ± 2.0 year; duration, 3.6 ± 2.7 year; hemoglobin A1c $8.0 \pm 2.0\%$), who visited our clinic between January and December 2011, were included in the present study. Patients' baseline characteristics {BMIand blood pressure} and data from blood chemistry [triglyceride; total, LDL- and HDL-cholesterol levels; and total and high-molecular-weight adiponectin] were collected. FMD was measured using an ultrasound system.

Results: The %FMD was low in patients with type 2 DM (7.9 ± 4.0) compared to normal level. The BMI was 27.8 ± 5.20 kg/cm^2. Systolic blood pressure was 124.6 ± 15.7 mmHg. Total adiponectin levels was 6.95 ± 4.32 µg/ml and high-molecular-weight adiponectin levels was 2.81 ± 2.27 µg/ml.

Conclusions: We demonstrated that the %FMD was low in youth with the type 2 diabetes patients. There were many cases with being overweight or obese and hypertension. Also, the total adiponectin and high-molecular-weight adiponectin levels were low, indicating excess fat accumulation. All of these factors lead to major vascular damages. So youth with type 2 DM have advanced damage of the vascular endothelium and therefore are at higher risk for major vascular complications. Monitoring the progression of atherosclerosis would be beneficial in youth with DM and measurement of FMD could be further warranted.

P254

Bedside neuropathy disability score compare to electrophysiological findings in adolescents with type 2 diabetes mellitus

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Objectives: The aim of our study was to compare the bedside neuropathy disability score (NDS) vs electrophysiological findings in adolescents with type 2 diabetes mellitus (T2D).

Methods: Forty one patients were included and classified according to NDS score; a score of 0 ($n = 28$), a score 1–2 ($n = 4$) and a score >2 ($n = 9$). All participants were given a clinical examination and examined to assess the NDS by two pediatric endocrinologist. Nerve conduction studies were performed in each participant (evaluated the dominant median (motor and sensory), peroneal (motor), and sural nerves using standard techniques). In all patients were recorded HbA1c mean values and lipid profile.

Results: There was no significant differences between the patients classified according to the NDS in age, sex, weight length, body mass index (BMI), waist circumference, blood pressure values and Tanner stage. However, patients with diabetic neuropathy by the NDS, had greater HbA1c values ($9.62 \pm 1.39\%$) compared to those with abnormal score ($7.35 \pm 1.44\%$) and to patients without diabetic neuropathy (DN) (7.74 ± 2.3), $p = 0.02$. The DNS was a 55% sensitivity and 100 specificity compared to nerve conduction studies.

Conclusions: There was no correlation between clinical signs and electrophysiological findings in adolescents with T2D. We recommended to screen, all adolescents with T2D performing nerve conduction studies.

P255

Nonalcoholic fatty liver disease: a novel risk factor for the development of type 2 diabetes in childhood?

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Nonalcoholic fatty liver disease (NAFLD) is associated with obesity, insulin resistance (IR) and increased type 2 diabetes (T2D) risk. The physiopathology of these interactions remains unclear in pediatrics population. Alanine aminotransferase (ALT) is a recognized biochemical marker of NAFLD actually used as screening of this disease.

Objectives: To estimate the associations between (ALT) with IR and endothelial inflammation parameters.

Patients and method: 348 subjects (52.7% females) between 4.9 – 15.6 years old were studied. Fasting blood samples was obtained to determinate: ALT, aspartate aminotransferase (AST), glycaemia, insulin, lipid profile, high sensitive PCR (hsPCR), tumoural necrosis factor-α (TNF-α), interleukin-6 (IL-6) and adiponectin (A). HOMA-IR, QUICKI and HOMA-β were calculated. Variables were log10 transformed before Pearson correlations analyze.

Results: ALT levels were positively correlated with BMI-SDS ($r = 0.335$; $P < 0.0001$), waist/ height ratio ($r = 0.358$; $P < 0.0001$), insulin ($r = 0.33$; $P < 0.0001$), HOMA-IR ($r = 0.33$; $P < 0.0001$), HOMA-β ($r = 0.26$; $P < 0.0001$), TG/HDL-c ($r = 0.2$; $P < 0.0001$), hsPCR ($r = 0.3$; $P < 0.0001$); and inversely correlated with QUICKI ($r = -0.25$; $P < 0.0001$) and adiponectin ($r = -0.113$; $P = 0.03$). No correlation between ALT with: glycaemia ($P = 0.60$), TNF-α ($P = 0.14$) and IL-6 ($P = 0.82$) was found.

Conclusion: Our study demonstrated that ALT was significantly correlated with markers of IR and endothelial inflammation, all of them recognized as risk parameters of pre diabetes stage. Therefore, we suggest the measurement of ALT as a marker of NAFLD should be part of the evaluation of all obesity children, mainly those with other cardiometabolic risk factors, since it could predict later development of T2DM.

FONDEF D08i1087, FONDEF IDeA CA12i10150, FONDECYT 1100356 & 1130427 & IMII P09/016-F. CC is PhD fellows from Comision Nacional y Científica de Chile (CONICYT).

Poster Tour 28: Diabetes project in developing country I

P256

The correlation between body mass index (BMI), gestational diabetes mellitus (GDM) and early metabolic programming (EMP) in neonates: a need for nutrition intervention to reduce the risks

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Objectives: To show that there may be a correlation between BMI, GDM and EMP in Neonates.
Methods: Anthropometric measurements were taken and BMI calculated for 63 females, mean age 35.5 ± 17 yrs with no history of DM nor IGT. Using the results as baseline, a docket analysis was conducted on 10 females all referred to High Risk Clinic 2010 for GDM. Weights and 2HRPP Glucose readings were collected for the GDM group per Trimester. Weights of both the Non-DM and GDM groups were compared. Postnatal data were collected to determine the infants z-score on the WHO Growth Charts. The infants and mothers weights were compared to test the analogy of EMP.
Results: BMI results revealed 68.2% obesity in the Non-DM group and the weights of both groups were comparable, depicting there could be a correlation between BMI and GDM. The third trimester audit showed a mean (2HRPP) Blood Glucose of $9.3\,\text{mmol/L} \pm 3$. After delivery none of the neonates were admitted for Diabetic complications however, Seven-(7) had birth weight < 4000 g(Normal); and Three-(3) > 4000 g(Large-for-Gestational-Age) but presented no clinical signs of hypo- or hyperglycaemia. Four mothers were treated for increase blood glucose, these mothers could be associated with LGA neonates. Postnatal audit showed no significant weight loss by the mothers compared to initial weights and revealed 6-female Neonates; 3-possible risk of overweight and 3-obese, and 4-male; 3-possible risk of overweight and 1-obese. The above normal Weight-for-Length may be associated with EMP during pregnancy/lactation.
Conclusion: Pregnant women with BMI $\geq 30\,\text{kg/m}^2$ are at increased risk for Gestational Diabetes thus, high priority should be placed on Nutritional Assessment and Therapy at Antenatal visits to reduce the negative outcomes of Obesity in Neonates. The results prove that there may be a correlation between Obesity, GDM and EMP in infants. In this study EMP may be evident by the similarities in the above normal weight trends of both mothers and infants.

P257

Life style risk factors profile of young adults for type 2 DM with family history of diabetes

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Objectives: Family history of type 2 diabetes is a major risk factor for type 2 diabetes in youth, While environmental factors, such obesity and lack of physical activity, play an important role to the rapid increase in the prevalence of T2D, genetic factors are also important for the increased risk of T2D. Studies have estimated that risk for diagnosed T2D increases approximately two- to four-fold when one or both parents are affected. Therefore the present study is aimed to understand the risk factors in young adults with family history of diabetes.
Methods: 403 students of Bharati Vidyapeeth Deemed University Medical College screened which includes age, waist circumference, physical activity for exercise status as mild moderate or sedentary and Waist circumference for the assessment of obesity. Students having family history of diabetes, in single parents and both the parents in these waist circumference and physical activity are noted
Results: Out of 403 students 111 (27.54%) are having family history of diabetes, in single parents and both the parents. Along with this 22.52% students having obesity i.e. waist circumference ≥ 90 cm and 60% having sedentary life style i.e. not involved in any physical exercise activity daily.
Conclusion: Obesity and sedentary lifestyle that can be amenable to intervention. Urgent counselling is required for all these students for their future risk of development of type 2 diabetes so that interventions to change health behaviours among families might reduce the risk of diabetes in the offspring of diabetic parents.

P258

Abnormal blood glucose as a prognostic factor for adverse clinical outcome among children with acute medical conditions in Ghana

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Background: Abnormal blood glucose among sick children carries poor prognosis.
Aim: To compare the clinical outcome in children admitted to the PEU of KATH with normal and abnormal blood glucose (hypoglycaemia or hyperglycaemia).
Method: Prospective cohort study involving 430 children, 215 each with normal and abnormal blood glucose, selected from screening a total of 800 participants. They were matched for age group and diagnosis and clinical outcome compared. Participants were followed up till discharge. Complications, mortality and final diagnoses were recorded.
Results: Among the 215 children with abnormal blood glucose, 43% (187/430) had hyperglycaemia and 7% (28/430) had hypoglycaemia. 27% (116/430) of patients had at least one complication on admission and 22% (96/430) had abnormal blood glucose ($p = 0.000$). The commonest complications were shock, intravascular haemolysis and acute renal failure.
At the end of the study, 89% (382/430) were discharged well, 9% (40/430) died and 2% (8/430) were discharged with complication(s). 75% (6/8) of those discharged with complication(s), and 75% (30/40) of those who died had abnormal blood glucose ($p < 0.001$). Of those with abnormal blood glucose who died, 36% (10/28) had hypoglycaemia and 11% (20/187) had hyperglycaemia ($p = 0.000$).
The risk ratio of patients with abnormal blood glucose dying was 3 (95% CI: 1.5–6.0) ($p < 0.001$). The risk ratio of developing a complication was 4.8 (95% CI: 3.1–7.5) ($p = 0.000$).
Conclusion: Abnormal blood glucose was a common finding in children admitted to PEU, KATH, with acute medical conditions and was associated with increased complications including mortality. Hypoglycaemia on admission is a greater predictive factor of complications and mortality than hyperglycaemia.

P259

Clinical profile and outcome of children admitted with diabetic ketoacidosis (DKA) in JUSH pediatrics ward from 2007 to 2011, a five year retrospective study

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Background: Jimma is one of the old cities in Ethiopia 350 Km south west of Addis Ababa, the capital city. Jimma University Specialized Hospital is the only referral hospital for the whole south western Ethiopia with estimates of 20 million people being served. We have a total of 260 diabetic children who are on follow up. There is no single pediatric endocrinologist to care for these children.
Objectives: The study was conducted with the aim of having baseline data and pattern of admission over five years so that we can compare the outcome with the introduction of structured care in diabetes with the support from the 'changing diabetes in children'.
Methodology: The study was conducted for five years starting from 2007 till 2011 in JUSH, Ethiopia over 56 children with DKA. Every child was given regular insulin, half IV and half IM, with blood sugar level every 6 hour till urine ketone clears. If cerebral edema is entertained, furosemide will be given. Data was collected with chart review and prospective patient follow up chart.
Results: Mean age at time of presentation was 8.5 years. Thirty were females. The mean duration of hospital stay was 17 days (ranging 2–45 ds) (see Fig. 1).
Conclusion: There was relative increment in the number of cases for the past three years. The total number of death and duration of stay was comparable to other areas in Ethiopia. The use of manitole in the management of cerebral edema was not included though it can't be independently verified, had not resulted variation in the fatality of the case. The readmission rate was higher with time which shows unresolved problems at time of discharge and follow up visits. It will give us a clear image in the subsequent follow up and updating the management of DKA in the set up with lack of continuous insulin drips with perfusers.

P260

Baseline glycated hemoglobin percentage in relation to clinical parameters of children with diabetes in JUSH diabetes follow-up clinic, 2012, Jimma, Ethiopia

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Background: Jimma University Specialized Hospital, in Ethiopia, is the only referral hospital for south western Ethiopia with estimates of 20 million people being served. A total of 260 diabetic children are on follow up of which 120 were under the study. There is no single pediatric endocrinologist to care for these children.
Objectives: The study was conducted with the aim of measuring glycated hemoglobin as an indicator of glycemic control with traditional chronic care follow up.
Methodology: The study was conducted in the diabetic follow up clinic in 2012 for four months who have attended the clinic. Every diabetic child who has come for follow up underwent basic clinical history, clinical examination and HbA1c measurement using 'BIORAD' support from 'changing diabetes in children' project. Data was entered in Epinfo and analyzed using SPSS to see the associations of HbA1c and clinical parameters. A total of 120 patients were evaluated with available 111 patients for analysis.
Results: Mean age at time of presentation was 10.2 years ±3.6. The mean duration of illness in months was 24.8 and the glucose measurement in one month for a patient is 7 times. HbA1c% according to the DCCT standard was found to be 10.8 ± 2.5 which indicates poor glycemic control. there was no statistically significant association identified between HbA1c% and the clinical parameters (duration of illness, blood sugar level and number of blood sugar tests done on follow up).
Conclusion: There was poor glycemic control as revealed by high HbA1c% according to the DCCT standard. The traditional approach for chronic care in pediatrics diabetes has shown poor glycemic control though I was not able to find any of the chronic complications in the patients under study. There was no association between the recent blood glucose levels, body mass index with HbA1c%.

P261

Effectiveness of multiple daily injection or continuous infusion of insulin on children at different courses of T1DM

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Objectives: This retrospective study aimed to analyze the effects of multiple daily injections (MDI) or continuous subcutaneous insulin infusion (CSII) on children with type 1 diabetes mellitus (T1DM).
Methods: We collected 252 cases of patients with T1DM during 2001 to 2010 in our hospital. In the experimental group, we divided them into two groups: 1A group started to receive MDI or CSII treatment within 1 year of disease onset; 2A group started to receive MDI or CSII treatment from 1 to 3 year of disease onset. We also set up corresponding control groups (1B and 2B) who received conventional treatment. We compared HbA1c, insulin dose, BMI, frequency of blood glucose monitoring and poor control rate during the observation period. Logistic regression was used to analyze factors associated with HbA1c.
Results: In the whole 24–36 months observation period, the group 1A had lower HbA1c when compared with the group 1B ($P < 0.05$). The poor control rate was also lower in group 1A than that in group 1B ($P < 0.05$). The insulin dosage was always higher in group 1A than that in group 1B from baseline to 12 months($P < 0.05$). Group 2A had lower HbA1c ($P = 0.029$) and poor control rate ($P = 0.024$) than group 2B only during the 6 months follow-up. Logistic regression analysis revealed that in our study HbA1c is associated with gender, insulin dosage and BMI ($P = 0.04$, 0.002 and 0.038).
Conclusions: (1) Subjects treated by MDI/CSII, either early or late, displayed lower HbA1c than those having conventional treatment. The early MDI/CSII treated group always maintained low level of HbA1c during the whole study period (24–36 months), while subjects with MDI/CSII from 1 to 3 years of disease onset only kept HbA1c level for 6 month before it elevated. (2) Besides MDI/CSII treatment, it is important to consider factors such as compliance of boy patients, BMI, providing sufficient insulin in a timely manner so that the patients will be managed in a comprehensive way.

P262

Management of type 1 diabetes in a limited resource context: a study of the DREAM Trust model in Nagpur, Central India

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Background: DREAM Trust (DT) is a non-governmental organization and registered charity in Nagpur, India that offers free healthcare, insulin, and syringes to underprivileged children and youth with type 1 diabetes (T1D). Due to cost, DT has not been able to provide regular blood glucose or A1C tests.
Objectives: To systematically describe and evaluate the DT model in terms of approach to T1D management and factors, both medical and sociodemographic, which influence glycemic control.
Methods: Cohort study of DT patients diagnosed with T1D before 16 years and followed at DT for ≥ 1 year. For each participant, a questionnaire was administered, their chart reviewed for retrospective data, and an A1C measurement taken. Univariate and multivariate linear regression were performed to determine factors associated with A1C.
Results: In total, 76 DT patients completed the interview, chart review, and A1C measurement. Median age was 17 years (IQR 14, 21), T1D duration 6 years (IQR 4, 10), and 53% were female. Median A1C was 10.5% (IQR 8.8, 11.9). On univariate analysis, lower A1C was associated with a greater number of blood glucose tests per month ($p = 0.002$), lower insulin dose per kilogram per day ($p < 0.001$), insulin storage in a refrigerator ($p = 0.038$), higher maternal education ($p = 0.030$), and not holding a Below the Poverty Line Certificate ($p = 0.003$). There was no association between A1C and age, sex, caste, or religion. On multivariate regression, A1C was independently associated with number of blood glucose tests ($\beta = -0.09$, $p = 0.029$), insulin dose ($\beta = 0.29$, $p = 0.001$), and holding a Below the Poverty Line Certificate ($\beta = 0.99$, $p = 0.049$).
Conclusions: In T1D patients followed at DT, lower A1C was independently associated with a greater number of blood glucose tests per month, lower insulin dose, and not holding a Below the Poverty Line Certificate. Further study is underway to assess the impact of additional blood glucose monitoring on glycemic control in this population.

P263

Human cartilage glycoprotein 39 (YKL-40) and preptin as early biomarkers of cardiorenal disease in type 1 diabetic children and adolescents

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Objectives: To explore the use of new biomarkers of cardio – renal injury such as human cartilage glycoprotein 39 (YKL-40) and preptin in type 1 diabetic patients.
Patients and Methods: The study included 62 type 1 diabetic patients and 30 healthy volunteer of the same age and sex. Blood sample was taken for assessment of glycosylated hemoglobin, lipid profile, YKL-40, preptin and nitrous oxide by ELISA technique. Also urine sample was taken for analysis of albumin/ creatinine ratio. M mode echocardiography was also done. t- test or Mann Whitney U test for independent variables, Pearson's or spearman correlation and stepwise multiple regression analysis were used.
Results: The study included 62 patients with type 1 diabetes, their mean age was 16.3 ± 1.5 yrs (14.0–19.0 yrs), and mean duration of diabetes was 9.4 ± 2.9 yrs (5.0–16.5 yrs). Nitrous oxide was significantly lower, while YKL-40, preptin and albumin/ creatinine ratio were significantly higher than controls. Nitrous oxide had a significant positive correlation with LVEDD, LVESD, PWT and LV mass and negative correlation with YKL-40, preptin and albumin/ creatinine ratio. YKL-40 had a significant positive correlation with waist, hip, waist/height ratio, preptin and negative correlation with E/A ratio.
Conclusion: A significant reduction of nitrous oxide and elevation of YKL-40 and preptin and their relation to echocardiographic data and albumin / creatinine ratio imply that early assessment of these markers may unmask the initial endothelial dysfunction in type 1 diabetic patients before overt microalbumin and renal impairment supervenes.

P264

Relationship of plasma level of chemerin and vaspin to endothelial dysfunction, atherosclerosis, cardiac autonomic neuropathy and oxidative stress in adolescent type 1 diabetic patients

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Objectives: To evaluate the relationship of plasma level of chemerin and vaspin to endothelial dysfunction, atherosclerosis, cardiac autonomic neuropathy (CAN) and oxidative stress in adolescent type 1 diabetic patients.
Patients and Methods: The study included 62 type 1 diabetic patients and 30 healthy volunteer of the same age and sex. Blood sample was taken for assessment of chemerin, vaspin, ADMA and OxLDL by ELISA technique. Also blood sample were taken for analysis of glycosylated hemoglobin, lipid profile and urine sample was taken for assessment of albumin/ creatinine ratio. 24 hour holter and carotid intimal medial thickness were also done. t-test for independent variables, Pearson´s correlation and stepwise multiple regression analysis were used.
Results: The study included 62 patients with type 1 diabetes, their mean age were 16.3 ± 1.5 yrs, and mean duration of diabetes were 9.4 ± 2.9 yrs. Chemerin, vaspin, OxLDL and albumin/ creatinine ratio were significantly higher, while ADMA was significantly lower than controls. By stepwise multiple regression analysis, Vaspin had a relation to SDARR and Waist/ height ratio. On the other hand, Chemerin had a relation with OxLDL. Albumin/ creatinine ratio had a significant positive correlation with chemerin, ADMA and OxLDL.
Conclusion: A significant reduction of ADMA and elevation of chemerin, vaspin and OxLDL imply that they influence glucose metabolism in type 1 diabetes. Vaspin had a significant relation to CAN. While, albumin/ creatinine ratio had a significant positive correlation with chemerin, ADMA and OxLDL reflect their role in renal affection.

Poster Tour 29: Diabetes project in developing country II

P265

Plasma level of vaspin and rage in type 1 diabetics: its relation to 24 hour holter

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Objectives: To evaluate plasma vaspin and rage in type 1 diabetic patients. Also to detect their relation to 24 hour holter.
Patients and Methods: The study included 62 type 1 diabetic patients and 30 healthy volunteer of the same age and sex. Blood sample was taken for assessment of vaspin and rage by ELISA technique. Also blood sample were taken for analysis of glycosylated hemoglobin, lipid profile and albumin/ creatinine ratio in urine. 24 hour holter was also done.
Results: The study included 62 patients with type 1 diabetes, their mean age were 16.3 ± 1.5 yrs (14.0–19.0 yrs), and mean duration of diabetes were 9.4 ± 2.9 yrs (5.0–16.5 yrs). Vaspin was significantly higher, while rage was significantly lower than controls. Vaspin had a significant positive correlation with waist/ height ratio, SDANN, SDRR and SDDRR. On the other hand rage had a significant positive correlation with VLDL and negative correlation with BMI SDS, average and minimum heart rate.
Conclusion: A significant reduction of rage and elevation of vaspin imply that they influence glucose metabolism in type 1 diabetes. The release of vaspin and rage might be involved in the regulation of glucose homeostasis, indication an important role for vaspin and rage in type 1 diabetes and meriting further consideration.

P266

'Emotional Stress' and the 'Evil Eye' – two perceptions on the etiology of type 1 diabetes among affected families in Tajikistan

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Objectives: To explore and describe how affected families perceive the etiology of type 1 diabetes (T1DM) in Tajikistan.
Methods: Purposive and snowball sampling were used for participant recruitment. In-depth interview and observation of 18 diabetic children/adolescents (median age: 14 yrs, range 3–23 yrs; median illness duration: 3.5 yrs, range: 20d–14 yrs), their parents (n = 19) and endocrinologists (n = 4) provided qualitative data from three of four regions in Tajikistan.
Results: Each family described a unique and detailed story preceding outbreak of T1DM. 'Emotional stress' and/or the 'evil eye' were perceived as causes by most families. A sudden death of a sibling, experience of earthquake or being punished at school were examples leading to 'emotional stress'. Endocrinologists acknowledged inordinate stress as one possible cause, one doctor voicing that diabetes mellitus (DM) had risen notably since the civil war in Tajikistan. A few families perceived the 'evil eye' to cause T1DM, explaining that good fortune or having an exceptionally beautiful or smart child could lead to jealousy and envy. Consequently, the 'evil eye' could be cast on the child, leading to outbreak of T1DM.
Conclusions: 'Emotional stress' and the 'evil eye' are two common perceptions on the etiology of T1DM among affected families in Tajikistan. Considering the increasing burden of DM in developing countries and ongoing globalization and migration, it is essential to understand perceptions of etiology of DM across borders and cultures, to create appropriate interventions. Only then, educational programs can possibly prevent complications and contribute to hindering the increasing global economic burden of the disease.

P267

Socio-cultural obstacles to essential care for type 1 diabetes in Tajikistan. A qualitative study from Central Asia

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Objectives: To explore and describe perceptions and experiences of families living with a child/adolescent who has type 1 diabetes (T1DM) in Tajikistan.
Methods: Purposive and snowball sampling were used for participant recruitment. In-depth interview and observation of 18 diabetic children/adolescents (median age: 14 yrs, range 3–23 yrs; median illness duration: 3.5 yrs, range: 20 d–14 yrs), their parents (n = 19) and endocrinologists (n = 4) provided qualitative data from three of four regions in Tajikistan.
Results: Most families had no biomedical knowledge about T1DM prior to diagnosis. Medical personnel lacked awareness that diabetes could occur in children. Nearly all children/adolescents were severely sick at diagnosis. No culturally adapted, child-friendly information was available. Most families perceived sweets, bread and 'oily food' as worst for children with T1DM. Very few children/adolescents used glucometers regularly. Insulin injections were frequently not given as mothers had compassion and did not want to hurt their child. Insulin procurement was perceived as a main challenge among parents. Consequently, 11 out of 18 children/adolescents had experienced coma at least once since diagnosis. Most children/adolescents were stunted in growth and showed delayed pubertal development, adding to stigmatization and social exclusion. Eight of 16 school-aged children/adolescents had stopped attending school.
Conclusions: In 2013, almost a century after insulin saved the life of the first diabetic child, little has changed for children/adolescents with T1DM in Tajikistan, and possibly other developing countries. With a globally estimated rise in incidence of T1DM, more advocacy and resources are vital to improve diabetes care in resource constrained countries.

P268

This abstract has been withdrawn.

P269

Clinical and demographic characteristics of children and adolescents with type 1 diabetes mellitus at the Lagos University Teaching Hospital (LUTH), Lagos, Nigeria: a four year review

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Objectives: To describe the demographic and clinical characteristics of the children and adolescents with type 1 DM attending the Paediatric Endocrinology clinic of LUTH over a 4-year period.

Methods: Case records of patients attending the clinic from April 2009 to April 2013 were analysed. Ethical approval and informed consent/accent were obtained. Data analysis was done with Microsoft excel.
Results: Twenty seven patients with Type 1 DM were seen (13 males and 14 females).They accounted for 26.3% of all the endocrine cases. The mean age of the patients was 16.3 ± 5.96 years (range of 7 to 26 years).The mean age at presentation was 8.2 ± 5.0 years (range of 1–16 years). The commonest mode of first presentation was diabetic ketoacidosis (23[88.9%]).However, two patients first presented with classical symptoms of polyuria, polydipsia and weight loss while one had persistent hyperglycaemia. All the patients are on pre-mixed insulin (donated). 74% of patients are from a low-socioeconomic class. Six patients (22.2%) have a positive family history of diabetes (all type 2) in the parents or grand-parents. The major metabolic complications in the patients are hypoglycaemic episodes and diabetic ketoacidosis. Two female patients aged 25 years (duration of DM-21 years) and 19 years (duration of DM-12 years) respectively have features of diabetic nephropathy. One patient has associated Hashimoto thyroiditis. Many patients have challenges with HBGM and determination of HBA1C because of financial constraints.
Conclusions: Type 1DM constitutes a major proportion of the paediatric endocrine diseases seen in the paediatric out-patient. Majority of patients present with diabetic ketoacidosis at diagnosis. Hence nationwide health education of the population and training of health workers is advocated so that early symptoms of the disease can be recognized. National Health Insurance Services should also be instituted and strengthened so that patients can have access to quality healthcare.

P270
Diabetes in Caribbean youth

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Background: Diabetes is growing public health problem in the Caribbean. The International Diabetes Federation (IDF) estimate 6–12% in Caribbean adults. The prevalence in Caribbean youth unknown.
Methods: The project was conducted in Jamaica, Belize and St. Lucia and was a collaboration between diabetes associations and the respective Ministries of Health.
There were four main components:

1. Development of a registry of children and youth living with diabetes
2. Increased access to HbA1C testing
3. Development and implementation of a pocket guide for management of diabetes in youth for use by health care providers
4. Creation of support groups and youth camps

Results: Data on 1100 children and adolescent were collected in the three countries; 250 of whom routinely attend support group meetings. Preliminary analysis of the data shows that the registry comprises 43% males and 57% females. Ninety percent had type 1 diabetes, 7.9% Type 2 diabetes and 2.1% other types of diabetes. The average age of respondents in registry was 12.6 years and the average duration of diabetes 4.6 years. Average initial HbA1c of participants was 11.7% and at the end 9.2%.
Initial focus group discussions conducted with participants, their families and health care workers to assess the needs of children with diabetes, found that the children felt isolated and different from their peers. The caregivers felt stressed and thought that health-care professionals needed to be more understanding of the challenges faced in taking care of a young person with diabetes as this was 'no easy road'. Routine support group meetings were conducted in an effort to address some of the needs identified.
Conclusions: The support groups demonstrated a significant change in the lives of the children and caregivers who participated as seen by not just the decrease in average HbA1c but in the empowerment of youth to 'control their diabetes and not let diabetes control their lives'.

P271
Glycaemic control and associated factors in children and adolescents with type 1 diabetes in Cameroon

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Introduction: Type 1 diabetes is a chronic metabolic disorder associated with severe acute and chronic complications. Accessibility to insulin therapy is a key factor in management of type 1 diabetes in Sub-Saharan Africa. Despite the free access to insulin in Cameroon, a lot of glycaemic imbalances have been noted clinically.
Objectives: The aim of this study was to describe glycaemic control and determine associated factors in a group of children and adolescents with type 1 diabetes in Cameroon.
Procedure and Methods: This was a cross-sectional study carried out in 7 centres of diabetic child care under the program Changing Diabetes in Children in Cameroon. We included 95 children and adolescents living with type 1 diabetes. Logistic regression analysis was used to identify factors for achieving the target A1C level according to age.
Results: We had a male to female ratio of 1.11. The age range was 6–19 years with a mean of 16 ± 3 year. The mean diabetes duration was 4.1 ± 2.9 (1–14 years). The mean insulin dose per day was 0.79 ± 0.32 U/kg and 68.1% of the study population received 3 or more insulin injections a day. The mean HbA1c was $9.3 \pm 2.2\%$ and only 21.1% of the participants met their glycaemic objectives. A logistic regression model looking for factors associated with achieving glycaemic objectives showed that diabetes duration less than 2 years, low insulin dosage and absence of severe hypoglycaemic crises are associated with achieving glycaemic objectives.
Conclusion: In this study, longer diabetes duration, high insulin dose and severe hypoglycaemic events were identified as factors associated with poor glycaemic control.
Key words: adolescent – children – metabolic control – type 1 diabetes.

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Childhood diabetes and poverty: double challenge and lessons in management from an Indian model – DISHA

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Over the last 3 decades, **DISHA** has implemented several health programs to provide best possible care to all segments of the society.
DISHA: Insulin Lifeline: 1994- 600 plus children (Karnataka State total population 53 million) -FREE insulin and syringes.
Rationed SHBGM: 2006- Free meter, 5–10 BG strips/month; coupled urine glucose testing; routine HbA1c still unaffordable.
Insulin PLUS education: 2009- Full support for selected children towards school and college education.
Selective TSH screening: 1994- only on strong clinical suspicion.
Basal bolus insulin therapy: Meal time regular insulin + bedtime NPH 100%.
DISHA + CDiC [Changing Diabetes in Children]: Since 2011, 169 **DISHA** children [age diabetes onset 6 months to 18 years] are receiving insulin and syringes, 100 BG strips/month, TSH, HbA1c, urine albumin:creatinine ratio. Two could be changed from insulin to metformin [type 2]. 4 with onset before age 12 months being evaluated for monogenic diabetes [1 Wolcott-Rallison Syndrome]. 2 Wolfram syndrome. 3 pancreatitis.
Results: Follow up 18 months. Comparing baseline **B** *[i.e. entry to CDiC program]* with subsequent and latest **L** HbA1c **[%]** levels, 4 major longitudinal ***patterns*** of glycemic control were observed:
Group A: Prior discipline: Baseline A1c < 8 and stable [7.3 to 7.0].
B: Responder High: A1c > 8 and >3 decline [14.8 to 9.1];
C: Responder: A1c > 8 and 0.6 to 3 decline [10.9 to 9.2];
D: Non- responder: A1c > 8 and < 0.6 decline [10.4 to 11.5].
Percent of children achieving HbA1c target < 8 [29%], < 7 [12%].
Nephropathy % [mean UAC ratio μg/mg of Creatinine]: Nil **58**% [10], Incipient **29**% [88], Overt **13**% [1073].
Retinopathy %: NPDR **4%;** CSME **2**%; PDR **2**%.
Primary hypothyroidism: Newly detected **13**%. Growth retardation significant.
Conclusion: Aggressive poverty alleviation of the masses ***[universal education, government political will and honesty]*** and better health and longevity of children with diabetes remains a challenge and a dream – India.