# ISPAD2011

# POSTER SESSIONS

## Poster Session I: Diabetes Acute and Chronic Complications

P/001/WED

### Insulin-like growth factor -1- cytokines cross-talk in type 1 diabetes mellitus: relationship to microvascular complications

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**Objective:** This study was primary designed to investigate the association between inflammatory cytokine (IL-8, IL-6), IGF-1 levels in relationship to metabolic control, microvascular complications and bone mineral density(BMD) in a cohort of Egyptian adolescents with TIDM.
**Research design and methods:** A total of 60 type 1 diabetic patients and 40 healthy controls participated in the study. Glycated hemoglobin concentration, urinary albumin excretion, serum IL6, IL 8, IGF-I levels and DEXA scan were assessed.
**Results:** Diabetic patients showed significantly higher IL6, IL8 and lower mean IGF when compared to control (290.53 ± 68.60 vs. 176.60 ± 51.90 pg/ml, 183.30 ± 59.97 vs. 102.73 ± 20.03 pg/ml and 73.00 ± 23.21 vs. 361.07 ± 63.52 ng/ml respectively, $P < 0.0001$ for all). Of note, patients with unfavorable control(60%) showed higher Interleukin 6, Interleukin 8, lower BMD and IGFI when compared to favorable control cases(329.94 ± 59.87 vs. 213.22 ± 27.15 pg/ml, 144.78 ± 34.21 vs. 231.42 ± 22.61 pg/ml, –1.29 ± 1.05 vs.–.03 ± 1.09, 121.67 ± 21.80 vs. 241.08 ± 40.03 ng/ml, $P < 0.0001$, $P < 0.0001$, $P = 0.004$ and $P < 0.0001$ respectively). Osteopenic and Osteoporotic diabetic cases showed significantly lower mean IGFI when compared to normal BMD diabetic cases ($P < 0.0001$). Patients with unfavorable control had higher rate of neuropathy when compared to unfavorable control patients ($P = 0.02$) but the difference did not reach a significant level in nephropathy and retinopathy ($P = 0.69$, $P = 0.50$ respectively). There was negative correlation between both IL8, IL6 and bone density ($r = –0.50$, $P = 0.005$ and $r = –0.42$, $P = 0.021$ respectively).
**Conclusion:** Microvascular complications is a complex disorder in patients with diabetes which may be due to increase serum level of inflammatory mediators like IL-6, IL-8 and hormonal disturbances demonstrated by reduced level of IGF-1.

P/002/WED

### Monitoring of blood beta-hydroxybutyrate as a screening test for diabetic ketoacidosis at the Emergency Department

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**Introduction:** The purpose of this study was to evaluate if bedside monitoring of blood beta-OHB levels can simplify management of diabetic ketoacidosis (DKA) through elimination of laboratory monitoring and to evaluate its cost effectiveness than other parameters.
**Methods:** A prospective observational study was performed on 50 patients presented with DKA with a mean age of 8.24 ± 4.05 years at the Emergency department. All patients that were admitted had their blood glucose, pH, $pCO_2$, $HCO_3$, BUN and consciousness levels serially monitored in relation to (beta-OHB) levels measured using blood β-OHB meter (Optium, Abbott/Medisense Laboratories, Abingdon, UK) from a single five microlitre prick capillary blood sample.
**Results:** The percentage of newly diagnosed cases presented with DKA tended to be higher and more severe than known diabetics (62% vs. 38%, $P = 0.03$).Level of (β-OHB) was inversely correlated to the level of consciousness ($P = 0.04$). The correlation between β-OHB and other laboratory parameters at different timings in our study showed that β-OHB was significantly negatively correlated with PH ($r = –0.57$; $P < 0.0001$), $HCO_3$ ($r = –0.85$; $P < 0.0001$), $PCO_2$ ($r = –0.65$; $P < 0.0001$) and positively correlated with blood glucose ($r = 0.57$; $P < 0.0001$) with no significant correlation with BUN ($r = –0.01$; $P = 0.94$) at all point of measurement during the treatment. More importantly, this test is timely effective more than other laboratory parameters, as it minimizes the time of hospitalization by early diagnosis and following up DKA patients ($P < 0.001$). Subsequently; reduces the cost of intensive care unit ($P < 0.001$) by reflecting earlier normalization of metabolic status than other laboratory tests.
**Conclusion:** Measuring bedside B-OHB is a useful, safe and non-invasive tool in managing DKA in pediatric patients in the emergency department. In addition, its use reduces hospitalization/emergency assessment and offers potential cost savings.

P/003/WED

### Diabetic ketoacidosis, determinants and mortality rate in Sudanese children with type 1 diabetes mellitus

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**Background:** DKA is common at diagnosis in children with T1DM, and has significant morbidity and mortality. Many risk factors were implicated in its development and degree of severity.
**Objectives:** To describe the frequency of DKA at the onset of T1DM, identify the determinants of DKA, assess its severity, and determine its mortality rate in children in Sudan.
**Methods:** Hospital records of 466 diabetic children up to 18 year of age, diagnosed during the period 2006–2010 were reviewed (Gaafar Ibn Auf Children's Hospital, Khartoum). DKA was assessed mainly clinically using the severity criteria of Endocrine Clinics of North America 2000. Data were analyzed using the SPSS version 18. The differences in the mean values

were calculated using the ANOVA test. Pearson's correlation coefficient was used to evaluate the relationship between variables. For all tests, P-value <0.05 was accepted as significant.
**Results:** Of all patients diagnosed with T1DM, 173 (37.1%) presented with DKA in the latest admission. The frequency of DKA in newly diagnosed children was 35.2%. The majority had either mild (50%) or moderate DKA (37.2%). The frequency of DKA was higher in older children (P < 0.05). The major precipitating factors were infection (56.0%), omission of insulin dose (25.6%) and low socioeconomic status (21.8%). There was a significant positive relationship between age groups and HbA1c levels (P < 0.0001). Moreover, girls had significantly higher latest HbA1c levels (P < 0.003). Two children died (0.4%).
**Conclusion:** Our study provides recent data in East African population, for whom data are sparse. The incidence of DKA at initial presentation of T1DM among children in Sudan is high due unawareness of the population. Older children with T1DM face an increased risk for developing DKA, due to frequent omission of insulin doses and problems of non-compliance. Intensive educational programs about the early symptoms of diabetes will reduce the frequency of DKA in new patients.

## P/004/WED

### Frequency, clinical characteristics and outcome of diabetic ketoacidosis in children with type-1 diabetes at a tertiary care hospital

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**Objective:** To observe the frequency, demographic data and outcome of diabetic ketoacidosis (DKA) in children with established type 1 diabetes and newly diagnosed diabetes.
**Methods:** The case record review was done of children admitted with the diagnosis of DKA from 1st June 2008 till 31st May 2009. Those children with only hyperglycaemia, or who did not fulfil the criteria of DKA were excluded. The demographic data and investigations like blood sugars, arterial blood gases, urine analysis especially for ketones, serum electrolytes, complete blood count were reviewed. The previous numbers of admissions in children with established DKA were noted with reasons. The duration of symptoms, fluids required, time of recovery, complications, and outcome were noted and comparison done between both groups.
**Results:** Out of 124 case records, 117 fulfilled the criteria of DKA. 65 (55.5%) children were in the >10 years age group with a female predominance. Fifty (42.7%) had established Type 1 diabetes and 67 (57.2 %) children had newly diagnosed diabetes. The commonest presenting complaints in both groups were respiratory distress (87.1%) and vomiting (77.7%). The symptoms of polyuria, polydipsia and nocturia were more among the newly diagnosed children with a significant P-value <0.001. There was no difference between the groups except that children with established diabetes improved earlier, required lesser duration of intravenous fluids and their insulin was changed to subcutaneous in less time compared with newly diagnosed children. (P < 0.001). The commonest complication in both groups was hypoglycaemia followed by hyponatraemia, more in newly diagnosed diabetic children.
**Conclusion:** These soaring numbers are just from one center, highlighting the issue of this much neglected disease in our country. More studies are needed to assess the prevalence/incidence in our children and also more emphasis with educational programmes on prevention of recurrent attacks of DKA.

## P/005/WED

### Autoimmune thyroid, celiac and Addison's diseases related to HLA-DQ types in young type 1 diabetic patients

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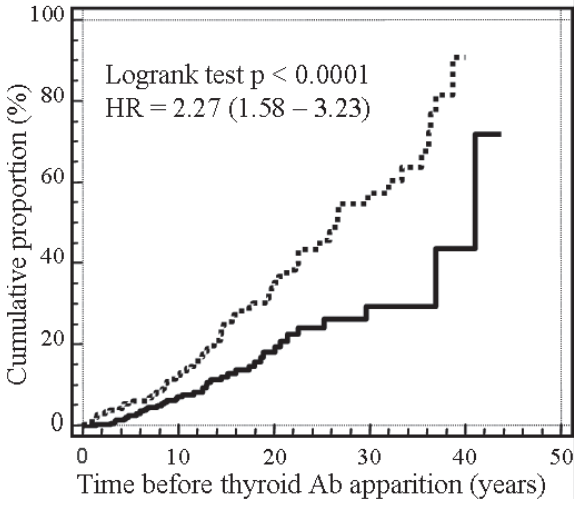
**Objective:** To define the prevalence of autoantibodies to different organs in a large cohort of young patients with type 1 diabetes (T1D) and to link their occurrence with clinical data and the HLA-DQ type.
**Methods:** Antibodies (Ab) to thyroid, celiac and adrenal disease were analyzed in 831 T1D patients.
**Results:** Hundred twenty-three (15%) patients had positive thyroid antibodies. The risk of developing thyroid antibodies was increased in girls (HR 2.3; 95% CI 1.6–3.2; P < 0.0001, Figure).
[Cumulative incidence for autoantibodies to thyroid]
Hundred forty-one (17%) patients had positive celiac Ab (18% in girls and 16% in boys; P = NS). Adrenal Ab were detected in five patients (3 girls). The presence of thyroid, celiac or adrenal antibodies were independent (P = NS). Seventy-one percent were HLA DQA1*0501-DQB1*0201 and/or DQA1*0301-DQB1*0302 positive. The DQA1*0301-DQB1*0301 haplotype was more prevalent in patients with thyroid Ab (P = 0.0281); DQA1*0201-DQB1*0201 and DQA1*0501-DQB1*0301 in patients with celiac Ab (P = 0.0085 and P = 0.0211). All patients with adrenal Ab were DQA1*301-DQB1*302 positive.




**Conclusions:** T1D patients should be screened annually for thyroid autoimmunity and for celiac disease. In absence of Addison's disease signs, systematic annual screening of adrenal Ab should not be recommended. The DQA1*0301-DQB1*0301 haplotype seems to confer susceptibility to thyroid autoimmunity, DQA1*0201-DQB1*0201 and DQA1*0501-DQB1*0301 to celiac disease and DQA1*0301-DQB1*0302 to adrenal autoimmunity.

## P/006/WED

### Risk markers for cardiovascular disease in young type 1 diabetic patients: lipoproteins, high-sensitivity C-reactive protein and adiponectin

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**Objectives:** Lipoproteins, high-sensitivity C-reactive protein (hs-CRP) and adiponectin have been studied as risk factors for cardiovascular disease (CVD). The aim of this study was to measure and analyze those risk markers in young type 1 diabetic patients and to evaluate the association between adiponectin and different parameters.
**Methods:** This cross-sectional study analyzed body mass index, subscapular skinfold thickness, physical activity, nutrition, glycated hemoglobin (HbA1c), total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, apolipoprotein B, hs-CRP and adiponectin in 148 young type 1 diabetic patients [age – median (interquartile range) – 13.5 (10.3–16.0) year]. Linear and multiple regression analysis were used.
**Results:** Median HbA1c was 7.5 (7.0–8.1)%. Median cholesterol and hs-CRP levels were normal. Adiponectin was 14.9 (10.8–19.0) $\mu$g/ml. There was no correlation between adiponectin and age, diabetes duration, body mass index, physical activity, protein, fat or carbohydrate intake, HbA1c, serum lipids or hs-CRP. But there was a negative correlation between serum adiponectin and skinfold thickness and a positive correlation between adiponectin and daily energy intake. Multiple linear regression analysis showed an independent positive correlation with daily energy intake, saturated fat intake and apolipoprotein B levels.
**Conclusions:** In type 1 diabetic children and adolescents with relatively well controlled glycemia, there is no abnormality of risk markers for cardiovascular disease: lipoproteins, hs-CRP and adiponectin. Adiponectin levels are associated with daily energy intake, saturated fat intake and apolipoprotein B levels suggesting that increased levels of adiponectin could protect patients at increased risk of CVD. A longitudinal analysis is needed to follow up these factors and any occurrence of cardiovascular disease.

## P/007/WED

### Serum uric acid: could it predict diabetic nephropathy?

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**Objectives:** Diabetic nephropathy is one of the major micro-vascular complications of diabetes and its early diagnosis is an essential step for proper treatment. The renewed attention, given to the association of serum uric acid with renal disease, inspired us to evaluate this correlation in children and adolescents with type 1 diabetes mellitus.
**Methods:** Our pilot study included a total of 40 children and adolescents with type 1 diabetes, who have disease duration ≥5 years and regularly attend the Specialized Pediatric Diabetes Clinic of Ain Shams University. Half of them had microalbuminuria and the other half was normoalbuminuric. All of them were thoroughly examined and had their blood samples investigated for serum uric acid, serum creatinine, and serum cystatin C, and then a cystatin C-based formula was calculated to evaluate their glomerular filtration rate (GFR).
**Results:** One quarter of patients with normoalbuminuria was found to suffer from glomerular hyperfiltration and ninety percent of patients with microalbuminuria were already suffering from reduced GFR either in the low normal range or actually low GFR. Serum uric acid was significantly correlated to higher serum creatinine and serum cystatin in both groups, and higher uric acid was correlated to lower cystatin C-based GFR among patients with microalbuminuria. In patients with normoalbuminuria, a statistically significant association was found between lower uric acid and normal GFR ranging from (90–130) on one hand and between serum uric acid ≥3.6 mg/dl and glomerular hyperfiltration on the other hand.
**Conclusions:** Significant correlation was found between high normal serum uric acid and abnormal GFR, presented by hyperfiltration in the normoalbuminuric group, and low GFR in the microalbuminuric group, which may imply the important role of uric acid in prediction and follow-up of diabetic nephropathy.

## P/008/WED

### Neurocognition and brain structure in pediatric patients with type 1 diabetes

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**Objectives:** Recent findings suggest that beyond severe hypoglycaemia also chronic hyperglycaemia may hamper the cognitive development of patients with type 1 diabetes. Executive and memory dysfunctions mediated by fronto-parietal and temporal brain structures are frequently reported to be associated with type 1 diabetes. The current study is novel as it merges neuropsychological and structural brain imaging methods (voxel-based-morphometry) to study the neurofunctional integrity of fronto-parietal brain areas.
**Methods:** We investigated 30 children with type 1 diabetes and 19 healthy controls. Children with diabetes were divided into two groups representing good (HbA1c ≤ 7.9%) and worse (HbA1c ≥ 8.0%) glycemic control. Neuropsychological testing comprised the assessment of intellectual functioning and a PC-administered marker-task tapping fronto-parietal functions. Intellectual level was estimated by using four subtests of the German-language version of the Wechsler tests. MRI imaging was performed using a 1.5 Tesla magnet.
**Results:** First, results revealed significant group differences with respect to neuropsychological performance (i.e., response accuracies on a marker task tapping fronto-parietal brain functions). Second, structural imaging disclosed significant group differences between patients and controls regarding grey matter volume in frontal (anterior cingulate) and occipital (cuneus, bordering pre-cuneus) brain regions and regarding white matter in middle temporal and occipital gyri as well as in the ventro-medial temporal lobe (uncus). Third, disease duration, age at diagnosis and white matter volume in a hippocampal region-of-interest (but not HbA1c levels, intelligence, total grey/white matter or other white/grey matter regions-of-interest) explained 56% of neuropsychological performance variance.
**Conclusions:** Our findings provide evidence of a direct link between brain function and brain structure in pediatric patients with type 1 diabetes.

## P/009/WED

### Urinary markers of renal inflammation in adolescents with type 1 diabetes mellitus and normoalbuminuria

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**Objective:** Patients with type 1 diabetes (T1D) with the highest albumin to creatinine ratio (ACR) within the normal range have been shown to be at increased risk for developing microalbuminuria (MA). The mechanistic basis for this is unknown, but may be related to renal inflammation. Our goal was to characterize the urinary excretion of cytokines/chemokines in normoalbuminuric T1D adolescents, to determine whether higher range normoalbuminuria is associated with evidence of renal inflammation.
**Methods:** Forty-two urinary cytokines/chemokines were measured using the 42-Plex Primary Cytokine/Chemokine Panel Luminex Assay (Eve Technologies, Calgary, Canada) in 150 adolescent TID subjects (age 11–17 years; T1D duration >1 year; median A1c 8.1%) who were screened for the Adolescent type 1 Diabetes cardio-renal Intervention Trial (AdDIT). Urinary cytokines/chemokines were compared across low (n = 50), middle (n = 50) or high (n = 50) ACR tertile groups.
**Results:** Urinary levels of GRO, IL-6, IL-8, PDGF-AA, RANTES and VEGF differed across ACR tertiles, with higher values in middle and high tertile patients compared to the lower tertile (ANCOVA $P < 0.01$). In contrast, EGF/MCP-1 ratio, which represents the balance between trophic and inflammatory factors, exhibited an opposite pattern, with higher values in the lower vs. middle and high tertile groups.
**Conclusions:** Within the normal ACR range, higher urinary albumin excretion in adolescents with T1D is associated with elevated urinary levels of inflammatory markers, while those in the lower ACR group may show a pattern conducive to rennoprotection. Ultimately, these may provide mechanistic insights into disease pathophysiology and stratify the risk of nephropathy in T1D.

## P/010/WED

### Evaluation of serum angiotensin converting enzyme activity as a marker of the risk of severe hypoglycemia in type1 diabetes mellitus

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**Background:** Severe hypoglycemic episodes are a major obstacle to optimum glycemic control in patients with type1 diabetes mellitus.
**Objective:** This study tested the hypothesis that angiotensin converting enzyme (ACE) activity is a marker of the risk of severe hypoglycemia in patients with type1 diabetes.
**Method:** 50 adolescents with type 1 diabetes and matched 20 healthy adolescents were undergone a detailed medical history and a thorough physical examination. Severe hypoglycemic episodes were reported for the preceding- 2 years. Laboratory investigations included: estimation of glycated hemoglobin and fasting serum ACE activity. The diabetic patients were divided into two subgroups: group (A) included diabetic patients with serum ACE lower than the median level while group (B) included those with serum ACE higher than the median level.
**Results:** This study showed that serum ACE levels in type 1 diabetics were comparable to those in matched controls. Despite the absence of significant difference between group (B) and group (A) patients as regards: age, duration of DM, glycated hemoglobin and daily insulin dose, both the number of yearly episodes of severe hypoglycemia and serum ACE activity were significantly higher in group (B) than those in group (A) patients. The study also revealed that the number of yearly episodes of severe hypoglycemia are highly significantly and positively related to the serum ACE levels, but not to the other variables. The multivariate analysis confirmed the highly significant relationship between serum ACE activity and the number of yearly episodes of severe hypoglycemia.
**Conclusion:** This study showed that ACE activity in patients with type I diabetes is a strong independent marker of the risk of severe hypoglycemia. Further, evaluation is needed before the clinical usefulness of this test can be elucidated.

## P/011/WED

### Study of diabetic keto-acidosis in type 1 diabetic children

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**Introduction:** Diabetic ketoacodosis (DKA) is a serious complication of diabetes mellitus, especially type 1, and its secondary consequences account for a large proportion of diabetes-related hospitalizations and mortality in children with type 1 diabetes.
**Aim of the work:** The aim of this study was to assess all cases of DKA admitted to National Institute of Diabetes & Endocrinology (NIDE), and to investigate their clinical and laboratory data at admission and after resolution of DKA with evaluation of the possible causes of the DKA and the relation of DKA to control of Diabetes.
**Subjects and methods:** A total of 400 type 1 diabetic children with DKA, all of them will be with pH < 7.3 & serum bicarbonate < 15 mg%. All of them were subjected to:
*Full history taking & thorough clinical examination with assessment of coma Glasgow score.
*Assessment of blood gases and serum electrolytes hourly (5).
*Laboratory investigations including: CBC, serum creatinine, liver enzymes (SGOT & SGPT) and glycated HbA1c (6).
**Results:** Duration of diabetes was 2.5 ± 5.7 years, pH = 7.127 ± 0.102, serum bicarbonate = 10.05 ± 5.25 mg/dl, coma score, according to Glasgow-coma score, 16.59 ± 19.31, stay in ICU = 11.03 ± 9.49 hours, Insulin dose per Kg = 1.23 ± 0.54 units, age = 9.96 ± 3.52 years and BMI = 19.74 ± 6.33. There was a positive significant correlation between pH and control of diabetes represented by glycated Hb A1c. All cases with DKA have glycated HbA1c > 9.3 (mean = 11.01 ± 1.23%). There was a significant positive correlation between coma score levels and the stay hours in ICU.
**Conclusion and recommendations:** All non recent cases with DKA are mostly due to mainly uncontrolled diabetes not related directly to infection or other stress factors. The more control of diabetes will cause less acute of DKA with less hours to stay in the ICU. It could be concluded that control of diabetes could prevent the occurrence of DKA as a very serious acute complication of diabetes.

P/012/WED

## Implementation of a novel intravenous insulin protocol in critically ill children

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**Objective:** Non-uniform approaches to achieving glycemic control in critically ill children can result in uncertainty among nursing staff and increased risk for hypoglycemia. The objective of this project was to create a standardized pediatric intravenous (iv) insulin protocol that eliminated hypoglycemia while maintaining adequate glycemic control.
**Methods:** As a quality improvement initiative at the University of Minnesota Amplatz Children's Hospital, a multidisciplinary team developed a novel protocol for non-DKA, pediatric ICU and BMT patients using available evidence based approaches. Target blood glucose (BG) range was set at 100–160 mg/dl. Prospective data from consecutive patients placed on protocol (cases) were compared to retrospective data from similar patients treated with non-standardized, continuous iv insulin protocols from 2007–2009 (controls). Nursing feedback was sought using a formal questionnaire. Statistical comparisons were made using a two-tailed *t*-test.
**Results:** Age, duration of therapy, mean BG after reaching target, and percent time spent in target range did not differ between groups. Mean starting BG was higher in cases, though time to target was similar between groups. Cases experienced significantly fewer overall and severe hypoglycemic episodes than controls. Nursing staff responded favorably to all aspects of questionnaire.

| | New Protocol (n = 17) | Controls (n = 19) | P-value |
|---|---|---|---|
| Age (years) | 8.5 ± 5.9 | 5.3 ± 4.9 | NS |
| Duration of therapy (days) | 5.5 ± 6.8 | 7.2 ± 7.7 | NS |
| Mean BG at time 0 (mg/dl) | 331 ± 95 | 233 ± 85 | 0.002 |
| Time to reach target range(hours) | 8.3 ± 7.4 | 7.2 ± 6.3 | NS |
| % of total hours in target range | 55 ± 20 | 59 ± 25 | NS |
| Mean glucose after reaching target (mg/dl) | 130 ± 11 | 130 ± 6 | NS |
| Episodes of severe hypoglycemia(BG < 50)per patient | 0.06 ± 0.2 | 1.2 ± 1.8 | 0.018 |
| Episodes of hypoglycemia (BG < 70) per patient | 0.6 ± 0.9 | 4.4 ± 5.3 | 0.006 |

*[Comparative Data]*

**Conclusions:** Use of a novel iv insulin protocol in critically ill children significantly reduced total and severe hypoglycemic events while achieving adequate glycemic control.

P/013/WED

## Evaluation of carotid intima wall thickness in type 1 diabetic patients

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The role of diabetes in the development of atherosclerosis in childhood, however, has received less attention. This study was conducted to investigate the presence of increased sub clinical atherosclerosis (measured as carotid intima-wall thickness) and its risk factors, including serum homocysteine & LDL-cholesterol, in young type 1 diabetic patients. This study was done on three groups: group 1 included 40 young type 1 diabetic patients with age less than 30 years and duration of type 1 diabetes ≥ 5 years, group 2 included 20 type 1 diabetic patients with duration of diabetes > 5 years and group 3 included another 20 healthy subjects comparable control group. All groups were matched for age, sex and socioeconomic classes. All subjects were subjected to: carotid intima wall thickness estimation by ultrasonography, ECG, Lab. Investigations including: Total cholesterol & LDL and HDL-cholesterol, estimation of serum homocysteine, glycated HbA1c level, and microalbuminuria. The results of this study revealed that there was a highly significant difference between the IWT in diabetic patients of group 1 (mean = 0.489 ± 7.538 mm) & healthy control group 3 (mean = 0.435 ± 4.830 mm), and between patients with diabetes of group 2 & healthy control group 3. While there was no significant statistical difference between IWT in patients of group 1 and patients of group 2. There was a positive significant correlation between IWT in group 1 and duration of diabetes. While there no correlation between IWT of group 1 and total cholesterol, cholesterol LDL, cholesterol HDL, triglycerides, glycosylated HbA1c, and microalbuminuria.

P/014/WED

## Clinical value of adiponectin in Egyptian type 1 diabetics

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**Objectives:** Adiponectin is an adipokine with anti-inflammatory and anti-atherogenic effects. This study was carried out to evaluate the relationship between adiponectin and: plasma lipoprotein lipids, cardiovascular risk assessment ratios, glycemic control indices, albumin to creatinine ratio and diabetes duration in Egyptian children and adolescents with Type1 diabetes mellitus "T1DM".
**Design and methods:** Study included 60 clinically diagnosed T1DM patients (subdivided according to diabetes duration). In addition, 20 healthy controls were selected with comparable socioeconomic, age, body mass index, Tanner stage and sex distribution. Glycemic control indices, lipid profile, total adiponectin, microalbumin and urinary creatinine were measured and albumin to creatinine ratio was estimated. Results were subjected to SPSS statistical Analysis.
**Results:** Adiponectin had higher serum levels in Egyptian children and adolescents with T1DM irrespective to duration of disease at $P < 0.0001$. Adiponectin correlated inversely with TG at $P < 0.01$. Adiponectin had higher diagnostic accuracy compared to traditional atherogenic indices (LDL-C/HDL-C and TC/ HDL-C).
**Conclusion:** T1DM children and adolescents tend to have lower risk for cardiovascular complications via adiponectin high ability to prevent atherosclerosis.
**Keywords:** Adiponectin, Lipid profile, Cardiovascular risk, Type 1.

## P/015/WED

### Uric acid is not correlated with diabetic retinopathy in youth with type 1 diabetes

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**Objective:** To investigate the cross-sectional association between uric acid (UA) and diabetic retinopathy (DR) in youth with type 1 diabetes (T1D).

**Methods:** Data was collected from a convenience sample of 81 adolescent subjects, age 12–19 years and mean T1D duration 8.9 ± 3.0 years. Retinopathy was assessed by 60 degree 2-field fundus photography and a modified ETDRS scale by a single observer blinded to UA level. Logistic regression was used to test the association of UA with DR and ANOVA was used to compare UA in those with no, mild and moderate DR as defined by ETDRS scores of 10, 20–31 and 37–43 respectively.

**Results:** Sixty subjects had no DR, 19 had mild non-proliferative DR and 2 had moderate non-proliferative DR. In an unadjusted model, UA was not associated with DR, OR = 1.38 (0.78–2.43), P = 0.27. A model adjusted for age, sex and T1D duration showed a nearly significant relationship between UA and DR, OR = 1.92 (0.94–3.93), P = 0.07 and a full stepwise model adjusted for age, sex, T1D duration, A1C, LDL, HDL, triglycerides, log albumin:Creatinine ratio and UA, showed T1D duration, OR = 1.45 (1.17–1.8), P = 0.0007 and triglycerides, OR = 1.01 (1.0–1.02), P = 0.02 to be significantly correlated with DR, but not uric acid. There was no association of UA quartiles with DR after adjustment for covariates. Uric acid was not significantly different across DR severity categories: none (4.50 ± 0.83 mg/dl), mild (4.63 ± 0.94 mg/dl), and moderate (4.98 ± 0.70 mg/dl), ANOVA P = 0.65. There was also no difference in UA between the no DR category and all of the other severity categories combined (4.50 ± 0.83 mg/dl versus 4.67 ± 0.91 mg/dl, P = 0.45).

**Conclusions:** Uric acid, a suspected marker of macro- and microvascular disease, is not significantly associated cross-sectionally with DR in youth with T1D. Alternatively, T1D duration and triglycerides were significantly predictive of DRLarger, prospective investigations are necessary for further characterization.

## P/016/WED

### DKA at onset of type 1 diabetes: Is the degree of metabolic decompensation less in children with a pre-existing familial diabetes disposition at onset?

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**Background:** At onset of type 1 diabetes (T1D) children often arrive at the hospital in a bad clinical condition, particularly with diabetic ketoacidosis (DKA). We expected a lower prevalence of DKA in families with positive T1D history due to their pre-existing diabetes experience.

**Methods:** We analysed retrospectively the metabolic condition (HbA1c, blood glucose/BG) and degree of decompensation (ketoacidosis, pH < 7.30, base excess/BE) at T1D onset in children with positive family history (FApos) and compared them to gender- and age-matched children with negative family history (FAneg). The statistical results (mean ± SD) of normally distributed data are based on *t*-test and of categorical data on chi-square test.

**Results:** From 103 children with FApos, 32 cases with evaluable data (18x father and/or mother, 13x sibling(s), 1x whole family with T1D) were compared with 32 FAneg children. The groups did not differ regarding gender (each with 12 boys/20 girls), mean age (8.3 ± 5.2 vs. 8.5 ± 5.1 years, P = 0.867, FApos. vs. FAneg) and year (each between 1993 and 2010) of T1D onset. The initial metabolic status of FApos was significantly better compared to FAneg children (HbA1c 9.6 ± 2.3 vs. 11.5 ± 2.3%, P = 0.002; BG 349 ± 167 vs. 472 ± 153 mg/dl, P = 0.003). In contrast, the degree of metabolic decompensation such as frequency of DKA (5/32 vs. 5/32, P = 0.922), mean pH (7.36 ± 0.01 vs. 7.33 ± 0.12, P = 0.361) and BE (–4.3 ± 5.5 vs. –5.7 ± 7.0 mmol/l, P = 0.366) did not differ between the groups.

**Conclusion:** The results suggest that parents despite of personal diabetes experience repress the possibility of a renewed onset in the family. An intensive education on symptoms and risk of further familial diabetes disease seems to be necessary for successful prevention of DKA at onset. In addition, frequent and continuous targeted long-term follow-up like screening tests could support predisposed families to early recognise symptoms of a new diabetes case and introduce treatment at an early stage of ß-cell destruction.

## P/017/WED

### Physical activity and joint mobility in young subject with T1DM

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**Background and aims:** It is well known that subjects affected by type 1 diabetes mellitus (T1DM) may have a limited joint mobility. The aim of the present study was to verify the presence of early limited joint mobility in young subjects with T1DM and verify the applicability of an adapted physical activity (APA) experimental protocol.

**Materials and methods:** Two groups of fourteen subjects were evaluated: group D included T1DM subjects (7/7 M/F), mean age 163.5 (SD 14.9) range 134–185 month; diabetes duration mean 6.1 (SD 4.5), range 1–12 month; group C included healthy subjects of the same age. Joint mobility was measured at the ankle by a bubble inclinometer.

**Results:** At the beginning of the study diabetic patients showed a significant reduction of ankle mobility in comparison with controls: right plantar flexion: 3.26°, $s_1$ = 3,76°, $s_2$ = 2,19°, P < 0.05; left plantar flexion 7.32°; $s_1$ = 2.49°, $s_2$ = 2.6°, P < 0.01; right dorsal flexion: 11.61°; $s_1$ = 5.75°, $s_2$ = 6.57°, P < 0.01; left plantar flexion; 11.24°; $s_1$ = 5.56°, $s_2$ = 6.28°, P < 0.01; total ROM of ankles 33.43°; $s_1$ = 13.17°, $s_2$ = 13.92°, P < 0.01. Diabetic subjects underwent intensive APA training four times a week for 5 weeks. Each training session lasted 30′–45′ and was structured for two different working areas: organic activation and stretching of muscles and tendons. After 5 weeks the ankle mobility was significantly improved: total ankle mobility mean difference is 10.69°, sd 11.25° P < 0.01 but the difference respect the control subject remains significant: total ROM of ankles 22.72°; $s_1$ = 13.17°, $s_2$ = 12.13°, P < 0.01.

**Conclusion:** The hypothesis of this study is that subjects with T1DM may have a early reduced ankle joint mobility and an appropriate protocol of adapted physical activity to the age of the subjects, lasting more than 5 weeks, could play a crucial role in the maintenance of a proper and biomechanical joint mobility.

## P/018/WED

### Role of c-peptide in the pathogenesis of microvascular complications in type 1 diabetes with pediatric age onset

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**Objectives:** To verify the effect of C-peptide (CP) in the development of microvascular complications.
**Methods:** A total of 452 patients with type 1 diabetes (T1D) onset in pediatric age, 6 years minimum of T1D duration, and CP plasmatic levels measured one year after diabetes onset were included in the study. Albumin excretion rate and fundus oculi were evaluated at two time points, after an average T1D duration of 11.4 ( ± 4.5 SD) years and 18 (± 8.5 SD) years. Weight, height, BMI, HbA1c (DCA), triglyceride levels, blood pressure (BP) and daily insulin requirements have also been evaluated. Statistical analysis was performed using parametric (*t*-test) and non-parametric (Wilcoxon) tests.
**Results:** At the first time point, reduced plasmatic concentrations of CP were found in patients who later on developed microalbuminuria ($P = 0.03$) and retinal microaneurisms ($P = 0.02$). Retinopathy was also significantly influenced by glycometabolic control, BP, and serum lipids. There was no correlation between residual CP secretion and mean HbA1c values: this suggests that the protective effect of C-peptide may not be the consequence of a residual insulin secretion, which would result in improved glycometabolic control. At the second time point we found a significant increase in the incidence of retinopathy (27–41%), while incidence of nephropathy increased at a slower rate (15–17%). CP's protective effect seems to have progressively decreased for both renal and retinal complications. Also the protective effect of glycometabolic control on the development of retinopathy was lost at this point (probably because of the progressive loss of metabolic memory).
**Conclusions:** Our results suggest a protective effect of CP on the development of nephropathy and retinopathy in early stages of T1D. Along with glycemic, blood pressure and blood lipid control, having a residual CP secretion could have a potential role in delaying the onset of microvascular complications in T1D patients.

## P/019/WED

### Vestibular function assessment in children and adolescents with type 1 diabetes mellitus

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**Objectives:** Glucose metabolism has a significant impact on inner ear physiology, and small changes may result in hearing and balance disorders. This study aimed to assess the vestibular dysfunction in children and adolescents with type 1 diabetes and its relation to disease duration and microvascular complications.
**Methods:** The study was conducted on 32 patients with type 1 diabetes (mean age of 14 ± 2.7 years) recruited from the Diabetes Specialized Clinic, Childreńs hospital, Ain Shams University and thirty two healthy age and sex matched controls. All patients were subjected to clinical assessment and investigations including mean random blood glucose (MRBG) and mean glycosylated hemoglobin over 1 year. All subjects underwent vestibular assessment that included videonystagmography and vestibular evoked myogenic potentials.
**Results:** Diabetic patients with more than 5 years duration suffered more significantly from dizziness compared to controls ($P = 0.017$). Diabetic patients with more than 5 years duration had reduced caloric responses compared to those with shorter duration and controls ($P < 0.001$). Vestibular evoked myogenic potential was absent or showed highly significant reduction in amplitude in diabetic patients with disease duration more or less than 5 years compared to controls ($P < 0.01$). Significant negative correlation was found between disease duration, MRBG and caloric tests ($P < 0.05$).
**Conclusion:** Peripheral vestibular system dysfunction was evident in young diabetic patients with more than 5 years duration by abnormal caloric test and absent or abnormal vestibular evoked myogenic potential response. Vestibular defects in young type 1 diabetes patients were directly related to disease duration and poor metabolic control. We recommend vestibular function assessment in diabetics suffering from dizziness. Better glycemic control is recommended hoping to reduce vestibular function impairment and further complications.

## P/020/WED

### Glucose control and vascular risk in adolescent diabetes

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**Objectives:** Long-term diabetes complications are pathophysiologically related to endothelial damage, increased oxidative damage, and inflammation. We, therefore, examined the relationship of these factors to various measures of glycemic control in nine adolescents with type 1 diabetes (age 13.4 ± 1.1 years, duration 3.6 ± 2.2 years mean ± SD).
**Methods:** Measures of control were fasting glucose, 72 hour average (AVG) and standard deviation (STD) determined using continuous glucose monitoring, hemoglobin A1c and A1c by duration area under the curve (AUC). Endothelial progenitor cells (EPC) were measured to assess repair capacity, soluble intracellular adhesion molecule to assess endothelial activation, reactive hyperemia (RH) to assess endothelial function, total antioxidant capacity (TAC) to assess oxidation, and high sensitivity C-reactive protein (CRP) to assess inflammation.
**Results:** Total and percent EPC both decreased as STD increased ($r = –0.82$, $P < 0.02$). RH tended to worsen as AVG increased ($r = 0.66$, $P = 0.074$). CRP increased as AUC increased ($r = 0.93$, $P < 0.001$).
**Conclusions:** These results demonstrate that different vascular risk factors are adversely affected by different aspects of poor glycemic control in adolescents with type 1 diabetes control.

## P/021/WED

### Soluble receptor for advanced glycation end products (sRAGE) and carotid intima-media thickness (CIMT) in type 1 diabetes mellitus: possible association with diabetic vascular complications

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**Objectives:** To evaluate sRAGE level and CIMT in children and adolescents with T1DM and their possible relation to glycemic control and diabetic vascular complications.

**Methods:** This study included 60 patients with T1DM with a mean age of 14.4 ± 3.4 years .They were subdivided into complicated and non-complicated groups according to the presence of microvascular complications. Thirty age and sex matched healthy controls were also included. Patients with disease duration less than 5 years, connective tissue disease, liver dysfunction, or apparent cardiovascular disease and those on lipid lowering agents were excluded. Vital signs and anthropometric measures were done. Laboratory investigations included; mean HbA1c, urinary albumin excretion (UAE), fasting lipid profile and sRAGE. Mean CIMT was done by dopplex ultrasound.
**Results:** Patients had higher levels of cholesterol, LDL, TG and lower level of HDL ($P < 0.001$). sRAGE was significantly higher (1765.0 ± 451.0 pg/ml) among patients compared to controls ($P < 0.001$). It was higher among non complicated group ($P = 0.18$) and directly correlated to HDL ($r = 0.3$, $P = 0.012$). Patients had increased CIMT compared to controls (0.57 ± 0.14 and 0.48 ± 0.05 mm respectively) ($P < 0.001$). Four (13.3%) patients showed carotid wall abnormalities. Complicated group had increased CIMT than non-complicated group (0.60 ± 0.19 and 0.56 ± 0.08 mm respectively) ($P = 0.33$). CIMT was directly correlated to age, weight, BMI, systolic and diastolic blood pressures, UAE, cholesterol and LDL ($P < 0.05$) and inversely correlated to HDL ($P < 0.05$). Neither CIMT nor sRAGE were correlated to glycemic control or disease duration.
**Conclusion:** Patients with T1DM are at risk of progressive increase in CIMT especially obese, older age, hypertensive with dyslipidemia and microvascular complications with concomitant increase in sRAGE which may be a therapeutic target for the prevention of diabetic vascular complications.

## P/022/WED

### High levels of stimulated glucagon 12 months after diagnosis of type 1 diabetes decreases the risk of severe hypoglycaemia in the following years

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**Objectives:** The risk of severe hypoglycaemia (SH) is the major factor for preventing good glycemic regulation. The aim of the study is early identification of individuals at high risk for diabetic complications.
**Methods:** A total of 129 children < 17 years with newly diagnosed T1D diagnosed in Denmark between 2004 and 2005 were followed for 6 years, prospectively. Glycated haemoglobin A1c (HbA1c), liquid mixed-meal stimulated C-peptide and glucagon were analyzed 1, 3, 6 and 12 months after diagnosis. Clinical data, and annual recordings of HbA1c were recorded. SH was defined as unconsciousness and/or seizures and a blood glucose level of < 3.5 mmol/l. Logistic regression was used as statistical analysis.
**Results:** A total of 129 children were included, 66 boys (51%) and 63 girls (49%). 94 children (72%) did not experience SH [mean age 10.3 (range 1.5–16.7) years], and 30 children (23%) had a severe hypoglycaemic event (mean age 9.0 years). Seven children (5%) experienced a severe hypoglycaemic event within the first year after diagnosis and 30 children (23%) experienced SH over the following 6 years. Age at onset and gender was not associated with an increased risk of SH. Individuals with severe hypoglycaemic events within the first year had a 15 times risk of future severe hypoglycaemic events ($P = 0.01$). Median glucagon levels at 12 months among children who experienced SH over the six years studied was 7.0 pmol/l, median stimulated C-peptide levels at 12 months in the same group was 236.0 pmol/l. There is a 19.3% decreased risk of long-term SH (95% CI 4.5–31.6%) per [pmol/l] increment of glucagon at 12 months, after adjusting for C-peptide levels and first-year SH.
**Conclusion:** Early SH and decreased stimulated glucagon levels at 12 months seem to identify individuals at higher risk of future severe hypoglycaemic events indicating a role for glucagon in preventing SH in some individuals. How glucagon should be incorporated in future treatment of diabetes needs further investigations.

## P/023/WED

### Early sign of atherosclerosis is associated with insulín resistance in adolescent type 1 diabetes

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**Objectives:** Patients with type 1 diabetes (T1D) have a substantial risk of developing cardiovascular complications early in life. This case-control study aims to explore the risk profile, including insulin resistance, in a group of young T1D patients with a short duration of disease.
**Methods:** A total of 20 adolescents with T1D and 20 healthy peers (aged 14–20 years) participated. After an overnight fast a euglycemic, hyperinsulinemic clamp (40 mU/m$^2$) was performed, measuring insulin sensitivity (Si). Blood was drawn for analyses of HbA1c, glucose, C-peptide, IGF-1 and lipids. Anthropometric data were collected. Ultra sonographic measurement of common carotid artery (CCA), intima media thickness (cIMT) was used as a marker of early atherosclerotic development and calculated from bilateral measurement of cIMT, and IM area (calculated from CCA and lumen diameter).
**Results:** The table shows group data. The diabetics had a mean duration of disease of 7.3 years. There were no group differences in lipid profile or IGF-1. We found a significant difference in cIMT between the diabetes and control groups for CCA (0.52 mm vs. 0.47 mm; $P = 0.005$) and for IM area (9.92 mm$^2$ vs. 8.94 mm$^2$; $P = 0.007$), respectively, concomitant with a lower Si in the T1D group (5.0 vs. 7.1 mg/kg/min: $P = 0.004$). After adjustments for all other factors cIMT was significantly associated to group, but not when adjusting for Si (ß = 0.1, $R^2 = 0.32$; $P = 0.005$).

| | T1D | Control |
|---|---|---|
| Age (year) | 17.9 ± 0.3 | 18.1 ± 0.4 |
| Sex (% ) | 40 | 60 |
| Waist (cm) | 82 ± 3 | 76 ± 2 |
| BMI (kg/m$^2$) | 23.5 ± 0.9 | 22.8 ± 0.9 |
| SBP (mmHg) | 116 ± 2.8 | 116 ± 2.9 |
| DBP (mmHg) | 72 ± 1.8 | 73 ± 1.8 |
| HbA1c (mmol/mol) | 74 ± 4.2* | 35 ± 0.4 |

*[Group characteristics, (means ± SEM, *P < 0.001)]*

**Conclusions:** Compared with healthy peers, adolescents with T1D show increased cIMT. This development is associated with insulin resistance rather than glycemic control.

P/024/WED

## Does the adherence to gluten free diet (GFD) influence bone mineral density (BMD) in children and adolescents with type-1 diabetes (T1DM) and celiac disease (CD)?

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**Background:** T1DM is often associated with CD. Both diseases may show impaired BMD, in T1DM possibly due to poor glycaemic control and in CD to low compliance to GFD.
**Objective:** To evaluate in patients with T1DM and CD whether bone mineral density is affected by GFD adherence.
**Patients and methods:** A total of 22 patients (10 F, 12 M) with T1DM and CD diagnosed by intestinal biopsy were examined. At BMD evaluation age was 13.6 ± 4.6 year, CD duration 7.4 ± 5 years and T1DM duration 7.7 ± 5.2 years. Compliance to GFD was assessed by the evaluation of serum anti-tissue transglutaminase antibodies IgA and deamidated gliadin peptide IgG. All patients had phalangeal quantitative ultrasound to assess BMD. The patients were subdivided into two groups:
group 1 consisted of the non compliant patients (n.3) and those CD diagnosed within a year (n.3),
group 2 included the patients with a good compliance. All patients in group 1 were asymptomatic at CD diagnosis, while 5 patients of group 2 presented abdominal pain and/or diarrhea.
**Results:** All pts showed auxological and BMD related parameters within normal range: weight-SDS 0.03 ± 0.9, height-SDS –0.10 ± 1, BMI-SDS 0.01 ± 1, amplitude-dependent speed of sound (ADSos) Z score –0.38 ± 0.1, bone trasmission time (BTT) Z score –0.35 ± 0.8. The variables considered were not different between the two groups.

| | Group 1 (n.6) | Group 2 (n.16) | P |
|---|---|---|---|
| Diaetes duration (year) | 6.96 ± 7.4 | 7.97 ± 4.3 | NS |
| CD duration (year) | 4.76 ± 6.1 | 8.41 ± 4.3 | NS |
| HbA1c (%) | 8.77 ± 2.2 | 8.47 ± 1.9 | NS |
| BMI_SDS | –0.18 ± 1.0 | 0.09 ± 1.0 | NS |
| ADSos_Z score | –0.41 ± 0.7 | –0.38 ± 1.0 | NS |
| BTT_Z score | –0.23±0.8 | –0.40 ± 0.9 | NS |

*[Table 1]*

No correlations were found between BMD parameters and HbA1c, BMI-SDS and weight-SDS.

**Conclusions:** The quality of bone as assessed by phalangeal quantitative ultrasound was within the range of the general population in all cases. None of our patients showed osteopenia even those with poor compliance to GFD.

P/025/WED

## Severe hypoglycemic (SH) episodes: a persistent threaten for type-1 DM children and their families

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**Introduction:** Despite SH episodes represent a constant fear for children and families, intensive treatment goals are mainly focused on lowering HbA1c levels. We analysed incidence and prevalence of SH episodes in our pts with type-1 DM. The records of 251 patients (107 with onset in the years 1990–2000, 144 in 2000–10) were examined for a total of 2030 years of follow-up. Inclusion criteria were disease onset after 1990, at least 3 visits/year and 1 year of follow-up. SH was defined in case of coma, seizures and/or altered mental status requiring third-party assistance. For each SH clinical characteristics and possible use of basal insulin analogue were recorded (basal-bolus therapy, BB).
**Results:** As a whole 136 patients (54.2%) experienced at least one SH episode for a total of 355 episodes. Details were available for 308 SH (87%). Whole incidence was 17.4/100 patients/year and was not different between 1st decade non-BB ther. (13.5), 2nd decade non-BB ther. (19.5) and 2nd decade BB ther. (16.6). Coma or seizures occurred in 47.7% of patients. SH was more frequent in the 1st 4 years of diabetes and after 15 years. SH occurred at night in 32% of patients and they were significant younger than patients with SH at other times. HbA1c at the time of SH was lower in the non-BB group (7.4 ± 1.3 vs. 8.2 ± 1.4; P = 0.0001) and significantly worsened 3 months after SH (P = 0.0001). SH caused admission to Hospital in 26% of patients. A total of 57 patients showed one episode, 67 patients showed two to five episodes and 12 patients six or more episodes. The latter group showed at 1st SH lower HbA1c than the other groups (6.8 ± 1.2 vs. 7.6 ± 1.2 vs. 7.8 ± 1.3; P = 0.05), a younger age and shorter disease duration. HbA1c at 1st SE was negatively correlated with number of SH (r = –0.20; P = 0.05).
**Conclusions:** At least one SH episode occurred in more than 50% of our patients with unchanged rate in the last 2 decades despite basal-bolus therapy. We confirmed the association between SH episodes and lower HbA1c levels. SH still represent a threaten for families and patients with type 1 DM.

P/026/WED

## Type 1 diabetes – celiac disease association. Clinical and evolutive aspects

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**The objectives:** Of our study were to determine the incidence of celiac disease (CD) in type 1 diabetes (T1D) patients, describe the clinical and evolutive features in children and adolescents with T1D and CD association.
**Patients and methods:** All of our T1D-CD patients were from western Algeria. This was a retrospective analysis of records listed as T1D-CD.
**Results:** (1) At 31/12/2010, we identified 308 T1D-CD associations, establishing a frequency of 11.1% of 2764 T1D and 6.9% of 4463 CD listed in our outpatient department since 1975. The sex-ratio was 0.94.
(2) Duodenal biopsy was indicated in presence of suggestive signs of CD 162 times, positive serology 76 times, and atypical CD signs 70 times.
(3) CD has been identified before T1D in 37 cases, simultaneously with, or following the onset of diabetes in 271 cases. In the last situation, CD was diagnosed in 52.3% of cases during the first 5 years of T1D. The mean age at diagnosis of T1D was similar in the isolated T1D (8.6 ± 4.8 vs. 9.1 ± 4.0 P = 0.2). In contrast, age at diagnosis of associated CD was higher than the age at diagnosis of isolated CD (11.7 ± 5.3 years vs. 5.2 ± 4.3 P < 0.001).
(5) An additional associated disease was noted 47 times (thyroiditis: 27; polyarthritis 4; trisomy 21: 5; epilepsy: 4; isolated hypertransaminemia: 3; vitiligo: 2; systemic lupus erythematosus : 1, and sclerodermia: 1).
(6) Our T1D-CD subjects presented a significant height deficiency at the age of 18 years (–3.6 ± 1.6 SD in boys and –2.2 ± 1.5 SD in girls). Severe complications such as retinopathy: 51 times,

cataract: 39 times, nephropathy: 29 times, parodontal disease: 18 times, were noted. Finally, 20 deaths and 67 lost to follow-up have been reported.

**Conclusions:** It is important to screen CD in T1D (mostly between 10 years and 14 years, and within 5 years following T1D). An accurate follow-up of both diseases is mandatory to decrease incidence of acute, degenerative, and autoimmune complications, and improve growth of this patients.

## P/027/WED

## Safety and patient perception of an insulin pen with simple memory function for children and adolescents with type 1 diabetes – the REMIND™ study

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**Objectives:** NovoPen Echo® is a new durable insulin pen incorporating half-unit dosing and a simple memory function. The aim of this study was to facilitate active surveillance of NovoPen Echo by collecting data on device complaints related to adverse reactions. In addition, the study assessed the perception of usability of the memory function and acceptance of NovoPen Echo in the clinical setting.

**Methods:** An observational, multicentre study involving type 1 diabetes patients on injection therapy, aged 2–18 years, from Canada, Finland, Israel and Sweden. At baseline, patients/caregivers completed a questionnaire regarding previous device(s). After using NovoPen Echo for 12–18 weeks, the same questionnaire was answered, along with a device preference questionnaire. Physicians completed separate questionnaires relating to safety, device education and memory function.

**Results:** In total 354 patients participated and 315 completed. No serious adverse reactions were seen, and three device complaints relating to adverse reactions were reported by physicians (0.8%, or one every 29 patient-years). Most patients found it ''easy'' or ''somewhat easy'' to read amount (99%) and time (95%) of last dose using the memory function, and were confident in having taken all injections (84%). Most patients (93%) found NovoPen Echo easy to use, and 80% of physicians reporting they could train users in ≤ 10 minutes. Overall, 90% of patients reported preference for continuing use with NovoPen Echo, a finding corroborated by 95% of physicians.

**Conclusions:** Few device safety events were reported for NovoPen Echo. Physicians found it easy and quick to educate users. Patients found the memory function easy to use and reported greater confidence in managing their insulin injections.

## P/028/WED

## Diabetes complications at pediatric patients in Ukraine (results from 4 years follow up data based on Ukrainian Pediatric Diabetes Register)

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**Objectives:** The aim of this study was to determine the frequency of acute and chronic complications of diabetes mellitus type 1 (DM 1) at children 0–17 year old during the last 4 years based on the Ukraine Pediatric Diabetes Register (UPDR).

**Methods:** Ukraine Pediatric Diabetes Register was established in 2004, it contains information about children with DM, 0–17 year old: their age, duration of DM1, frequency of acute [the severe hypoglycemia (Hypo) and diabetic ketoacidosis (DKA2, DKA3)], presence of chronic complications [diabetic cataract (DK), retinopathy (DR), nephropathy (DN), peripheral neuropathy (DNp), angiopathy of legs (DA), steatohepatosis (DS), lypodistrophy (DL), heiropathy (DH) etc], number of children without complications (NC), type and dose of insulin, the level of HbA1c.

**Results:** Based on the UPDR the number of children 0–17 years old with DM1 in 2007 was 6650, in 2008 – 6762, in 2009 – 6974, in 2010 – 7371. Therefore prevalence increased over 4 years by 10.8%. The frequency of DKA 2-3 in 2007 was 6.04%, in 2008 – 9.23%, in 2009 – 11.39%, in 2010 – 9.69%. The frequency of Hypo was 0.45%, 0.43%, 0.57% and 0.85%, accordingly. The level of HbA1c was rather constant about 8.8–8.9%.

| Years | DK | DR | DN | DA | DNp | DL | DH | DS | NC |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | 0.94 | 7.56 | 10.69 | 15.42 | 18.67 | 3.01 | 7.59 | 11.49 | 51.29 |
| 2008 | 1.92 | 8.52 | 11.43 | 19.14 | 19.31 | 7.29 | 8.55 | 16.12 | 47.68 |
| 2009 | 2.01 | 8.92 | 12.95 | 19.04 | 20.46 | 8.26 | 8.30 | 14.75 | 51.55 |
| 2010 | 1.95 | 5.52 | 10.30 | 15.77 | 19.49 | 9.18 | 7.93 | 14.40 | 53.68 |

*[The frequency of chronic complications (%)]*

**Conclusions:** During the last 4 years most children with DM1 have such chronic complications as DNp, DA and DS.

## P/029/WED

## Relationship between the cardiovascular and gastrointestinal forms of autonomic neuropathy in young patients with type 1 diabetes mellitus

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**Objectives:** One of the serious complications of type 1 diabetes mellitus (T1DM) is autonomic neuropathy. It is manifested by dysfunction of one or more organ systems (e.g., cardiovascular, gastrointestinal etc.). Early signs of autonomic neuropathy can be detected by non-invasive tests. Impaired heart rate variability (HRV), the lengthening of the QT interval, decline of the motor-evacuation function of stomach can be revealed. The aim of this study was to determine the relationship between cardiovascular and gastrointestinal forms of autonomic neuropathy.

**Methods:** Thirty young patients with T1DM (17 boys and 13 girls) aged 16 ± 2.8 years were examined to identify cardiovascular and gastrointestinal forms of autonomic neuropathy. In all subjects were conducted 24-hours ECG monitoring with the assessment of HRV and duration of Bazett HR-corrected QT (QTc) interval, a battery of autonomic function tests (RR variation, Valsalva maneuver, heart rate response to standing), standard 12-leads ECG and 13C-octanoic acid breath test.

**Results:** Multiple linear regression model demonstrated that duration of QT interval and half-time of gastric emptying was significantly correlated with HbA1c (Beta = 0.57 and 0.37 respectively; both $P < 0.05$) but not with duration of diabetes and age of the subjects. Also, we have established the relationship between the duration of QT interval and half-time of gastric emptying ($r = 0.6$; $P < 0.05$). Significant correlation between the battery of cardiovascular tests and HRV with half-time of gastric emptying were not detected, that can be explained by small study group.

**Conclusion:** In our study, an association between the cardiovascular and gastrointestinal forms of autonomic neuropathy was established. Poor metabolic control associated with the signs of cardiovascular and gastrointestinal forms of autonomic neuropathy.

## P/030/WED

### Relationship between low-grade albuminuria and atherosclerosis risk factors in type 1 diabetic children and adolescents

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**Objectives:** Microalbuminuria in the range of 20–200 μg/minute is well known predictor of diabetic nephropathy but there is also evidence that low-grade albuminuria (that is well within normal limits) indicates the increased risk of cardiovascular disease in adult diabetic individuals.
The aim of this study was to examine the relationship between low-grade albuminuria and the risk factors for atherosclerosis, markers of endothelial dysfunction and inflammation in diabetic children and adolescents.
**Methods:** The study was performed in 96 type 1 diabetic patients (45 girls, 51 boys) aged 14.6 ± 3.1 years with diabetes duration of at least 5 years (5–15.3 years). Assessment of each patient included: albuminuria (AER) measurement in 2–3 overnight urine collections, determination of HbA1c, lipid profile (cholesterol, LDL, HDL, triglycerides, Lp(a), ApoA, ApoB), uric acid, fibrinogen, vonWillebrand factor activity, asymmetric dimethylarginine (ADMA), 24-hour ambulatory blood pressure monitoring, calculation of GFR on the basis of cystatin C concentration, BMI-SDS and ophtalmologic evaluation.
In the statistical analysis logistic regression and Mann–Whitney test were used.
**Results:** Mean AER was 3.9 ± 5.1 μg/minute. Microalbuminuria was present in only one patient and AER > 10–20 μg/minute (above upper normal level for healthy individuals) was found in 5 (5.3%) patients. AER correlated positively with age (P = 0.012), cholesterol (P = 0.024) and systolic (P = 0.002) and diastolic (P = 0.016) blood pressure. In comparison of 75 patients with AER < 5 μg/minute and 19 patients with AER > 5 μg/minute. (suggested to confer an increased risk for CVD) we found significantly higher fibrinogen (P = 0.022) and Lp(a) (P = 0.045) concentration in patients with higher AER.
**Conclusions:** Low-grade albuminuria is infrequent in diabetic children but 20% of patients demonstrated AER above the level indicating increased cardiovascular risk what may be also confirmed by higher fibrinogen and Lp(a) concentration.

## P/031/WED

### Variability in daily insulin dose is associated with insulin resistance in type 1 diabetes adolescents on insulin pump therapy

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**Objectives:** To determine parameters of insulin pump therapy (daily insulin dose (DD), SD of daily insulin dose (DD_SD), ratio of SD to average daily insulin dose (DD_SDr), ratio used as basal (DDb) and number of boluses) associated with insulin resistance (IR), as determined by estimated glucose disposal rate (eGDR).
**Methods:** A total of 64 T1D adolescents (15.8 ± .4 years; 34 girls) on insulin pump therapy were included in this pilot-study. IR was defined as a lower quartile of eGDR (calculated as 24.13 – 12.22 (waist-to-hip ratio) – 3.29 (hypertension status) – 0.57 (A1C)). Data on the last 3 weeks of insulin pump therapy were abstracted by CareLink software® (Medtronic®). Data are presented as means ± SEM. Pearson correlation coefficient or ANOVA (with Dunnett's post-hoc test) were used for statistical analysis when appropriate. P < 0.05 was considered statistically significant (*).
**Results:** eGDR correlated negatively with parameters of daily insulin dose variability (DD_SD (r = –0.375; P = 0.005), DD_SDr (r = –0.393 P = 0.003). IR subjects significantly differed to non-IR subjects according to A1C and parameters of daily insulin dose variability, but not DD, DDb or number of boluses (table 1). When gender-specific eGDR quartiles were determined, the associations remained significant for boys.

| | eGDR (quartile) | | |
|---|---|---|---|
| | Lower (IR subjects) | Middle | Upper |
| Age (years) | 16.9 ± 0.9 | 15.4 ± 0.5 | 15.8 ± 0.9 |
| A1C (%) | 9.3 ± 0.4* | 8.1 ± 0.2 | 7.4 ± 0.2 |
| eGDR(mg/kg/min) | 8.0 ± 0.1* | 9.2 ± 0.1 | 10.1 ± 0.1 |
| DD (U/kg) | 0.76 ± 0.04 | 0.76 ± 0.03 | 0.75 ± 0.05 |
| DD_SD (U) | 9.8 ± 0.9* | 7.0 ± 0.6 | 6.6 ± 0.6 |
| DD_SDr (ratio) | 0.21 ± 0.03* | 0.16 ± 0.01 | 0.13 ± 0.01 |
| DDb | 0.47 ± 0.05 | 0.41 ± 0.02 | 0.43 ± 0.02 |
| Boluses per day | 6.5 ± 0.4 | 6.6 ± 0.4 | 5.6 ± 0.6 |

*[Parameters by eGDR quartile]*

**Conclusions:** In T1D adolescents (especially boys) on insulin pump therapy, variability in daily insulin dose, but not DD, DDb or number of boluses, is associated with IR as determined by eGDR.

## P/032/WED

### Impaired endothelial function in female adolescents with type 1 diabetes, measured by peripheral artery tonometry

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**Background:** The reactive hyperemia-peripheral artery tonometry (RH-PAT) is a newly developed method for noninvasive endothelial function assessment.
**Objective:** The goal of this study is to determine whether a significant difference in RH-PAT score is present between adolescents with type 1 diabetes (T1D) in comparison with controls.
**Subjects and methods:** Thirty-one adolescents with T1D and 19 control subjects (age 12–20 years) underwent RH-PAT endothelial function testing after an overnight fast. Height, weight, body mass index (BMI), blood pressure (BP), fasting lipid profile, Tanner stage and glucose level were determined in each child.
**Results:** Adolescents with T1D had significantly lower RH-PAT scores compared to healthy controls (P = 0.0065). This difference was also seen in the female subgroup (P = 0.0046).
Significant correlations between RH-PAT scores and hemoglobin A1c (HbA1c) or BMI were excluded in T1D patients.
**Conclusions:** The RH-PAT technique is used as a promising non – invasive test to assess peripheral endothelial function in

children. Endothelial dysfunction, measured by RH-PAT, was present in diabetic adolescents. Although larger validation studies are required, early detection of this reversible process may have therapeutic and prognostic implications.

## P/033/WED

### Is retinal thinning the first sign of diabetic retinopathy in young patients with type 1 diabetes mellitus?

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**Objective:** The loss of neural tissue with consequent central retinal thinning, was reported as the earliest sign of diabetic retinopathy (DR). Aim of this study is to evaluate the influence of the metabolic control, blood glucose excursion and disease duration on the central retinal thickness (CRT), evaluated by optical coherence tomography (OCT), in patients without evidence of DR at stereoscopic fundus photography (SFP).

**Methods:** A total of 25 patients (16 boys) aged 7–18 years (median 15), disease duration 7–152 months (median 71), mean insulin requirement 0.3–1.2 U/kg/day (median 0.8), mean HbA1c 6.5–11.2% (median 8.1), mean blood glucose 118–275 mg/dl (median 165) and mean blood glucose SD 29–120 mg/dl (median 79) were evaluated in the same day by SFP and OCT. SFP was performed by a Topcon, NW200 equipment and central retinal thickness was measured by Spectral Domain OCT Topography map (OTI, Toronto Canada). Mean HbA1c, hypoglycemic events, insulin requirement and blood glucose (mean ± SD) were calculated on the last year basis. High blood glucose index (HBGI) and low blood glucose index (LBGI) of the last year were also calculated in each patient.

**Results:** All patients showed normal retina at SFP. A total of 14 patients with poor metabolic control (HbA1c > 8%) compared with 11 patients with good metabolic control (HbA1c < 8%) showed a significant thinner retina (median 202 $\mu$m vs. 228 $\mu$m; Mann–Whitney test $P < 0.001$). Statistically significant inverse simple correlations were also present between CRT and HBGI ($P < 0.01$), blood glucose SD ($P < 0.02$) and insulin requirement ($P < 0.05$). No correlations were found between CRT and mean blood glucose, LBGI and disease duration.

**Conclusions:** Our results suggest that retinal thinning can represent the first sign of retinal involvement by diabetes microangiopathy and is associated with poor metabolic control but not with disease duration.

## P/034/WED

### Impaired left ventricular diastolic function in long term type 1 diabetes with childhood onset is associated with advanced glycation endproducts

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**Objectives:** The left ventricular (LV) function i long term (40 years duration) type 1 diabetes is not well known. Therefore we assessed LV systolic and diastolic function in such a cohort, and studied if advanced glycation endproducts (AGEs) were associated with these parameters.

**Methods:** A total of 27 (54 ± 7 years) patients with T1D of 40 ± 3 years duration (all with childhood onset diabetes in the period 1960–76) underwent clinical examination, standard echocardiography and tissue velocity imaging (TVI), and were compared with 26 controls (55 ± 6 years). LV systolic function was assessed by two-dimensional echo ejection fraction (EF) and S by TVI measured at septum and lateral LV wall and averaged. LV diastolic function was assessed by peak early (E) and atrial (A) diastolic transmitral velocities by pulsed Doppler, and TVI E′ as an average of early diastolic septal and lateral TVI velocities. E/É was then calculated as a measure for increased LV filling pressure and thus LV diastolic dysfunction. The AGE modification methylglyoxal derived hydroimidazolone was analyzed in serum by immunoassay.

**Results:** There were no significant difference in age, BMI, EF, or systolic blood pressure between the groups. The diabetics had lower diastolic blood pressure and increased heart rate, 65 ± 8 vs. 73 ± 9 mmHg ($P < 0.01$) and 76 ± 10 vs. 67 ± 10 beats/minute ($P < 0.01$). Systolic S was also significantly lower in this group, 6.9 ± 1.6 cm/second vs. 7.9 ± 1.5 cm/second ($P < 0.05$), and transmitral E and E/É were significant higher, 0.8 ± 0.1 m/second vs. 0.7 ± 0.2 m/second ($P< 0,01$) and 7.2 ± 2 vs. 6.0 ± 1.5 ($P < 0.05$). Hydroimidazalone correlated significantly with E/E′, $R = 0.45$ ($P < 0.05$).

**Conclusion:** LV systolic function by TVI S was reduced and E/É increased, reflecting increased LV filling pressures and thus LV diastolic dysfunction in the diabetics. The association between E/E′ and hydroimidazalone may suggest AGEs as a mechanism for the enhanced LV filling pressure in these patients by inducing stiffening of LV connective tissue.

## P/035/WED

### Frequency of microalbuminuria (MA) among children participating in the T1D Exchange Clinic Registry

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**Objectives:** To examine the prevalence of MA in pediatric patients in the T1D Exchange Clinic Registry and its relationship to relevant clinical factors.

**Methods:** The Registry currently includes approximately 60 adult and pediatric centers throughout the U.S and has over 8000 participants with T1D with ~2000 new patients being enrolled per month. The analyses in this report were based on data from 3802 pediatric patients (< 18 years of age, T1D ≥ 1 year) where MA status was available; 49% female, 83% non-Hispanic white, mean age 12.2 years, diabetes duration 5.6 years, and HbA1c 8.4%. Differences in prevalence of MA were evaluated according to age, duration, HbA1c, body mass index (BMI) and blood pressure (BP).

**Results:** None of the 1363 patients < 10 years of age with < 3 years duration of T1D had MA. In the 2439 patients 10–17 years of age and T1D duration ≥ 3 years, the prevalence of MA was more common in 14–17 year olds (4.8%) than in 10–13 year olds (1.4%, $P < 0.001$ after adjustment for duration), with duration of T1D ≥ 10 years (5.5%) than < 10 years (2.6%, $P < 0.001$), with HbA1c levels ≥ 7.5% (4.0%) compared with HbA1c < 7.5% (1.6%, $P = 0.004$) and with diastolic BP > 90th% (8.8%) than in patients with diastolic BP ≤ 90th% (3.0%, $P < 0.001$). However, the prevalence of MA was not significantly different for systolic BP > 90th%, (4.2%) and ≤ 90th% (3.2%, $P = 0.25$), and was similar in obese (2.3%) and non-obese (2.6%) children ($P = 0.78$).

**Conclusions:** These finding support American Diabetes Association treatment guidelines that do not recommend

screening for MA in children aged < 10 years and T1D duration < 5 years. The yield from MA screening also is quite low in 10–13 year olds; whereas the return on screening is much greater in 14–17 year olds, especially those with longer duration of T1D, elevated HbA1c levels and diastolic BP.

## P/036/WED

### Compliance with gluten free diet (GFD) is associated with better glycemic control in children with type 1 diabetes (T1D)

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**Objectives:** The aim was to investigate whether compliance with GFD improves glycemic control in children and adolescents with T1D and celiac disease (CD).

**Methods:** Twenty seven children and adolescents with T1D [mean (SD) age 10.4 (4.4) years; 10 boys; median disease duration 5.0 years] with positive IgA anti endomysium antibodies +/or IgA anti gliadin +/or IgA anti tissue transglutaminase antibodies at their annual screening, had CD confirmed by jejunal biopsies. Analysis was performed in 24 patients [mean (SD) age 10.4 (4.4) years; 10 boys; median disease duration 5.0 years], who were followed up after the diagnosis of CD {median (range) period 4.0 (1–9.67) years}. HbA1c, weight, height, daily insulin requirements and BMI were recorded every 3 months and these within 12 months prior to the positive screening with antibodies were compared to those within 12 months prior to the negative screening.

**Results:** In total 113 anti-CD antibodies measurements were performed in 24 patients with T1D and CD and 70 (61.9%) were positive. Patients with negative antibodies (compliant) within a year before the screening, had significantly lower $HbA_1$ levels compared to those with positive antibodies (non compliant): mean (SD) HbA1C (%) 7.2 (0.9) vs. 8.2 (1.8) respectively; $P < 0.0005$. The number of mild hypoglycemic episodes were significantly higher in compliant patients compared to non compliant ($P = 0.006$). There was no difference between the two groups in the number of severe hypoglycemic episodes and BMI z-score. Non compliant patients had higher HbA1c 1 year after diagnosis of CD compared to 1 year before ($P = 0.008$), while compliant patients had no difference. A positive correlation was found between HbA1c levels and the presence of positive anti celiac Abs (R: 0.27, B: 0.99, SE(B): 0.33 P: 0.004).

**Conclusion:** Compliance with GFD has a positive influence on glycemic control in patients with CD and T1D diabetes.

## P/037/WED

### A case of diabetic ketoacidocis (DKA) with cerebral edema (CE) and impaired renal function

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**Objective:** The objective was to report the difficulties in treatment of a newly diagnosed girl with type 1 diabetes (T1D) and DKA with concomitant CE and impaired renal function, conditions requiring contradictory therapeutic actions.

**Methods:** A 11-year-old girl was admitted to a pediatric clinic with T1D and severe DKA in lethargy. Initial lab tests: pH 6.9, $HCO_3$ 1.3 mmol/l, BE -14 mmol, Glu 448 mg/dl, K 4.2 mmol/l, Na 136 mmol/l, urea 53 mg/dl, Cr 1.1 mg/dl, funduscopy (-). She was transferred to the ICU after 46 hours in a coma. On her admittance at the ICU, she had impaired level of consciousness (GCS10/15), anisokoria (R>L), dehydration ~ 15%, respirations 25–30 /min, blood pressure 134/82 mmHg, heart rate 130 /min, pH 7.24, $HCO_3$ 11, BE-13, Na132 mEq/l, K 3.6 mEq/l, Ur 63 mg/dl, Cr 1.3 mg/dl,. Brain CT did not reveal apparent CE, however fundoscopy showed signs of papilloedema. She had reduced diuresis (~0.5 ml/kg/h).

**Results:** Rehydration was performed with 4000 $ml/m^2$/24 hours despite the presence of CE. CE was treated with hypertonic solution NaCl 3% (3 ml/kg) in 30 minute followed by a mannitol solution (0.5 g/kg). Correction of the serum Na was continued with NaCl 3% solution in parallel with the main rehydration fluids for 5 hours (1 ml/kg/h). Serum Na levels remained between 132–141 mEq/l and blood glucose levels between 130–249 mg/dl. Her level of consciousness improved 10 hours after the admittance at the ICU and 56 hours total of being in a coma.

Evaluation by a psychiatrist and a learning disabilities specialist 3 years after T1D diagnosis revealed that there were learning disorders related to the range of vocabulary and morphosyntactic deficits as well as attention deficits at a sub-clinical level.

**Conclusion:** Although CE accompanying DKA is generally treated with fluid restriction, in case of concomitant renal failure, fluid restriction is not recommended. Early administration of hypertonic 3% NaCl solution and/or mannitol may be helpful for the treatment of this severe complication.

## P/038/WED

### Young people with coeliac disease are not at increased risk of microvascular complications

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**Objectives:** Individuals who have type 1 diabetes (T1D) and coeliac disease (CD) may be at increased risk of microvascular complications due to chronic inflammation and/or the high glycaemic index gluten-free diet (GFD). We examined glycemic control, anthropometry and complications in T1D with CD (CD+) and without CD (CD–).

**Methods:** Comparative study of CD– (n = 2450) and CD+ (n = 138) aged < 20 years attending complications assessment at The Childreńs Hospital at Westmead from 1990–2010. Investigations included HbA1c,cholesterol and AER by timed overnight urine collections. Early retinopathy was detected using 7-field fundal photography . GFD accordance was defined TTG antibody titres within the normal range (GFD+, n = 45) or not (GFD–, n = 15).

**Results:** There was a trend to better glycaemic control in CD+ vs. CD– (Table 1) and HbA1c was significantly lower in those with GFD+ (8.2%) vs. GFD– (8.9%) or CD– (8.6%, P = 0.017). Insulin dose (U/kg/day) was larger in CD+ vs. CD–, stratified by GFD accordance; insulin doses were lowest in GFD+ (1.01) vs. 1.21 in GFD–, and CD–, 1.06, P = 0.022. No differences were observed in anthropometry or complication rates.

**Conclusion:** Young people with T1D and CD who adhere to the GFD have better glycemic control. It is reassuring that CD does not appear to negatively influence anthropometry or complications risk.

| | T1D (n = 2450) | T1D + CD (n = 138) | P-value |
|---|---|---|---|
| Age at diabetes diagnosis (years) | 8.6 [5.4–11.3] | 6.9 [3.1–9.9] | < 0.0001 |
| HbA1c (%) | 8.6 [7.7–9.6] | 8.3 [7.7–9.3] | 0.064 |
| Height SDS | 0.23 [0.45–0.89] | 0.19 [0.60–0.87] | 0.45 |
| Weight SDS | 0.77 [0.18–1.26] | 0.68 [0.14–1.25] | 0.66 |
| BMI SDS | 0.71 [0.16–1.20] | 0.76 [0.10–1.25] | 0.72 |
| Cholesterol (mmol/l) | 4.4 [3.9–5.0] | 4.4 [3.9–5.1] | 0.57 |
| Insulin dose (unit/kg/day) | 1.06 [0.88–1.28] | 1.13 [0.92–1.35] | 0.025 |
| Retinopathy | 541/2297 (24%) | 27/131 (21%) | 0.44 |
| Microalbuminuria (AER) | 46/1026 (4%) | 1/55 (2%) | 0.51 |

*[Characteristics at most recent visit]*

## P/039/WED

### Long-term effect of insulin pump treatment on metabolic control, its variability and hospital burden of children with type 1 diabetes

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**Aim of study:** Treatment with continuous subcutaneous insulin infusion (CSII) allows the large degree of treatment individualization and intensification in children with diabetes. The study aimed to evaluate an impact of treatment with CSII on glycated hemoglobin level (HbA1c) in children with diabetes and investigate whether introduction of CSII was associated with increased risk of acute complications of diabetes.

**Materials and methods:** Patients treated throughout the recruitment period exclusively with multiple daily injections (MDI) were matched for duration of diabetes and HbA1c level at baseline to patients treated exclusively with CSII in a 1:1 group ratio (n = 223 and 231 for MDI and CSII respectively).

**Results:** The CSII group showed lower HbA1c after the observation period (7.98 ± 1.38 vs. 7.56 ± 0.97; P = 0.002). Standard deviation of patients' HbA1c was lower in the CSII group (0.73 ± 0.45 vs. 0.84 ± 0.54; P = 0.049). The rate of hospitalizations due to acute events was similar in both groups (14.0/100 person/years in CSII vs. 14.7/100 in the MDI group). Duration of hospital stay per year was on average 1.25 day shorter in the CSII group (P = 0.0004), but the risk of acute complications resulting in hospitalization did not differ between the groups (Hazard Ratio (HR) 1.16, 95% Confidence Interval (95%CI) 0.68–1.63). The most significant risk factor of hospitalization due to acute complications was baseline HbA1c (HR 1.25 95%CI 1.14–1.37).

**Conclusions:** CSII treatment may improve glycemic control and reduce its variability. Change of MDI o CSII does not alter the risk of hospitalization but may reduce the annual duration of hospitalization in children with diabetes.

## P/040/WED

### The effect of taurine in Lycium barbarum (goji berry) on diabetic retinopathy in human retinal pigment epithelial cells: activation of PPAR-$\gamma$

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**Objectives:** The peroxisome proliferator activated receptor-$\gamma$ (PPAR-$\gamma$) is involved in the pathogenesis of diabetic retinopathy. Diabetic retinopathy is a preventable microvascular diabetic complication that damages human retinal pigment epithelial cells. Taurine is abundant in the fruit of Lycium *barbarum* (Goji Berry, LB), and is reportedly beneficial for diabetic retinopathy. However, the mechanism of its action is unknown. Hence, we have investigated the mechanism action of an extract from LB on a model of diabetic retinopathy, the high glucose-treated retinal ARPE-19 cell line, and identified the receptor function of taurine, a major component of LB extract, which is potentially responsible for the protective effect on diabetic retinopathy.

**Methods:** PPAR-$\gamma$ activity was measured by reporter gene luciferase analysis. Gene expression of PPAR- $\gamma$ at the levels of mRNA, and PPAR-$\gamma$, iNOS, COX-2 and caspase-3 at the protein levels were analysed by semi-quantitative RT-PCR and Western blot, respectively. The binding mode of taurine within the PPAR-$\gamma$ ligand binding site was modelled via computational docking.

**Results:** We demonstrate for the first time that LB extract and its taurine component dose-dependently enhance PPAR-$\gamma$ luciferase activity in HEK293 cell line transfected with PPAR-$\gamma$ reporter gene. This activity was significantly decreased by a selective PPAR-$\gamma$ antagonist GW9662. Moreover, LB extract and taurine dose-dependently enhanced the expression of PPAR-$\gamma$ mRNA and protein. In an inflammation model where ARPE-19 cells were exposed to high glucose LB extract and taurine down-regulated the protein expression of COX-2, iNOS and caspase-3 proteins. The predicted binding mode of taurine in the PPAR-$\gamma$ ligand binding site mimics key electrostatic interactions seen with known PPAR-$\gamma$ agonists.

**Conclusions:** We conclude that PPAR-$\gamma$ activation by LB extract is associated with its taurine content and may explain at least in part its use in diabetic retinopathy progression.

## P/041/WED

### Resetting the bar: frequency of severe hypoglycemia (SH) and diabetic ketoacidosis (DKA) among children with type 1 diabetes (T1D) in the T1D Exchange Registry Cohort

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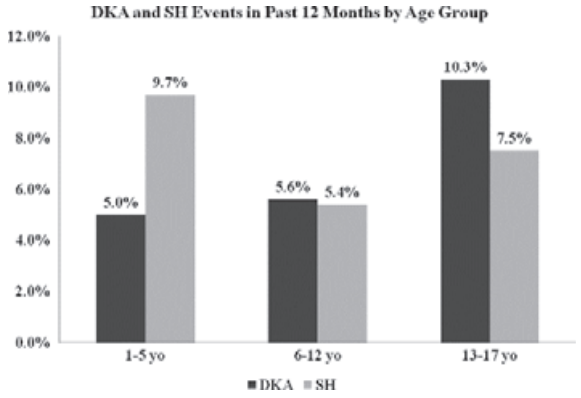
**Objectives:** Episodes of DKA and SH are the most problematic acute complications of T1D in children. The T1D Exchange Clinic Registry currently includes approximately 60 adult and pediatric centers in the U.S and has over 8000 participants with T1D. The aim of this study was to investigate the rate of DKA and SH in pediatric T1D Exchange participants.

**Methods:** Data obtained from 4120 participants (age < 18 years, T1D for ≥ 1 year, 48% female, 82% non-Hispanic white, mean ± SD age 11.9 ± 3.6 years, T1D duration 5.2 ± 3.5 years, HbA1c 8.4 ± 1.5%) were analyzed. Frequencies of DKA and SH (defined as any of the following: seizure or coma, glucagon

injection, emergency medical team called and treated while hypoglycemic) in the 12 months prior to enrollment were obtained from clinic records.

**Results:** In the prior 12 months, DKA occurred in 5.7% (21% with >1 event) and SH in 4.7% (27% with >1 event) of participants. The incidence rates were 7.8 events and 6.6 events per 100 person-years, respectively. The 14–17year old age group had more episodes of DKA ($P < 0.001$) and the < 5 year old age group had more episodes of SH ($P = 0.05$) compared with other age groups (Figure). The proportion of participants with both a DKA and SH event was 1%, 1%, and 2% in the 1–5, 6–12, and 13–17 year old groups, respectively.




**Conclusions:** DKA and SH remain major challenges for youth with T1D. Identifying high risk groups and developing interventions targeted at these groups are needed to reduce the burden of these complications.

## P/042/WED

### Examination of macrovascular complications in type-1 diabetic children and adolescents with transcranial Doppler ultrasonography

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**Objectives:** The frequency of macrovascular complications in type-1 diabetic (T1DM) children and adolescents is far less than in adults. In adults transcranial Doppler ultrasonography (TCD) is a well known method to evaluate the cerebral hemodynamic changes related to T1DM. The aim of this study was to assess the values of velocity in the middle cerebral artery (VMCA), the pulsatility index (PI) and the resistance index (RI) in T1DM children and adolescents older than ten years of age.

**Methods:** We involved seventeen type-1 diabetic children and adolescent older than 10 years of age in our recent work. Nine healthy, age-matched children served as control group. During TCD we measured VMCA during rest, and both after hypoventilation and after hyperventilation. We investigated the relationship between these parameters and metabolic control, serum lipid levels, duration of T1DM, age, gender. *t*-test, logistic regression and linear regression were used during statistical analysis.

**Results:** No significant difference was found of PI values nor of RI values between the diabetic and control group, which means that no clinical cerebral abnormality could be found among our diabetic patients, no remarkable vascular resistance can be proven. Nevertheless the fact that the flow velocity compared with the control group during systole is significantly decreased both in rest ($100 \pm 25$ cm/s, $P = 0.033$) and during hyperapnia ($117 \pm 30$ cm/second, $P = 0.024$) suggests that the developing of vascular stiffness could have started in diabetic patients even after quite short duration of T1DM.

The serum trygliceride level was found to be significant decreasing factor of both PI ($P = 0.023$, $r = -0.099$) and RI ($P = 0.022$, $r = -0.62$).

**Conclusion:** The decreased VMCA during systole suggests that some kind of pathophysiological process must have already been started. Corresponding to our recent work the clinical significance of these early functional cerebrovascular abnormalities needs further investigations.

## P/043/WED

### Temporal trends in diabetic ketoacidosis in newly diagnosed type 1 diabetes

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**Objectives:** To examine temporal trends in the incidence of diabetic ketoacidosis (DKA) in children with newly diagnosed type 1 diabetes (T1D) and to determine factors associated with DKA.

**Methods:** Prospective case series of new onset T1D (n = 1073) aged ≤ 18 years presenting to the Children's Hospital at Westmead (CHW) in Sydney, Australia, from 1998 to 2010. Ethnicity and socioeconomic status were classified according to the Australian Bureau of Statistics. Factors associated with DKA were analyzed using multiple logistic regression.

**Results:** From 1998 to 2010, 1073 youth aged ≤ 18 years presented to CHW with T1D, of whom 404 (38%) had DKA. There was one death from DKA at T1D onset over the 13 years. The mean incidence of DKA was 37.7 per 100 person years (95% CI 34.1–41.5) over the 13 years and did not change significantly over time ($P = 0.63$). In multiple logistic regression, DKA associated risk factors were: younger age, odds ratio (OR) 2.18, 95% CI 2.08–3.96, $P = 0.002$, low socioeconomic status OR 1.66, 95% CI 1.08–2.22, $P = 0.009$ and higher blood glucose level OR 1.02, 95% CI 1.01–1.03, $P = 0.023$. Neither ethnicity (Caucasian vs. other) nor country of birth other than Australia were associated with DKA. The proportion of children with DKA at onset of T1D residing in rural areas did not change over time, suggesting no change in referral rates from rural areas over the 13 years.

**Conclusions:** It is of great concern that the incidence of DKA in young people with new onset T1D has remained high over time. Established risk factors for DKA, including younger age and lower socioeconomic status, were significantly associated with DKA in our population. Education of health care professionals and the general population should target these at-risk groups to reduce the incidence of DKA. We cannot exclude the possibility that environmental triggers for T1D, such as viral infections, may influence the consistently high rate of DKA.

## P/044/WED

### Systematic review of screening for coeliac disease in type 1 diabetes

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**Objectives:** Guidelines for coeliac disease(CD) screening in type 1 diabetes(T1D) are inconsistent; the American Diabetes

Association recommends screening at diagnosis of T1D and at follow-up if symptoms present, ISPAD – screening at T1D diagnosis and annually for 5 years, and the UK NICE – screening at T1D diagnosis (all ages), but not ongoing. The aim of this systematic review was to provide an evidence base to inform frequency of CD screening in children and adults with T1D.

**Methods:** Systematic review of studies in: Medline, Embase, Cochrane and Health Technology Assessment database. Inclusion criteria were:

(i) cross sectional, case control, retrospective or prospective cohort study;

(ii) children/adults with T1D;

(iii) ≥ 2 tests for antibodies (Ab) to endomysium or tissue transglutaminase.

**Results:** A total of 234 non-duplicate citations were identified. After abstract review, inclusion criteria were applied hierarchically, leaving 49 studies for full-text review. A total of seven longitudinal cohort studies involving 6506 children and adolescents with T1D met the inclusion criteria (1–7). None of the studies were in adults. Follow-up ranged from 3 years to 18 years. The studies consistently demonstrated a high prevalence of CD Ab(5.5–10.2%) or biopsy-proven CD (1.6–6.8%), mostly detected at T1D diagnosis or within 2–4 years (1–3,6,7). CD was rare > 10 years T1D duration (3). Subgroups for whom the risk of CD may be higher include females and age < 4 years at T1D diagnosis.

**Conclusions:** This systematic review provides evidence for routine screening at T1D diagnosis and repeated testing until the risk declines, although none of the studies were designed to address the optimal frequency of screening. More frequent screening in young children is advised.

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## P/045/WED

### Flow mediated dilatation and carotid intima media thickness, markers of atherosclerosis and cardiac dysfunction in type 1 diabetes?

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**Objectives and hypotheses:** To examine the occurrence of subclinical markers of cardiovascular risk and cardiac dysfunction and their association with biochemical markers and metabolic control in Type 1 diabetes mellitus.

**Methods:** The study included 55 Type 1 diabetic patients (31F/24M) (17, 6 ± 4 years) without any cardiovascular abnormalities and 30 healthy aged matched subjects (14F/16 M) (16, 4 ± 4, 1 years) served as the control group. HbA1c, lipid profile, HsCRP and adiponectin were evaluated as the biochemical markers of arteriosclerosis and metabolic control. Standard echocardiography (2D, Doppler), myocardial performance index (MPI), carotid intima media thickness (CIMT) and flow mediated dilatation (FMD) were performed.

**Results:** HsCRP levels in children and adolescents with diabetes were significantly elevated compared with the control group (0.21 ± 0.31 vs. 0.1 ± 0.16 mg/l P:0.00) whereas no significant difference was found in adiponectin concentrations between the two groups (15.2 ± 6.1 vs. 15.57 ± 6.49 mcg/ml). In MPI abnormalities and diastolic dysfunction of both ventricules were shown in Doppler measurements in diabetic patients (P: 0.01) FMD measurements were decreased and CIMT was increased in the study group (P: 0.001). Duration of diabetes correlated positively with CIMT and negatively with FMD. FMD correlated negatively with HsCRP (r = –0.28, P = 0.03) , and adinopectin (r = –0.27, P = 0.04).

**Conclusion:** Increased HsCRP and CIMT, decreased FMD and diastolic dysfunction in the study group show that children with type 1 diabetes have cardiaovascular disease risk. Standard echocardiographic measurements were independent from duration of diabetes, insulin dose and metabolic control whereas advanced techniques as FMD and CMIT were influenced by duration of diabetes.

As a result this study shows the necessity of advanced techniques as MPI, CIMT and FMD in the follow up of type 1 diabetes.

## P/046/WED

### Effect of antioxidant therapy in high risk type1 diabetics: a 2-years prospective study

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**Background:** Antioxidant potential decreases while plasma lipid peroxidation products increase in type1 diabetes mellitus.

**Objective:** To find out whether a 2-years supplementation with vitamins E, C would improve oxidant stress (OS) status, diabetes control and diabetic microvascular complications (MVCs) in type 1 diabetics with high index of OS. Design: This study is a prospective follow-up study included 90 type 1 diabetics (mean age = 14.03 ± 2.50 years). Inclusion criteria: diabetics with bad metabolic control $HbA_{1c}$ > 8%, with MVCs, diabetes duration > 5 years and with high os defined as malondialdehyde(MDA) level > 8.035 nmol/ml. In the recruitment period laboratory investigations included random blood sugar (RBS), $HbA_1c$, urinary microalbumin, fasting lipid profile and measurement of serum MDA as a marker of lipid per oxidation with measurement of annexin 5 as a marker of apoptosis. All patients received oral vitamin E and C. Patients with body weight (BW) up to 25 kg take 1 capsule of both vitamins (100 mg), patients with 25–50 kg take two capsules and those over 50 kg take three capsules/day.

**Results:** There was a significant decrease in mean RBS, HbA1c, MDA and annexin 5 after supplementation (means = 178.13, 156.67 mg/dl, 9.93, 8.49%,13.87, 10.45 nmol/ml and 16.50, 9.60 ng/ml respectively, P < 0.001). A significant decrease in the percentage of patients with microalbuminuria after supplementation ( 26.7% and 6.7%, P < 0.0001). There were no significant changes in percentage of patients with retinopathy and peripheral neuropathy before and after suplementation. Serum MDA was positively correlated with disease duration, RBS, HbA1c, diastolic blood pressure, total cholesterol, triglycerides and low density lipoproteins. On multiple regression analysis, HbA1c had the strongest effect on MDA level (P < 0.0001).

**Conclusion:** A 2-years oral supplementation of vitamin E, C significantly improve diabetes metabolic control, level of OS and decrease the pecentage of microalbuminuria.

## P/047/WED

### Subclinical pulmonary dysfunction in young type1 diabetics: risk factors and relation to microvascular complications

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**Objectives:** To assess the frequency and nature of pulmonary dysfunction in young asymptomatic type 1 diabetics, to correlate pulmonary functions to markers of metabolic control and microvascular complications.
**Methods:** The study included 94 type 1 diabetics compared to 80 healthy controls. Spirometric measurements: forced expiratory volume (FEV1%), forced vital capacity (FVC%), FEV1/FVC%, peak expiratory flow rate (PEF%), mean forced expiratory flow during middle half of the forced expiratory flow rate (MME 25/75%). Impulse oscillometry with measurement of airway resistance (R520) and lung reactance, pulmonary diffusing capacity [DL(CO)]corrected by alveolar volume, HbAIc, fundus examination and urinary albumin creatinine ratio as parameters of metabolic control and diabetic complications.
**Results:** In the studied diabetics 26.7% had abnormal pulmonary functions: restrictive pattern (37.5%), obstructive (50%), mixed (12.5%). Diabetics showed a significant reduction of the following functions compared with controls: TLC, lung diffusing capacity in sitting position, lung diffusing capacity in supine position FVC and FEV (1), $P < 0.001$. A negative correlation was found between duration of disease and FEV (1), FVC, MME 25/75 and middle half of the FVC ($P < 0.01$). Flow rate parameters were negatively correlated with age ($P < 0.001$) while airway resistance was positively correlated to age ($P = 0.001$). Parameters of air flow rate and lung volumes and DLCO were negatively correlated to urinary microalbumin. R20 was positively correlated to mean blood glucose level while DLCO was negatively correlated to it. Diabetics with abnormal pulmonary functions had significantly longer disease duration, older age, higher blood glucose. R20 was positively correlated with RBS ($P = 0.01$). In multiple regression analysis urinary albumin creatinine ratio was the most important predicting factor for pulmonary functions.
**Conclusions:** Pulmonary function in young type1 diabetics and related to longer disease duration and hyperglycemia.

## P/048/WED

### Frequency of episodes of diabetic ketoacidosis (DKA) and severe hypoglycemia (SH) during the first year after diagnosis of type 1 diabetes (T1D)

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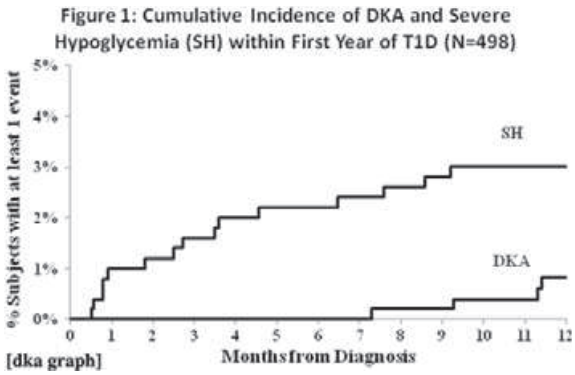
**Objectives:** Few studies have examined the frequency of DKA and SH during the first year following diagnosis of diabetes. Our objective is to investigate the frequency of DKA & SH in children enrolled in the Pediatric Diabetes Consortium study during the first year of T1D diagnosis.
**Methods:** All seven centers utilized a prospectively designed, web-based electronic database with study specific case report forms to capture clinical data and DKA and SH (defined as an event requiring assistance of another person to actively administer carbohydrate, glucagon, or other resuscitative actions to treat). Data from 498 subjects diagnosed with T1D and at least one year follow-up were included in the study. Mean age was 9.4 ± 4.0 years with an age distribution of 15% 0-< 5 year old, 58% 5- < 12 year old, 27% 12-< 19 year old and 67% were white, 20% Hispanic, 6% AA, 4% Asian subjects. Mean ± SD HbA1c was 11.2 ± 2.4 at diagnosis and 7.7 ± 1.3 at 12 months.
**Results:** Four subjects had a total of six episodes of DKA (1.2 events/100 patient years) and 15 subjects had 23 episodes of SH (4.7 events/100 patient years) documented during the first year after diagnosis; all DKA events occurred during the last 5 months of the first year (Figure).




**Conclusion:** Our data demonstrate that, despite relatively low rates, DKA and severe hypoglycemia remain concerns even during the first year of treatment of T1D.

## P/049/WED

### Soluble CD40L in type 1 diabetic children and adolescents: relation to micro-vascular complications and glycemic control

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**Background:** CD40- soluble CD40 ligand (sCD40L) interactions might constitute an important mediator for vascular inflammation that initiates diabetic micro-angiopathy. Therefore, this study aimed to evaluate sCD40L levels in type 1 diabetic patients and its relation to micro-vascular complications and metabolic control.
**Materials and methods:** Sixty type 1 diabetic patients were compared with 30 healthy subjects served as controls. Detailed medical history, thorough clinical examination and laboratory assessment of high-sensitivity C-reactive protein, glycemic control and the presence of micro-vascular complications were performed. Measurement of serum sCD40L levels was done using enzyme linked immunosorbent assay. Patients were divided into two groups according to the presence of micro-vascular complications.
**Results:** Serum sCD40L levels were significantly elevated in all diabetic patients compared with healthy control group (median, 750 pg/ml vs. 225 pg/ml; $P < 0.001$). Patients with micro-vascular complications had higher serum sCD40L concentrations than non-complicated cases (median, 13000 pg/ml vs. 450 pg/ml; $P < 0.001$). Serum sCD40L cutoff value of 330 pg/ml was able differentiate complicated from non-complicated cases ($P < 0.001$). Diabetic patients with nephropathy or neuropathy showed higher levels of sCD40L when compared with patients without these complications

($P < 0.05$). Serum sCD40L levels were positively correlated with fasting blood glucose and HbA1c ($P < 0.05$).

**Conclusions:** Serum sCD40L levels are elevated in type 1 diabetes, particularly in patients with micro-vascular complications and an evident correlation with glycemic control exists. Therefore, measurement of serum sCD40L levels in poorly controlled diabetic patients would help to identify those at high risk of developing micro-vascular complications. This study highlights the role of sCD40L in the development of diabetic microangiopathy.

## P/050/WED

### Increases of nocturnal urine cortisol metabolites and 11β-hydroxysteroid dehydrogenase type 1 activity in children with type 1 diabetes

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**Objective:** Liquid chromatography-mass spectrometry (LCMS) provides a new tool to examine cortisol metabolism. Our aim was to investigate nocturnal urine cortisol metabolites and to use them as surrogates to assess 11β-hydroxysteroid dehydrogenase type 1 (11HSD1) activity in children with type 1 diabetes.

**Methods:** Children [5–17] year with type 1 diabetes of at least 1 year duration and siblings participated. They were asked to collect their awakening urine. Diabetic patients with known hypoglycaemia during the night prior sampling were excluded. Glucocorticoid metabolites were profiled using LCMS and there concentrations were corrected for creatininuria. Enzyme activities were assessed by established metabolites ratios.

**Results:** Forty five type 1 diabetes patients (median age 11 year IQR [8–14]) and 24 siblings (median age 10 years IQR [8–14] were included. The groups were similar for body mass index, waist circumference and blood pressure. THF (5β-tetrahydrocortisol 114 ± 71 $\mu$g/nmol creat vs. 80 ± 36 $\mu$g/nmol creat, $P < 0.05$) and THFs (THF + aTHF (5α-tetrahydrocortisol) 127 ± 77 $\mu$g/nmol creat vs. 93 ± 37 $\mu$g/nmol creat, $P < 0.05$) were increased in diabetic children compared to siblings.

THFs/THE (tetrahydrocortisone) ratio, as an indicator of the activity of 11HSD1 enzyme which converts non active cortisone to active cortisol, was also increased in diabetic children compared to siblings (0.74 ± 0.18 vs. 0.51 ± 0.17, $P < 10^{-5}$, respectively). In diabetic children, THFs/THE ratio was associated with age (r 0.56, $P < 10^{-4}$). Glucocorticoid metabolite excretions and metabolite ratios were neither associated with diabetes duration nor with HbA1c.

**Conclusion:** Children with type 1 diabetes present increase glucocorticoids metabolism during the night, not related with known hypoglycaemia. Considering the known effects of glucocorticoids impact on psychoneurogical development in children, this higher nocturnal exposition to cortisol deserves more investigation.

## P/051/WED

### Nonketotic hyperosmolar syndrome as an acute complication of type 1 diabetes onset in a 20-month-old boy with congenital CNS defect

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**Objectives:** Hyperglycaemic hyperosmolar syndrome (HHS) is one of the most severe acute complications of type 2 diabetes, but may also be developed in type 1 diabetes, especially in children with concomitant central nervous system (CNS) defects or suffering from severe infections associated with dehydration.

**Case report:** The authors report a case of HHS in a 20-month-old child with, agenesis of the corpus callosum and with cerebellar hypoplasia, psychomotor retardation, congenital hypothyroidism, and congenital heart disease (ASD and VSD).

On admission the child's condition was defined as severe, conscious but sleepy, with symptoms and signs of severe dehydration, body temperature; 38.7 °C. Physical examination revealed obesity, macrocephaly, dysmorphic features, reduced muscle tension, and a systolic murmur 2/6 in the Levin scale. The laboratory tests results revealed extreme hyperglycaemia, acidosis, elevated hematocrite and lactate concentration, blood serum hyperosmolality, elevated sodium, potassium and chloride levels, adequate renal and hepatic function, ketonuria and glucosuria, moderate leukocytosis (blood glucose: > 56 mmol/l; pH-7.33; $HCO_3$-20.3 mmol/l; effective serum osmolality :409.7 mOsm/kg $H_2O$; Na corrected: 172.8 mmol/l; urine ketone:trace; C-peptide: 0.37 ng/MI; HbA1c:9.3%; positive antibodies: IA2 and ICA and positive level anti-tTG IgA).

After admission intravenous fluid administration and intravenous insulin therapy were continued, which led to a gradual reduction of the serum sodium concentration (hypernatremia correction not faster than 0.5–0.75 mmol/l/hour). In the 27th hour of treatment the laboratory parameters and the clinical state of the child gradually improved.

| Laboratory test | | Result | Normative value |
|---|---|---|---|
| Blood glucose | mmol/l | > 56 | 3.4–5.6 |
| Venous pH | | 7.339 | 7.35–7.45 |
| Effective serum osmolality | mOsm/kg $H_2O$ | 409.7 | 280–320 |
| Na+ corrected | mmol/l | 172.8 | 132.0–145.0 |
| $HCO_3^-$ | mmol/l | 20.3 | 22.0–26.0 |
| serum ketone | | trace | |
| Urine ketone | | trace | |
| C-peptide | ng/Ml | 0.367 | 1.06–3.3 |
| HbA1c | % | 9.3 | <6 |

*[Table1.Laboratory results on admission]*

**Conclusions:** Symptoms observed in our patient are characteristic for the HHS. One of the factors predisposing to the development of HHS are CNS disorders – in the reported case a congenital brain malformation. It must be emphasized that the HHS may accompany diabetes onset.

P/052/WED

## Glycemic control and acute complications in children and adolescents with type 1 diabetes at Kilimanjaro Christian Medical Centre, in Moshi, Tanzania

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**Objective:** To assess improved glycemic control and acute complications in children and adolescents in Tanzania.
**Methods:** A longitudinal study was conducted over a 6 month period, to assess baseline diabetes control and the impact of a diabetes education program. A total of 81 children and adolescents aged between 3 years and 19 years were enrolled. All children were on Insulatard and Actrapid insulin, and were given enough test strips to test 3×/week. Children were seen in clinic an average of six times during the 6 month period and received diabetes education. A structured questionnaire was used for evaluating social demographic data and prevalence of acute complications.
**Results:** At baseline, only four children (4.9%) had good glycemic control (HbA1c < 7.5%), 22 children (27.2%) had moderate glycemic control (HbA1c 7.5–10.9%), 19 children (23.5%) had poor glycemic control (HbA1c 11–12.5%), and 36 children (44.4%) had very poor glycemic control (HbA1c > 12.5%). At onset of diabetes 86% presented with diabetes ketoacidosis. During the 6-month study period, 17% reported episodes of severe hypoglycemia (had to be helped by others) compared to 52% in the 6 months prior to the study period. Ten children were admitted in DKA during the study period, compared to three admissions in the previous 6 months. A total of 26 children (376%) reported missing more than six doses of insulin for variable reasons. Hemoglobin A1C levels did not significantly change.
**Conclusions:** Diabetes education reduced the risk of severe hypoglycemia, but better control of diabetes could not be attained without the ability to measure blood glucose levels. Public health measures need to be instituted to make at least limited home testing of blood glucose levels possible.

P/053/WED

## Platelet activation in diabetic children on intensive insulin treatment

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**Background:** Development of atherosclerosis in children with diabetes starts early. Increased platelet reactivity seems to be an important feature in the development of atherosclerosis and is described in adult patients with diabetes, but so far not in children.
**Objective:** To evaluate the degree of platelet activation in early stage of childhood diabetes.
**Methods:** Diabetic patients (n = 256) (age 8–18 years, mean diabetes duration 5 years) and 100 healthy control subjects participated as part of a population based study. Platelet activation was assessed by plasma levels of P-selectin and CD40L and by use of the PFA 100 method, with epinephrine (EPI) and ADP as agonists. In addition, flow cytometry was used for measuring platelet-leukocyte aggregates in a sub-population (n = 55 and 39, respectively). Specific labelling for identifying platelet-polymorphonuclear (PPMA), platelet-monocyte (PMA) and platelet-platelet aggregates (PPA) was used.
**Results:** [Mean (SD)]: Soluble P-selectin was significantly higher in diabetics than controls [34 (10) vs. 30 (10) ng/ml (P = 0.012)], whereas no difference was observed for soluble CD40L. There was also no difference between the groups in closure time of EPI and ADP with the PFA-method, or in PPMA and PMA rates by flow cytometry. Increased fraction of free platelets [96 (3)% vs. 92 (15)%], and lower levels of PPA [4.3 (2.8)% vs. 5.6 (2.2)% were observed in diabetics compared to controls (P = 0.001 and P = 0.004, respectively].
**Conclusion:** In this cohort of diabetic children and adolescents, limited differences in platelet activation compared to aged-matched controls, were observed. The significantly higher levels of soluble P-selectin found in the diabetics, may nevertheless indicate more activated platelets, whereas the reduced fraction of platelet-platelet aggregates indicates the opposite, not easily explainable.

P/054/WED

## Withdrawn by author

P/055/WED

## Bone turnover and metabolic control in children and adolescents with type 1 diabetes mellitus

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**Objectives:** Osteopenia and impaired bone turnover have been reported in patients with type 1 diabetes mellitus (T1DM) but their aetiology is still unclear. In recent studies osteocalcin, one of the main markers of bone turnover, has been reported as associated with insulin sensitivity. Aim of the present study is to establish whether insulin sensitivity in type 1 diabetes patients is directly correlated to bone metabolism.
**Methods:** Lumbar spine and total BMD Z-score (evaluated by DXA), serum levels of calcium, phosphate, PTH, and 25-OH-D were evaluated in 35 subjects with type 1 diabetes mellitus (12 girls, 23 boys, mean age 14.4 ± 3.8, mean duration of disease 71 ± 44 months; mean HbA1c of the last 12 months 8.3 ± 1.3%). Height, weight, BMI SDS, insulin requirement, were also measured.
**Results:** Osteopenia (Z-score between –1 and –2.5) was present in 4 (11%) patients at total body BMD evaluation and in 8 (23%) patients at spine BMD evaluation. Twenty out of thirty five patients (57%) had insufficient levels of 25-OH-D according to AAP guidelines 2008 but we didńt find significant correlation between 25-OH-D serum levels and BMD. There was no significant correlation between PTH values neither with 25-OH-D status or BMD z-score (total and spine). We found a significant negative correlation between BMD lumbar spine z-score and HbA1c (P < 0.05). Moreover in a multiple regression analysis BMD lumbar spine z-score correlated negatively with HbA1c and positively with BMI SDS and insulin requirement (P < 0.01).
**Conclusions:** Our results only partially support the hypothesis that insulin sensitivity is associated with bone metabolism in type 1 diabetes children and adolescents.

P/056/WED

## Lipid abnormality and hypertension in type 1 diabetes mellitus Nigerian children and adolescents

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**Background and aim:** Type 1 diabetes is one of the most common chronic diseases among children and adolescents. In children and adolescents with type 1 diabetes, the most common complications include hypoglycemia, hyperglycemia, diabetic ketoacidosis. Long-term vascular squeal including retinopathy, nephropathy, neuropathy and cardiovascular disease begins usually in childhood with the clinical manifestations of these complications occurring commonly in adulthood. The aim of this study was to determine the effect of duration, diabetes control and BMI on lipids and blood pressure of Nigerian children and adolescents with type 1 DM.
**Method:** The study included 30 children and adolescents attending the diabetes care center at Lagos university teaching hospital. Their lipids (< 110 mg/dl LDL cholesterol, ≥ 35 mg/dl HDL cholesterol, ≤ 150 mg/dl triglycerides, blood pressure, HbA1C, height and weight measured during their visits for follow up was computed and analyzed.
**Result:** The subjects studied consisted of 10 females and 20 males (1:2). Their mean age (range) was 13.66 years (4–22). The mean duration of diabetes (range; S.D) was 4.3 years (0.5–11; 3.2). The mean HbA1c (SD) was 8.5% (2.09). All had a triglyceride less than 150 mg/dl, 4 (13%) had HDL < 35 mg/dl and 7 (23%) had LDL > 110 mg/dl. High systolic blood pressure for age normal range was observed in 13(43%) of which 6 (46%) had an associated LDL > 110 mg/dl. 12 (40%) had HbA1c > 9.0% of which 9 (75%) had diabetes f > 3.5 years. Four had high systolic blood pressure, HbA1C > 12%, LDL > 110 mg/dl and duration > 3 years. 2 (6%) had high systolic blood pressure, HbA1C > 12%, LDL > 110 mg/dl, duration > 3 years and obese.
**Discussion:** Although hyperlipedimia is yet to be a major problem amongst our cohort, the observation of high HbA1C, high LDL, low HDL and obesity amongst those that had systolic pressure showed that a combination of these factors is a risk factor for developing cardiovascular complication.

P/057/WED

## Growth and puberty in type 1 diabetes mellitus – experience from a pediatric endocrinology unit

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**Objective:** To correlate the metabolic control and disease duration with growth and puberty in young patients with type 1 diabetes mellitus (T1DM).
**Methods:** Retrospective analytical study (Qui$^2$ test and Pearson linear correlation). Sample obtained from patients with T1DM followed in an Outpatient Pediatric Endocrinology Unit of Lisbon, from 1994 until January 2011. Inclusion criteria: patients diagnosed before the onset of puberty and who had reached final height during the follow-up consultation. Variables: gender, age, weight and height at diagnosis and final, parents' height, growth rate, pubertal height gain, age at menarche, presence of complications and / or comorbidities and metabolic control during puberty.
**Results:** A total of 39 patients, 51% female, 82% diagnosed less than 5 years before puberty beginning. Over half (54%) had mean HbA1c during puberty between 8% and 10%, which we considered "reasonable." Males and females obtained a maximum growth rate respectively of 9 cm/year and 6.6 cm/year, and the pubertal height gain was 24.2 cm and 20.1 cm. These variables showed an inverse relationship with HbA1c values. We found our children slightly taller than average at diagnosis and subsequent lost height during puberty (respectively in females and males, z-score at diagnosis was 0.5 and 0.9 and z-score of the final height of -0.7 and 0.3). This difference was significant (P = 0.004 and 0.03). Still the z-score of the final heights were within the parameters of normality and appropriate to target height.
**Discussion and conclusions:** In the diabetic group studied there was a loss of final height in relation to height at diagnosis, probably caused by a decrease in growth velocity and height gain during puberty (most evident in females and in situations of poor metabolic control). However, all patients have reached or even surpassed the target height, and can thus be concluded that there was no compromise in final height.

# Poster Session II: Diabetes and Obesity

## P/058/FRI

### Hormonal and lipid profile in correlation with anthropometric measurements among offspring of diabetic mothers

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**Objective:** This study was designed primarily to estimate whether there is an association between anthropometric parameters on one hand and cord blood levels of insulin, leptin, IGF-I and lipid profile on the other hand in offspring of diabetic mother.
**Research design and methods:** A total of 60 full term infants of diabetic mothers (IODM) and 40 healthy infants of non-diabetic women participated in the study. Anthropometric assessment of the newborn including birth weight (BW), neonatal ponderal index (NPI) ,head circumference (HC), abdominal circumference (AC), triceps skin fold thickness (TST) and sub scapular skin fold thickness (SST) was performed. Cord blood levels of insulin, leptin, IGF-I and lipid profile were also assessed.
**Results:** IODM had significantly higher BW (3.9 ± 0.48 vs. 3.2 ± 0.4kg), NPI (3.1 ± 0.32 vs. 2.7 ± 0.46), AC (30.8 ± 1.9 vs. 28.5 ± 1.32 cm), TST(3.5 ± 0.58 vs. 2.2 ± 0.28 mm) and SST compared to controls(3.57 ± 0.6 vs. 2.47 ± 0.56 mm, $P < 0.0001$ for all). Moreover, IODM had higher levels of biochemical growth factors compared to controls; insulin (70.4 ± 56.4 vs. 4.48 ± 3.7 $\mu$IU/ml), leptin (40.4 ± 14.85 vs. 12.5 ± 6.7 ng/ml and IGF-I (131 ± 44.8 vs. 77.3 ± 21.9 ng/ml, $P < 0.0001$ for all). There are insignificant sex difference regarding studied measurements; apart from higher mean insulin in female than male cases (79.4 ± 69.1 vs. 65.1 ± 48.2 $\mu$IU/ml $P = 0.04$). Mean HDL was lower in IODM (21.4 ± 0.6) when compared to control (32.8 ± 11.5 mg/dl, $P = 0.02$) whereas other lipid profile were insignificant including: LDL; TG; total cholesterol ($r = 0.5$ ,$P = 0.001$, $r = 0.32$, $P = 0.05$, respectively). A positive correlation between cord insulin level and maternal HbA1c ($r = 0.481$, $P = 0.032$) was detected.
**Conclusion:** Exposure to maternal diabetes in fetal life results in characteristic changes in neonatal anthropometric measurements and caused abnormalities of lipid and biochemical growth factors which may lead to metabolic and cardiovascular complications in later life.

## P/059/FRI

### Prevalence of metabolic syndrom in children with overweight and obesity and their parents

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**Objectives:** To investigate the prevalence of metabolic syndrome (MC) defined by different criteria in children with overweight and obesity and their parents.
**Methods:** This study involved 51 children (M/F = 27/24) with overweight and obesity, mean age 10.9 ± 1.1 years (range 9.0–13.1 years) and their parents 44 (M/F = 7/37), mean age 37.6 ± 5.5 years (range 27.9–52.9 years). Overweight and obesity was defined as BMI Z-score > 1.0 according to WHO (2007) BMI criteria. MC was diagnosed in children by four pediatric criteria: Weiss (2004), Ford (2005), Cruz (2004) and IDF (2007) and in adults by two criteria: IDF and ATP III. Control: 28 children with BMI Z-score ≤ 1.0 (M/F 14/14, mean age 11.1 ± 1.04 years, range 9.7–12.7) and their parents 27 (M/F = 6/21, mean age 38.8 ± 6.35, range 29.3–57.6).
**Results:** Total groups did not differ in age and height. Girls were higher than boys. In adults group males had higher height, weight and WC vs. females. See table:
Prevalence of MC in children with overweight and obesity was 11.8% by Weiss, 13.7% by Ford, 17.6% by Cruz and 9.8% by IDF criteria. 43.2% of their parents had MC by IDF and ATP III criteria. In control group only 1 child (3.6%) had MC by Ford and Cruz criteria, prevalence of MC in parents of control group was 18.5% by IDF and 14.9% by ATP III.

| | Children | | | Parents | | |
|---|---|---|---|---|---|---|
| | Overweight/ obesity | Control | P | Overweight/ obesity child | Control child | P |
| Number | 51 | 28 | | 44 | 27 | |
| Age, years | 10,9±1,11 | 11,1±1,04 | 0,46 | 37,6±5,47 | 38,8±6,35 | 0,41 |
| Height, cm | 149,1±8,81 | 147,5±7,59 | 0,44 | 166,4±9,32 | 167,8±7,82 | 0,51 |
| Weight, kg | 53,7±11,08 | 37,3±6,31 | <0,001 | 84,8±21,69 | 67,8±14,49 | 0,001 |
| BMI, kg/m2 | 23,9±2,88 | 17,01±1,74 | <0,001 | 30,4±6,23 | 23,9±3,94 | <0,001 |
| Z-score | 2,16±0,57 | -0,18±0,69 | <0,001 | | | |
| Waist cir., cm | 77,38±8,94 | 60,01±4,05 | <0,001 | 94,7±17,06 | 80,9±12,34 | <0,001 |

*[Characteristics of groups of children and parents]*

**Conclusions:** Prevalence of MC was significantly higher in children with overweight and obesity and their parents by all criteria used. Family intervention has to be a priority in managing of weight and metabolic abnormalities in children with overweight and obesity.

## P/060/FRI

### Prediabetes in overweight and obese children and adolescents; optimal diagnosis and relationship with metabolic syndrome, non-alcoholic fatty liver disease (NAFLD) and sub-clinical inflammation

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**Objectives:** To define the prevalence of prediabetes [Impaired Fasting Glucose (IFG) or/and Impaired Glucose Tolerance (IGT)] in obese and overweight children and its relationship with Metabolic Syndrome (MS), non-alcoholic fatty liver disease (NAFLD) and sub-clinical inflammation. To examine whether HbA1c could identify prediabetes at a cut-off point ≥ 5.7% in youth.
**Material:** A total of 54 obese (BMI ≥ 95PC) and 50 overweight (85 ≤ BMI < 95PC) consecutive children 6–17 years old underwent Oral Glucose Tolerance Test (OGTT) according to the IDF standards. HbA1c was measured according to the DCCT standards. MS was diagnosed using the Cook criteria modified for normal fasting plasma glucose < 100mg/dl. NAFLD was diagnosed with liver ultrasound. Insulin resistance, as expressed by HOMA-IR, interleukin-6 (IL-6), hsCRP, TNFa, fibrinogen, white blood cells count, adiponectin and homocysteine were measured.
**Results:** About 29.6% of the obese children had IFG, 5.6% had IGT and 9.3% had both IFG and IGT. In parallel, 20.8% of the obese children with prediabetes had MS and 29.1% had NAFLD. Among overweight children we found IFG or IGT or both in 16%, 6% and 2%, respectively. The prevalence of MS and NAFLD in overweight children with prediabetes was 25% and 16.7%, respectively. Obese and overweight children with

prediabetes compared to their counterparts with normal glucose metabolism had more severe abdominal obesity (Waist Circumference: 98 ± 11.7 cm vs. 93.4 ± 9.6 cm, P = 0.038) and insulin resistance (HOMA-IR: 6.8 ± 4.5 vs. 4.3 ± 2.5, P = 0.004), but did not differ in HbA1c (4.7 ± 0.3 vs. 4.7 ± 0.5%, P = 0.476) or in markers of sub-clinical inflammation. None of the children with prediabetes had HbA1c ≥ 5.7%.
**Conclusions:** Prediabetes, predominantly as IFG, is prevalent in obese and overweight children. It seems to be related with abdominal obesity and insulin resistance and often co-exists with MS and NAFLD. HbA1c is not sensitive at a cut-off point ≥ 5.7% in diagnosing impaired glucose metabolism in youth.

## P/061/FRI

## Adiponectin, leptin, and lipid profile in type 1 diabetic children and adolescents

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**Background:** Adipose tissue is known to produce and secrete a variety of bioactive substances known as adipocytokines. Adiponectin and leptin are considered to be among the most important adipocytokines.
**Objectives:** To explore the relationships between adipocytokines (adiponectin and leptin), lipid profile and diabetic control indices in type 1 diabetic subjects.
**Subjects and methods:** In this study 63 clinically diagnosed type 1 diabetic subjects and 30 age and sex-matched healthy control subjects were analyzed. Age, sex, diabetic duration, family history of diabetes, daily insulin dose, weight, height, body mass index, systolic and diastolic blood pressure were recorded. Fasting blood glucose, glycated hemoglobin A1c, total hemoglobin, Lipid profile and plasma levels of adiponectin and leptin were measured in type 1 diabetic subjects and control subjects.
**Results:** In this study a significant increase in triglycerides and HDL-cholesterol of type 1 diabetics as compared to normal control subjects. In type 1 diabetic subjects, plasma adiponectin was significantly elevated while leptin showed a significant decrease as compared to normal control group. Leptin showed a positive correlation with body mass index, and systolic blood pressure, while it showed a negative correlation with both fasting blood glucose and glycated hemoglobin$A_{1c}$.
**Conclusion:** The results of this study revealed that leptin but not adiponectin has a significant correlation with glycemic control indices.
**Keywords:** Adipocytokines, Adiponectin, Leptin, Lipid profile and Glycemic control indices.

## P/062/FRI

## Associations between bone, fat tissue and metabolic control in children and adolescents with type 1 diabetes mellitus

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**Objectives:** Recent studies have shown a new link between skeleton, regarded as an endocrine organ, fat tissue, and insulin action. However, such data are still limited, especially in children. The aim of the presented study was to investigate the relationship between bone-derived osteocalcin (OC), osteoprotegerin (OPG), and Receptor Activator of Nuclear Factor NF-κB ligand (RANKL), and fat tissue-derived leptin and adiponectin, with glucose metabolism in children and adolescent with type 1 diabetes mellitus.
**Methods:** Eighty patients, 44 girls and 36 boys, with type 1 diabetes were included into the study. Blood samples were drawn at 8.00 am, after 8 hours fast. All above-mentioned parameters were measured by ELISA. In all patients HbA1c, a marker of long-term follow-up metabolic control of diabetes, was measured by standardized ISCC method. Patients were divided into three groups according to HbA1c level, I – below 7%, II – between 7–9% and III – above 9%. In statistical analysis ANOVA, and multiple regression analysis were used.
**Results:** The mean data ± SDS are presented in the Table 1. (Differences between I and III group *P = 0.04, **P = 0.06).
Multiple regression analysis adjusted for age showed that serum OC and leptin negatively correlated with HbA1c (r = –0.22, P = 0.004 and r = –0.27, P = 0.0001 respectively). In opposite, serum OPG correlated positively with HbA1c (r = 0.26, P = 0.02) as well as with adiponectin (r = 0.26, P = 0.02) and RANKL (r = 0.27, P = 0.02).

| | n | OC [ng/ml] | Leptin [ng/ml] | Adiponectin [g/ml] | OPG [pmol/l] | RANKL [pmol/l] | OPG/RANKL | HbA1c [%] | Age [year] |
|---|---|---|---|---|---|---|---|---|---|
| Group I | 25 | 37.4±17.5 | 2.1±1.9 | 11.1±3.4 | 1.7±1.4 | 0.2±0.1 | 52.5±77.0 | 6.4±0.4 | 10.5±4.2 |
| Group II | 28 | 33.0±18.3 | 1.8±1.7 | 12.3±4.9 | 1.8±1.3 | 0.1±0.1 | 68.0±98.7 | 7.8±0.6 | 12.7±4.6 |
| Group III | 27 | 27.8±13.7 | 1.0±0.6 | 13.4±6.6 | 2.3±1.4 | 0.2±0.1 | 107.6±131.8 | 11.2±1.8 | 11.5±4.0 |
| p | NS | 0.12* | 0.03 | 0.62 | 0.63 | 0.63 | 0.15** | 0.000001 | 0.19 |
| Total | 80 | 32.6±16.9 | 1.7±1.6 | 12.3±5.2 | 1.9±1.4 | 0.2±0.1 | 76.5±106.7 | 8.5±2.2 | 11.6±4.3 |

*[Table 1]*

**Conclusions:** Our data suggest that in children and adolescents OC and OPG are important not only for bone metabolism but also glucose and fat metabolism.

## P/063/FRI

## Childhood obesity as a predictor of diabetes and cardiovascular diseases

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**Objectives:** Prevalence of childhood overweight and obesity is continually increasing due to increased energy intake, decreased expenditure and sedentary lifestyles of children of present age. Overweight/obesity during childhood is directly related to increased health risks and may be a valid tool to predict co-morbidities in children.
**Methods:** Children of same age and sex with BMI 85th–95th percentile (n = 82; overweight) and BMI > 95th percentile (n = 74; obese) were assessed for cardiovascular and metabolic risk factors. Data was statistically analyzed by Graph Pad Prism (version 5.0).
**Results:** High blood pressure with increased left ventricular mass was encountered in 22% of overweight and 36% of obese children. C-reactive protein was elevated (P < 0.05) in 20% of overweight and 32% of obese children. Total cholesterol, high density lipoprotein cholesterol and apolipoprotein AI were lower (P < 0.05) in 41%, 32% and 45% of overweight and 54%, 61% and 58% of obese children, respectively. Low density lipoprotein cholesterol and triglycerides were higher (P < 0.05) in 26% and 34% of overweight but 41% and 49% of obese children, respectively. Type 2 diabetes was prevalent in 5% of overweight and 8% of obese children. Glucose intolerance was observed in 12% of overweight and 19% of obese children. It was

further observed that, in addition to BMI, waist circumference was more strongly related to diabetes and dyslipidemia, in children.

**Conclusions:** The study identifies overweight, in particular, obese children at a higher risk for type 2 diabetes and cardiovascular abnormalities. Extensive weight control strategies including restricted caloric consumption and increased activity, for prevention and reversal of obesity in children, may be warranted at population level. Long term follow up studies are needed to observe the effectiveness of prevention strategies. Further, irrespective of BMI, children with elevated waist circumference should also be screened for health risks.

## P/064/FRI

### Metabolic syndrome in moderate/severe obese children: an effective treatment

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**Objectives:** Childhood obesity is a major problem of public health in all Europe, with the highest rate found in Campania Region, Italy. Importance has to be paid on the identification of the possible complications (mainly the metabolic syndrome, MS), in order to better understand the dimension of the phenomenon and to better address effective strategies to combat it. The principal aim of the study is to underline the importance of a multicomponent hospitalization programme for moderate/severe obese children for the identification and treatment of MS.

**Methods:** A total of 103 children (63 M) were hospitalized for 6 days, to evaluate the complications of obesity and to start a multicomponent treatment based on educational integrated therapy (nutritionist and psychologist) addressed to modify behaviours and habits which caused and/or nourished the complications. A 1 year integrated follow up (nutritionist and psychologist) was addressed to all patients, while blood tests were repeated after 6 months only to the subjects affected by MS.

**Results:** Mean age of the population was 11.5 ± 2.7, mean BMI z-score 2.6 ± 0.4. The 41.7% (N = 43) of the population was affected by MS. After 6 months mean BMI z-score was 2.2 ± 0.4 and only 7.7% of the sample was still affected by MS.

**Conclusions:** The big reduction of MS (-34%) after 6 months of therapy show that the multicomponent hospitalization treatment is important to:

(1) identify MS (otherwise not surely identified);
(2) address specific treatments;
(3) modify unhealthy behaviours.

## P/065/FRI

### An overlapping diabetes phenotype in children and adolescens

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**Introduction:** The incidence of both type 1 and type 2 diabetes is increasing, as reported by many studies, for type 1 diabetes in children < 5 years of age and for type 2 diabetes as the consequence of an increasing sedentary lifestyle and obesity. Some children could present with an overlapping diabetes known as "double-diabetes".

**Objectives:** To assess the presence of overlapping diabetes phenotype typical for both type 1 and type 2 diabetes in our children and adolescents diagnosed with diabetes since 1999.

**Material and method:** We analyzed the data from our local county registry between 1999–2010, regarding the number of children and adolescents with a mixture of the two types of diabetes, subjects who are obese and with signs of insulin resistance, classified as type 2 diabetes, as well as positive for markers of autoimmunity to β cells and children previously diagnosed as having type 1 diabetes and treated with insulin who developed features of type 2 diabetes.

**Results:** Out of total number of patients (149) diagnosed with type 1 diabetes, 26 develped features of type 2 diabetes (17.44%), after several years of evolution, from 2 to 12 years. Also, from 14 patients diagnosed with type 2 diabetes, 12 were obese, with signs of insulin resistance and 6 tested positive for several antibodies specific for type 1 diabetes.

About 19.3% of our patients are diagnosed with ''double-diabetes''. 93.75% of those diagnosed with ''double-diabetes'' are treated with insulin and metformin.

**Conclusion:** The differentiation between the two types of diabetes is becoming increasingly challenging in children. Whether type 1 diabetes combined with obesity causes type 2, or whether type 2 triggers the symptoms of type 1 diabetes in susceptible individuals remain to be established by future studies. Also, future studies will assess the complications related to this mixture of the two types of diabetes.

## P/066/FRI

### Elevated BMI increases cardiovascular disease risk in adolescents with type 1 diabetes

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**Objective:** Cardiovascular disease (CVD) is the leading cause of mortality in type 1 diabetes (T1D). Overweight increases CVD risk and is more common among T1D adolescents in the U.S. Our aim was to compare BMI Z-scores between non-diabetic (non-DM) and T1D adolescents and determine whether CVD risk differs by overweight status.

**Methods:** CVD risk factors were compared in adolescents age 12–19 years with T1D (n = 302, duration > 5 years, 50% male, 80% non-Hispanic White) and without (n = 100, 47% male, 69% non-Hispanic White) by T1D status and BMI categories in T1D subjects (< 85th%ile and T1D ≥ 85th%ile [overweight]).

**Results:** Adolescents with T1D had higher BMI Z-scores than non-DM (0.62 ± 0.77 vs. 0.29 ± 1.04, P = 0.004). Overweight T1D adolescents were more likely to be female than normal weight T1D (64% vs. 43%, P = 0.001). T1D adolescents (both normal weight and overweight) had higher CVD risk factors and

| Least square means±SE, adjusted for sex/race-ethnicity; *geometric mean and range; 1p<0.05 for non-DM v T1D<85th%; 2Non-DM v ≥T1D85th%; 3T1D<85th% v ≥T1D85th% | Non-DM N=100 | T1D<85th% N=206 | ≥T1D85th% N=96 |
|---|---|---|---|
| A1c, %, 1,2 | 5.4±0.1 | 9.1±0.1 | 9.3±0.1 |
| BMI z-score, 2,3 | 0.32±0.07 | 0.28±0.05 | 1.51±0.07 |
| Total Cholesterol, mg/dl, 1,2 | 146±3.3 | 156±2.6 | 160±3.4 |
| Triglycerides*, mg/dl, 3 | 76 (34-235) | 73 (27-333) | 83 (35-394) |
| HDL-c, mg/dl, 1,3 | 48±1.0 | 52±0.8 | 49±1.0 |
| LDL-c, mg/dl, 1,2 | 81±2.6 | 88±2.0 | 92±2.7 |
| SBP, mmHg, 1,2,3 | 109±0.8 | 112±0.7 | 118±0.9 |
| DBP, mmHg, 1,2,3 | 64±0.7 | 68±0.5 | 70±0.6 |
| CRP*, mg/dl, 1,2,3 | 0.39 (0.02-9.1) | 0.55 (0.04-22) | 1.09 (0.07-17.3) |

*[Subject Characteristics by Diabetes Status and BMI]*

normal weight T1D adolescents also had higher HDL compared to non-DM adolescents (Table). Furthermore, the overweight T1D adolescents had higher TG, SBP, DBP, and CRP and lower HDL than normal weight T1D adolescents, despite similar A1c.
**Conclusions:** In this cohort, a third of T1D adolescents were overweight and these adolescents had a more atherogenic CVD risk factor profile despite glycemic control similar to normal weight T1D adolescents. Elevated BMI is common in T1D adolescents in the U.S. and it further increases CVD risk. Its prevention should be emphasized for CVD health.

## P/067/FRI

### Physiological growth but over gain of adipose tissue in children with type 1 diabetes treated with insulin pump

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**Background:** Physical growth and nutritional status is one of the most important clinical outcome in children with type1 diabetes. The evidence of the impact of continuous subcutaneous insulin infusion (CSII) on growth has not been established.
**The aim:** To estimate parameters of physical development and nutritional status in children treated with continuous subcutaneous insulin infusion (CSII).
**Material and method:** Cross-sectional study included 110 children (68 girls, 42 boys), average 11.1 ± 3.94 years, diabetes duration 5.29 ± 3.4 years, av. HbA1c 7.48 ± 1.35%; insulin requirement 0.76 ± 0.21 IU/kg/day.: Enlarged anthropometric examination was conducted during scheduled visit. Patients were assessed on the basis of general somatic condition, linear growth and body composition. The data were presented as a SDS = $(x_b - x_n)/SD_n$, standardized on reference system growth chart.
**Results:** In general physical development we found that 14.5% of study's population has obesity (BMI > 2SDS) and overweight(BMI > 1 SDS). On the regards of all parameters of skeletal development: body height, length, head and chest circumferences the percentage of patient out of ± 1SDS was 0.9%. In body composition we noticed significant abnormality in fatty mass and tissue distribution – 45% of patients had abdominal skin-fold thickness > 1SDS and in 47% of patients Mid Arm Fat Area (MAFA) was > 1 SDS . There was not the decreased of total muscle mass Mid Arm Muscle Area ( MAMA > 1 SDS in 2%) in total muscle mass. Statistically significant correlation was found between age/maturation stage and abdominal skin-fold but not with insulin daily dose.
**Conclusion:** CSII method help to held general somatic growth in normal range. In course of growing up and maturation process one of two adolescent has an adipose tissue gain above standard range. The enlarged anthropometric examination should been done regularly in children with type diabetes.

## P/068/FRI

### Metabolic syndrome and their individual componentes is strongly associated with a pro-inflammatory and insulin resistant state in pediatric population

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Endothelial inflammation and Insulin resistance (IR) begin in childhood. The diagnosis of Metabolic Syndrome (MS) which involves cardio-metabolic risks is increasing in children. Inflammation markers such as highly sensitive C-reactive protein (hsCRP), pro coagulants markers like plasminogen activator inhibitor 1(PAI-1) and IR surrogates markers as insulin (Ins), Alanine aminotransferase (ALT) and Microalbuminuria (MA), have been associated with MS.
**Aim:** To correlate the presence of MS, their individual components and the sum of them with inflammatory, pro-coagulant and IR surrogates markers in children and adolescents.
**Subjects and methods:** A cross sectional study including 337 children (52.5% males), 10.9 ± years old (range: 4.9–15.6), BMI 1.03 ± 2.11 SDS (33.2% overweighted and 25.5%, obese) were performed. MS was defined by the Cook criteria: waist circumference (WC) and blood pressure (HBP) > p90, Triglycerides (TG) > 110 mg/dl, HDL Cholesterol (HDL) < 40 mg/dl and Glycemia (GL) > 99 mg/dl. Plasma levels of hsCRP, PAI-1, Ins, ALT, and urinary MA were determined and their association with the presence of MS, its individual components and the sum of them were calculated. Results were expressed as median and were compared with Kruskal–Wallis test.
**Results:** MS was present in 37 children (10.9%). The frequency of individual components of MS were WC: 38.5%, HBP: 21.3%; TG: 17.8%; HDL: 21.3% and GL: 1.4%.
Median hsCRP, PAI-1, Ins and ALT were significantly higher ($P < 0.01$) in the presence of MS and increased progressively when a increasing number of MS components was present.
**Conclusions:** Pediatric population with MS has a higher concentration of hsCRP, PAI-1, ALT and Ins but not MA. These markers increase proportionally as MS components are added, suggesting that even before reaching the diagnostic criteria for MS, a pro-inflammatory, pro-coagulant and/or an insulin resistant state exists. The components with higher risk of adding another MS component are WC and GL.

## P/069/FRI

### Impair glucose tolerance in children and adolescents with obesity

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**Objectives:** Overweight and obesity in children and adolescents has increased dramatically since the 1980s. Being overweight as a child or adolescent increases the risk to develop diabetes type 2, hypertension and cardiovascular disease. Insulin resistance has a pathogenetic role in this development. Even small children may have insulin resistance. A simple and reliable method to detect abnormalities in glucose metabolism is the oral glucose tolerance test, OGTT which may be used in school children and adolescents.
Aim of our study was to describe the outcomes of the OGTT in children and adolescents with obesity who have been referred to the regional team in Västra Götaland.
**Methods:** The study was conducted as a retrospective record review of all children and adolescents aged 8–18 years with obesity where an OGTT had been carried out in the obesity clinic Queen Silvia Childreńs Hospital during the years 2008 and 2009.
**Results:** Out of the 83 individuals who completed the first OGTT, 63 had a normal outcome (76%), seven had impaired fasting glucose (IFG) (8%) and 13 had impaired glucose tolerance (IGT) (16%). Overall 24% had an abnormal OGTT. Analysis of background record data in relation with the test results of the first OGTT shown that there was a significant

negative correlation between birth weight (r = –0.349, P = 0.0037) and the 2-hours glucose value.
In 23 patients an OGTT was performed a second time. In the second test, 11 had a normal outcome (48%), eight had IFG (35%), two had IGT (8.5%) and two had diabetes type-2 (8.5%).
**Conclusion:** The OGTT can be used to identify risk groups among children and adolescents with obesity. The interventions around diet, exercise may be intesified and sometimes medication may be applied. Adolescents with obesity and low birth weight with a significantly higher 2-hour glucose value on OGTT, can be interpreted as glucose tolerance is associated with body size in early life.

## P/070/FRI

### Evaluating glucose metabolism in children: oral glucose tolerance test versus glycated hemoglobin

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**Background:** Childhood obesity is associated with an array of metabolic disturbances, but the proper way of evaluating them is still a matter of controversy. The 2009 ISPAD consensus does not recommend glycated hemoglobin (A1c) as a standard test for diagnosing anomalies of glucose metabolism in children.
**Objective:** To evaluate the long term glucose profile in obese children.
**Methods:** We performed a retrospective study that included 208 children evaluated in our clinic, between January 1st 2000 and December 31st 2009, for obesity and/or impaired glucose tolerance (IGT). IGT diagnosis was based on two consecutive oral glucose tolerance tests (OGTT). After we applied the exclusion criteria we obtained a study population of 35 children that we divided into three groups, according to their weight and metabolic status: obese without IGT (n = 17), obese with IGT (n = 11), normal weight with IGT (n = 7). We analyzed variables obtained during the first admission: age, sex, weight, height, body mass index, OGTT, A1c. We performed an ANOVA one-way test.
**Results:** The three groups were homogenous for age and gender. We did not find significant differences for baseline glucose (4.5 ± 0.7, 4.8 ± 1, 5 ± 0.7; P = 0.442) and A1c (5.5 ± 0.9, 5.4 ± 0.6, 5.6 ± 0.3; P = 0.908) across groups. 2 hours glucose differed significantly in the study population (5 ± 1.1, 6.4 ± 1.1, 5.9 ± 1.5; P = 0.011).
**Conclusions:** The long term glucose profile was similar in obese children, whether they were diagnosed with IGT or not. Larger studies are needed to establish the role of A1c as a standard test for diagnosing anomalies of glucose metabolism in children.

## P/071/FRI

### The strength of family risk factors in relation to pediatric obesity

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**Objective:** Environmental risk factors continue to fuel the childhood obesity epidemic, with significant deteriorations of diet and physical activity patterns being key etiological contributors. Family history can be part of the approach to screening for children at risk of diabetes and cardiovascular disease due to childhood-onset obesity. This study examined the relationship between family history of diabetes, high blood pressure, heart attack, smoking, and parent and child obesity prevalence in a multiethnic population.
**Methods:** Parents who consented to have their children ages 2–5 participate in a randomized-controlled obesity prevention trial in 28 low-income preschools completed a baseline assessment that included demographic, nutrition and physical activity items. Body mass index (BMI) data was collected on all participating children (N = 624). Chi-Square analysis was conducted to measure the association between prevalence of chronic disease risk factors and their child's BMI. The Centers for Disease Control and Prevention standardized BMI percentiles (> 85th percentile for age and sex to define those who are overweight and > 95th percentile for age and sex to determine those who are obese) were used as cut-points for child BMI.
**Results:** Over half (58%) of the sample was Hispanic representing over a dozen countries (majority were from Cuba), 15% were Haitian, 12% were non-Hispanic Black, and 3% non-Hispanic White. The majority (95%) was born in the United States, but the majority of their parents were born abroad. None of the family risk factors were associated with child BMI, although caregiver BMI did have the strongest correlation.
**Conclusion:** In our study, there was no relationship between family history of diabetes, heart attack, hypertension, smoking, and child BMI. However, family history should be part of prevention campaigns aimed at reducing the burden of these diseases and their risk factors in children.

## P/072/FRI

### Influences of leptin level on body composition in obese children

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Total body composition by dual energy X-ray absorptiometry (DEXA) can be used as an specific method of measuring body composition for identify the individual risk of metabolic complications in children.
**Objective:** To investigate serum leptin level and its relationship with bone mineral density in obese children.
**Methods:** A total of 91 children with obesity (male/female = 52/39, mean age 12.81 ± 0.5 years) were involved. DEXA was used to determine bone mineral density and body composition. BMI were average 95 percentile for age and sex. Serum leptin was measured using ELISA by "DRG Diagnostics" (USA). All the data were performed nonparametric (ANOVA, test of Mann–Whitney *U*-test) and parametric (Student-criteria) methods.
**Results:** The mean BMI m/f (29.7 ± 0.68/28.3 ± 0.52 kg/m$^2$) (P = 0.05).DEXA data (m/f): bone mineral density 1.12 ± 0.02/1.06 ± 0.03 g/cm$^2$ (P > 0.01), Android 51.05 ± 0.93/53 98 ± 0.58 (P > 0.05), Gynoid 46.93 ± 0.68/51.29 ± 0.52 (P = 0.05), A/G 1.09 ± 0.02/1.05 ± 0.01 (P > 0.05), total body 42.5 ± 0.71/46.65 ± 0.54 (P = 0.05), fat 39559.1 ± 2228.08/34212.16 ± 1374.2 g (P = 0.01), fat free 50474.93 ± 2429.83/41343.36 ± 1496.6 g (P = 0.05), lean mass, 47 804.3 ± 2421.72/38790.33 ± 1451.34 g (P = 0.05). A significant gender differences were revealed in «total body», more pronounced in girls. A correlation bone mineral density and lean mass were observed in prepuberty (r = 0.9) and early puberty (r = 0.79) boys groups. This correlations wasn't noted in girls. Serum leptin level was positively correlated with mineral density (m/f) prepuberty (r = 0.3/0.46), early puberty (r = 0.32/0.49), puberty (r = 0.4/0.58)groups, more expressed in girls (P >0.01).

**Conclusions:** Serum leptin level was positively correlated with mineral density. A lean mass was significantly correlated with mineral density in boys.

## P/073/FRI

### Clinic and home blood pressure measurements are related with abdominal obesity, atherosclerosis and cardiac function in normotensive obese children and adolescents

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**Objectives:** To compare routine clinic (CBP), research setting clinic (rCBP), ambulatory (ABP) and home blood pressure (HBP) measurements in normotensive obese children and adolescents in terms of average levels and relationship with target organ damage.

**Methods:** A total of 48 healthy, normotensive children and adolescents [24 boys, 5 overweight, 43 obese, 21 prepubertal, median age 11.1 years, range (4.6–14.5)] had measurements of CBP (1 visit), rCBP (1 visit), HBP (6 days) and ABP (24 hour). Participants underwent an oral glucose tolerance test (OGTT), lipid profile investigation, carotid intima media thickness (IMT) and echocardiographic evaluation. Left ventricular mass (LVM) and LVM index [LVMI] were calculated.

**Results:** Systolic CBP (mean ± SD 117.5 ± 13.5 mmHg) was higher than rCBP (105.2 ± 7.2$^{\#}$), 24-hour ABP (108.1 ± 6.0$^{\#}$), daytime ABP (dABP) (112.1 ± 6.2$^{*}$), nighttime ABP (nABP) (101.1 ± 6.7$^{\#}$) and HBP (110.4 ± 1.3$^{\$}$,). dABP was higher than rCBP$^{\$}$ and nABP. BMI was correlated with rCBP (r = 0.40$^{\$}$), CBP (r = 0.30$^{*}$) and HBP (r = 0.48$^{\$}$); waist circumference (WC) with rCBP (r = 0.54$^{\#}$) and HBP (r = 0.52$^{\$}$); Systolic rCBP with LVM (r = 0.43$^{\$}$), A wave (r = 0.37$^{*}$), fraction shortening (r = 0.34$^{*}$), IMT (r = 0.38$^{*}$) and triglycerides (r = 0.35$^{*}$); Systolic HBP with body fat% (r = 0.50$^{*}$), HbA1c (r = 0.55$^{\$}$), A wave (r = 0.43$^{*}$) and inversely with HDL (r = 0.45$^{*}$). No differences in CBP, HBP and ABP were detected between subjects with normal or impaired OGTT. Non-dippers had higher CRP than dippers$^{*}$. In multifactorial models IMT was best defined by rCBP$^{*}$ and BMI$^{*}$ ($R^2$ = 0.14, R = 0.52) (independent variables: rCBP, dABP, BMI, age, TG/HDL) and LVMI by rCBP$^{\$}$, age$^{*}$ and impaired glucose tolerance$^{*}$ (IGT) ($R^2$ = 0.32, R = 0.56) (independent variables: rCBP, dABP, age, BMI, sex, IGT).

**Conclusions:** In obese normotensive children and adolescents carefully standardized rCBP and HBP but not casual CBP or ABP measurements are associated with abdominal obesity, early atherosclerosis and cardiac function. $^{*}$P< 0.05, $^{\$}$P< 0.01 $^{\#}$P< 0.001.

## P/074/FRI

### Serum resistin in obese and type 1 diabetes mellitus (T1DM): relation to anthropometric and metabolic parameters

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**Objectives:** To assess serum resistin level in obese and patients with T1DM in relation to anthropometric and metabolic parameters.

**Methods:** This study included;

**Group I:** A total of 37 obese children with mean age of 5.66 ± 1.3 years, those with BMI< 95th percentile, endocrinal, genetic or drug induced causes of obesity were excluded.

**Group II:** A total of 25 patients with T1DM with mean age of 9.6 ± 3.9 years. Twenty age and sex matched healthy controls. Data recorded included; age, gender, disease duration, dietary habits, weight, height, BMI, waist circumference (WC), waist/hip ratio (W/H) and Tanner score (SMR). Laboratory investigations included; fasting serum insulin and resistin, fasting (FBS) and postprandial blood glucose (PPBG), urinary albumin excretion (UAE), HbA1C (for diabetics only) with calculation of insulin resistance (HOMA-R), insulin sensitivity (QUICK 1) and β cell function (HOMA-B).

**Results:** Waist circumference was higher among patients with T1DM and obese (68.4 ± 13.09 and 69.89 ± 23.24 cm respectively) than controls (52.07 ± 8.81 cm) (P < 0.01). Serum resistin was higher among group II (9.69 ± 2.59 ng/ml) than group I and controls (7.58 ± 1.74 and 5.06 ± 0.86 ng/ml respectively) (P < 0.01), it was inversely correlated to age, WC and HOMA-R only in group I. Serum insulin was higher among group II (22.51 ± 5.8 $\mu$U/L) compared to group I and controls (13.42 ± 1.73 and 12.27 ± 1.62 $\mu$U/L respectively) (P < 0.01), it was directly correlated to BMI, WC, W/H, SMR, FBS, PPBG (only in group I), HOMA-R and TV watching hours (in group I and II). HOMA-R was higher among group II (7.02 ± 3.7) and group I (3.48 ± 1.07) than controls (P < 0.01). Neither serum insulin nor resistin was correlated to QUICK1 or HOMA-B (P > 0.05). No significant relation between serum insulin and resistin to sex in all studied groups.

**Conclusion:** Patients with T1DM have higher serum insulin, resistin and HOMA-R. Resistin is not correlated to anthropometric, metabolic parameters and HOMA-R in T1DM. It is inversely correlated to HOMA-R in obese children.

## P/075/FRI

### Evaluation of the c-IMT to identify the cardiovascular risk in children with metabolic syndrome (MS)

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**Objective:** The metabolic syndrome has been recently identified also in paediatric age (IDF, 2007). Objective of the study has been to estimate the correlation between metabolic syndrome, carotid intima-media thickness (c-IMT) and cardiovascular risk in paediatric age.

**Patients and methods:** We have recruited 183 children (90 F and 93 M): 83 affected by obesity (median age: 11 years old), of which 23 affected by metabolic syndrome, and 100 healthy controls. In the patients we have analyzed BMI, blood pressure, relationship waist/height, blood levels of triglyceride ,cholesterol, HDL cholesterol, insulin, glycemia, C peptide, HbA1c. All have been subordinated to echo-color Doppler TSA B-mode (MyLab 40) in order to estimate the carotid intima-media thickness, to identify signs of preclinical atherosclerosis.

**Results:** We have defined the cut-off for pathological values> of 0.7 mm for children of 5–9 years old,> of 0.8 mm for children of 10–14 years old and > 1 mm for adolescent of 15–18 years old. 22/83 (26.6%) obese children had c-IMT increased for the age. We have observed a statistically meaningful correlation between increased c-IMT and dislipidemia (hypercholesterolemia)/hyperinsulinemia.

We have moreover found a strongly correlation between MS and increasing of the waist and waist/height relationship.

**Conclusions:** The c-IMT represents an optimal, not invasive screening test of the cardiovascular risk also in children affected by metabolic syndrome. Hypercolesterolemia and hyperinsulinemia have been mainly related to the development of preclinical atherosclerosis and therefore they must be prevented modifying life style in children. It's very important the involvement and collaboration of the family. The waist and the waist/height relationship can be easy instruments for the paediatrician to identify subjects at risk.

| Risk Factors | Patients | Pathological c-IMT |
|---|---|---|
| Hypertension | 20 | 3 (3.6%) |
| IFG/IGT | 11 | 3 (3.6%) |
| BMI > 97 | 64 | 22 (26.6%) |
| Hyperinsulinemia | 40 | 27 (33.3%) |
| Dislipidemia | 78 | 39 (42%) |
| Waist > 90°C | 66 | 14 (21%) |
| Waist/Height > 75°C | 74 | 14 (21%) |
| Total | 83 | 22 (26.6%) |

## P/076/FRI

### The prevalence of insulin resistance and prediabetes in obese children

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**Background:** Childhood obesity is associated with an increased risk of metabolic and cardiovascular complications such as: insulin resistance (IR), impaired glucose tolerance (IGT), type 2 diabetes (T2D), dyslipidemia, hypertension. Among obese children and adolescents the IR leads to the development of IGT and T2D which prevalence among children is increasing.
**Objective:** To estimate the prevalence of IR and prediabetes among obese children and to evaluate the utility of the indexes assessing IR.
**Material and methods:** Cross-sectional study included 48 children (25 ♂ and 23 ♀ ) aged 5–10 year (mean 7.8 year) with BMI > 90 pc. IR was assessed using homeostasis model assessment (HOMA-IR), fasting insulin/glucose ratio (FIGR) and quantitative insulin sensitivity check index (QUICKI). Fasting glucose, insulin and CRP were measured. Based on literature data we adopted HOMA ≥ 2.5, QUICKI ≤ 0.34 and FIGR ≥ 0.3 as a cut-off points for diagnosing IR. Waist circumference (WC), BMI and Cole's index were assessed.
**Results: (see table nr 1)**In 4% patients a fasting glucose was higher than 100 mg/dl indicating at least prediabetic state. HOMA

| BMI percentile | % patients | Fasting glucose mg/dl | Fasting insulin mIU/L | HOMA -IR | QUICKI | FIGR | CRP mg/l |
|---|---|---|---|---|---|---|---|
| 90-97 | 14.5% | 81 ±6 | 7.3±5.5 | 1.5±1.2 | 0.38±0.05 | 0.09±0.06 | 0.8±0.2 |
| ≥97 | 85.5% | 84±10 | 11.5±9.8 | 2.5±2.2 | 0.35±0.03 | 0.13±0.1 | 5.1±7.4 |

*[Results (mean±SD)]*

below 2.5 had 77% children; 6.3% patients between 2.5 and 3.14 and 16.7% above 3.15. QUICKI was below 0.34 in 37.5% children and ≥ 0.34 in 62.5% patients. We analyzed the relationship between CRP and fasting glucose, insulin , HOMA-IR, QUICKI and FIGR but we did not observe any significant correlation.
**Conclusions:** We confirmed the high incidence of IR in obese children. The highest rate of IR (37.5%) was found when using QUICKI index compared to HOMA-IR (22.85%). The FIGR was not useful in the diagnostics of IR in our group. Additionally the results confirm that children with overweight and obesity are at increased risk of T2D.

## P/077/FRI

### Prevalence of metabolic abnormalities in young obese children

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**Objectives:** Pediatric metabolic syndrome (MetS) is being studied extensively due to the increased prevalence of obesity in children, but research in younger children is limited. The purpose of this study was to examine the prevalence of MetS, its components, and their relationship with relative BMI (rBMI) in obese school-age children.
**Methods:** Study subjects were 222 obese children (40% males) aged 6–10 years seen as new patients in the Lipid Clinic at The Children's Medical Center of Dayton in 2008–2010. Demographic, anthropometric, and biochemical data were extracted retrospectively from medical records. RBMI was calculated by dividing the subject's BMI by the BMI at the 50th percentile for age and sex. MetS was defined as BMI ≥ 85th percentile, plus ≥ 2 of the following: high-density lipoprotein (HDL) < 35 mg/dl, triglycerides (TG) > 150 mg/dl, 2 hour glucose on oral glucose tolerance test ≥ 140 mg/dl (IGT), and/or SBP or DBP ≥ 90$^{th}$ percentile for age, sex, and height. In addition, elevated fasting insulin (FINS) was defined as ≥ 17 $\mu$IU/ml. The association between presence of metabolic abnormalities and rBMI was examined using chi-square analysis across rBMI tertiles.
**Results:** The mean (SD) age of participants was 9.3 ± 1.3 years. Mean BMI was 30.4 ± 5.1 kg/m$^2$, and mean BMI percentile was 98.9%. While 23.0% of subjects had only one MetS component (i.e., obesity), 27.9% had MetS. Prevalence of MetS was 18%, 34%, and 32% in rBMI tertiles 1–3 respectively, and the difference was not statistically significant (P = 0.06). 19.8% had low HDL, 18.5% had high TG, 13.1% had IGT, and 62.6% were hypertensive. 40.1% had high FINS. Prevalence of high FINS

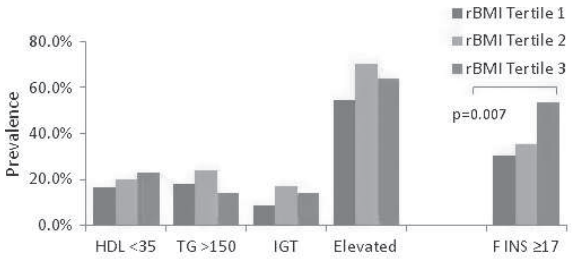

Figure 1. Metabolic abnormalities by rBMI tertiles

was significantly different among rBMI tertiles (P = 0.007). [Metabolic abnormalities by rBMI tertiles]
**Conclusion:** Obese children are at high risk of MetS, hypertension, and elevated insulin. Current clinical practice guidelines do not include assessment for MetS components in children under the age of 10 years; however, screening for MetS in this population is warranted.

# Poster Session I: Diabetes and Puberty

P/078/WED

## Elevated testosterone but normal anti-müllerian and inhibin b levels in pubertal boys with type 1 diabetes mellitus (T1D)

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**Background:** The effect of type 1 diabetes on Leydig and Sertoli cells function is not clear.

**Objective:** To assess testicular function in pubertal boys with T1D.

**Methods:** Pubertal boys with T1D (T1D n = 69, 14.5 ± 0.3 year) and healthy controls (C) (n = 100, 14.3 ± 0.2 year) were studied. Inclusion criteria were Tanner stage 2 to 5, up to 18 years of age, lack of other chronic diseases. Both groups were matched by age, BMI and Tanner stage. Total testosterone (TT), SHBG levels, inhibin B, anti-Müllerian hormone (AMH) and gonadotropins were measured and free androgen index (FAI) and calculated free testosterone (cfT) were estimated. All T1D received treatment with multiple daily insulin injections. Statistical analysis was performed using ANOVA, *t*-test and linear regression.

**Results:** TT, FAI and cfT were higher in T1D than in C, even after adjusting for Tanner stage and BMI (Table 1). TT levels, IAL and TLC were higher in T1D in Tanner 3 y 5. Similar levels of inhibin B, AMH and gonadotropins were observed in both group.

**Conclusions:** Children with T1D exhibit elevated androgen levels but normal Sertoli cell function during puberty. These data suggest involvement of Leydig but not Sertoli cells during puberty in T1D.

| N = 169 | T1D (n = 69) | C (n = 100) |
|---|---|---|
| TT (ng/dl) | 422.5 ± 30 | 333.5 ± 30* |
| SHBG (nmol/l) | 47.2 ± 3.6 | 35.6 ± 1.4*** |
| cfT (pmol/l) | 324.5 ± 27.7 | 251.7 ± 15.9** |
| FAI (%) | 48.2 ± 4.3 | 37.6 ± 2.2** |
| AMH (pmol/l) | 132.8 ± 14.4 | 128.7 ± 15.9 |
| Inhibin (ng/l) | 218.1 ± 8.8 | 214.7 ± 6.5 |

*P = 0.008 **P = 0.001 ***P = 0-01

*[Testicular function in pubertad boy T1D]*

# Poster Session II: Diabetes Care, Education, Psychosocial Issues

## P/079/FRI

### Quality of life and metabolic control in children and adolescents with type 1 diabetes mellitus

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**Objectives:** To evaluate quality of life (QOL) in children with type 1 diabetes mellitus (DM) in relation to metabolic control.Quality of life is considered being an important factor to measure since it often correlates with children's and adolescents' perception of having diabetes, diabetes-related conflicts within the family, depression andglycemic control.
**Methods:** The cross-sectional study included 56 children with type 1 DM (aged 5–18 years) and their parents. QOL was evaluated by the PedsQL 3.0 Diabetes Module. The children were assigned to one of two groups according to metabolic control. Metabolic control was assessed by a single HbA1c at the time of the visit.
**Results:** Children with lower HbA1c (less than 8.0%) reported that their QOL on several domains was better than that of children with poor metabolic control. By self-report, children with better metabolic control reported that they had statistically significant better QOL scores for the diabetes symptoms, treatment barriers, treatment adherence and worry subscales in comparison to the children with worse metabolic control. Children with lower HbA1c differ significantly in the same diabetes related subscales from children who have poor metabolic control. The only exception is the communication subscale of the child and parents report where there is no difference between the groups. The parents experienced that their children had lower diabetes related Quality of Life compared to the children themselves, $P < 0.05$.
**Conclusion:** Children with better metabolic control report better QOL.

## P/080/FRI

### Effects of diabetes self-management education on glycaemic control in children with insulin-dependent diabetes mellitus

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**Objective:** To evaluate the effect of diabetes self-management education (DSME) on glycaemic control (HbA1c) in Pakistani children suffering from type-1 diabetes mellitus.
**Study design:** Quasi-experimental study.
**Place and duration of study:** This study was conducted at the Diabetic OPD of National Institute of Child Health, Karachi, from April to September 2009.
**Methodology:** Sixty children with a mean age of 9.94 years with type-1 Diabetes mellitus (T1DM) were selected conveniently from the diabetic OPD. The patients along with their parents/caregivers attended a modular series of diabetes self-management education program consisting of two sessions. Customized program was designed to educate children regarding general information about the disease, basic insulin therapy, planning for hypoglycaemia, hyperglycaemia, activity, traveling and basic nutritional management. It was conducted by a multidisciplinary paediatric diabetes team including an endocrinologist, general paediatrician, nutritionist and diabetic nurse. The educational sessions were followed by monthly revision exercises. HbA1c levels were measured at baseline and after 3 months and compared using paired sample *t*-test.
**Results:** Out of a total of 60 patients, 50 completed the trial. There was a significant decrease in the HbA1c levels after the DSME program. The mean pre- and postintervention HbA1c levels were $9.67 \pm 0.65$ and $8.49 \pm 0.53$ respectively with a P-value $< 0.001$.
**Conclusion:** In the studied group, DSME programs helped to improve glycaemic control. It should be an integral part of patient treatment in diabetic care setups.

## P/081/FRI

### Exploring demographic and clinical barriers to research participation: a pilot analysis

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**Objectives:** To explore the demographic and clinical differences of research participants versus non-participants among local eligible patients for the SEARCH for Diabetes in Youth study, a large population-based study of youth with clinically diagnosed diabetes.
**Methods:** As part of recruitment protocol for the SEARCH study (Washington site), the medical record number of every eligible patient is tracked. After obtaining local IRB approval, we compared demographic (age, sex, race/ethnicity, language, insurance) and clinical (type of diabetes, HbA1c, number of visits) data for Seattle Children's participants (n = 204) and non-participants (n = 45) with incident diabetes in 2007–2008 by chart review. For the 2008 cohort (n = 98 participants, 29 non-participants), we collected additional clinical information (frequency of glucose monitoring, insulin regimen, adverse events and presence of comorbidities over 1 year). Descriptive statistics and chi-squared tests were used to describe data and explore differences in these variables between participation groups.
**Results:** Participants were more likely to be non-Hispanic white versus other race ($P < 0.01$), English-speaking versus needing an interpreter ($P < 0.01$), and with private versus public insurance ($P < 0.05$). No clinical characteristics were significantly different between the two groups, although data from the 2008 cohort revealed that participants were slightly more likely to have comorbidities (high blood pressure, lipids, thyroid, celiac disease, or albuminuria) over their first year then non-participants (43.9% vs. 27.6%; $P = 0.09$).
**Conclusions:** Generalizability is often a concern in research studies. We found that non-participants were similar to participants in the clinical measures assessed. However, observed differences in race/ethnicity, language, and insurance indicate that more efforts are needed to improve participation among diverse, heterogeneous population of children with diabetes.

## P/082/FRI

### Personality as a longitudinal predictor of self-care and glycaemic control in adolescents with type I diabetes: implications for clinical practices

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Personality is an enduring psychological construct that may influence an individual's management of their diabetes on a

daily basis. Whilst cross-sectional research has highlighted the importance of five-factor model personality traits in youths' management of diabetes, the role of these dimensions over time remains unclear. The current study examined whether baseline personality influenced trajectories of blood glucose testing and glycaemic control in a sample of 104 youths (8–19) with type I diabetes. Participants completed the five-factor personality inventory for children (FFPI-C) annually for 3 years. Reports of blood glucose testing were also recorded at these occasions and a capillary blood sample was taken for HbA1c analysis. Baseline personality scores were employed to create groups which were then compared using mixed design analyses of variance. Results showed that individuals high in conscientiousness had better glycaemic control ($F$ (1.67) = 4.74 P = 0.03) and tested their blood glucose more regularly ($F$(1.70) = 4.05, P = 0.04) than those low in conscientiousness. Individuals high in agreeableness also had better glycaemic control ($F$(1.70) = 11.02, P = 0.01), as did individuals moderate in emotional regulation (F (2.66) = 3.90, P = 0.02). Importantly, there were significant interactions between conscientiousness group and time ($F$(2.134) = 5.00, P = 0.01) and agreeableness group and time ($F$(2.140) = 3.44, $P$ = 0.04) for HbA1c values. Examination of the means demonstrated that HbA1c values for individuals high in agreeableness or conscientiousness decreased over time whereas HbA1c values for individuals low in agreeableness or conscientiousness increased over time. Together, results show that a personality pattern of low conscientiousness, low agreeableness and low emotional regulation poses a considerable risk for worsening glycaemic control during adolescence. The clinical and treatment implications of these findings will be discussed.

## P/083/FRI

### Care plans: part of improving ability to self care

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**Objective:** To utilize and evaluation diabetes care plans as part of the diabetes service aiming to improve adherence and improve self care skills for children and adolescents with type 1 diabetes in a clinic situation with 150–160 children less than 19 years with type 1 diabetes.

**Methods:** From 2006, diabetes care plans have been a part of the service delivered to each child/parent at consultations so that at the end of the clinic, the patient has gone with a specific update on their current insulin regimen, guidelines as to how to manage common acute problems and contact number for in hours and after hours advice. Written and in many cases electronic copies are given to patients for all other involved in their care including schools where appropriate. Copies of the care plans are available electronically to all paediatric medical staff, emergency physicians online, and hard copies are kept in the paediatric ward to enable quick access should issues arise. Evaluation of the care plans took place late 2009 with changes made to improve user friendliness and avoid any issues of confusion. Feedback has lead to a change in format and further development occurred in 2011 with funding provided to allow for better user friendliness for physicians and others accessing the care plans on line.

**Outcomes:** While this is only one component of the service delivered, in 2010, a drop of 0.5% in HbA1c was noted in those under 13 years, and 0.7% drop in the 13 and over group of the 160 patients in the clinics. Feedback from users have reinforced the value of this tool as a means of assisting patients (parents) to self manage with increased efficacy.

Fewer calls during working hours and after hours have been noted but not documented.

## P/084/FRI

### Young adult education evenings. From the smallest seeds – grows the tallest trees

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In early 2010, the idea for a joint young adult and parent education evening was born. This evening would not just be education on diabetes and its self management but also symbolic of the need to include parents and family, whilst promoting patient independence.

The first ever MUSTARD, evening was held on 6th May 2010. MUSTARD II followed a year later, in March 2011.

The concept of MUSTARD is to educate and empower all those affected by diabetes, from the patients, to the parents and partners. The main focus being on the young adults with diabetes, while simultaneously reaching out to the families recognising the invaluable role they play.

The attendees (patients, parents, and others) receive education as a group; this is then followed by the part of the evening which makes MUSTARD so unique. The room was divided into two with the use of a partition. The young adults in one room received education based around them, how THEY can self manage. The second room's participants are the 'others', e.g. parents, partners and friends. This group received talks focused on helping manage other people's diabetes.

The aim is to lift the childhood burdens that may have been carried through into the young adult setting, embrace independence, self management and enter diabetes adulthood on their own, but with a great deal of support. More symbolism played a part in the dividing and separation of the room/talks, it was fine for the parents to be there – just in a different space, similar to when a parent wishes to attend the young adults clinic – they simply stay in the waiting room.

On both MUSTARD evenings, 100% feedback was given. This covered the whole event, from the timing to the content. An equal number of participants were invited on both occasions and similar numbers were in attendance. Feedback from participants has enabled the young adult diabetes team to tailor their service to the thoughts and requests of their clients.

## P/085/FRI

### Intensive subcutaneous insulin therapy and intravenous insulin infusion at onset of diabetes preserve beta-cell function equally well in children

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**Objectives:** Swedish children with newly diagnosed diabetes have since 20 years been treated with intravenous (IV) insulin

infusion for the first 48–72 hours. One reason for this has been to achieve immediate good metabolic control to prolong the residual beta-cell function. Our aim was to see if IV insulin therapy at diagnosis preserves beta-cell function better than multiple daily injections (MDI).
**Methods:** A total of 54 children aged 9.9 ± 3.5 years (range 2.8–14.9), without ketoacidosis, were included in a 2 year, randomized multicentre study (factoring for puberty and centre) to treatment with MDI or 48–72 hours IV initially, with the ambition of achieving normoglycemia in both groups. 33 (61%) were boys. 22 (41%) were pubertal. 48 subjects completed 12-months follow-up and 42 completed 24 months.
**Results:** HbA1c at diagnosis was 10.6% DCCT, 92 mmol/mol for IV, 11.0%, 96 mmol/mol for MDI (ns). During the first two full days of insulin therapy, mean plasma glucose was 8.2 mmol/l for IV, 9.5 for MDI (P = 0.025) and mean insulin dose 1.5 U/kg/day for IV vs. 1.0 for MDI (P = 0.001). After the initial therapy, both groups received MDI, but 16 (7 in IV, 9 in MDI group) started with pumps during the follow-up. 1, 6, 12 and 24 months after diabetes onset, HbA1c, fasting serum C-peptide and insulin doses/kg/24 hours were registered. At 24 months a mixed-meal tolerance test (MMTT) was performed. There were no differences in HbA1c, C-peptide or the insulin-dose/kg/24 hour between the groups. At 24 months, HbA1c (7.5% DCCT, 58 mmol/mol, for IV, 7.2%, 55 mmol/mol, for MDI; ns) and insulin doses (0.79 U/kg/day for IV vs. 0.88 for MDI; ns) did not differ. Fasting C-peptide (0.08 pmol/l for IV vs. 0.12 for MDI), maximal MMTT response (0.19 pmol/l for IV vs. 0.25 for MDI), and AUC (18.2 pmol/l*min for IV vs. 24.0 for MDI) also did not differ significantly.
**Conclusion:** There was no difference in (24 months) preservation of beta-cell function when using IV insulin vs. MDI at diabetes diagnosis in children.

## P/086/FRI

## The dynamics of opinions involving the physical activity and its relation to the metabolic control in children with type 1 diabetes

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**Introduction:** Implementing and encouraging physical activity ameliorates the metabolic control and sensitivity to insulin in T1D patients. A regular sport activity has strong multifaceted psycho-socioeconomic conditioning.
**Objectives:** Conducting an audiovisual trial with the resulting analysis of the dynamics of opinions on physical activity, and finding its relation to the metabolic control in children with Type 1 diabetes mellitus (T1DM).
**Methods:** A total of 32 T1DM children over 12 years of age (average 14.9; ± 1.9): 30 on insulin pump; and 2 on Peny (average T1DM duration in years: 5.9; ± 4.3), HbA1c: 7.8, ± 1.6%, the children's 28 Mothers and 4 Fathers. During the visit basic demographic and medical history information were collected, along with the one-time assessment of HbA1c. To evaluate the dynamics of opinions an audiovisual method ''The Objective of a Computer Mouse'' (OCM) (1), was used, supplemented by the original questionnaires on the opinions relating to physical activity.
**Results:** Four types of graphs illustrate the dynamics of opinions on sports and sport activities, as an interpretation of patterns of thinking and common fears of physical activity in midst of one's diabetic status. The highest HbA1c (8.029, ± 1.68%) represented a group of individuals who did not mention their diabetes very often. The most stable hemoglobin A1c levels were observed in persons active in sports (7.59, ± 1.23%) and those with families friendly to sports (7.29, ± 0.99%).
**Conclusions:** Persons active in sports and families supporting it, manifest positive approach to physical activities, are aware of dangers associated with diabetes in sports, and achieve the recommended metabolic control discipline.
**References:** 1. Borkowski, W., Nowak, A., Vallacher, R. (1995–2006). *Dynamic mouse – the software for "mouse paradigm" based psychological experiments*. Department of Psychology Florida Atlantic University.

## P/087/FRI

## Educational assessment of the KICk-OFF structured education course for 11–16 year olds with type 1 diabetes. Evaluation by independent educationalists, participants and educators involved in the KICk-OFF randomised controlled trial

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**Objective:** To assess the educational aspects of the KICk-OFF course.
**Method:** KICk-OFF (KO) is a 5 day, intensive education course involving up to eight young people, taught by trained KO educators. There is a separate parents' day. During 12 months from Sept 2009, 31 courses were delivered to 195 participants and evaluated as follows: Educationalists: Independent observation of seven courses by two education academics, using a structured peer review process, Participants: daily written and verbal feedback, Educators: course reports, interviews during courses and focus groups at the end of the intervention period.
**Results:** Educationalists concluded that KO produced observable improvements in students with regard their self-regulation, attitudes, confidence and knowledge. Positive practices included use of students' experience to raise confidence, creativity and flexibility within the curriculum, organisation and structure. They highlighted the need to reinforce key messages, use more sophisticated strategies for assessment of learning and continually identify and address obstacles to learning. Participant and parent feedback was overwhelming positive. The course was enjoyable, the group effect was beneficial and students' confidence in diabetes self care improved. Mathematics was a challenge for many: educators needed to find innovative ways of teaching the calculations involved in carbohydrate counting. Other challenges were maintaining motivation and behaviour management but educators' skills improved markedly with experience. Parents raised concern about sustaining behaviour change.
**Conclusion:** Intensive education can be successfully delivered to groups of young people. The KO curriculum is deemed to be educationally sound. Training is required to ensure health professionals can effectively manage behaviour, assess learning and address mathematical difficulties. Optimal delivery would include regular follow-up sessions to consolidate initial learning.

P/088/FRI

## Patient, family and contextual factors associated with transition readiness, HRQOL and health status among youth with type 1 diabetes (T1D)

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**Objectives:** Cross-sectional data from adolescents and young adults with T1D assessed potentially modifiable patient and family factors associated with poor outcomes during the time of transitioning from pediatric to adult medical care. Transitioning represents a vulnerable developmental period, when youth with T1D are at great risk for suffering poor physical and psychosocial outcomes. Outcomes of interest include: Transition readiness, Adherence behaviors, and HbA1c. Predictors of interest include patient (diabetes-specific emotional distress) and family (diabetes-specific family conflict, problem-solving skills) factors among these vulnerable youth.
**Methods:** Forty-two youth ($M_{age}$ 19.07 ± 1.48; range 15.33–25.90 years) 68% Caucasian, 27% Hispanic, 56% female completed questionnaires on a confidential study website. Multiple regression analyses were performed, based on each of the three outcomes of interest (Transition Readiness, Adherence and HbA1c).
**Results:** Family conflict significantly predicted transition readiness ($R^2 = 0.37$, $F(4,42) = 3.5$, $P = 0.038$, $\beta = 0.53$), higher conflict is associated with more transition readiness. Higher conflict was significantly associated with adherence ($R^2 = 0.38$, $F(4, 28) = 3.716$, $P = .007$, $\beta = 7.02$). The relation between diabetes-specific emotional distress and adherence behaviors is moderated by family problem-solving difficulty ($R^2 = 6.76$, $F(5.28) = 9.598$, $P < 0.001$, $\beta = 0.783$). Specifically, poor adherence occurs with high levels of emotional distress and poor family problem solving skills ($R^2 = 0.564$, $F(3.30) = 11.65$, $P < 0.001$, $\beta = 0.671$). Better adherence occurs with high levels of distress and positive family problem-solving skills ($R^2 = 0.564$, $F(3.30) = 11.65$, $P < 0.009$, $\beta = 0.417$).
**Conclusions:** Results suggest that family conflict, diabetes-specific emotional distress and family problem-solving can serve as the focus of clinical interventions aimed at facilitating both transition readiness and adherence behaviors in adolescents and young adults.

P/089/FRI

## Preventing depression in adolescents with type 1 diabetes (T1D)

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**Objective:** Teens with T1D are at increased risk for depressive disorders, with prevalence rates between 15 and 33%, as compared with 10% for their healthy peers. We designed an intervention to promote resilience and prevent depressive symptoms by teaching cognitive-behavioral and social problem-solving skills in a group format.
**Methods:** Partnering with the Penn Resilience Program developers, we adapted the prevention program, integrating diabetes-specific content. Three non-randomized groups (N = 39 teens) completed the intervention. Teens completed pre and post intervention questionnaires.
**Results:** All teens reported program satisfaction. Feedback from teens led to simplifying some concepts and providing more examples to underscore specific concepts. Session frequency (once per month for 9 months) was not ideal because academic schedules change from fall to spring. Teens reported forgetting material in-between sessions, even though group leaders called in-between sessions, reminding them to complete homework. Most teens were without depressive symptoms prior to enrollment, and because the pilot study only included one post-intervention assessment, little change was observed. However, all measures moved in the direction of improved well-being. Paired sample *t*-tests revealed statistically significant improvements in adolescents' social problem-solving skills ($P < 0.0001$). Paired sample *t*-tests for the subgroup exceeding the clinical cut-off score for depressed mood at baseline (CESD score > 16; n = 6) showed statistically significant improvements in adolescents' social problem-solving skills ($P < 0.05$) and coping efficacy ($P < 0.01$).
**Conclusions:** Results from the pilot study suggest this adaptation of PRP is feasible and acceptable. A randomized control study is being planned, integrating pilot study feedback, to more thoroughly assess the intervention's ability to build resilience and reduce depression risk.

P/090/FRI

## Development of the adolescent diabetes needs assessment tool (ADNAT)

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**Objectives:** To create an on-line interactive learning needs self-assessment tool for adolescents (12–18 years) with type 1 diabetes.
**Methods:** Re-analysis of data from our previous qualitative research studies of the lived experiences of adolescents with diabetes, their parents and health professional team identified questionnaire items which were then categorised into domains using the Diabetes Self-Management Education Framework. The performance of each item in the tool was examined through expert, patient and carer review using the Delphi method; cognitive interviews with adolescents to pre-test the identified items; and pilot work with fifty young people to check for variations in relation to levels of missing data and floor and ceiling effects.
**Results:** The Adolescent Diabetes Needs Assessment tool (ADNAT) uses six inter-connecting domains relating to diabetes self-management: all about me, physical activity, eating, medication, blood glucose monitoring and living with diabetes. Mental health and independence including social skills underpin the domains. It consists of 99 questions, filtered according to treatment regimen, and takes an average 20 minutes to complete on-line. The tool can be used in its entirety or as individual domains.
**Conclusions:** ADNAT provides a communication tool for use in health care consultations. Collaboration between young people

and parents at six hospital sites, a multi-disciplinary research team, an established Research Steering Group, and the SWEET EU project have been key to its development. Participants have reported that completion of ADNAT is a learning exercise in its own right and that it supported disclosure of personal information. It can be used to audit educational progress at both individual and population levels. ADNAT is currently being validated with 220 adolescents and we plan to develop it into a personalised elearning system.

P/091/FRI

## 'Fit for school': evaluation of a training course for 5–6 year old children with type 1 diabetes

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**Objectives:** To assess feasibility of a structured diabetes course (12 hours) 'Fit for school' for 5–6-year-old children before school enrolment.
**Methods:** A total of 49 preschoolers (age 6.5 ± 0.4 years, diabetes duration 3.1 ± 1.4 years, 49% girls, 86% on CSII) participated in the course. No reading and calculation abilities are required for the program that focuses on practical skill training. Topics are blood glucose measurement, age appropriate management of pump or injection therapy, hypoglycaemia awareness and prevention, self-confidence in talking about diabetes and asking for help at meals and sports. Parents answered Kidscreen-27 proxy (child's QoL) and reported about school attendance and social integration (15 items). HbA1c were assessed before and after 6 months in school.
**Results:** After 6 months in school there was no increase in HbA1c (7.2 ± 0.6 vs. 7.1 ± 0.5; P = 0.5). All children attended regular schools, participated in sports and school trips. For this 17.2% needed external assistance. According to parental assessment school achievement wasn't compromised by diabetes in 46%, rarely 31%, sometimes in 23%. They reported that 94% of the kids managed CSII and blood glucose measurement adequately, 95% cared for their meals, 94% talked about their diabetes openly, 67% reacted on hypo symptoms reliably. In three of five Kidscreen subscales children had better QoL than healthy norms (each P < 0.01), while there was no difference in physiological and psychological well-being. All parents recommended the course as age adequate. 86% of them reported that it reduced own fears, while 91% felt it raised higher child's self-confidence.
**Conclusion:** 'Fit for school' is an effective and age appropriate initial diabetes education concept for children diagnosed before entering primary school.

P/092/FRI

## Withdrawn by author

P/093/FRI

## Structural aspects of quality in pediatric diabetes care in Germany and Austria: medium-sized and large centers achieve equal results, while very small centers do worse

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**Objectives:** Optimizing process and short/intermediate outcome of pediatric diabetes care is an important goal to improve the longterm health prospective for children and adolescents with type-1 diabetes. There are few data relating structural aspects of care to quality indicators achieved. In this study we address the question whether center size, reflected by the number of type-1 patients treated at the center, relates to the quality of care provided.
**Methods:** The DPV initiative is based on structured prospective longitudinal documentation of relevant items for diabetes care. The initiative was started on a nationwide basis in 1995, currently 202 pediatric centers (14 from Austria) contribute anonymized data twice yearly. Data were aggregated with SQL statements and analyzed with SAS 9.2, using regression models to adjust for patient heterogeneity (age, gender, duration, migration background, BMI-z-score). Centers were classified according to the number of patients treated in 2010 into large centers (> 80 patients, n = 66), medium-sized (40–80, n = 63) and small centers (< 40 patients, n = 73).
**Results:** Adjusted mean HbA1c was 7.97 ± 0.07 (SE) in large centers, 8.10 ± 0.07 in medium-sized and 8.19 ± 0.08 in small centers (large vs. medium: ns; large vs. small: P < 0.03). The rate of severe hypos was not different among large, medium and small centers. Retinal exams were documented in 57% of patients in large centers, 56% in medium sized and 55% in small centers (n.s.). In contrast, urinary albumin excretion was documented for 77% of patients in large centers, 68% in medium and 66% in small centers (large vs. small: P < 0.02, other comparisons n.s.).
**Conclusion:** These data show similar quality of care in large and medium-sized pediatric diabetes centers. In contrast, in very small centers with less than 40 patients per year, some indicators are inferior. However, residual confounding due to unmeasured patient heterogeneity (education, psychosocial aspects etc.) may be present.

P/094/FRI

## From conflict to cooperation – improving life skills and HbA1c in adolescents with type 1 diabetes

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**Objective:** Adolescents with type 1 diabetes face demanding challenges due to conflicting priorities between psychosocial needs and diabetes management. This conflict often result in poor glycaemic control and discord between adolescents and parents. Adolescent-parent conflicts are a barrier for health care providers (HCPs) to overcome. We test whether the method

Guided Self-Determination-Young (GSD-Y) integrated into routine paediatric outpatient clinic visits will reduce HbA1c and improve adolescents' life skills.
**Methods:** A total of 72 adolescents aged 13–18 years with type 1 diabetes (HbA1c ≥ 8.0%) and their parents are randomised to GSD-Y or standard visits. During 12 month both groups complete eight outpatient visits. Before each appointment the GSD-Y group fill in reflection sheets exploring their challenges in life with diabetes. Trained GSD-Y HCPs guide adolescents and parents to identify strategies for problem-solving and facilitate autonomy in decision-making. Primary outcome is HbA1c. Secondary outcome measures are Problem Areas In Diabetes (PAID), Health Care Climate Questionnaire (HCCQ), Treatment Self Regulation Questionnaire (TSRQ), Perceived Competence with diabetes (PCD), Perception of Parents Scale (POPS), WHO-5, Self-monitored blood-glucoses (SMBG) per week. In addition 10-12 GSD-Y visits are being recorded during the intervention and analysed qualitatively together with individual interviews carried out after 6-month follow-up.
**Results:** Baseline data are presented concerning HbA1c, PAID, WHO5, HCCQ, TSRQ, PCD, POPS and SMBG. In addition examples of using GSD-Y to overcome conflicts in and between the parties are illustrated through completed reflection sheets.
**Conclusion:** This study will provide evidence of the effectiveness of using GSD-Y with three parties on HbA1c and conflict-solving and the feasibility of integrating GSD-Y into routine outpatient clinic visits.

## P/095/FRI
## Withdrawn by author

## P/096/FRI
## Burden of diabetes and quality of life in adolescent, comparison between continuous subcutaneous insulin infusion and multiple daily injections

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**Objectives:** To compare glycemic control, quality of life and burden of diabetes between adolescents with type 1 diabetes treated with continuous subcutaneous insulin infusion (CSII) and adolescents treated with multiple daily injections (MDI).
**Method:** A comparative cross-sectional study with quantitative approach. Adolescents with type 1 diabetes (n = 290), aged 12–18 year, visiting five diabetes clinics in Sweden were included in the study. HbA1c-values were used to measure glycemic control. The ''Check your health'' questionnaire was used to measure physical health, social relations, emotional wellbeing, quality of life and burden of diabetes.
**Results:** No difference was found in glycemic control between the groups. There were differences between the treatment groups in physical health and burden of diabetes on social relations and quality of life. The MDI- group perceived better physical health (80 (range: 20-100) vs. 74 (22–100), P = 0,026) than the CSII- group and more adolescents in the MDI-group did not perceive any burden of diabetes regarding social relations (77.8 vs. 60.2%, P = 0.02). More adolescents in the CSII-group did not perceive any burden of diabetes on quality of life in comparison with the MDI- group (64.1 vs. 44.9%, P = 0.003). There were not any differences in emotional wellbeing between the groups, but 40% of the adolescents perceived a burden of diabetes on emotional wellbeing.
**Conclusions:** Even though the CSII-group had longer diabetes duration (7.5 ± 3.8 vs. 5.9 ± 3.6 years, P < 0.001) no difference in glycemic control was observed between the groups. In both treatment groups adolescents perceived a burden of diabetes. Probably, quality of life and burden of diabetes are dependent on other factors than type of diabetes treatment. It is important to involve the adolescents in the choice of treatment and thereby learn how she/he perceives the treatment, the burden of diabetes and quality of life.

## P/097/FRI
## Quality of life and adjustment in a newly diagnosed pediatric diabetes population

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**Objectives:** Our research examined the quality of life and diabetes symptom management over the first year post-diagnosis in a sample of children (ages 5–17) at the Chicago Children's Diabetes Center (CCDC). The major hypotheses tested were that our psychosocial intervention would be effective in minimizing complications by reducing stress and increasing coping behavior and that the sample would be adjusting better than a matched comparison group.
**Methods:** A total of 54 participants were seen at inpatient stay upon diagnosis and then followed at their 1-, 6-, and 12-month clinic appointments. A structured interview with child and parent occurred at each contact. The Pediatric Quality of Life Diabetes Module [PedsQL/D] was administered at each visit. HbA1C levels, number of subsequent hospitalizations, and other clinical indicators were also collected. Participants were compared to 54 matched controls on the clinical indicators. Results were assessed using repeated measures analyses of variance (ANOVAs).
**Results:** In sum, A1C levels across both groups (intervention and comparison) got higher over time, and there was not a difference between the two groups on A1C, hospitalizations, or referrals for counseling. Contrary to our initial hypothesis, on a subscale of the PedsQL/D assessing coping with treatment regimen, both parents and children actually reported that the treatment regimen became significantly more difficult over time.
**Conclusions:** Children and parents report that they are coping well with the treatment requirements at one month, but that the treatment requirements become more taxing as the months go on; suggesting that families may initially overestimate how easily they will be able to cope with treatment requirements following diagnosis. Clinical data (A1C levels rising at the one year follow-up) substantiates this notion. Findings have implications for compliance with medical treatment and intervention strategies.

P/098/FRI

## Adversarial growth in children with type 1 diabetes: the role of constructive rumination, perception of illness impact, generalised self-efficacy and supportive family environment

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**Introduction:** Adversarial growth is the development of psychological strengths from dealing with a challenging life experience. Kilmer's (2006) model proposes constructive rumination as a key mechanism. It also suggests that illness perception, self-efficacy and family support may influence its development.

**Objectives:** Constructive rumination was hypothesised as a mediator of the relationship between perception of illness impact and adversarial growth. Perceived self-efficacy was proposed as a moderator. A supportive family environment was predicted to facilitate constructive rumination. Child reported growth was compared with parent ratings of positive development. Adversarial growth was also compared to maturational growth in the general population.

**Method:** Measures of adversarial growth, constructive rumination, perception of illness experience and perceived self-efficacy were administered to 63 children, aged 7–12 years, with T1DM. 48 children, aged 8–12 years, in the general population completed modified measures. All parents rated their child's emotional and behavioural strengths and family environment.

**Results:** Children with T1DM reported a moderate level of adversarial growth. Regression analysis showed that constructive rumination partially mediated the relationship between perception of illness impact and adversarial growth. Perceived self-efficacy was strongly correlated with constructive rumination and adversarial growth. There was no evidence of a moderator interaction however. Family environment was not correlated with constructive rumination although it was weakly correlated with adversarial growth. There was no correlation between adversarial growth and parent rated positive development. Unexpected findings in the general population suggested that children report considerably higher positive changes from the experience of growing older.

**Conclusion:** Constructive rumination is potentially an important mediator of adversarial growth in children with T1DM.

P/099/FRI

## Integrating 'SweetText' a mobile phone behavioural support programme for young people with T1D into clinical service in Kuwait and Scotland

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**Aims:** Adherence to regimens of type 1 diabetes (T1D) is poor in adolescence. Behavioural interventions improve psychological wellbeing and clinical outcome. However, support programmes are resource intensive and difficult to implement into clinical service. We describe the integration of SweetText, a ''resource minimal'' behavioural support programme, into two distinct clinical settings.

**Methods:** SweetText is a modular based goal setting text messaging system delivered automatically by mobile phone, based on a proof of concept RCT. The system design requires acknowledgement of the cultural contexts: language; clinical practice; gender and age; IT systems; mobile phone access and use. Patients are enrolled in the system at clinic visits, through the local computer patient management system. The system draws randomly from the module message bank, delivering an SMS at designated times of the day. Choice of the module is based on goal setting and motivation.

**Results:** Country specific discussions led to a programme consisting of eight modules, each with a glossary of clinically appropriate short text messages, delivered for a pre-determined time (2, 4 or 26 weeks), either daily or 3 /week: New Patient (45text, 26 week, 3 /week); Post DKA admission (27text, 2 week, daily); Intensive Routine (141text, 26 week, 3 /week); 'Carb' counting (16text, 2 week, daily); Pump start (21text, 2 week, daily); Pump sub-optimal control (26text, 4 week, daily); Transition(27text, 4 week, daily); Wellbeing (121text, 26 week, 3 /week).

**Discussion:** SweetText appears to be an acceptable system for two distinct societies, with differing service requirements in the delivery of support for the self-management of diabetes to improve adherence to therapy. It uses standard mobile technology, and is easily integrated into the patient management system and clinical consultation. The system requires adaptation for each country, influenced by the health needs of patients and health professionals.

P/100/FRI

## Enhancing the communication skills of young people with diabetes: Video Interaction Guidance (VIG) integrated into clinical practice

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**Aims:** Despite diabetes being a disease of self-management, there are limited interventions to improve the communication skills of young people themselves with T1D. Video Interaction Guidance ('VIG') uses self-modelling to develop attuned communication between young people and health professionals (HP). We undertook a feasibility study of VIG for use in a paediatric diabetes service.

**Methods:** Video interaction guidance affirms positive communication skills by clients reviewing short video clips (~60 seconds) of successful interactions, enhancing negotiation of goals. We piloted VIG in three adolescents, perceived as poor communicators with poor glycaemic control. A total of 10 consultations (~8 minutes) between patients and their HPs were analysed by using interaction analysis categorisation.

**Results:** Video Interaction Guidance was accepted by the clinic team as unobtrusive. The three patients and their HPs initially demonstrated a varying degree of categories of communication ranging from closed questions and limited acknowledgment of replies through to the use of open and closed questions, checking for reception and understanding and giving of information. With two feedback sessions, using the short video clips, the three 3 subjects had a marked improvement in communication skills, translating into an increase in both

confidence in the consultation and assertion in their attitudes, wishes and needs for diabetes management. Other clinic HPs blind to which patients had received VIG remarked spontaneously on the positive change in their interaction ability.
**Conclusion:** From this feasibility study, we hypothesise, that if young people themselves could be taught to improve their communication skills in the consultation and increase their ability to express their views, experiences and needs for diabetes management, this is likely to influence positive change in health outcome. VIG is a potential practical tool to enhance the communication skills of young people with diabetes with their HPs, parents and peers.

## P/101/FRI

### Application and evaluation of Arabic diabetes educational program on diabetic patients & their families

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Education for diabetic patients & their families about how to live safe with diabetes and how to enjoy your life with diabetes is an essential item during management of diabetes. The aim of this work was to apply and evaluate the Arabic educational program that had been built specifically for the Arabic diabetic patients & their families. The program was explained for the nurse supervisors and the junior doctors to prepare them to be as diabetes educators. The program consisted of three sessions. First session contain explains to definition of diabetes, classification of diabetes, diabetes in children and adolescents, how to deal with acute complications of diabetes, (hypoglycemia & hyperglycemia and diabetic ketoacidosis. The second session contains summary of first session in addition to management of diabetes including: change of life style, nutritional therapy, oral and insulin therapy and how to deal with exercise, school days and fasting with diabetes. The third session contains summary of the previous tow sessions in addition to chronic complications of diabetes and how to live without diabetic complications. After application of every session there was an open discussion with patients & their families. The program was applied on 300 diabetic patients with pre-test questionnaire and post-test questionnaire. The test result was 40% while the post-test result was 90%. The program was applied twice through 3 months on 100 patients and the post-test for them was 98%. There was a significant difference between glycated HbA1c levels before (HaA1c = 9.21 + 3.65%) and after application of the program (HbA1c = 7.43 + 2.65%). It was recommended to apply this program on all diabetic patients and their families and it was advisable to repeat the application of the program periodically. The program was given in two forms as a C.D. and DVD forms and was given to patients. It is going to be given as a handbook to be a reference with the patients.

## P/102/FRI

### A randomised controlled trial comparing hospital based and hospital based home care when a child is newly diagnosed with type 1 diabetes

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**Objective:** To develop, test and evaluate a model for individualised hospital based home care (HBHC) by comparing traditional hospital based care, and HBHC for children newly diagnosed with type 1 diabetes. A further objective is to develop methods for identifying families where the child runs the risk of decreased metabolic control and to give those families proactive support.
**Method:** A RCT based on a solid framework for complex interventions, including children 3–15 years old, newly diagnosed with type 1 diabetes. Families in control and intervention groups receive the same hospital based management the first 2 days. Subsequent care is definite by randomisation, where control group receives traditional management which involves additional 5–10 days hospitalisation. Families in the intervention group move to a home-like environment, placed at the hospital area with support by the diabetes nurse. The active parts in the HBHC are defined as;
A) a home-like environment, allowing families to learn management tasks in a ''hands on'' fashion,
B) individualised learning based on the family's need for knowledge and
C) support after discharge. Extensive data from valid and reliable instruments are collected at inclusion and after six, 12 and 24 months after inclusion for assessing the effectiveness and cost-effectiveness.
**Results:** No adverse events have occurred during the RCT when 53 of 60 families are included. The HBHC makes the family's personal lifestyle come into sight for health professionals, and strengths and difficulties can be taken into consideration for an individualised learning process. Analyses to be presented will include child glucose level and variation, parents' healthcare satisfaction and healthcare costs for the first month after diagnosis.
**Conclusions:** Evidence based knowledge on how to assist families to promote health and to care for a child with newly diagnosed diabetes will lead to a better allocation of both family and health care resources.

## P/103/FRI

### Audit of parental diabetes knowledge

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**Objectives:** To assess parental diabetes knowledge using an adapted version of the validated ADKnowl tool suitable for type 1 diabetes. The 18 item-sets (80 true/false/don't know items) assess knowledge of; diabetes treatment, insulin administration, sick day rules, hypoglycaemia, effects of exercise, diet, complications and glycaemic control. The aim of the study was to identify knowledge deficits within our population and evaluate the effectiveness of our teaching program.
**Methods:** The ADKnowl questionnaire was completed by parents of children aged 0–18 years with type 1 diabetes during attendance at our diabetes clinic between February and April 2011. Families remained anonymous. Ethics approval was granted. Results were analysed using SPSS.
**Results:** A total of 194 questionnaires were analysed (inc. n = 54 CSII) with a 97% response rate. Mean age 10.9 years, mean duration of diabetes 5.0 years and mean HbA1c 8.3%. Out of 80 true/false items 45 had more than an 80% correct response rate (CRR) showing reasonable overall levels of knowledge. Some knowledge deficits were apparent in our population. Deficits were identified in the areas of; sick day rules (total 69% CRR), hypoglycaemia treatment (67% CRR), diet knowledge (68% CRR) and HbA1c knowledge (64% CRR). Good knowledge was evident for; insulin administration (81% CRR), hypoglycaemia knowledge (83% CRR) and the need to screen for complications (82% CRR). On sub analysis significant differences ($P < 0.05$)

were elicited in 20 items between pump (n = 54) and non-pump (n = 140) parents with pump parents providing more correct responses in each case.
**Conclusion:** We have shown this adapted ADKnowl tool to be useful in providing cross-sectional analysis of parental knowledge deficits within our diabetes population. Interestingly on comparing HbA1c groups < 8% (n = 70) and > 8% (n = 117) there were no significant differences. This data will be used by our multidisciplinary team as we continue to modify and improve the diabetes education we provide.

## P/104/FRI

### Type 1 DM, social support and dependency

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**Aim:** To find out the financial dependency of people, who are being supported on regular basis by a non government organization (NGO) for their insulin requirement and annual routine checkups?
**Introduction:** India is country where there is no support system by government for people with Type 1 DM. Having type 1 diabetes is an unfortunate happening in any body's life, it becomes more stressful if it happens to lower socioeconomic class of people. Idea was to see how they would cope up if support is withdrawn. They are all supported by NGO in the city named Society for Prevention and Awareness of Diabetes – (SPAD) for their insulin and annual routine investigations.
**Material and method:** A total of 34 people with Type 1 DM (M/F 14/20) were surveyed, mean ages of M/F 16/19, mean duration of diabetes in M/F 10/8 years. All 34 people were being provided regular insulin supply by support group. The mean duration of follow up was 8 years. Study was done on different parameters of dependency in terms of insulin supply and investigations.
**Result:** Out of 34, 20 people would purchase insulin if it was short for few days while eight would decrease the dose and six would even skip the insulin. Majority of them were not doing SMBG regularly, only 40% were doing once in a week. Only 25% would be bearing the cost of investigations if left unsupported. In this study 50% people have passed 10th standard and continuing their further studies.
**Conclusion:** People who are getting their insulin supply regularly and investigations support free of the cost became dependent for the supply. However if supply is stopped for ever majority of them are aware enough to purchase it from outside. A sub set of them cannot purchase insulin due to poverty. Majority of participants had good awareness level in spite of poverty and willing to be financially independent in future.

## P/105/FRI

### Awareness of diabetes in low socio economic group Vs affordable group of people with type 1 DM

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**Aim:** To see if there is any difference of diabetic awareness in low socio economic class in comparison to affordable class and the role of social support system in raising the awareness among people with Type1 diabetes.
**Introduction:** In India the population is heterogeneous and more than 30% of people are of low socio economic status along with low general education level. Society for Prevention and Awareness of Diabetes (SPAD) has been working as an NGO (Non government Organization) for last 15 years to bring awareness about diabetes in all strata of society. SPAD is providing free insulin and investigation support to people with Type 1 DM of low socioeconomic status.
**Material and method:** Total participants were 64, low socio economic /affordable- 34/30, age 7–46 years, Duration of diabetes 5–37 years. All the participants had been attending the awareness programs intermittently, which are being organized periodically for 8 years by SPAD. Questions about diabetes awareness were as follows –
(1) What should be the ideal blood sugar level in Fasting / PP/ Before Dinner?
(2) What is the value of HbA1c for good control and frequency of test?
(3) Common symptoms of hypoglycemia.
(4) What are the diabetic complications?
(5) Do you get investigation support for the screening of diabetic complications?
(6) Sites for insulin injection.
(7) Mixing of different types of insulin.
(8) Symptoms of keto acidosis.
**Result:** There was no difference in awareness level in between two groups however it was least about ketoacidosis which may be due to less evidence of ketoacidosis in both groups.
**Conclusion:** The study proves that awareness level may be increased even in low socio economic class by sincere and meticulous efforts by support system. This may be the right model to touch the people with Type1 DM (Low socio economic status) in countries where there is no support system by the government.

## P/106/FRI

### Investigating team solved the mystery of unexplained hypoglycemia

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**Objectives:** Factitious hypoglycemia occurs secondary to the surreptitious use of insulin or insulin secretagogues. We present the unique case of a young girl with past medical history of poorly controlled diabetes mellitus type-1 (HbA1C 11.1%) with multiple ER visits for hypoglycemic episodes who was admitted with right foot cellulitis.
**Methods:** During the hospital stay, she had frequent episodes of hypoglycemia not associated with meals or insulin. (Glucose by finger sticks ranged b/w 26–360 mg%). Basic metabolic profile and urine tests were all within normal limits with no evidence of diabetic nephropathy. The patient was unwilling for prolonged fasting test. Thus etiology of hypoglycemia in hospital remained an unresolved mystery. It was noted that hypoglycemic episodes were mostly during evening or early morning hours. We suspected a case of factitious hypoglycemia. C-peptide levels and insulin antibodies and analogues were sent during the episode of hypoglycemia. It revealed that c-peptide levels were low and insulin antibodies and insulin analogues were high, consistent with factitious hypoglycemia. Information was carefully gathered from the nursing staff and the patient regarding daily visitors. It was found that her sister (who had a significant h/o of substance abuse) used to visit her every evening. We also placed a one to one sitter for next 3 days in the patient room and surprisingly there were no more hypoglycemic events. After careful confrontation, the patient admitted that her sister was giving her insulin injections to prolong hospital stay with the possible intention of getting pain meds. The pain medications were being used inappropriately by her visiting sister.
**Results and conclusions:** Factitious hypoglycemia is often difficult to recognize and delays the appropriate management. High risk

of suspicion should be kept and often simple measures like careful data gathering, co-operation of the nursing staff can be very helpful.

## P/107/FRI

### Relations of prent stress to the health of children with type 1 diabetes: 5-year longitudinal study

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The purpose of the study was to examine the implications of parent stress for parent mental health and the health of adolescents with type 1 diabetes. Adolescents (n = 132), average age 12 years at study start, and one parent completed questionnaires following a clinic appointment once a year for five consecutive years. Parent general stress (marital, financial, family), parent child-specific stress (due to caring for a child with diabetes), and parent mental health were measured as well as adolescent self-care behavior (meter downloads; adolescent and parent self-report) and glycemic control. Multi-level modeling was used to examine concurrent and longitudinal relations between stress and parent mental health and between stress and adolescent health. Both parent general stress and child-specific stress were independently associated with poor parent mental health (P's < 0.001). Parent general stress was associated with greater adolescent depressive symptoms, poorer adolescent self-care behavior, worse glycemic control, and predicted a deterioration in glycemic control over time (all P's < 0.05). By contrast, parent child-specific stress was associated with better self-care behavior and improvements in glycemic control over time (P's < 0.05). Parent general stress was associated with a lack of shared (joint parent and child) involvement in diabetes care, whereas parent child-specific stress was associated with greater parent only involvement and less adolescent only involvement in diabetes care (P's < 0.01). Parent involvement in diabetes care partly mediated the relations between stress and adolescent health. Whereas parent general stress is associated with poor health outcomes for both parent and adolescent, the stress parents reported in regard to caring for a child with diabetes has mixed effects. Caring for a child with diabetes takes its toll on parents, but appears to benefit the adolescent.

## P/108/FRI

### Adjusting to the diagnosis of diabetes – the value of other people's lived experience

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**Objective:** To evaluate the benefit of a book containing real life diabetes experiences when adjusting to the diagnosis of diabetes.
**Methods:** A book of 11 diabetes life stories from children, young adults and parents (2–37 years) was compiled. Topics included; being a parent/grandparent, sports, pumps, travel, camp, coeliac disease, first injection, pregnancy and work. Parents from the diabetes service were sent an electronic survey with 10 questions and a copy of the book via email.
**Results:** Twenty one out of forty surveys were received and evaluated. Children were diagnosed between 1997 and 2011, 10 female and 11 male. Parents reported; being overwhelmed, angry, helpless, in shock, fearful, in denial and guilty, when their child was first diagnosed. Children felt; sad, overwhelmed, confused, scared, withdrawn, unsure and became clingy at diagnosis. 90.5% (19) reported concerns at diagnosis, including; diet, people's attitudes, the future, injections, health risks, managing at preschool, school, parties, sports and driving. 90.5% (19) reported that a book of real life diabetes experiences would have helped them cope when their child was first diagnosed. The reasons were; a real life perspective, to know that lives returned to normal, to know that you are not alone and to know what to expect. 54.5% (12) of parents reported the book was helpful to them. Parents identified with people from the stories, it confirmed normality of the process of adjustment, was easy to relate to, and reduced anxiety. 18.2% (4) reported the book was helpful to their child, they felt they weren't alone and had increased confidence and knowledge. Parents reported the book; was positive, inspirational, contained real issues, easy to read, short, interesting, clear, honest and provided ways of coping.
**Conclusion:** About 90.5% of parents report that a book containing real life diabetes experiences would be of benefit when adjusting to the diagnosis of diabetes.

## P/109/FRI

### The influence of psychosocial factors on adherence, metabolic control, and quality of life in children and adolescents with type 1 diabetes – Results of the Danish National Psychosocial Diabetes Survey

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**Objective:** International studies indicate that psychosocial variables influence adherence, metabolic control, and quality of life (QoL) in children and adolescents with type 1 diabetes (T1DM). The objective of this study was a first-ever investigation of the importance of psychosocial factors in relation to the aforementioned outcome variables in a homogeneous, national population of children and adolescents with T1DM.
**Method:** Two web-questionnaires containing a number of psychosocial scales, sociodemographic and treatment-related questions were designed for the study – one questionnaire for parents of children and adolescents between the ages of 2 and 17 years, and one self-report questionnaire for children and adolescents between the ages of 8 and 17 years. A total of 1716 families with a child with T1DM, identified through the Danish Registry of Childhood Diabetes, were invited to participate. Participants submitted a blood samples for evaluation of current HbA1c level.
**Results:** A total of 1040 parents (60.6%) and 855 children and adolescents (56.5%) completed the questionnaires, and 999 families (58.2%) returned blood samples for HbA1c analysis. Among psychosocial factors most strongly related to the outcome variables were the self-efficacy of the child/adolescent in relation to diabetes-related tasks and challenges, and amount of conflict in the family in relation to diabetes. Self-efficacy correlated significantly with adherence (r = 0.62, P < 0.001), HbA1c (r = –0.27, P < 0.001), and health-related QoL(r = 0.46, P < 0.001), as did diabetes-related family conflict (r = –0.37, r = 0.28, and –0.38 respectively, P < 0.001).
**Conclusion:** These results highlight the influence of psychosocial factors on daily treatment and QoL in children and adolescents with T1DM. For the purpose of optimizing both adherence, metabolic control and quality of life in this group, diabetes-related self-efficacy and conflict in the family appear to be promising targets for future psychosocial intervention.

## P/110/FRI

### The development of readiness, confidence and importance of change in diabetes care in a group therapy program for teens with elevated A1c levels

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This study evaluates the development of self-reported readiness, confidence and importance for change in diabetes care in adolescents with elevated A1c levels involved in an 8-week group therapy program. Thirty adolescents (16 males and 14 females) between the ages of 13–17 years (M = 15.3 years, SD = 1.4) with poorly controlled type 1 diabetes attended an 8-week therapy group informed by motivational interviewing and cognitive behavioral approaches. Participants had been diagnosed with diabetes for an average of 8.2 years (SD = 3.5) and had a mean A1c level of 11.05 (SD = 1.58) prior to their attendance in the group. Adolescents' self-reports regarding their readiness, confidence and the importance they placed on change in their diabetes care were collected at pre-group assessment, at the end of the group sessions and at two months follow-up. A1c levels were obtained prior to group participation, 2–3 months following participation and 1 year following completion of the group program. Results indicated that adolescents importance [t (29) = –3.6, P < 0.001) and confidence (t (29) = –3.0, P = 0.006) to improve their diabetes care significantly increased from the pre-group assessment to the end of group. There were no significant differences between importance, confidence and readiness to change from the end of group and 2-months follow-up. Significant correlations were identified between adolescents' readiness to change at 2-month follow-up and their A1c levels at 2–3 months post group (r = –47, P = 0.013) and at 1-year follow-up (r = –68, P = 0.004). Teens who reported high levels of readiness to change had lower A1c levels at 2–3 month and 1-year follow-up. Results indicate that importance and confidence to change diabetes care increased by the end of the therapy group and higher readiness to change was associated with improved Ha1c levels at follow-up.

## P/111/FRI

### Psychosocial situation, worries and needs of families with children with type 1 diabetes (T1D) during the initial period after diagnosis – a representative sample

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**Objectives:** To assess the psychosocial situation, worries and needs of families with children after diagnosis of T1D.
**Methods:** Between 07/2009 and 06/2010 families with a newly diagnosed child were interviewed using a semi-structured questionnaire. Data were collected during initial hospital stay and analyzed with qualitative content analysis.
**Results:** The study included 67 families (89.3%) with a mean age of the child at T1D onset of 10.0 ± 4.5 years, 59.7% male. 13.4% had non-German parents, 14.3% lived with just one parent. 77.6% had at least one sibling and 91.0% attended kindergarten or school. 90.0% had fathers working full-time, 57.9% had mothers working part-time. 31.3% of the children and 23.9% of the parents had mental or physical problems. Worries and needs of the families expressed at T1D onset could be classified into six categories: Families were most worried about their ''family-life'' (29.5%) and the ''daily life of their child'' (29.1%), followed by worries about the ''child's development'' (20.8%) and about ''critical situations'' (10.0%). Families were less worried about their own ''working-life'' (4.6%) or the ''cause of diabetes'' (6.2%). There was a correlation between worries and needs and age at onset as well as initial HbA1c, but not between worries and needs and DKA. Families with younger children (38.2%) and children with a higher HbA1c (36.4%) were most worried about their ''family-life''. Worries about ''daily life of their child'' were mainly expressed by families with schoolchildren (34.8%) and children with a lower HbA1c (34.4%).
**Conclusions:** One third of the children and ¼ of the parents had already physical or mental problems at T1D onset. After diagnosis families expressed mostly worries and needs about ''family-life'', ''daily life of their child'' and ''child's development''. To integrate diabetes into daily life of families a consultation tailored to family requirements and resources is needed during the initial period after diagnosis.

## P/112/FRI

### Transition from pediatric to adult health care in patients with type 1 diabetes: results of a post-transition young adult survey

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**Objectives:** Data are limited to guide the transition from pediatric to adult care for patients with type 1 diabetes (T1D) in the US. We sought to assess the transition in T1D from the perspective of patients now in adult care.
**Methods:** We developed a survey to evaluate transition characteristics and outcomes and mailed the survey to 273 young adults previously seen in the Diabetes Program at Children's Hospital Boston.
**Results:** 30% of surveys were undeliverable and the response rate was 34% (65/190). Respondents were 26.7 ± 2.8 years, 49% female, 91% Caucasian, and 64% college-educated. Mean ages at T1D diagnosis and transition were 9.7 ± 3.2 and 19.2 ± 2.8 years. 75% of respondents had current HbA1c >7%. An adult endocrinologist was the current diabetes provider for 79%, and 80% had seen that provider more than once in the past year. However, 26% reported a gap of >6 months between their last pediatric diabetes visit and first adult visit. Common reasons for transition were provider suggestion (46%), feeling ''too old'' (49%), relocation (20%), and college (17%). Those with relocation as the primary reason were more likely to have a gap >6 months between pediatric and adult care (67% vs. 19%, P = 007). Overall, 69% of respondents were mostly/completely satisfied with their transition and 72% felt mostly/completely prepared. Among eight specific aspects of care related to transition preparation, 78% had seen a pediatric diabetes provider without a parent, 65% had discussed independent self-care with a pediatric provider, 46% had an adult provider recommended to them, and 28% had a pediatric transition visit. Those who received fewer transition preparation items were more likely to have a gap between pediatric and adult care (median 3 vs. 4 items, P = 0.006).
**Conclusion:** Although most respondents receive regular adult diabetes care, one-fourth reported a gap >6 months in establishing adult care. Gaps in care were associated with inadequate preparation and relocation.

P/113/FRI

## Center differences in metabolic outcome in young children with type 1 diabetes (<11 years) : treatment or center's recipe?

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**Objectives:** Despite new technologies, centre differences in metabolic control in adolescents with T1DM are persisting (Hvidoere Study Group 2005) and are influenced by centres effectiveness in implementing treatment regimens. To evaluate whether this applies as well to prepubertal children, HSG performed a cross sectional study in children <11 years with T1DM.
**Methodology:** All children, <11 years with a diabetes duration >1 year, were invited to participate. CRFs included information on clinical characteristics, treatment, DKA , hypoglycaemia, language difficulties and co morbidities. A1c was measured centrally by RTosoh liquid chromatography (DCCT aligned, range 4.4–6.3%).
**Results:** 1133 children from 18 centres participated (female: 47.7%; mean age 8.0 ± 2.1 years; mean diabetes duration 3.8 ± 2.1 years). The grand mean A1c was 8.0 ± 1.0% without significant impact of diabetes duration, age or gender. Significant centre differences were demonstrated with mean A1c varying between 7.3 ± 0.8 and 9.0 ± 1.1%. ($P < .000$). Language difficulties had a negative effect ($P = 0.036$) on A1c. Different insulin regimen were used (CSII: 32.8%, Basal bolus 16.9%; freemix: 36.5%; premix: 6.3%; freemix+(extra insulin when needed): 7.5%). Lowest A1c was observed in freemix+ (7.3 ± 0.8%) and highest in the premix group (8.5 ± 1.7%). Significant center differences ($P < .000$) in blood glucose measurement (BGM) frequency were reported (2.5 to 8.3x per day) with a higher frequency in CSII treated and younger kids. A significant($r = -.170$, $P < .00$) inverse correlation was seen with A1c and BGM frequency.
**Conclusion:** Centre differences are present in children < 11 years, unrelated to diabetes duration, age, or gender, and despite generally lower A1c values compared to adolescents. BGM frequencies differ between centres and have a weak positive effect on the A1c level. Although treatment regimen has some effect, the centre's effectiveness (recipe) using a specific treatment strategy remains the key factor for outcome.

P/114/FRI

## Cognitive function, behavior profile and quality of life and well-being in children with type 1 diabetes mellitus (T1DM)

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**Objectives:** To study and identify predictors of behavior and cognitive function in children with T1DM.
**Methods:** Children aged 6–18 years with T1DM for ≥6 months were studied. Indicators of glycemic control studied included mean HbA1c over past 6 months (<8.5% for age 0–6 year,< 8% for age 6–12years, <7.5% for age >12 years), episodes of hypoglycemia(blood glucose <60mg/dl or symptomatic) and severe hypoglycemia (altered sensorium, seizures, loss of consciousness). Socioeconomic status (SES) was based on the modified Kuppuswamy Scale. The QOL questionnaire of the DAWN youth project (high score indicating high negative impact on QOL), the WHO-5 Well Being Index (with a best score of 100), Child Behaviour Check List (CBCL) and Malin's Intelligence scoring for Indian children (MISIC – Information, General Comprehension, Arithmetic, Analogies/Similarities, Digit Span) were administered. To identify predictors of CBCL and MISIC results, univariate analysis and regression (significance at $P < 0.05$) were done.
**Results:** 24 male and 16 female children were studied. T1DM had greater negative impact on QOL of children with disease onset at age <5 years ($P = 0.02$), and those with high HbA1c ($P = 0.03$). Emotional well-being was poorer in children with high HbA1c ($P = 0.01$). Parents of children with hypoglycemia more than once per month reported more behavior abnormalities ($P = 0.04$).Episodes of severe hypoglycemia associated with abnormal internalizing behavior ($P = 0.02$).Early disease onset was associated with fewer behavior abnormalities ($P = 0.01$). Low SES was associated with a lower mean MISIC score ($P = 0.03$). Notably, early T1DM onset was associated with bettter scores on digit-span test.
**Conclusion:** Our results suggest that euglycemia is important for the child's emotional wellbeing, and glycemic disturbances negatively impact the child's behavior pattern. However, poor glycemic control in T1DM may not affect cognitive performance. Early onset of T1DM may enable better psychological adjustment and permit better cognitive function.

P/115/FRI

## Quality of the parent-child interaction in young children (0–7 years) with diabetes mellitus 1: development of a disease-specific observation method called OKI-DO

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**Objectives:** In young children with diabetes mellitus type 1, parents have full responsibility for the diabetes-management. Behavioral processes in childhood may interfere with the diabetes-management and hamper optimal blood glucose control and vice versa. This could negatively affect the parent-child interaction. The aim of this study was to construct an observational method to assess diabetes-specific parent-child interaction. Secondary aim was to explore whether quality of parent-child interactions were associated with glycemic control (HbA1c).
**Methods:** First, using literature and expert opinions, we examined which situations are suitable for observing diabetes-specific interactions. These situations were video-taped (n = 15). All observed behaviors were described in rating scales, face validity and weighted kappa were investigated. Next, we tested the newly developed observational tool in a larger cohort

(n = 65) to look at correlations between parent-child interaction and HbA1c.
**Results:** Literature and expert opinions mentioned mealtime and glucose monitoring to be best suited to observe. All videotaped parent and child behaviors were described. The result was a usable and reliable OKI-DO observation method (k = 0.73), with the following scales: Emotional involvement, Limit setting, Respect for autonomy, Quality of instruction, Negativity, Avoidance, Compliance, Response, Diabetes related behaviors during meal, and Structure during meal. First results of the cohort showed that HbA1c was significantly positively correlated with both Emotional involvement and Response.
**Conclusions:** The OKI-DO method is a useful and reliable instrument to assess diabetes-specific parent-child interaction and can be used to determine which factors could affect HbA1c. Furthermore, HbA1c is positively correlated with Emotional involvement and Response, indicating that when children have a higher HbA1c, parents are more emotionally involved, and children express more pain while being injected.

## P/116/FRI

### Effect of perceived family social support and optimism on depression among diabetic patients

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**Objective:** To determine the impact of perceived family social support and optimism on depression among diabetic patients.
**Methods:** It comprised 100 patients with mild diabetes and 100 patients with severe diabetes selected randomly from Aligarh. Perceived family social support scale developed by Zimet and Farley (1988), Optimism scale developed by Seligman (1998) and Beck's depression inventory were used in this study.
**Results:** Keeping in view the comparison between two groups of diabetic patients: one who have mild diabetes problems and second those who have severe diabetes. Obtained data were statistically analyzed by means of a *t*-test. Further analysis of variance was applied. It revealed that patients with mild diabetes had high perceived family social support and high optimism and had less depression.
**Discussion:** It was evident from Table 'A' that both groups of patients differ significantly on perceived family social support. The higher mean score of patients with mild diabetes showed that they have more family social support. Table 'B' showed patients with mild diabetes significantly differ from patients with severe diabetes on optimism sale, significant value of 't' indicates that both have different levels of optimism. The higher mean score of patients with mild diabetes showed that they have more optimistic behavior. Table 'C' showed significant 'F' value that patients of mild diabetes with high perceived family social support and high optimism had less depression, furthermore; interaction of perceived family social support and optimism also had significant effect on depression.
**Conclusion:** Present study revealed that there were significantly meaningful differences among patients with mild diabetes and patients with severe diabetes. It means patients with mild diabetes have good family social support and optimistic thinking; hence they have less symptoms of depression.

## P/117/FRI

### Mental health needs among youth with diabetes

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**Objectives:** To investigate prevalence of mental health need and use of mental health services among American youth diagnosed with diabetes.
**Methods:** The present study investigated the prevalence of mental health symptoms and mental health service use among youth with diabetes. The Survey of Children with Special Health Care Needs (SCSHCN) was used to measure the variables of interest. The structure of the survey, including the complex survey design, was taken into account when forming a profile of youth with diabetes and mental health needs. Logistic regression was utilized to measure which subpopulations among youth with diabetes and mental health needs utilized services.
**Results:** Youth with diabetes were found to be less likely than the general population to have mental health symptomatology but of those with significant need most did not receive services. Among youth with both mental health needs and diabetes, those that used mental health services were more likely to be older youth and less likely to be of Hispanic ethnicity.
**Conclusion:** The present research indicates the need to screen youth with diabetes for mental health symptomatology and aid accessing services for those in need. Future research should study the behavioral implications of unmet need among this population.

## P/118/FRI

### Cognitive dysfunction, neuropsychiatric features, satisfaction with life and treatment outcome in patients with type 2 diabetes in India

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**Background:** Depression is found to be chief comorbid disorder in diabetic patients and can cause poor treatment outcome including glycaemic control. In India, in spite of having largest diabetic population, neuropsychiatric manifestations, cognitive dysfunction, satisfaction with life and the impact on treatment compliance are poorly studied.
**Objective:** To study and compare the range and severity of cognitive dysfunction and neuropsychiatric manifestations in patients with type 2 diabetes, and normal controls.
**Methods:** 120 patients of type 2 diabetes were assessed on a variety of measures of cognitive dysfunction, clinically obvious behavioural manifestations of frontal dysfunction and other neuropsychiatric derangements. 100 age and sex matched normal controls were also included. The measures included the Frontal Assessment Battery, the Frontal Behaviour Inventory, subtests of PGI battery of brain dysfunction and the Stroop Test. The Neuropsychiatric inventory and satisfaction with life scale assessed neuropsychiatric features and satisfaction with life respectively. Medicine compliance was noted for every patient through a diary card.
**Results:** 80% of patients were found to have major depressive disorder and 5% suffered Anxiety disorders. ANOVA and correlation analysis were performed through SPSS version 16. Type 2 diabetics with depression showed frontal executive dysfunction and poor performance on test of higher mental functions. Type 2 non-depressed diabetics showed decline in

cognitive performance in comparison to normal controls. Satisfaction with life and treatment compliance was worse in type 2 depressed diabetic patients.
**Conclusion:** Findings confirmed that cognitive dysfunction in type 2 non-depressed diabetics is less severe than in type 2 depressed diabetics. Our results indicate greater attention to the treatment of depression in diabetics may further improve treatment outcome.

## P/119/FRI

### Improving the teaching skills of paediatric health professionals. A working partnership between the teaching and health care professions

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**Objective:** To improve the teaching skills of paediatric diabetes health professionals (HCP) in the delivery of structured education.
**Method:** KICk-OFF (KO) is a novel structured education course developed in collaboration with school teachers. This intensive group education requires specific teaching expertise which is not provided within existing HCP training. We needed to ensure the educators were equipped to deliver the KO package and manage groups of children with diverse learning needs. In collaboration with a university teacher training department we designed a five-day teaching skills course specifically for HCP. The key features were:
Childhood learning theory
Reflection on personal teaching experience
Practical teaching skills within a secondary school
Delivering the same structured curriculum to mixed ability groups
Management of behaviour
Assessment of learning
Qualitative feedback on the course content was collected from the 22 participants using questionnaires and focus groups, immediately after completing the course and after 12 months of teaching KO.
**Results:** All reported the training would improve their approach to teaching. School placement and reflection had the biggest immediate impact. Feedback after teaching KO demonstrated that their skills had improved. This was confirmed by external peer review. They suggest including advanced techniques for the teaching of mathematics and motivating learners in future training courses.
**Conclusion:** The delivery of structured education to children requires educators to be appropriately trained. They require an understanding of how children learn and effective teaching methods. Having identified a gap in training we have developed a course which provides a better understanding of this process. These results have shaped this training course into a programme of essential teaching skills for all HCP's working within paediatrics which may give access to masters level study.

## P/120/FRI

### The importance of social support as a life satisfaction predictor in adolescent with type 1 diabetes

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**Introduction:** Adolescents with type 1 diabetes mellitus (T1DM) have to face major daily challenges related to disease, which often happen during the school time and may cause poorer health related quality of life and life satisfaction.
The objective of the study is to investigate the life satisfaction of adolescents with T1DM depending on the level of social support.
**Methods:** A study of 2542 adolescents (13–18 years.) was carried out in 2010–2011 at schools in 6 of 16 Polish provinces; the subsample of 77 with T1DM was selected. Life satisfaction was indexed in 3 domains, on the basis of 11 items coming from the polish adaptation of CHIP-AE questionnaire (1): perceived fitness, overall health assessment and self-esteem. Social support was measured using the Medical Outcomes Study (MOS-SS) questionnaire. Linear regression models for three life satisfaction domains as dependent variables were estimated, separately for the total group under study, total T1DM group and children with diabetes and coexisting health problems.
**Results:** Mean MOS-SS index was lower in the group with diabetes (51.5 ± 21.7) than in total group (57.8 ± 18.2). In multivariate models MOS-SS regression coefficients estimated in the group with diabetes and coexisting health problems were significant and equal to: $\beta = 0.064$ (perceived fitness); $\beta = 0.062$ (overall health assessment) and $\beta = 0.098$ (self-esteem). In the total group of 77 children with diabetes, MOS-SS remained significant only for self-esteem ($\beta = 0.047$).
**Conclusions:** Social support of adolescents with T1DM tend to be one of the most important predictor of life satisfaction and especially self-esteem. Medical care should be enhanced and supplemented through support on the environment of an adolescent.
**Keywords:** Adolescents, life satisfaction, social support, self-esteem, T1DM
1. Starfield B, Riley AW, Green BF. *Manual for The Child Health and Illness Profile: Adolescent Edition (CHIP-AE)* (2000). Boston: The Johns Hopkins University.

## P/121/FRI

### Organizing person centered care in pediatric diabetes: communication, decision making, ethics and health

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**Objectives:** Partnership in the relation between caregivers and patients is essential. Minority groups are at high risk for diabetes-related health complications. To be able to deliver an optimal self-care diabetes education to minority groups, the members of the diabetes team have to consider factors not commonly associated with Health Care delivery. This study aims to develop educational tools and strategies in a broad sense with the ultimate goal to support every adolescent diabetes patient and family in an optimal way, based on the individual needs and circumstances.
The aim of the intervention: Improve Person Centered Care aspects by better professional adjustment to the conceptions, conditions and needs of adolescents with diabetes, enabling these persons, their families and close ones to become more aware of the meaning of optimal treatment for long-term health and quality of life, and to stimulate the taking of appropriate responsibility in self-care.
**Methods:** Utilizing knowledge obtained in transcribed, videotaped adolescent patient clinical consultations with pediatric diabetologists, nurses and dieticians as well as interviews of both patients and professional team members, concrete strategies are developed in alliance with the beneficiaries through joint workshops, use of experimental exercises, such as forum theater, learning laboratories and role playing, but also detailed strategies for the structuring and

execution of care meetings. Specific indicators of success (incl. biomedical) found relevant are selected in accordance with the kind of measures used.
**Results:** Intervention actions are built on advanced organizational and pedagogical models of extended duration that assume outcome to depend on subjective and interactive phenomena. A specialized, adolescent outpatient diabetes clinic for patients with certain needs is created.

## P/122/FRI

### Evaluation of cellular phone utilization for adolescent diabetic patient care and management: a pilot study

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In present cellular communication technology plays a vital role in enhancing diabetic care and management. The primary aim of our study is to examine the feasibility of utilizing this technology to assist with diabetes self-care in a clinic population as well as its impact on clinical outcomes. Forty two adolescent patients with a diagnosis of type 2 diabetes at five Health institutes in India were randomized to intervention or control. Intervention patients participated in a brief intervention and received tailored daily messages via cellular phone prompting them to enhance their diabetic self-care behaviour. Patients at the control site continued with their standard diabetes self-management. A mean improvement in HbA1c levels was apparent (-0.1, SD = 0.4%; P = 0.1623) in the intervention group, compared with a mean deterioration in the control (0.4, SD = 1.0%; P = 0.4542), yet without statistical significance. Self-efficacy scores improved significantly in the intervention group (-0.6, SD = 0.4; P = 0.0056) compared with no improvement in the control (0.0, SD = 1.0; P = 0.8240). Participants encountered numerous technological barriers when attempting to adhere to the intervention protocol. The results indicate the intervention had a positive impact on some clinical outcome and self-efficacy. Although the technology appears feasible in a clinical setting technology must be made more user-friendly before a larger phase II trial is conducted.

## P/123/FRI

### Disordered eating behaviors in youth with type 1 diabetes initiating pump therapy: baseline and after 6 weeks

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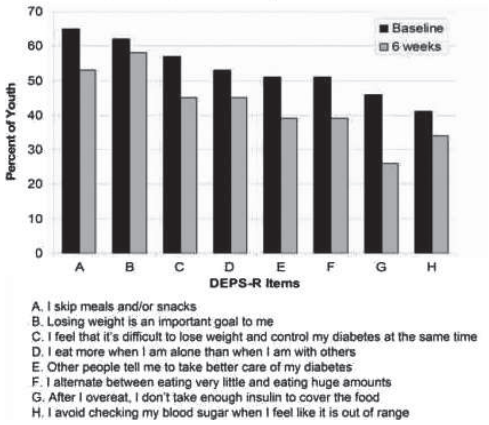
**Objectives:** Disordered eating behaviors (DEB) are more common in youth with T1D than in a normative sample. Few studies have examined DEB in youth when starting insulin pump therapy (CSII). Our aim was to examine the impact of initiating CSII on DEB in youth with T1D.
**Methods:** In a multi-site study, youth with T1D, aged 10–17 years, completed the 16-item Diabetes Eating Problem Survey-Revised (DEPS-R) within 10 days of starting CSII and 6 weeks later. The DEPS-R is a diabetes-specific measure of DEB; higher scores indicate more DEB.
**Results:** Youth (N=38, 55% male, 92% white) had mean T1D duration of 3.8 ± 3.2 years, mean A1C of 8.3 ± 1.3%, and mean zBMI of 0.7 ± 0.9. Six weeks after starting CSII, median DEPS-R score had decreased from 8.0 to 4.5 (P = 0.01). Baseline DEPS-R score correlated significantly with zBMI (r = 0.5, P = 0.001) and T1D duration (r = 0.35, P = 0.03) but was not correlated with A1C or age. Females scored significantly higher than males (F median = 11.0; M median = 5.0; P = 0.04). Few participants endorsed risk for DEB (score ≥20) (baseline: n = 2; 6 weeks: n = 3); half of these participants were male. One person endorsed risk for DEB at both time points. At baseline, eight items were endorsed by >40% of youth; after 6 weeks, fewer youth endorsed these items (see figure).

**Figure: DEPS-R Items Endorsed by >40% of Youth at Baseline**




**Conclusion:** While T1D may increase risk for DEB, CSII may normalize eating behaviors, possibly reducing DEB risk, as assessed by the DEPS-R.

## P/124/FRI

### Addressing issues of diabetes patients community: role of NGO's in resource poor settings

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**Issues:** Adolescent diabetes social stigma in India. Such diabetics need proper guidance/information/treatment-counselling outlets. This is burning issue in developing-nations like India. we need form comprehensive diabetes care & counselling policy plan at Miami Treatment options must be suitable for developing-nations considering cost of Rx. Incorporating NGO's in such efforts is very effective.
**Our project methodology:** Our 15-year-old-NGO started Diabetes education-project in rural India from 2005. We started education & surveillance project to analyze social & anthropological issues facing those affected by adolescent diabetes. Total 62 adolescents subjects enrolled by Feedback questionnaires to get feedback on needs, perceptions, social attitude on diagnosis of diabetes. Factors like community-inhibition, social-ostracism, economic-difficulties, marital discord, non-availability of treatment-guidance centres, lack of trained-staff analysed & draft policy is recommended to Govt-agencies.
**Lessons learned:** Adolescent diabetes management must include care of nursing & psycho-social needs. Role of NGO's in diabetes education is very effective in terms of cost-management, better impact & better-compliance. Community intervention projects have proven useful in rural communities of resource poor-nations. ISPAD-Miami-congress-participants can collaborate with NGO-activists to address this issue. Uniform public health policy needed to implement & expand newer strategies to include broader range of diabetes care-issues.

**Recommendations:** Promoting dialogue between Government-health-services & NGO's accelerates diabetes education/awareness programs. NGO participation improves cost-efficacy of such initiatives in economically poor populations. This reduces difficulties faced by young diabetics in Asia. It is essential that WHO, ISPAD form common guideline manual on this issue affecting developing-countries.

## P/125/FRI

### Quality of life of children and adolescents with type 1 diabetes in Kuwait

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**Introduction:** Recent research has shown that health-related quality of life (HRQoL) in children and adolescents with type 1 diabetes is markedly affected, resembling that of children with other chronic diseases, like malignancies. The objective of the study was to investigate the HRQoL in children and adolecents with diabetes in Kuwait.

**Method:** A total of 377 children and adolescents with type 1diabetes aged 5–18 years and parents of children aged 2–18 years (total 436) participated in the study. They were recruited from diabetes out-patient clinics in the six governorate hospitals in the country. The PedsQL™3.0 Diabetes Module was used to assess HRQoL. Demographic information form was used to collect data like age, gender, and socioeconomic status using a spacially designed form. Diabetes related information including age at disease inset, duration of disease, mode of treatment and mean HbA1c over the last year were collected in a special diabetes information form. Interviews were conducted by research assistants with experience in quesionnaire applications. The child and parents completed the questionnaire independently.

**Results:** The Cronbach's $\alpha$ coefficient for the Peds QL Diabetes Module for child and parent report approached 0.825, indicating their internal consistency and reliability. The mean (+/−SD) age of participants was 9+/−1.2 years, and the duration of diabetes was 4.9+/− 2 years. There was a statistically significant difference in the total scores among children and their parents in all three age groups (70.2 vs. 59.3, $P < 0.001$).The main difference was in the "worry" section where parents reported worse QoL. Diabetes-specific QoL scores correlated with female gender, duration of diabetes and HbAic.

**Conclusions:** Children and adolescents with type 1 diabetes in Kuwait showed good psychological adjustment and QoL. Parents appeared to be more worried than their adolescents about the effectiveness of the treatment and the long term complications of diabetes.

## P/126/FRI

### Insulin for children, education for the life

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**Objectives:** To educate to improve the quality of life, to achieve behavior changes, bigger emotional stability and to diminish the risk of complications.

It shows and method: Continuous education and semipresencial through modules to achieve dexterities, abilities of self monitoring, to form healthy habits. Access to insulin, syringes and self monitoring inputs to get adhesion to the intensified treatment (three daily determinations of capillary glucemia); control quarterly of Glucosilated Hemoglobin, syringes and self monitoring inputs gratuitously to 100 children and young of 7 departments of Bolivia of scarce resources, smaller than 21 years during 12 months. Psicoeducación and effective support Therapy to break psychological barriers and to get bigger emotional stability.

**Results:** Decrease of the average of the value of the Glucosilated Hemoglobin of 9.5 at 8.2; bigger adherence to multidosis of insulin and frequent self monitoring. Gradual adoption of healthy habits in feeding and physical activity, in 12 sessions monthly monitored for staff, with individual and family practices of car-observation, reflection and action. 70% of beneficiaries with an acceptable grade of emotional stability, with capacity of self-management, of communication and of practicing an effective self monitoring. Bigger adherence was observed to the treatment, bigger emotional stability and a high dependence grade toward the parents in smaller than 12 years. In the adolescent beneficiaries signs of more independence but a smaller adherence were seen to the treatment and a less effective self monitoring.

**Conclusions:** In the adolescent it was shown how effective the multidisciplinary intervention is in decreasing the Hemoglobin Glucosilada (HbA1c) values. This could produce bigger emotional stability and a high independence grade toward the parents and a effective self monitoring.

**Keywords:** Education for the life, glucosilated hemoglobin (HbA1c), diabetes mellitus.

## P/127/FRI

### Behavior problems in children with early onset type 1 diabetes

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**Objectives:** In adolescents with T1DM, the risk for depression and other internalizing behavior problems is increased. However, behavior problems in pre-adolescence have been less studied. The aims of the study were to compare the prevalence of externalizing and internalizing problems in children with early onset T1DM and healthy control children, and to assess the association of behavior- and T1DM-related measures.

**Methods:** The study included 63 children with T1DM onset before 5 years of age and 86 healthy control children. All the children were 9–10 years of age. The mother evaluated her child's behavior with the Parent Rating Scale of the Behavior Assessment System for Children. The subscales of externalizing and internalizing symptoms were used. The children whose subscale score was above the 90th percentile of the control group's score were considered to have behavior problems. The prevalence of behavior problems was analyzed by $\chi^2$ tests. The most recent HbA1c value, mean HbA1c during the disease, and the history of severe hypoglycemia (SH) and diabetic ketoacidosis (DKA) in the diabetic children with and without behavior problems were analyzed by t and $\chi^2$ tests.

**Results:** The prevalence of internalizing problems was 25% in the children with early-onset T1DM and 9% in the control children ($\chi^2 = 6.97$, $P = 0.008$), and the prevalence of externalizing problems was 8% in the children with T1DM and 11% in the control children ($P = 0.601$). Mean HbA1c during the disease was higher in the children with T1DM and internalizing problems than in the children who did not have internalizing problems ($t = -2.61$, $P = 0.011$). Episodes of SH or DKA or the recent HbA1C were not associated with behavior problems.

**Conclusions:** Children with early onset T1DM might be at increased risk for internalizing behavior problems such as depression in middle childhood. Poor long-term glycemic

control seems to be associated with internalizing problems already in childhood, before adolescence.

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### Perceived level of autonomy, coherence of parenting practices and glycaemic control in adolescents with type 1 diabetes: a qualitative exploratory study

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Adolescents who transition from parental to self-managed care are faced with an increased risk of poor diabetes control. There is contrasting evidence that the type of parenting practices has some impact on type 1 diabetes control in adolescents. However, most studies have focused on parenting practices in one dimension of self-care only, namely the management of diabetes, and have failed to take into account two important dimensions of self-care, namely the management of general health and psychosocial issues.

The purpose of our study was to examine possible relationships between glycaemic control and

(1) The coherence of the mother's or father's parenting practices in three dimensions of self-care;

(2) The coherence between both parents' parenting practices;

(3) Autonomy in decision-making.

We opted for a qualitative methodology, and conducted semi-directive interviews during a summer camp with 32 adolescents aged 13–15. We referred to Barrera & Ainlay's theory of social support, as well as Baumrind's theory on parenting styles for the thematic analysis of our interview transcripts.

In our sample, good glycaemic control (HbA1c < 7.5, n = 15) was found to be associated with coherent practices and higher levels of demandingness and responsiveness in all three dimensions of self-care from both parents. The adolescents in this group reported to be generally involved in decision-making in all three dimensions. By contrast, poor glycaemic control (>9, n = 5) was found to be associated with incoherent intra- and inter-parental practices in the three dimensions. Moreover, the adolescents reported that they were never involved in decision-making processes.

Our results support the hypothesis that HbA1c is associated with coherence of parenting practices in the three dimensions of self-care: the management of diabetes, health, and psychosocial issues. Autonomy-supportive practices need to take into account the three dimensions of self-care, and the perceived need for coherence in parenting practices.

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### Local paediatric diabetes teams on the web – flip or flop? A case study

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**Objectives:** Is it feasible for local Diabetes Team Practitioners to communicate information, news and frequent updates on a website to their patients? May such websites attract users?

**Methods:** Empirical case study over 24 months. Two local diabetes teams serving approx 200/300 patients, each team actively managed a local website showing contact data and locally produced information, integrated in a Paediatric Diabetes portal on the open Internet, www.diabit.se

The software allowed local teams to publish text, images, videos, pdf files for downloads and more. The portal as a whole included targeted diabetes information and user generated contents in forums, blogs. The medical information was managed and updated by local editors-practitioners.

**Results:** Team A created 54, Team B 64 new local articles for their patients on e g medical devices, local activities, staff changes, research news, food, nutrition and more, mostly using text, images and links.

Website self-administration was found feasible by the local editors, though initially the teams had hard to contribute with new information contents. Multi-professional workshops updating contents contributed to team education as well.

Site visits were most frequent on clinical visit-days but lower at weekends and during night. Practitioners and patients gradually started referring to website contents in their care contacts.

The top 10 visited parts of the case study portal (page visits/12 months) were: Open forum (22531), Blogs (10257), the Local teams' websites (9950), FAQ (8423), tailored info on Blood glucose (7773), Insulin (6108), Food (4666), info for Schools (4473), Living with diabetes (4383) and Devices (4303).

**Conclusions:** Local Team practitioners may successfully communicate relevant information, news and updates to patients online when frequently updated on a regular basis. Users' interest may be further enforced by the use of forums, blogs and other dynamic functions for user-generated contents.

## P/130/FRI

### Evaluation of perceived health and quality of life is crucial for young people with type 1 diabetes

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**Background:** ISPAD: guidelines states the treatment goal for young people with diabetes as HbA1c <57 mmol/mol. Teenagers with diabetes report lower quality of life than healthy peers, and guidelines highlight the importance of regular measurement of quality of life.

**Objective:** The aim of this study was to explore how teenagers who reach the HbA1c-treatment goal, compared with those who do not, perceive quality of life, and to evaluate gender differences.

**Subjects:** Two hundred and four patients with type 1diabetes, 12–17 years of age, from three centres in Sweden were consecutively recruited to the study.

**Methods:** Respondents completed four questionnaires at the outpatient clinic. Data were also collected from the patients' medical records.
**Results:** Twenty-two percent reached the treatment goal (24% girls, 21% boys). This group perceived better physical health and lower negative impact of diabetes, reported more knowledge about diabetes, were more able to handle stress and had more control over their self-management than did patients with HbA1c >83 mmol/mol. Girls with poor control reported lower physical health, lower acceptance of diabetes, lower quality of life and more negative impact on quality of life than boys did. Girls with HbA1c <57 mmol/mol perceived that emotions and stress had more impact on diabetes; boys scored higher on managing stress.
**Conclusions:** Young people who reach the treatment goal perceived less negative impact on quality of life, but girls perceive more negative impact from diabetes than boys do. The results support the importance of regular measuring of quality of life.

## P/131/FRI

### Therapeutic regimens, diabetes knowledge, quality of life and HbA1c in children and adolescents with diabetes attending summer camps

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**Objectives:** The follow-up of children and adolescents with diabetes who have attended the national diabetes camps over the last 10 years has shown a dramatic increase in the use of multi-injections regimens and pumps, but with nearly no change in mean HbA1c. The aim of the study was to further evaluate the correlation between HbA1c, measured in a single laboratory, and therapeutic regimens, along with diabetes knowledge and quality of life.
**Methods:** From 715 young people with type 1 diabetes, aged 8–17 year, who attended the 2009 summer camps, 446 (age 12.5 + 2.4 year) gave their consent to participate in the study which consisted in collecting: sex, age, duration of diabetes, height, weight, BMI, treatment regimen, declared HbA1c, admission interview, self-questionnaires of knowledge (AJD) and quality of life (QOL, Ingersoll et Marrero, short version from the Hvidoere Study Group), centralised measurement of HbA1c. Statistical analyses : analysis of variance, Chi-2, multi-variate analyses.
**Results:** Compared to the previous years, the percentage of pumps (28%) was much higher, while multi-injections decreased slightly (48%) and 2–3 injections (15%) or mixed insulins (3.5%) dropped markedly. Mean HbA1c (8.3 + 1.5%) remained unchanged compared to the last 12-year period, although the percentage of HbA1c >9% et >10% decreased, from 33 to 24% and from 16 to 10%. HbA1c was lower (P = 0.04) with the pump (7.9 ± 0.9%) than with basal bolus (8.1 ± 1.1%) or other regimens (8.2 ± 1.1%). HbA1c correlated with diabetes knowledge, in patients >14 year old but not the younger ones. Scores of QOL (health perception and parent issues) correlated strongly with HbA1c, but not with age or therapeutic regimens.
**Conclusions:** HbA1c in young people with type 1 diabetes was more strongly correlated with quality of life than with diabetes knowledge or therapeutic regimens.

## P/132/FRI

### Care of newly diagnosed children with diabetes: survey of general practitioners practise

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A National survey in UK showed that 97% of young people (0–16 years) with Diabetes (DM) had Type 1 diabetes. Previous studies have shown that about 25% of them present in Diabetic keto-acidosis though rates of up to 67% in ethnic minority have been reported. Many children present initially to their General Practitioners (GP). Current National guidelines suggest urgent referral to a Paediatric Diabetes team (PDT) so that appropriate therapy is started in a timely manner.
**Aim:** We carried out a survey in order to document the current practise of GP's when they suspect DM in a young person.
**Method:** 300 local GP's were asked to complete a Questionnaire indicating what actions they would take when faced with an 11-year old with typical symptoms of DM and point of care blood glucose was more than 11.1 mmol/l. Statistical analysis was made by MINITAB 15. Chi Square was used to examine factors that affected choices made by the GP's.
**Results:** 37% (111/300) replied. Of these 34.5% would have taken an action that would have led to delay in both referral to PDT and therefore delay in initiation of appropriate therapy. Some of these actions include organising either a fasting blood glucose or OGTT and waiting for results before making a referral. 47.5% GP's had a special interest in adult DM but only 36% had been involved in the diagnosis of a child with DM in the last year. There were no statistical difference between those who had declared a special interest in adult DM or had been involved in the care of newly diagnosed child with DM in the actions they would take (P = 0.9 and P = 0.84 respectively). 23.6% of GP's felt that childhood DM should be managed by themselves in Primary care. This again had no relation as to whether they would have referred in a timely manner or not (P = 0.35).
**Conclusions:** There is a need to increase awareness amongst General Practitioners about need to act in a timely manner when a child is suspected of Diabetes Mellitus.

## P/133/FRI

### Innovation in practice: development of mobile phone applications, involving adolescents with type 1 diabetes. A pilot study

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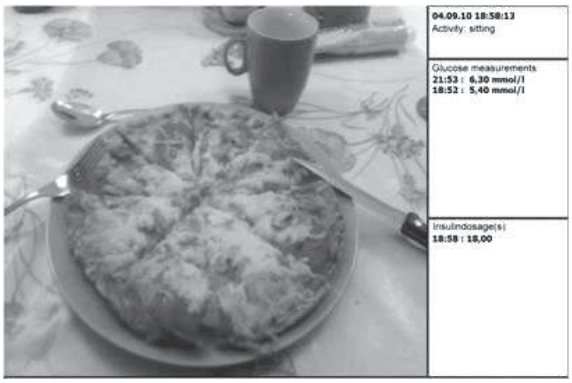
**Objective:** The main objective was to explore the experiences of adolescents involved in developing mobile-phone applications for management of Type 1 diabetes.
**Background:** In spite of new insulin analogues, insulin pumps, and improved support from diabetes teams, most adolescents do not reach the treatment goals. In order to guide adolescents to improve self-management behavior, mobile phone applications were developed to facilitate their interactions with the diabetes team.

**Methods:** Semi structured interviews were conducted among 12 adolescents (7 girls) age 13–18 years in an out-patient setting. All had HbA1c <10 and had taken part in a three-month pilot study using mobile phones with two different applications as part of their follow-up. The application uses the camera in the mobile phone to generate a picture-based diabetes diary. Photos incorporate food, insulin dosage, physical activity and pre and postprandial glucose measurements transmitted from the glucometer by Bluetooth technology. Images were used to assess insulin dosages. A mobile phone text messaging (SMS) application, using secure Internet encryption for individual guidance and educational text messages, was tailored for the study.

**Results:** The participants experienced that the picture-based diabetes diary, gave a visual understanding of the cornerstones of diabetes self-management, i.e. food intake, physical activity and medication. Internet based SMS guidance gave a feeling of safety, but was felt as cumbersome. Educational text messages were described as useful in relation to increased understanding of self-care. Simple and practical self-management advice was appreciated more than theory-based messages.

[Picture 1]




**Conclusion:** The studied mobile phone applications may be useful as a self-help tool in management of diabetes during adolescence, and the adolescents themselves provided important input to further development of the applications. The applications need to be evaluated in a randomized controlled study.

## P/134/FRI

### As facts and chats goes online, whaťs important for young persons with type 1 diabetes?

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**Objectives:** The purpose of this study was to understand information-seeking behaviours, Internet use and social networking online in young people with type 1 diabetes (T1DM). This applied to their everyday life including the context of diabetes and experiences and need of contacts with diabetes peers.

**Methods:** Twenty-four young persons aged 10–17 years with T1DM since 0.5–11 years were recruited from a County hospital in South-east of Sweden. Qualitative data were obtained using 8 focus groups, wherein each participant engaged in a 60–90 minute video-audio-recorded session, transcribed and analyzed with qualitative content analysis.

**Results:** Even in older children, parents or other significant adults are the main source of information regarding diabetes. The need of contacts with other young persons with T1DM varied; some hold high expectations on a living online community.

Three main categories that were identified; Aspects of Security, Updating and Plainness, give significant information about how to enhance information retrieval and peer contacts related to T1DM. Thus online resources for young patients must give a serious and trustworthy impression with information given by professionals. It is important to protect identity, but also to make anonymity possible. Open access without a password requirement was preferred. Information about research and technical devices are important, but also other updates attracting the user. Plainness in layout, content and language is essential.

**Conclusions:** Sensitivity and adaptation to users' needs and expectations seem crucial in the development of future online resources for young persons with T1DM. Health practitioners need to focus on three areas: security of information and communication, frequent updating and simplicity of design – *less is more.*

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### The understanding of self-perceptions in the diabetic adolescent population: strategies toward reducing noncompliance

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**Objective:** Adolescents with diabetes are subject to numerous stresses brought on by exacerbations of their disease as well as treatment regimens. Moreover, adolescence is a time of increased non-adherence with medical directives, which can lead to heightened anxiety and worse clinical outcomes. We propose that an improved understanding of diabetic adolescents' self-perceptions will allow us to target intervention strategies toward reducing noncompliance in these patients. The aim of our study was to characterize the self-views of adolescents with diabetes.

**Methods:** 132 adolescents with Type 1 diabetes were assessed during a routine outpatient clinic visit. Patients were categorized according to their theories of health and were asked to describe themselves and their attitudes toward their illness in a series of open-and closed-ended questions.

**Results:** Overall, patients considered themselves equal in health to non-diabetic peers. Further, illness was not a major factor in their self-views – only 10% mentioned health at all. The most commonly used descriptors included hobbies both athletic (62%) and non-athletic (76%). Patients also listed aspects of their personality, preferences, and social features when describing themselves. Significant differences were noted across gender: Boys were more likely to cite disease as a personal characteristic than girls ($P < 0.05$). In addition, girls were less likely to perceive themselves in terms of sport activities than were boys ($P < 0.05$).

**Conclusions:** The self-perceptions of adolescents with diabetes do not appear to be dominated by either their health or medical treatments. Instead, patients focused on activities, both athletic and non-athletic, when describing themselves. This bodes well

for their coping mechanisms but may negatively impact their adherence to treatment regimens. We discuss ways that information about patients' self-perceptions may be integrated into programs designed to improve rates of adherence.

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## The dreaded clinic visit: exploring family and diabetes care provider (DCP) perspectives

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**Objective:** The relationship between DCPs, patients and their families is a key factor for successful diabetes management. This collaboration allows delineation of treatment goals and identification of barriers to these goals. Teens with poorly controlled diabetes and their families often become estranged from their DCPs, leading to mutually frustrating visits and poor follow up, Taking a systems approach, we interviewed families, and DCP's to understand how sub-optimal diabetes control affects the DCP/family relationship.
**Methods:** Adolescents (n = 15) with sub-optimally controlled type 1 diabetes were recruited. Families participated in a comprehensive semi-structured interview. Questions were open-ended, focusing on specifics of living and working with diabetes. DCP interviews (n = 11) included questions on attitudes toward managing teens with uncontrolled diabetes. Videotaped interviews were reviewed by a team of two clinical social workers and a pediatric endocrinologist. Transana 2.41, a qualitative research software package, was used for data entry and analysis.
**Results:** Families of 8 females and 7 males, aged 14.8 ± 1.6 years with diabetes duration 6.8 ± 3.6 years participated. Average HgbA1C was10.4 ± 1.6%. Family interviews reflected themes of frustration, helplessness, and feeling judged. Families believed that they were "doing their best''. Interviews also often revealed alternative and more complex dynamics, including social issues often not shared with their DCP. DCP interviews also revealed themes of frustration, helplessness and anger, as well a belief that many poorly controlled teens and their parents "didn't care about diabetes" or weren't "doing their best".
**Conclusions:** Strained family/DCP relationships are common and can prevent identification and treatment of root causes of poor diabetes control. Training providers to expand their perspective may improve collaboration with teens and their families, creating a more successful and rewarding partnership.

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## Reliability and validity of the Norwegian version of DISABKIDS questionnaires

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**Objectives:** The DISABKIDS measures were developed as a joint European project to address health related quality of life (HRQOL) in children with chronic health conditions. The purpose of this study was to examine reliability and validity of Norwegian versions of the DISABKIDS generic and diabetes specific modules for children and adolescents with diabetes.
**Method:** The DISABKIDS questionnaires were translated following standard forward-backward translation methodology. Discriminant validity was investigated with regard to demographic and clinical variables. Child Health Questionnaire instruments (CHQ CF-87 and CHQ PF-50) were included to examine convergent validity. Cronbach's alpha was used to determine internal consistency reliability.
**Results:** Of 198 eligible child-parent dyads, 103 (52%) completed the questionnaires. Mean age 13.6 (2.6), range 8–19 years, (52% were boys). The participants were representative for the total Norwegian diabetes population with regard to gender, body mass index, duration of diabetes and episodes of hypoglycaemia and ketoacidosis but had a lower mean HbA1C (8.1% vs. 8.6%), were older (13.6 vs. 12.9 years) and more commonly used insulin pumps (76% vs. 52%). Cronbach's alpha was >0.7 for all DISABKIDS sum scales except one (0.6). Increasing HbA1c was associated with reduced HRQOL score (multiple regression model) on all, except one of the DISABKIDS subscales ($P < 0.05$). Increasing age was associated with lower score in both of the two disease specific subscales ($P < 0.05$). Adequate correlations between subscales in the DISABKIDS instruments and corresponding subscales in CHQ-87and CHQ PF-50 were found (Pearson's $r = 0.5–0.8$). Comparison between the Norwegian population and scores from the European validation study displayed similar results.
**Conclusions:** The Norwegian generic and diabetes-specific DISABKIDS modules demonstrated sufficient validity and reliability and seem to be applicable to Norwegian childhood diabetes populations.

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## Coping with sexuality issues in Greek teenagers with type 1 diabetes mellitus (T1DM)

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**Introduction:** Adolescents with type 1 diabetes mellitus (T1DM) may differ from their healthy peers in respect to both their sexual activity and contraceptive use.

**Objectives:** To compare sexual behaviors and contraceptive use between adolescents with T1DM and their healthy peers.

**Methods:** A matched case-control study was conducted. The case group consisted of adolescents with T1DM (n = 17) aged 14–18 years (mean ± SD disease duration: 6.29 ± 2.9 years and mean ± SD HbA1c: 9.22 ± 1.58%). The control group consisted of healthy adolescents (n = 228) matched in respect to age and socioeconomic status. Anonymous self-completed questionnaires were used to evaluate sexual behaviors and contraceptive use.

**Results:** Among the study population (n = 245), 37.5% of T1DM adolescents reported having experienced sexual intercourse (male/female ratio: 5/1) as compared to 28.3% of controls (P = 0.434). Significantly more T1DM adolescencts reported initiation of sexual activity at age 17 years (33% vs. 4%, P = 0.014). Moreover, early initiation (<15 years old) of sexual activity occurred less often among T1DM adolescents when compared to controls (16.7% vs. 40%; P = 0.014). While 13.6% of controls reported having more than five sexual partners, no T1DM adolescent reported relevant information (P = 0.182) In respect to condom use, 87.5% of T1DM used it in every sexual contact versus 56.1% of controls (P = 0.326). It is also interesting that no adolescents with T1DM reported alcohol use prior to sexual contact as compared to 8.9% among controls (P = 0.175).

**Conclusions:** Adolescents with T1DM initiate sexual activity at an older age and seem to be more responsible when compared to their healthy peers.

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## Quality of life in 1043 young children with diabetes. A new smiley faces international QOL assessment tool

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**Objectives:** To assess metabolic control and Quality of Life (QOL) in young children and to develop a QOL questionnaire for this age group.

**Methods:** Clinical data and HbA1c were collected on 1133 children aged <11 years, (girls 47 .7%, mean age 8.0 ± 2.1 years; >1 year of diabetes, mean duration 3.8 ± 2.1 years) and parents (874 mothers and 187 fathers) from 18 centres in Europe, Japan, North America and Australia. Children completed a 10 item Smiley faces QOL questionnaire constructed for the study and children ≥7 years also completed the KIDSCREEN-10 Index questionnaire. Parents completed the WHO5 well-being and family affluence questionnaires.

**Results:** 1043 children completed all items on the Smiley questionnaire which was well understood by most children ≥5 years. Mean HbA1c was 8.0 ± 1.0%. The questionnaire showed good internal consistency and reliability, Cronbach's alpha = 0.734. Inter-item correlation range r = 0.047 to 0.451 indicating each item measures separate aspects of children's satisfaction construct. Convergent validity was demonstrated by comparison of the Smiley scale to the HrQOL KIDSCREEN-10 Index and a general health perception question(r = 0.496 and 0.375).

Children reported good QOL with most items positive (mean range 2.7–3.8) on a 5-point scale. QOL was unrelated to age, duration of diabetes, or HbA1c. Girls are more satisfied than boys. Children on Intensive insulin regimens (IT) had a better QOl than conventional regimens (P < 0.02). Child QOL was positively associated with parent well-being (P < 0.001) and with family affluence score (P = 0.01). Main dissatisfaction related to insulin injections and blood sugar testing.

**Conclusions:** Young children with diabetes generally have a good QOL. The new Smiley questionnaire enables identification

of clinically relevant QOL items. The psychometric adequacy and acceptability indicates its value as an international QOL assessment tool for young children which is brief and easy to score in a busy clinical setting.

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### Identification of diabetes myths and misconception for need assessment of a diabetes education program in Pakistan

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**Objective:** The purpose of present study was to explore various myths and misconceptions regarding diabetes mellitus prevailing in Pakistani culture, so that we would be able to combat the major hurdle for proper treatment and effective control of diabetes.

**Method:** Data was collected from 200 adults (i.e, 60 diabetes patients, 60 individuals from families of diabetes patients who are closely involved with diabetes patients in their disease management, 60 individuals from community, and 20 physicians) from Rawalpindi/Islamabad. The sample was approached at health care centers, hospitals, and homes. A semi-structured interview protocol was prepared based on extensive review of literature. Face to face interviews were conducted. Data was analyzed using qualitative data analysis software Nvivo-8.

**Results:** The findings revealed various myths and misconceptions regarding perception of disease (i.e., awareness, knowledge, types, at risk population); diabetes treatment versus cure ( i.e., faith healers, eastern medicines, homeopathic medicines, para-psychology etc); and medical and psychosocial issues with diabetes (i.e., medication, attitudes of self toward the disease, attitude of others toward patients, familial issues, and adjustment issues etc). Prevalence of the various types of myths was compared in the three populations (i.e., patients, family members, and general public), additionally comparisons for the differences across gender, ses, education, and age were also investigated.

**Conclusions:** The findings lead to the identification of critical cultural aspects of diabetes, which shall be addressed in an awareness program for general public and in a diabetes education program for diabetes patients and their family members.

## P/141/FRI

### Psychological support for children with diabetes: are the guidelines met?

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**Objective:** There is substantial evidence for the significant role of psychosocial factors in the management of type 1 diabetes in youth. ISPAD therefore published the Clinical Practice Consensus Guidelines in 2009 for psychological care of young patients. However, it is not clear if and how these guidelines are being implemented in routine care. We conducted a survey to document this in pediatric diabetes clinics around the world.

**Methods:** A questionnaire was created to assess implementation of the guidelines and directed to physicians through the ISPAD listserve via a web-based survey.

**Results:** The survey was completed by 122 participants from 42 countries; 20% were from the USA and 39% work at a university hospital. Following recommendations, 95% of respondents work in an interdisciplinary team; 71% of the teams have access to a mental health specialist (MHS). In 60% of cases, the MHS is part of the team and reimbursed by the government (55%). Most MHSs received training in diabetes (61%). Only 24% of MHSs see all patients; however, 44% participate in routine clinic visits. Three-quarters of MHSs screen for psychological problems, mostly on referral (86.2%) by physician (100%), nurse (69%) and upon parental request (63%). Less than a third of the teams received training in recognition of mental health problems; 40% received training in counseling techniques. 57% assess family functioning. Most teams provide psychosocial interventions (79%), mainly to those newly diagnosed (76%) or in poor control (83%).

**Conclusion:** Psychological care is available for many children with diabetes worldwide. Yet, nearly 30% of teams do not have access to a MHS. Only a minority of MHSs see all children with diabetes or are part of routine clinic visits. More physician and nurse training in the recognition of mental health problems and counseling skills are warranted. More advocacy is needed to increase availability and utilization of psychological services in routine diabetes care.

## P/142/FRI

### Higher levels of physical activity are not associated with better glycemic control in pre-school children with type 1 diabetes

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**Objective:** Physical activity (PA) reduces cardiovascular risk factors including insulin resistance and lowers plasma glucose. Children with diabetes are recomended to be at least as physically active as other children. We have previously shown that young children with type 1 diabetes are less active than healthy controls (FS, GF, UE, oral presentation ADA 2011). The aim of this study was to explore the relationship between objectively measured PA and glycemic control in young children with type 1 diabetes.

**Methods:** 24 children younger than seven years with type 1 diabetes (12 boys, mean age 4.5 years, diabetes duration 2.0 years, HbA1c 60 mmol/mol = 7.6% DCCT) participated. PA was measured with a combined accelerometer and heart rate monitor (Actiheart, Cambridge Neurotechnology Ltd) attached to the child's thorax. The children wore the monitors continously (including during sleep and water-based activities) during 1 week (mean 6.7 days). Sick-days were reported and excluded. HbA1c was measured at start of the registration with DCA Vantage (Siemens).

**Results:** Total PA (measured as counts per minute) was not significantly associated with HbA1c ($r = 0.16$, $p = 0.47$). No association between time spent in moderate to vigorous PA and HbA1c was observed ($r = 0.16$, $p = 0.45$), or between time spent sedentary and HbA1c ($r = -0.18$, $P = 0.40$). In boys with diabetes ($n = 12$) higher total amount of PA was correlated with higher HbA1c ($r = 0.71$, $P = 0.010$).

**Conclusion:** Higher levels of objectively measured PA is not associated with better glycemic control in young children with type 1 diabetes. It is well known that PA can lower plasma glucose instantly but in order to transfer this effect into lower HbA1c we need to improve treatment regimens for young children with type 1 diabetes. It is possible that both the lower amount of PA in young children with type 1 diabetes (FS, GF, UE ADA 2011) and the lack of association between

increased PA and lower HbA1c could be related to fear of hypoglycemia.

## P/143/FRI

### Physical activity and diet patterns of adolescents with type 1 diabetes

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**Objective:** A healthy diet and physical activity are important for all teenagers, but even more so for teenagers with diabetes. Recommendations include 1 or more servings of fruit and vegetables per day and 5 days per week at least 60 minutes physical active. In this study, we examined physical activity, screen time and different diet patterns of adolescents with type 1 diabetes and the associations with glycemic control.
**Methods:** A sample of 84 adolescents with type 1 diabetes in the age of 13–17 completed questions on physical activity and diet of Health Behavior in School Children (HBSC) questionnaire: breakfast, lunch, dinner, fruit, vegetables, candy, soda, physical activity and screen time. We compared our sample to data from the HBSC study using chi-sqaure and one-sample *t*-test analyses. Multiple regression analyses were performed to examine the association with glycemic control (HbA1c).
**Results:** Compared to their peers, adolescents with diabetes eat more fruit (42.8% vs. 29%, P = 0.006) and vegetables (53.6% vs. 40.6%, P = 0.015) and drink less soda's (26% vs. 41%, P = 0.006). 36% of the adolescents in our sample is 5 or more days at least 60 minutes active and they spend on average 5.4 hours per day behind a screen. This means that adolescents with diabetes are as physical active as their peers, but watch less TV (2.7 vs. 3 hours per day, P = 0.041).
Eating more fruit was associated with lower HbA1c values (P = 0.045). In the group of children on conventional therapy, more candy per week was associated with lower HbA1c values (P < 0.001).
**Conclusion:** Overall, adolescents with type 1 diabetes seem to have a more healthy diet pattern compared to their peers, although the majority does not meet the recommendations for a healthy diet or physical activity. Physical activity patterns are not associated with glycemic control. Eating more fruit and candy seem to be related to better glycemic control.

## P/144/FRI

### Evaluation of care and education for children and young people with diabetes in Kuwait: the SWEET project

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**Objectives:** ISPAD guidelines state clearly that every child, newly diagnosed with type 1 diabetes, should be evaluated and educated by a diabetes team qualified to provide up to date pediatric-specific education and support and dedicated to communicating basic diabetes management skills to the whole family. The aim is to reduce inequality and improve care and education for all children with diabetes.
**Method:** We undertook the following survey to assess the quality of care given to children in eight pediatric diabetes units in Kuwait, using the SWEET Project questionnaire. SWEET is a European project to improve secondary prevention, diagnosis and control of diabetes in children and adolescents by supporting the development of centers of reference (CORs) for pediatric and adolescent diabetes services across the EU. This survey was distributed to 34 pediatric endocrinologists and health care professionals dealing with diabetes in Kuwait.
**Results:** Twenty one out of 34 responded (response rate was 62%) and 64% stated that they provided a structured education program for patients at diagnosis, but only 2% provided this service at every stage from diagnosis onwards. Almost 60% of responders found that the most effective methods of educating patients and parents used practical works and hands on activity while only 5% used problem solving. Furthermore, 50% felt they had a CYP team that had a shared philosophy and targets for A1c. Only 5% were offering training in diabetes for school teaching staff and assistants. Most pediatric endocrinologists followed the ISPAD guidelines while dietitians followed ADA guidelines. About 85% would like to have a national structured diabetes program introduced.
**Conclusion:** Our dataset provide important information about care given to children and young people with diabetes in Kuwait which varied significantly across the country. Based on these results gaps have been identified and future programs are planned to address the deficiencies.

## P/145/FRI

### Parents of young children with type 1 diabetes: their well-being and diabetes specific burden in association with clinical and socio demographic factors

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**Objective:** To assess parents' well-being and diabetes specific burden and its association with children's metabolic control, type of insulin regimen and socio demographic factors.
**Methods:** Demographic and clinical data (centrally analysed HbA1c) were collected in 1133 children <11 years, (47 .7% girls; mean age 8.0 ± 2.1 years; mean diabetes duration 3.8 ± 2.1 years) and their primary carers (874 mothers, 187 fathers) from 18 centres in Europe, Japan, North America and Australia. Parents completed the WHO-5 questionnaire, a

Parental Burden of Diabetes score and the Family Affluence Scale (FAS).

**Results:** Mean parent well-being was 59.9 ± 19.1 with significant differences between centres (P < 0.001) and mothers reporting lower well-being than fathers (58.9 ± 20.3 vs. 65.3 ± 16.8; P < 0.001). 29% of the mothers had poor well-being (WHO-5 < 50). The grand mean HbA1c was 8.0 ± 1.0%. Parental well-being was not associated with child's age, duration of diabetes, insulin regimen, HbA1c or family structure. It was lower than in parents of adolescents with T1DM in the former Hvidoere study (64.4 ± 18.8; P < 0.001). There were positive associations with family affluence scores (F = 6.496; each P < 0.001). Poorer parent well-being was demonstrated at children with co morbidity (56.4 ± 20.5 vs. 60.5 ± 19.8; P = 0.018) and in families with a severe life event during the last year (56.4 ± 20.8 vs. 61.2 ± 19.4; P = 0.001). Good parental well-being was associated with lower diabetes burden (r = -0.325; P < 0.001).

**Conclusion:** Parent well-being in young children with diabetes is significantly poorer than in parents of adolescents with T1DM. Intensified Insulin regimens like CSII and ICT are not associated with lower parent well-being, but co-morbidities or adverse social conditions have a significant impact and require additional support. As parents' well-being forms an important part of diabetes care, it requires on-going assessment.

## P/146/FRI

### Use of an insulin pen with memory is not enough to give better glycaemic control

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**Objectives:** Omitting insulin doses is probably a common explanation of poor glycaemic control. The aim of this study was to examine if use of an insulin pen with memory of the last 16 given doses can help children with type 1 diabetes to take the proper insulin doses and improve glycaemic control.

**Methods:** 48 children of 7–18 years with type 1 diabetes for at least 2 years and with too high HbA1c (≥57 mmol/mol; mean 72 mmol/mol) and with multiple insulin therapy regimen were included in the study. After a run-in period of 1 month they were randomized to use either an insulin pen with memory (HumaPen Memoir™) for 3 months or an ordinary pen for 3 months in a cross-over design. HbA1c was analyzed after each period. Both parents and children answered questionnaires how often they used the memory function and if they found it useful.

**Results:** Eighty one percent of the children completed the study. There were no difference in HbA1c after the period with the memory pen compared to an ordinary pen (67 mmol/mol vs. 68 mmol/mol, P = 0.35).55% of the children had omitted at least one insulin dose the last days. However, the memory function was used only once a week or more seldom by 61% of the parents and 44% of the children. Only 19% of the parents and 16% of the children believed the pen had often helped the child to remember the insulin injection. The main reason for both parents (83%) and children (56%) to use the memory was high blood glucose. Another main reason for children was to check if they had taken their meal bolus (50%) and for parents to control if the child has taken insulin in school (58%).

**Conclusions:** Even though more than half of the diabetic children with too high HbA1c did omit insulin doses a memory pen did not improve their HbA1c and only a small minority found the memory helpful. Modern technique is not always enough to improve compliance and metabolic control.

## P/147/FRI

### Predictive utility of IDAA1C in a clinical setting

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**Objectives:** To define the duration and associated factors of the partial remission (honeymoon) period in our patient population. To test the clinical utility of a new definition of partial remission as proposed by Mortensen et al [*Diab Care Aug 2009, Vol 32(8):1384-1390*]. This defines an individual as being in remission when a calculated Insulin Dose Adjusted $A_{1c}$ (IDAA1C) has a value of ≤9.

**Methods:** All new cases diagnosed between 2005 and 2006 (n = 156) were retrospectively identified from our diabetes database. Cases were excluded where they were: not antibody positive; had not attended ≥1 out-patient appointment in the first year post-diagnosis, or had other missing data.

$HbA_1c$, weight and insulin dose were used to calculate the IDAA1C at 3, 6, 9 and 12 months post-diagnosis. Where IDAA1C >9, the% insulin adjustment was calculated and correlated with change in HbA1c.

**Results:** 109 individual cases were identified for inclusion, with a mean age at diagnosis of 9.0 ± 3.4 years. As defined by IDAA1C, 53% of patients entered a remission phase, with a median duration of 4 months (0–26months). Age at diagnosis had only a weak association with duration of remission (r = 0.26), although none of the patients ≤3.5 years had a remission phase (n = 11). 18.3% of patients had moderate/severe DKA at diagnosis and were less likely to enter a remission phase [OR = 0.58 (95% CI 0.55–0.61)].

Overall when the calculated IDAA1C value was >9, patients had a recommended mean insulin dose increase of 12.5%. Where patients did not have a recommended increase in insulin dose (33%; n = 36), they experienced a mean increase in HbA1c of 0.56 ± 0.96%.

**Conclusions:** The IDAA1C is a reliable measure of the partial remission phase post-diagnosis of T1DM. It is a useful guide in the out-patient setting as to when an increase in insulin dose should be considered.

## P/148/FRI

### Demographic, inter- and intrapersonal predictors of metabolic control and self-care in children/adolescents with type 1 diabetes

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**Objectives:** To identify consistent reproducible predictors of metabolic control and self-management in children/adolescents with T1DM by examining demographic, intrapersonal and interpersonal individual factors.

**Methods:** We conducted a systematic literature review of Medline, Embase, PsychInfo, and Cinahl databases, after identifying no similar reviews on the Cochrane or DARE database systems. Studies were excluded if they included >20% of participants with type 2 diabetes in their assessment, or if they did not have an identifiable cohort of children/adolescents. A qualitative synthesis was performed.

**Results:** 70 empiric studies were identified for inclusion, representing 11,868 individuals with diabetes.

Consistent demographic factors associated with higher HbA1c and lower self-care are:

•belonging to an ethnic minority grouping or

•belonging to a lower socioeconomic status grouping, or
•having a single-parent family structure.Interpersonal factors linked with improved health-care outcomes are:
•being in a family with high cohesiveness,
•where parents employ an authoritative style of parenting,
•where diabetes responsibility is shared and levels of conflict are low.Intrapersonal factors linked with lower $HbA_{1c}$ levels were:
•higher agreeableness, conscientiousness and higher emotional stability on personality scales,
•high levels of self-efficacy,
•active problem-focused coping skills.Predictors of diabetes technologies use were the number of daily blood glucose self-measurements performed and shorter diabetes duration.
**Conclusions:** Psychosocial screening should be instituted from diagnosis and considered prior to regimen intensification with newer diabetes technologies. Identifying individuals from high-risk groupings would allow early access to appropriate supports. A theoretical model for links with metabolic control is proposed.

## P/149/FRI

### Reversion to injected insulin from CSII and the ``pump probation'' process at the Royal Children's Hospital (RCH) Melbourne, Australia

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**Objective:** To describe measures to minimise reversion to injections from CSII.
The Diabetes Service at the RCH cares for over 1650 children and adolescents with type 1 diabetes. At RCH, 433 patients have commenced Continuous Subcutaneous Insulin Infusion (CSII) therapy and, as of 31st March, 2011, 43 (10%) have reverted to injected insulin. The documented reasons include deterioration in metabolic control, unsafe practice and being ''sick of a pump''. The RCH philosophy is that CSII is intensive management and to succeed families must commit to the work required, that it will not suit all patients, and that deteriorating glycaemic control means that continuation of CSII therapy will be reviewed.
To minimise reversion to injections, initial selection process for potential pump candidates includes a dedicated information session clearly outlining expectations of what is required to safely and effectively manage CSII. Referrals for CSII commencement are sometimes requested by children and parents who have unrealistic expectations. Any misconceptions the child or family has about what CSII can do are dispelled, and the family can elect to continue with injections.
**Methods:** Reversion to injections is presented with the option of restarting CSII at some point. For children who wish to continue CSII (with or without parental support), a pump probation period is commenced. The probation period is contingent on patient willingness to accept intensive support and meet key measures. These include weekly pump downloads to the Diabetes Nurse Educator which allows assessment of the frequency of blood glucose testing, pump overrides and bolusing events, and attendance at scheduled pump user group workshops.
**Results:** Follow-up analysis is yet to be conducted.
**Conclusion:** To be provided.

## P/150/FRI

### The transition of adolescents and young adult diabetics: a proposal for research action

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**Objectives:** The aim of the study was to conduct a psychological evaluation of adolescents and young adults still followed at Department of Pediatrics who have to move to adult care units. The broader objective of this research-intervention is creating a care pathway to accompany the transition process.
**Methods:** 105 subjects were divided into two groups according to age: (1) Adolescents 16–21 years (77 subjects, 37 M, mean age 18.6 ± 1.6, mean HbA1c 8% ± 1.3); (2) Young adults >21 years (28 subjects, 10 M, mean age 23.3 ± 1.7, mean HbA1c 7.7% ± 0.6).
Subjects were tested by the Questionnaire Response Evaluation Measure-71 (REM-71) for evaluating defensive mechanisms, the Confidence in Diabetes Self-Care Scale (CIDS) for measuring therapeutic compliance, the Symptom Check List (Test SCL-90) for screening serious psychopathology.
**Results:** In group 1 the following dynamics have emerged: a great sense of attachment and trust in the pediatrician 87%, fear of losing the acquired relationship with the pediatrician 78%, fear of separation from the specific place of care 75%, difficulties in meeting the "new" 59%. In group 2 the following dynamics have emerged: a great sense of attachment and trust in the pediatrician 85%, difficulties in meeting the "new" 69%, sense of loss 67%, fear of separation from the specific place of care 66%, fear of a new dependency 58%. Finally, in group 1 have emerged healthier and more functional defense mechanisms to chronic illness and improved compliance compared with group 2. The SCL-90 test has not showed psychopathological profiles in both groups.
**Conclusions:** The data obtained suggest the need for differentiated psychological support of adolescents and young adults in transition to adult diabetes care units, in order to facilitate the adaptation and to prevent risky drop-outs in a very delicate life cycle stage.

## P/151/FRI

### ReportWriter: an innovative electronic health record for more efficient and enhanced quality of diabetes care

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**Objectives:** Electronic Health Records (e-HRs) lead to improved patient safety, enhanced physician efficiency and reduced medical errors. e-HRs helps health care professionals and provides immediate access to timely, comprehensive information about their patients and also foster administrative efficiency. ReportWriter™ is an e-HR that provides a complete visual design environment for users to design and build reports. It is a comprehensive suite of software and information solutions architected from a robust platform and designed to improve safety and health performance indicators and support a decision-making process from multiple sources of health care information systems.
**Methods:** The setup of the application is at Dasman Diabetes Institute, Kuwait, in collaboration with Harvard School of Public

Health and the Division of Clinical Informatics at Harvard Medical Faculty Physicians (HMFP).The software is a flexible and comprehensive informatics solution allowing for structured and unstructured capturing of data. A note can contain any mix of templates, along with user typed data and imported structured data such as labs, medications and patient initial data. Problems are encoded in a robust interface terminology, with over 300,000 clinical terms, allowing easy repurposing for use throughout the system, and sophisticated reporting. ReportWriter is written in Java® using Google Web Toolkit® (GWT) for cross-compilation to create a robust web based application with desktop sophistication.

**Results:** The system proved to be most valuable in increasing data legibility, user competency, efficacy and productivity. Each user could easily create added features and templates for use in different disciplines. Additionally, since the system is web-based, no complex per-terminal installation is required.

**Conclusion:** Report Writer has the potential to enable dramatic transformation in the delivery of healthcare, making it safer, more effective and more efficient.

## P/152/FRI

### Momentary sampling using personal digital assistants (PDAs) to assess adherence in teens with type 1 diabetes (T1D): feasibility, burden and acceptability

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**Objective:** To determine feasibility, burden and acceptability of using PDAs to collect real-time data on mood, social context, blood glucose (BG) monitoring and insulin administration in teens with T1D.

**Methods:** 40 teens (48% male), ages 14–18, with T1D >1 year participated in a 2-week study using PDAs. Participants (63% pump users) had a mean age of 16.6 ± 1.5 years, T1D duration of 8.7 ± 4.4 years, daily BG monitoring frequency of 3.9 ± 1.5 and A1c of 8.7 ± 1.4%. They completed baseline and final surveys of adherence behaviors and mood. PDAs were personalized to signal around the times of four 4 regularly scheduled BG checks daily. Signals occurred before 3 of the 4 BG checks, prompting teens to report mood and social context, and 30 minutes after all 4 BG checks, prompting them to report BG result and insulin management. One pre-BG signal was skipped daily to assess impact of queries on behavior (data not yet available). Each of the 7 daily queries took 2–3 minutes. After 2 weeks, the PDA and final surveys, including a survey about study burden, were returned by mail. Associations of teen data with momentary response rate used Spearman correlations and *t*-tests.

**Results:** Of 56 teens approached, 71% agreed to participate. To date, 37 have finished the study, responding to 2049 of 3528 queries (median response rate = 62%). 67% of teens responded to ≥50% of queries and 44% responded to ≥70%; only 14% (n = 5) answered <10%. Response rate was unrelated to age, sex, T1D duration, baseline BG monitoring frequency, baseline mood, A1c or pump use. Teens responding to ≥70% of queries tended to have higher self-reported adherence at baseline (P = 0.14) and after the 2-week study (P = 0.02). 87% were ''very'' to ''moderately'' willing to participate again.

**Conclusions:** Using PDAs to collect data on mood, social context, BG monitoring and insulin administration was acceptable to teens with T1D. Such data may identify momentary predictors of self-management and inform behavioral interventions.

## P/153/FRI

### Diabetes, adolescence and quality of life

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**Introduction:** Diabetes mellitus type 1 (DM 1) is a chronic and multisystemic disease that needs a demanding treatment whose noncompliance is responsible for an increased risk of complications. Historically, studies of the disease have focused on metabolic control as the main indicator of quality of care; nowadays self-perception of illness is also a factor of its quality. Multiple tools have been developed to evaluate quality of life and care. One of these tools is the Diabetes Quality of Life questionnaire (*DQOL*), a multiple-choice and closed answer questionnaire which is already standardized for the portuguese population.

**Objectives:** To assess the quality of life in a sample of adolescents with DM 1 followed at a Pediatric Diabetology Outpatient Care in Hospital São Teotónio, Viseu.

**Methods:** Application of a standardized questionnaire *DQOL* to portuguese adolescents with DM 1 aged 12–19 years. Metabolic control was assessed by the mean values of glycated hemoglobin obtained during the previous year. The statistical analysis was made with SPSS® version 15.0.

**Results:** Of a total sample of 30 adolescents, 17 (57%) were female, with an average age of 15.2 years. The disease duration ranged from 0 to 15 years with a mean value of 6.3 years. The mean glicosilated haemoglobin varied from 5.5% to 10.9% with an average of 8.66%. Statistical analysis of different variables showed significant relation between the subscale scores of the *Impact* of *DQOL* and mean glycosylated hemoglobin (P = 0.05); the same was not observed with the other subscales (*Concern, Satisfaction*). The remaining variables, including years of disease duration and sex were not statistically correlated with *DQOL* scores.

**Conclusions:** Metabolic control and quality of life are two important aspects of the approach to the diabetic adolescent. In our study, adolescents with better metabolic control, revealed lower impact of the disease on the activities of daily living.

## P/154/FRI

### Quality of life in children and adolescents with type 1 diabetes and coeliac disease

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Health-related quality of life (HRQOL) is an important health outcome and a well-know indicator of the long-term consequences of chronic diseases that affect the quality of life (QOL). Aim of our study was to investigate general and HRQOL of children with type 1 diabetes (T1DM) and subjects with coeliac disease (CD) compared to healthy controls.

We studied 101 outpatients: 35 children with T1DM (12.8 ± 2.85 years, duration of T1DM 60.5 ± 33.4 months), 32 subjects with CD (9.60 ± 2.61 year, duration of CD 52.0 ± 47.9 months), and 34 controls children matched for age and sex. All subjects were assed using the Paediatric Quality of Life Inventory (PedsQL) Generic Core Scales to measure HRQOL with 23 items included in 4 scales.

T1DM patients showed a satisfactory metabolic control HbA1c (8.06 ± 0.75%). Twenty-one out of 32 CD subjects showed a strict dietetic control. We demonstrated that social functioning (fx), school (fx), psychosocial health (fx), and total scale were significantly different between groups; the major concern was related to emotional (fx) (Table. Kruskal–Wallis ANOVA; * vs. controls; † vs. T1DM).

Our results demonstrate that children and adolescents with chronic disease, despite a good adherence to therapy, have impairment in psychosocial health (fx). Our data disagree with common opinion that children with CD have a better adaptation and functioning. These findings contribute significant information on the effects of pediatric chronic conditions on generic QOL from the perspectives of children. It is conceivable that an immediate multidisciplinary approach to patients with T1DM can be responsible for this differences.

| PedsQL | T1DM | CD | Controls | $\chi^2$ | P |
|---|---|---|---|---|---|
| Physical Health (fx) | 79.9 ± 12.5 | 77.4 ± 15.8 | 85.3 ± 11.2 | 7.14 | 0.058 |
| Emotional (fx) | 67.1 ± 19.0 | 70.3 ± 17.1 | 77.6 ± 11.6 | 0.42 | 0.065 |
| Social (fx) | 89.2 ± 12.6 | 81.2 ± 12.1*† | 90.4 ± 10.6 | 11.6 | 0.002 |
| School (fx) | 74.1 ± 15.1 | 67.6 ± 18.6* | 81.6 ± 12.8 | 5.57 | 0.005 |
| Psychosocial Health (fx) | 76.8 ± 12.8* | 73.0 ± 11.7* | 83.2 ± 8.22 | 9.04 | 0.001 |
| Total scale | 77.9 ± 11.7* | 74.5 ± 11.8* | 83.9 ± 8.15 | 14.8 | 0.002 |

*[Table. PedsQL results]*

## P/155/FRI

### Interrelation of indicators of quality of life and psychosomatic aspects of a diabetes of 1 type at children and teenagers Siberian State Medical University of the Health Ministry of Russia

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**The purpose:** To study interrelation of parameters of quality of life and psychosomatic characteristics of children and teenagers with DM1.
**Methods:** The Basic group of inspection patients with DM 1 in quantity of 150 children age 10.7 ± 0.6 years. and age 15.8 ± 0.2 years. Duration of disease made teenagers from 7 years till 16 years 8.2 ± 0.4 years. Complex klinik-laboratory inspection of patients with use of standard methods of research and psychological testing with definition such as the attitude to illness with questionnaire LOBI, a level of alarm and depression (test Spilberger), estimations of quality of life questionnaire SF-36 is carried out. The control group is submitted healthy of children 96 person comparable on to a floor and the age.
**Results:** At an estimation of correlation between QL and social-psychological factors authentic significant communication between a level of depression and all parameters of QL is received, except for BP (pain) ($r = -0.26$, $P < 0.05$), is revealed authentic communication between parameters of uneasiness of patients and QL on PF, RP, VT, SF, MH ($r = -0.28$, $P < 0.05$). Return correlation of average force between expressiveness of uneasiness and making qualities of life V (vallity) and SF ($r = -0.39$, $P < 0.05$) is marked. The feedback between age of patients and parameters of scales RF ($r = -0.29$, $P < 0.05$) is established. The correlation analysis of parameters QL and types of the attitude to illness has revealed correlation interrelations the GH and egocentric type of the relation to illness ($r = -0.26$, $P = 0.048$), and also ipochondris ($r = -0.24$, $P = 0.043$), role functioning and disturbing TO??? ($r = -0.28$, $P = 0.013$), at ipochondris type ($r = -0.32$, $P = 0.023$). The received results testify to absence of an authentic difference between other parameters quality of life.
**Conclusions:** The major factors authentically lowering quality of life of patients with DM1 and influencing the majority of parameters of scales of QL both mental, and physical are: depression and uneasiness.

## P/156/FRI

### Socioeconomic determinants and metabolic control in children and adolescents with type 1 diabetes mellitus belonging to immigrant families in Catalonia (Spain)

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**Background:** There is an increasing perception that type 1 diabetes mellitus (T1DM) of children and adolescents belonging to immigrant families is difficult to manage due to socioeconomic and cultural determinants.
**Methods:** Multicenter cross-sectional study in which data from 91 children with T1DM belonging to immigrant families and followed-up in ten hospitals from Catalonia were collected and compared with data from 91 controls. Variables included demographic and metabolic data as well as a socioeconomic questionnaire.
**Results:** Origin of immigrant children were: Maghreb 56 (61.5%); Latin America 21 (23%); Eastern Europe 6 (6.6%); European Community/USA: 5 (5.5%); India/Pakistan: 3 (3.3%). A comparison between clinical variables of inmigrant versus native population is shown in table 1. The socioeconomic analysis showed that children belonging to immigrant families had lower economic incomes and a higher rate of unemployment than the native population. The worst scores in economic items were obtained in Maghreb population. In all groups there was a correlation between low economic incomes and poor metabolic control.
**Conclusion:** Our data suggest that metabolic control of T1DM is worse in children of immigrant families and socioeconomic factors may be implicated in this issue. As a consequence it is very important to identify potential targets in these cohorts in order to achieve a good balance of diabetes.
Table 1. Metabolic characteristics of both groups

| | Immigrants | Natives | P |
|---|---|---|---|
| Age (years) | 11.03 ± 4.10 | 12.34 ± 3.40 | ns |
| Diabetes duration (years) | 4.59 ± 3.26 | 4.79 ± 3.28 | ns |
| Insulin requirements (U/kg per day) | 0.90 ± 0.30 | 0.86 ± 0.23 | ns |
| HbA1c (%) | 9.37 ± 1.69 | 8.06 ± 1.05 | P < 0.05 |
| Number of blood tests >300 mg/dl in 15 days | 8.41 ± 7.59 | 4.87 ± 5.05 | P < 0.01 |
| Number of blood tests <60 mg/dl in 15 days | 4.48 ± 4.40 | 2.70 ± 2.97 | P < 0.01 |
| Number of blood tests/day | 4.14 ± 1.26 | 4.99 ± 1.22 | ns |
| Days of hospitalization at onset | 10.09 ± 5.41 | 5.56 ± 2.91 | P < 0.01 |
| Missing school days | 9.27 ± 7.89 | 4.99 ± 4.07 | P < 0.01 |

P/157/FRI

## Parental monitoring, adolescent disclosure, and diabetes management in a diverse sample of youth with type 1 diabetes

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**Objectives:** Parents' awareness of their adolescent's diabetes care behavior is associated with better HbA1c (Berg et al., 2008; Ellis et al., 2007). We examined age, sex, and ethnicity differences in parental monitoring and adolescent disclosure of diabetes behaviors.
**Methods:** Age and sex matched samples of Latino and Caucasian youth with type 1 diabetes (n = 91; ages 10–15 years; 40% Latino; duration > year; 51% female; 27% on CSII) completed cross-sectional surveys of mother/father awareness of their diabetes and general activities (parental monitoring), disclosure of diabetes care to mother/father, and adherence. HbA1c was obtained through medical records.
**Results:** Hierarchical regressions revealed that older youth reported lower mother/father monitoring and adolescent disclosure ($P < 0.05$), while Latino youth reported higher parental monitoring of general activities than Caucasian youth, (($P < 0.05$). A sex X ethnicity interaction was found for maternal diabetes monitoring [b = 1.265, t(87) = 2.098, $P < 0.05$], but not for maternal general monitoring or any paternal monitoring variable ($P > 0.10$). Caucasian males perceived mothers as less aware of their diabetes care than Caucasian females (2.51 vs. 3.78), while Latino males and females perceived mothers as equally aware (3.31 vs. 3.84). Maternal diabetes monitoring is correlated with adherence in Caucasians ($P < 0.01$) and Latinos ($P < 0.05$), while paternal diabetes and general monitoring are correlated with adherence and HbA1c in Latinos (Ps < 0.05).
**Conclusion:** Although parental diabetes monitoring decreases across adolescence, Latino/a youth may benefit from parents' heightened awareness of their ongoing activities. Latino males in particular may benefit from mothers' sustained surveillance of their sons' diabetes care during adolescence. Cultural differences in expectations for caregiving and changing parent-child relationships across adolescence are important to consider when providing care to diverse populations.

P/158/FRI

## Use of a web portal to improve education and communication in young diabetes patients with families – a case study

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**Objectives:** To develop a diabetes Web portal to facilitate self-management, including diabetes-related information and social networking functions, and study its use and effects in young patients.
**Methods:** A Web portal was developed in collaboration with patients, parents and their practitioners. It offered communication with staff, interaction with peers and access to relevant information and services. A geographic population were randomized to a group (n = 233) receiving passwords (parents and adolescents) for access to the portal, or a control group with no access (n = 230) for one year. All subjects had access during a second study year. The portal was used on users' own initiatives only.
**Measures:** User activity was logged. Health-related quality of life, empowerment and quality of information questionnaires, clinical data, at baseline and after one and two years.
**Results:** There was a continuous flow of site visits, but decreasing in summer and Christmas periods. In 119/233 families (51%) someone visited the portal the first study year and in 169/484 (35%) the second study year. More frequent page visits were seen on social networking with peers, such as blogs, stories and discussions, followed by news from the local diabetes teams.
No effects were found on outcome variables. No adverse effects were identified. A higher proportion of mothers compared to fathers visited once or more the first ($P < 0.001$) and the second year ($P < 0.001$). Those patients where someone in the family visited five times or more (active users), n = 68, had shorter diabetes duration ($p = 0.006$), were younger ($p = 0.008$), had lower HbA1c after one year ($p = 0.010$), and were more often girls ($P < 0.001$).
**Conclusion:** The Web portal appears useful as a complement to traditional care for this target group. Peer interaction seems to be a valued aspect. The use of a portal needs to be integrated in routine care and promoted e.g. by diabetes team members, advertisements and newsletters.

P/159/FRI

## Parent and youth report of the diabetes behavior rating scale

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**Objectives:** Parent/youth dyads are commonly studied in pediatric diabetes as parents play an integral role in disease management. Decreased communication during adolescence may result in a discrepancy in reports of disease care. However, it is common research practice to average parent and youth reports. The current study will determine if discrepancies in reports of disease care contribute to the understanding of HbA1c beyond that of averaged disease care scores.
**Methods:** The Diabetes Behavior Rating Scale (DBRS) and demographic questionnaires were administered to 246 youth with T1D aged 11–14, and their parents. Metabolic control was measured by HbA1c.
**Results:** Pearson's *r* correlation coefficients demonstrated moderate parent/youth agreement on the DBRS, r = 0.38. Pearson's *r* correlations with parent/youth discrepancy scores displayed significant associations with reports of disease care, r = -0.47, and HbA1c, r = −0.15; suggesting more parent/youth discrepancy was associated with poorer disease care and poorer HbA1c. Pearson's *r* correlations between the DBRS and HbA1c were significant for parents, r = -0.31, youths, r = -0.17, and averaged, r = -0.28 data. A hierarchical multiple regression revealed the averaged parent/youth DBRS scores significantly related to HbA1c, $P < 0.001$, $R^2 = 0.08$; addition of the DBRS discrepancy scores did not significantly improve the association, $P = 0.77$, $\Delta R^2 = 0.00$.
**Conclusions:** Although higher discrepancy scores between parent and youth reports of disease care were associated with poorer disease care and HbA1c, this discrepancy failed to

contribute to the understanding of the relation between disease care and HbA1c beyond averaged disease care scores. In addition, averaging parent and youth scores does not impact the association with HbA1c. Although discrepancies in parent and youth report exist with adolescents, averaged parent and youth disease care scores appear to be a viable method of combining reports to better understand glycemic control.

## P/160/FRI
## Initial treatment for children with diabetic ketoacidosis

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1. Diabetic ketoacidosis (DKA):
Diabetic ketoacidosis (pH < 7.30) in Jönköping county represent about 10% of newly diagnosed patients, i.e. 3–4 per year. Among known children with diabetes approximately 3–5 patients are admitted every year. DKA is a life-threatening condition. It is important to have an initial rapid and adequate treatment, which involves rapid onset of blood sampling and rehydration. Initial rehydration therapy lowers blood sugar and should precede the insulin therapy by 1–2 hours.
2. Assessment of problem and analysis of its causes:
Review of records 2000–2003 (n = 22) showed that the average time from arrival to initiation of rehydration was more than 2 hours (0.5–7 hours). Given that DKA is a life-threatening conditions, it is far too long.
**We identified 3 problems:** 1. Waiting for the analysis of acid-base status from the laboratory
2. Waiting for the effect of the anesthetic cream, Emla®, (~45–60 minutes) before the staff inserted the peripherally catheter.
3. Rehydration usually started after the patient was transferred to the children's ward.
3. Changes done:
1. Introduction of bedside analysis of acid-base status by IStat®.
2. In suspected DKA Emla® should not be used before insertion of the peripherally catheter.
3. The rehydration shall start directly at the emergency room (ER).
4. Information about the study at staff meetings at the ER and the children's ward, including doctors and nurses.
5. Information to nurses at the neonatal unit who are helping out with the bedside analysis.
4. Measurement of improvement: The goal is that the blood samples are taken and rehydration started within 45 minutes of recorded arrival in all patients with DKA.
5. Effects of changes: The time to rehydration has:
• a median decrease from 120 to 40 minutes. The interval between the start of rehydration to the start of insulin treatment has:
• a median increase from 22 to 150 minutes which is more in direction of international guidelines.

## P/161/FRI
## Intrinsic motivation and diabetes management in minority youth

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According to self determination theory, intrinsic motivation is a helpful construct in understanding regimen adherence (RA) of individuals with chronic disease. The aim of this study was to develop a measure of intrinsic motivation and evaluate its relationship to RA and glycemic control in minority youth with type 1 diabetes. Patients were recruited at their outpatient visit. The sample so far consists of 29 12–16 year old youth (52% male; 81% Hispanic; 19% Black) with mean age of 13.5 years. Youth completed the Intrinsic Motivation Inventory for Diabetes Management (IMI-DM), developed for this study, and the Diabetes Self Management Profile (DSMP), a measure of RA; HbA1c was obtained at the clinic visit. The IMI-DM consists of 13 items each rated on a 7-point Likert scale; 7 items comprise the confidence and six comprise the importance subscales. Results indicate acceptable internal consistency (Confidence $\alpha$=0.90; Importance $\alpha$=0.80; Total $\alpha$=0.91). Significant associations were observed between IMI-DM Importance and DSMP exercise ($r = 0.50$, $P < 0.01$) and DSMP eating ($r = 0.50$, $P < 0.01$). IMI-DM Confidence was associated with HbA1c ($r = -0.51$, $p < .01$) and DSMP eating ($r = .41$, $p < .05$). The IMI-DM Total score was related to DSMP eating ($r = .50$, $p < .02$) and DSMP exercise ($r = .47$, $p < .02$). Total scores for the IMI-DM and DSMP were also related ($r = .56$, $p < .01$), indicating greater diabetes related intrinsic motivation is associated with better RA. These findings indicate that the IMI-DM has acceptable psychometric properties, and youth with higher levels of intrinsic motivation for diabetes management exhibit better RA and glycemic control. These results provide support for the important role of intrinsic motivation in pediatric diabetes management and suggest that motivational interventions may be helpful.

## P/162/FRI
## Withdrawn by author

## P/163/FRI
## Metabolic control among non-Nordic diabetes patients in Sweden

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**Objectives:** It has been suggested that a wide variation in indicators of metabolic control of diabetes among children and adolescent patients is due primarily to variations in ethnic origin. We recruited a large cohort of diabetes patients younger than 20 years of age and examined whether ethnic origin defined by country of birth of the child and parents affects among other factors metabolic control of diabetes.
**Methods:** A total of 8712 patients (54% males) were identified during the period of 2006–2010 with a mean age of 8.3 years and diabetes duration of 6 years. The cohort was grouped into Nordic (including Swedes and Nordic countries except Finland; n = 7828, 90%), non-Nordic Europeans (n = 453, 5.2%) and non-Europeans (n = 395, 4.5%).
**Results:** In general higher mean HbA1c (NGSP) was seen in younger age at diagnosis ($P < 0.0005$) and longer (>5 years) diabetes duration ($P < 0.0005$). Our analysis also showed that non-European patients had shorter diabetes duration compared to Nordic patients ($P < 0.0005$) and European patients ($P < 0.014$). However, in Sweden mean HbA1c (NGSP) did not vary among the three groups. Regression analysis showed that HbA1c (NGSP) is better predicted by longer diabetes duration ($P < 0.0001$), age at diagnosis ($P < 0.0001$) and percent bolus insulin ($P < 0.0001$) but not ethnic background.
**Conclusion:** Our results suggest that non-Nordic diabetes patients in Sweden did not show variations in metabolic indicators of diabetes due to ethnic origin or access to health services and variation in metabolic control may be better explained by diabetes duration, age of onset and intensity of insulin treatment.

P/164/FRI

## Study of insulin injection technique in type 1 diabetes children and adolescents

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**Objectives:** To evaluate epidemiologic profiles, causes of variability in insulin injection technique, their ranking and their interactions, and to query participants' perception of the injection process.

**Methods:** A questionnaire on insulin injection practices was anonymously filled in diabetes summer camps by 407 children and adolescents: age 13.3 ± 1.9 years (10–18 years), diabetes duration 4.9 ± 3.6 years, HbA1c 8.3 ± 1.5%, 391 using pens.

**Results:** Among children using intermediate-acting premixed insulins, ¼ never resuspend them. Needles of ≥8 mm length are used by 33% of children, 6 mm or less by 62%. Needle purging is done frequently by 80%, sometimes by 14%, never by 6%. The injection is always made at the same location within a site by 9% of patients. Lipodystrophies were found in 68% of patients; 17% inject into lipodystrophies. Injection is made into a skinfold by 92% of responders ; 67% of them inject perpendicularly at the skinfold top, regardless of the needle length; only 20% do not keep skinfold during injection when done obliquely. The needle is kept in the s.c. tissue more than 10 sec in 55% of cases; no relation was found with insulin needle leakage. Children claim to have absolutely no fear of injections in 86% of cases. Pain is perceived more with long-acting insulin, regardless of the injection site. Fear of injecting and injection pain correlate with diabetes perception: 30% of those who express difficulties in living with diabetes fear injection, in 10% of those who have adjusted well to living with diabetes; 70% of those who have difficulties adjusting to diabetes claim to have injection pain; pain is reported in 57% in those who report a good adjustment to diabetes.

**Conclusions:** Injection should remain a constant concern of the health care team in the long-term follow-up of children and adolescents with diabetes. Injection technique should be evaluated regularly and self-assessment by the patient encouraged to maintain efficacy of care.

# Poster Session I: Diabetes Epidemiology

## P/165/WED

### A population based, nationwide study of insulin pump treatment in children and adolescents

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**Objectives:** In Norway all children and adolescents with T1D are treated in 26 pediatric departments. All these departments participate in the Norwegian Childhood Diabetes Registry (NCDR) with an annual standardized registration of clinical data and acute and chronic complications. NCDR is a population based, nationwide registry with 92% completeness. From 2000 to 2009 NCDR observed an increase in the use of insulin pumps from 15 to 52%. This study describes blood glucose control and frequency of acute complications in the total cohort.
**Methods:** HbA1c is analyzed in one central DCCT standardized laboratory. In 2009, 2130 patients with T1D participated, 52% boys, mean age 13 years (SD 3.7), mean diabetes duration 5.6 years (3.4). The children were stratified by age (0–4; 5–9; 10–14; ≥15 years). 52% were on insulin pump, with a range between hospitals from 13 to 81%, 47% were on multiple daily injection with insulin pen (60% insulin basal analogs). Outcome variables were HbA1c, severe hypoglycemia, hospitalization due to DKA. Severe hypoglycemia is defined as hypoglycemia with unconsciousness and/ or convulsions.
**Results:** No significant difference in HbA1c was found in any of the age groups or in the total group (pump 8.7% vs. pen 8.8%). No difference in number of severe hypoglycemia (pump 7.1% vs. pen 7.6%). No correlation was observed between HbA1c and frequency of severe hypoglycemia. Children on pump has significantly more DKA episodes (6.4% vs. 3.2%, $P < 0.001$). Stratified into age groups, number of DKA episodes were only significantly increased in pump users in the age group 5–9 years (9.3% vs. 1.8%, $P = 0.002$).
**Conclusion:** There is no nationwide unified agreement on the indication for starting pump treatment, but frequently those with inferior glycemic control are offered pump treatment. HbA1c was similar in the pump and the pen group. There was no increased risk of severe hypoglycemia in the pump group, but there was a higher risk of DKA in the age group 5–9 years.

## P/166/WED

### Forms of pediatric diabetes mellitus defined by anti-islet autoimmunity and beta-cell function at diagnosis

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**Objectives:** To test the hypothesis that anti-islet autoantibody (Ab) status and beta-cell function at diagnosis define clinically distinct forms of pediatric diabetes.
**Methods:** Cross-sectional analysis of 573 patients with newly diagnosed diabetes in our Division between 1/2008–8/2010. We excluded 12.5% with secondary diabetes (e.g. cystic fibrosis related, steroid induced) and 4.7% missing C-peptide and/or Ab. The final sample comprised 546 subjects. Ab positivity (AbPos) was defined as at least 1 positive out of GAD65, insulin or ICA512 Ab. Serum C-peptide was obtained at diagnosis with a median plasma glucose of 357 mg/dl (>180 mg/dl in 90%) and thus considered stimulated. Preserved beta-cell function was defined by serum C-peptide ≥0.6 ng/ml (HighCP). We used BMI at median 1.2 months post diagnosis.
**Results:**
**Conclusions:** In an ethnically diverse United States population with high prevalence of obesity, 33% of children with newly diagnosed diabetes had positive Ab and preserved beta-cell function (Form B). Compared to AbPos/LowCP children (Form A), Form B children were older, more likely female, had higher BMI, and had lower HbA1c, glucose and risk of DKA. Compared to AbNeg/HighCP (Form D), Form B children were younger, more likely White, had lower BMI and slightly lower HbA1c. Prospective studies are underway to understand pathogenic mechanisms that may underlie those differences.
Table 1 presents characteristics and selected comparisons (Forms B v A, B v D, and C v A).

| | AbPos/LowCP Form A | AbPos/HighCP Form B | AbNeg/LowCP Form C | AbNeg/LowCP Form D | P-value: All four | P-value: Forms B v A | P-value: Forms B v D | P-value: Forms C v A |
|---|---|---|---|---|---|---|---|---|
| N (%) | 283 (51.8) | 179 (32.8) | 13 (2.4) | 71(13) | n/a | n/a | n/a | n/a |
| C-peptide (ng/ml): Median (IQR) (ng/ml) | 0.3 (0.2) | 0.9 (0.7) | 0.3 (0.1) | 1.7 (2.1) | n/a | n/a | n/a | n/a |
| Age (yrs): Median (IQR) | 8.7 (6.1) | 11.4 (4.7) | 10 (10) | 13.8 (4.3) | <0.0001 | <0.0001 | <0.001 | NS |
| Sex: % Male | 54.4 | 41.9 | 92.3 | 40.9 | <0.0001 | <0.01 | NS | <0.01 |
| Race / ethnicity: % NHW, H, AA | 61, 17, 16 | 56, 24, 16 | 39, 46, 0 | 17, 39, 38 | <0.0001 | NS | <0.0001 | <0.02 |
| Obese or overweight: % | 29.0 | 52.4 | 50 | 69.7 | <0.0001 | <0.0001 | <0.02 | NS |
| DKA: % | 49.9 | 18.5 | 36.4 | 15.0 | <0.0001 | <0.0001 | NS | NS |
| HbA1c (%): Mean (SD) | 12.3 (2.1) | 11.0 (2.8) | 12.2 (2.3) | 11.8 (2.8) | <0.0001 | <0.0001 | <0.05 | NS |
| Glucose (mg/dl): Median (IQR) | 391.5 (264) | 330 (183) | 346 (257) | 310 (156) | <0.0001 | <0.001 | NS | NS |

*[Table 1. IQR=Interquartile range; NS=Non significa]*

## P/167/WED

### Serological screening for celiac disease in type-1 diabetes

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**Objectives:** Evaluate the prevalence of celiac disease (CD) and its trend, with IgA and IgG anti-transglutaminase (tTG) antibodies in patients with diabetes and their families.
**Patients:** Children and adolescents with Type 1 diabetes (T1D) diagnosed during the last 3 years and their first degree relatives (parents, siblings).
**Methods:** Determination of IgA tTG and total-IgA levels (in search of IgA deficiency) in all investigated subjects. In case of IgA deficiency, we measured IgG tTG. Jejunal Biopsy was performed in positive subjects, with histological study of biopsy fragments.
**Results:** (1) Altogether, determination of tTg (IgA ± IgG) and total IgA levels was effected in 977 subjects. 330 T1D subjects

(155 boys, 175 girls), and 647 of their first degree relatives (145 fathers, 221 mothers, 124 brothers, 157 sisters).
(2) The tTG levels were positive in 6.9% of T1D patients (23/330, 10 boys and 13 girls). The mean age at the study was 9.0 ± 3.9 years (2.9–14.9 years). The mean age at T1D was 7.5 ± 3.6 years (1.1–12.8 years).
The tTG levels were also positive in 2.2% of T1D first degree relatives (14/647) (3 fathers, 6 mothers, 2 brothers and 3 sisters).
(3) The clinical study showed signs suggestive of CD in at least 54.0% of the positive subjects (20/37). These disorders were mostly gastrointestinal, with or without asthenia, anemia, and abnormal tooth enamel.
(4) An IgA deficiency was found in 18 of 977 subjects (12 T1D subjects and 6 of their siblings). The deficit was complete in 9 subjects, 4 of which with positive IgG tTG levels (3 T1D and T1D brother).
(5) Jejunal biopsy was performed in 28 positive subjects (22 villous atrophy, mucosa apparently normal in 6 cases).
**Conclusions:** Our study confirmed the high prevalence of CD in patients with T1D. It has also shown the clinical and routine screening benefits among patients with T1D, even among their relatives.

## P/168/WED

### The influence of age, gender, insulin dose, BMI and blood pressure on metabolic control in young patients with type 1 diabetes

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**Objectives:** To explore the relationship between certain clinical variables and metabolic control in a large unselected population of young patients.
**Method:** Clinical data continuously registered from diagnosis on 7018 boys and 6014 girls in the Swedish pediatric diabetes quality registry, SWEDIABKIDS, from year 2000–2010 was obtained. In the logistic regression analysis one group with HbA1c <57 mmol/mol, and one group with HbA1c >78 mmol/mol were compared. A linear regression analysis was also performed.
**Results:** The children with mean HbA1c <57 mmol/mol (n = 2005) in year 2010 had at diagnosis mean HbA1c 89 mmol/mol. Children with mean HbA1c >78 mmol (n = 559) had at onset 97 mmol/mol. Children with mean HbA1c in between (n = 3258) had mean HbA1c 91 mmol/mol, P < 0.000. Longer diabetes duration and higher age was associated with higher HbA1c (OR = 1.16 and 1.21 respectively.) Female gender increases the HbA1c both at diagnosis and at follow up (OR = 1.2 and 1.32 respectively). The gender difference was also found for BMI SDS at follow up (OR = 1.65). Patients that reported high insulin dose had higher HbA1c (OR = 11.8) and lower BMI SDS (OR = 0.69). Age and diabetes duration did not influence BMI significantly. Linear regression showed that having a mother and/or a father with high BMI implied a higher HbA1c at diagnosis (<0.01), while it was the opposite pattern for the patient – a low BMI at diagnosis implied a high HbA1c (P < 0.000). Children in the highest BMI group (>75%) had a higher blood pressure than children in the lowest group (< 25%) (0.19 and 0.43 respectively, P < 0.000). Girls in the highest BMI-group had a longer duration (P < 0.000) and higher mean HbA1c (P < 0.000) compared to girls in the lowest group. This was not seen in boys.
**Conclusions:** The risk for later complications seems to be predictable already at time of diagnosis. There is a gender difference as this risk is most obvious in girls.

## P/169/WED

### What influences hospital admission in the young with type 1 diabetes (T1D)?

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**Objective:** To identify all young patients with T1D using electronic record linkage of multiple data sources from local and national data sets and evaluate the hospitalisation rate and associated risk factors for patients managed with or without admission at diagnosis.
**Design:** Retrospective cohort study. Eligible patients identified from a local patient management system – SCI-DC – and cross-referenced against a national register. A unique community health index number allowed the identification of any diabetes related hospital admissions by electronic record linkage. Comparisons between those with and without an admission at diagnosis were performed using multivariable logistic regression.
**Setting and participants:** Tayside, Scotland; diagnosed T1D, aged ≤25 years, currently resident in Tayside; n = 504, diagnosed from 1985–2010.Main outcome measures: Frequency and pattern of hospital admissions in those with T1D. The comparison of those patients managed with or without a hospital admission at diagnosis and the incidence of diabetic ketoacidosis (DKA) leading to hospital admission pre-and post diagnosis.
**Results:** An admission at diagnosis was not shown to be significant in predicting future hospitalisation in our cohort. Longer diabetes duration (OR = 1.249, 95%CI = 1.156–1.348, P = <0.001), social deprivation (OR = 0.763, 95%CI = 0.612–0.950, P = 0.016) and $HbA_{1c}$ value at diagnosis (OR = 1.013, 95%CI = 1.001–1.025, P = 0.030) were all statistically predictive of a post diagnosis admission.
**Conclusions:** Young people presenting with T1D in our practice are managed usually in an outpatient programme, and hospital admission at diagnosis reflects a severe clinical picture, nearly always DKA. Hospital admission following the diagnosis of T1D is a severe complication to be avoided. Our study demonstrates that admission at diagnosis does not predict re-admission but it is established patients from poorer background who are at risk and this should be considered in their clinical management.

## P/170/WED

### Partial remission in children and adolescents with type 1 diabetes mellitus

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**Objective:** To determine whether there are different rates of partial remission in children and adolescents with type 1 diabetes mellitus (T1DM) according to age, and to identify clinical and laboratory characteristics that are associated with increased rate of partial remission.
**Methods:** Medical charts of 71 consecutive patients with newly diagnosed T1DM and at least 6 month follow-up in our clinic were retrospectively studied. The duration of symptoms, diabetic ketoacidosis (DKA) at diagnosis, length of hospitalization, initial HbA1c, glucose, insulin and C-peptide levels, autoantibody frequency, and daily insulin requirement at discharge were recorded. During 6 month follow-up period,

insulin requirements and HbA1c levels at each visit were noted. Partial remission was defined as <0.5 units per kilogram per 24 hours with HbA1c <8%. The patients were analyzed according to age-group (group 1, aged ≤5, group 2, aged 6–11, and group 3, aged ≥12).
**Results:** Median age of patients at diagnosis was 8.9 years (range 0.8 to 15.6 years; 37 males and 34 females). Thirty-one patients (43.7%) entered partial remission in 6 months after diagnosis, and there were no differences in rates of partial remission between groups (group 1, 47.1%, group 2, 42.4% and group 3, 42.9%). High basal insulin levels and low daily insulin requirements at discharge were associated with more likelihood of having partial remission ($P < 0.05$ and $P < 0.01$, respectively). We did not find any associations between rate of partial remission and other clinical and laboratory characteristics.
**Conclusions:** In this study, duration of symptoms, DKA at diagnosis, length of hospitalization, initial glucose, HbA1c, basal C-peptide levels, autoantibody frequency and age of patients weren't predict having partial remission. Low daily insulin requirements at discharge should be warning for partial remission after discharge, and hypoglycemia risk associated with high dose insulin treatment.

## P/171/WED
## Study of diabetic children

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**Introduction:** Diabetes mellitus is the most common endocrine metabolic disorder of childhood. It is widely spread all over Egypt as its prevalence was found to be 1.09 per 1000 among school aged children. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The urban population in developing countries is projected to double between 2000 and 2030. For Egypt, the total projected number of people with diabetes is about 6.7 million.
**Objective:** The aim of this study was to assess the causes and the clinical condition of all diabetic children that were admitted to the inpatient ward of National Institute of Diabetes & Endocrinology.
**Subjects and method:** All admission files of the inpatient pediatric ward from July, 2010 until May, 2011were studied retrospectively.
**Results:** 839 diabetic children were admitted to pediatric ward during the period from July, 2010 till May, 2011 were studied. There was 431 females and 408 males. Their age ranges between 2–15 years, with mean = 10 ± 3.95 years. The cause of admission in 529 diabetic children was diabetic ketoacidosis, 22 with hypoglycemia and 298 with uncontrolled diabetes. There was 214 diabetic children with recently diagnosed diabetes, out of them there was 206 type 1 diabetes while only 8 patients with non-type 1 diabetes. The mean admission days were 4.5 ± 5.6 days. 442 patients were referred from ICU after cure from the acidosis, while the others were admitted directly to the inpatient ward.
**Conclusion and recommendations:** It could be concluded that most of admissions of diabetic children in NIDE was due to uncontrolled diabetes as a result of negligence of doing regular follow up in the outpatient pediatric clinics. It could be recommended to do regular home blood glucose monitoring at home to avoid repeated admissions in inpatient wards that costs a lot of money in addition to the acute and chronic complications of uncontrolled diabetes.

## P/172/WED
## Serum insulin-like growth factor (IGF)-I and IGF-binding proteins (IGFBP)-3 levels are possible markers for glycemic control in children with diabetes

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**Purpose:** Numerous studies suggest that growth factors may relate to the diabetes and its complications. The aim of this study was to investigate the hypothesis that serum IGF-1 and IGFBP-3 levels may correlate with levels of glycohemoglobin, clinical and other laboratory parameters in children with diabetes.
**Method:** From 1 August 2009 to 31 July 2010, we identified 90 diabetic children (type 1, 70 patients; type 2, 20 patients), who were newly diagnosed and treated more than 1 year. Information on clinical manifestations and laboratory data were obtained by reviewing medical records. First, we compared serum IGF-1 and IGFBP-3 in diabetic children with age-matched healthy 152 children. Then, we examined the correlation between serum IGF-1 or IGFBP-3 levels and clinical and laboratory data including HbA1c in children with diabetes.
**Results:** Patient group showed a higher BMI (19.9 ± 4.4 kg/m$^2$) and higher IGFBP-3 level (4826.9 ± 1330.1 ng/ml) compared to control group(n = 152, 18.6 ± 3.4 kg/ m$^2$ , 2646.5 ± 652.0 ng/ml respectively, $P < 0.01$). However, serum IGF-1 levels in diabetes did not show any significant differences compared with those of control group. Patients with type 1 diabetes have significantly lower serum IGF-I levels (225.9 ± 116.1 ng/ml) and higher serum IGFBP-3 levels (4578.6 ± 1311.9 ng/ml) compare to those of controls (293.3 ± 171.9 ng/ml, 2646.5 ± 652.0 ng/ml respectively; $P < 0.01$). In contrast, serum IGF-I levels in type 2 diabetes were significantly higher (448.4 ± 107.4 vs. 386.8 ng/ml, $P < 0.05$) compared with controls. The levels of HbA1c were positively correlated with serum IGFBP-3 in type 1 diabetes, and negatively correlated with serum IGF-I in type 2 diabetes.
**Conclusion:** The serum IGF-I and IGFBP levels were changed in diabetic children, and the levels of serum IGF-I and IGFBP-3 were correlated with the serum HbA1c levels in diabetes.

## P/173/WED
## Childhood diabetes in nordic countries: comparison of treatment quality

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**Objective:** To describe and compare the childhood diabetes registers in four Nordic countries, Denmark (DK), Norway (N), Sweden (S) and Iceland (I).
**Methods:** With comparison of HbA1C during year 2009 as an example, data from the four paediatric diabetes quality registers in 2009 was analyzed. All four registries have a standardized registration at the onset of diabetes and annual registration, conducted at the local paediatric departments on either paper form (N), on the web-site of the registry (S, I) or centrally measured and registered once a year (DK). HbA1c

standardisation was performed in all countries. Each patients first registered HbA1c value for 2009 (N, S) or the value closest to the birthday this year (DK, I) was used, IFCC values.

**Results:** The highest incidence was found in Sweden and the lowest in Iceland (Table 1). The completeness of data regarding HbA1c was 80–100%. HbA1c varied between the countries ($P < 0.001$) as well as the proportion of children with HbA1c <57 mmol/mol.

**Conclusion:** In this large unselected population a high proportion of children do not reach treatment target. International collaboration is needed for comparison of quality indicators of diabetes care. It facilitates identification of problems and learning from each other. A prerequisite is availability of registers. Data need to be harmonised with great care in order to be comparable.

Table 1. Type 1 diabetes in children <15 years of age in four Nordic countries. Data from 2009.

| | DK | N | S | I | P |
|---|---|---|---|---|---|
| Diabetes incidence, cases/100 000 | 26 | 36 | 43 | 18 | |
| New onset patients, n | 283 | 325 | 688 | 14 | |
| Mean age (onset), year | 9.0 | 8.9 | 8.5 | 7.8 | 0.207 |
| Gender (onset), female% | 45 | 45 | 44 | 40 | 0.901 |
| Patients with DKA (onset) ph <7.3% | 20 | 22 | 18 | 36 | |
| Mean age (annual registration), year | 11.3 | 10.9 | 10.7 | 11.8 | P<0.001 |
| Gender (annual registration), female% | 49 | 49 | 48 | 56 | 0.11 |
| Mean HbA1c mmol/mol | 64 | 69 | 63 | 69 | <0.001 |
| Patients with HbA1c <57 mmol/mol,% | 27 | 16 | 31 | 15 | <0.001 |

[Table 1. Type 1 diabetes, children<15 years of age]

## P/174/WED

### Reasons for staying as a participant in the environmental determinants of diabetes in the young (TEDDY) longitudinal study

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The TEDDY study is a multicenter longitudinal observational clinical study investigating environmental triggers for type 1 diabetes (T1D) in children with increased HLA risk for T1D. Children in Finland, Germany, Sweden and the US are followed from 3 months up to 15 years of age for development of islet autoantibodies and T1D. TEDDY has a demanding study protocol including frequent study visits with blood draws, collection of detailed data and specimens. Important challenges are retention and collection of quality data over many years.

With the aim to investigate opinions on participation in TEDDY a questionnaire was given to parents been in the study for at least one year. Thoughts of leaving the study were also explored.

Of 3336 families eligible to fill out the questionnaire 2000 were obtained (59%). Rate of completed questionnaires differed between countries ($P < 0.0001$). Mothers filled out 78%, fathers 14% and parents together 8%.

Very important reason for participation: someone is watching my child for diabetes (75%), help science (68%), obtain autoantibody results (63%).

Works great/no problem most satisfied: work with TEDDY staff (98%), get questions answered (95%), waiting time before visit (94%); least satisfied: reminders for visit (76%), transportation to visit (75%), parking at clinic (54%).

Have had thoughts of leaving: 24% (country differences 15–43%).

Reasons for leaving (most mentioned): blood draws (8%), too busy/not enough time (4%), too demanding protocol (4%), food diaries too troublesome (3%).

Despite a demanding protocol the study shows that parents are very content with their participation and experience great importance of having their high risk child checked for diabetes development and of contributing to research. They endure the many study visits and all challenges of collecting different data and specimens in a positive way. An important contribution is a supportive study staff that creates a gratifying study environment for the family.

## P/175/WED

### Increasing incidence of type 1 diabetes in children and adolescents: are there gender differences at clinical manifestation?

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**Objectives:** The incidence of type 1 diabetes in children and adolescents is increasing all over the world. The purpose of this retrospective study was to analyze if there are differences in the incidence rate in regard to sex and to define gender differences at the time of clinical manifestation.

**Methods:** Records of all children and adolescents (n = 226) treated due to clinical manifestation of type 1 diabetes at the Department of Paediatrics, Graz, Austria between 1999 and 2009 were analyzed. Age, HbA1c, presence of diabetes specific antibodies (GAD, IA2, ICA) and of diabetic ketoacidosis (DKA), height-SDS, weight-SDS, and BMI-SDS at diabetes onset were compared by means of Student's *t*-test and Fisher's exact test.

**Results:** Out of 226 patients, 115 were female and 111 were male. Incidence increased from 12.0/100.000 in 1999 to 19.2/100.000 in 2009, without any sex difference. Median age was 8.97 years ± 4.15 f, vs. 8.41 ± 5.01 m (n.s.). DKA was present in 37 f, and in 38 m (n.s.). Antibodies were available in 107 females and 79 of them had one or more positive antibodies and in 102 males and 65 of them had one or more positive antibodies (n.s.). HbA1c values were 11.55% ± 2.5 f vs.11.51 ± 2.54 m (n.s.). Height-SDS was 0.6576 f vs. 0.5037 m ($p = 0.154$, n.s.) Weight-SDS was -0.004 ± 1.40 f vs. 0.073 ± 1.524 m (n.s.). BMI-SDS was 0.947 ± 1.333 f vs. -0.862 ± 1.383 (n.s.).

**Conclusions:** Our data show a remarkable increase in the incidence of type 1 diabetes without any sex difference. Furthermore, there were no gender differences neither regarding anthropometric nor metabolic parameters at the time of the clinical manifestation.

## P/176/WED

### Incidence trends and prevalence for childhood type-1 DM in the area of Bologna, Imola and Ferrara (Northern Italy)

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**Objectives:** In the last few decades the incidence of type-1 diabetes in Italy has increased by 2.94% yearly (RIDI study). However data are partial and non-homogeneous. We estimated type-1 DM 0-14 years incidence for the period 2005–2010 and the prevalence for the age 0-17 years in the area of Bologna, Imola and Ferrara (Northern Italy).
**Methods:** We identified incident cases by a diabetes registry of the 3 Pediatric Departments of the areas and confirmed the information by hospital discharge records and insulin prescriptions. The latter were also used to estimate the prevalence in the 0–17 years population. Standardized incidence rates and 95% CI were calculated assuming a Poisson distribution. 100% of ascertained cases were confirmed. Overall population of the area was 1.351.992p.
**Results:** There were 154 incident cases during the study period, 23 cases were immigrants (15%). Incidence per 100.000 person-years increased from 14.1 (95% CI: 8.1–20.1) in 2005 to 16.8 (95% CI: 10.6–23.0) in 2010 with an annual increase of 4% year. There were no significant differences between males and females during the 6 years studied. The highest incidence was in the 10–14 years age group, but the highest increase was in the 5–9 years age group (+39%). Prevalence was significantly ($P < 0.0001$) higher in the Ferrara area (175 cases/100.000; $P < 0.001$), than in the Bologna area (114/100.000). Prevalence was higher in the teenagers (15–17 years: 320 cases/100.0000).
**Conclusions:** Also in this area of Northern Italy the incidence of type-1 DM has increased over time, with the highest increment rate in the ages 5–9 years. Present incidence rate in our area is similar to that of mid-European countries. Approximately 1/300 of our adolescents are affected by type-1 DM.

## P/177/WED

### Adenovirus infections and islet autoimmunity

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**Objective:** To test whether the frequency of Adenovirus DNA (subtypes A to C) in fecal samples collected monthly from early infancy was associated with development of multiple islet autoantibodies in children with the highest risk HLA genotype.
**Methods:** Individuals carrying the HLA-DRB1*0401-DQA1*03-DQB1*0302/DRB1*03-DQA1*05-DQB1*02 genotype were identified at birth and followed with monthly stool samples from age 3 to 35 months. Blood samples taken at age 3, 6, 9, 12 months, and then annually, were tested for autoantibodies to insulin, glutamic acid decarboxylase 65 and IA-2. Among 911 children, 27 developed positivity for ≥2 islet autoantibodies in ≥2 consecutive samples (cases). Two controls per case were matched by follow-up time, date of birth and county of residence. Stool samples were analyzed for Adenovirus with a semiquantitative real-time reverse transcriptase PCR.
**Results:** In total, 412 of 2034 (20.3%) samples were positive. The frequency of Adenovirus DNA in stool samples from cases prior to seroconversion (41/335, 12.2%) did not significantly differ from the frequency in controls (103/664, 15.5%). Looking at several time windows before seroconversion (3, 6, 9 and 12 months), first year of life or looking at infection episodes instead of positive samples did not appreciably change the results. The estimated relative risk for islet autoimmunity per Adenovirus DNA positive sample during follow-up (nested case-control analysis) was 0.76, 95% CI: 0.36–1.59.
**Conclusions:** To conclude, Adenoviruses are common in childhood, but not associated with development of islet autoimmunity.

## P/178/WED

### Exposure to maternal diabetes in utero and the rate of beta cell decline in youth with diabetes

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**Objective:** To assess the influence of exposure to maternal diabetes *in utero* on rate of decline in beta cell function among youth with newly-diagnosed type 1 and type 2 diabetes.
**Methods:** Participants were from the SEARCH for Diabetes in Youth study and were followed, post-diagnosis, for an average of 59 months for type 1 and 57 months for type 2 (with a mean duration of illness of 9.4 months for type 1 and 11.1 months for type 2). Exposure to diabetes *in utero* was assessed by interview and fasting C-peptide (FCP) was measured in samples drawn at research visits. Repeated measures general linear models were used to estimate the relationship between rate of change in log FCP (outcome) and exposure to diabetes *in utero*, in separate type-specific models adjusting for onset age, sex, race/ethnicity, highest parental education and household income.
**Results:** Exposure to maternal diabetes *in utero* was associated with younger age at diagnosis among youth with type 2 ($P < 0.0001$) but not type 1 diabetes ($P = 0.12$). There were no significant differences in baseline FCP levels by *in utero* exposure status for either diabetes type. When comparing youth exposed to diabetes *in utero* to unexposed youth, FCP levels were 17% lower among youth with type 2 diabetes (95% CI:-37% to +l9%) and 15% higher for youth with type 1 diabetes (95% CI:-16% to +57%) although these differences were not statistically significant ($P = 0.1820$ and $P = 0.3621$, respectively). Exposure to maternal diabetes was not associated with rate of

beta cell decline in youth with type 2 (P = 0.13) or type 1 diabetes (P = 0.73); nor was the effect of *in utero* exposure on beta cell function modified by diabetes type.
**Conclusions:** Our findings suggest that exposure to maternal diabetes *in utero* is not a major contributor to the decline in beta cell function in youth with newly-diagnosed type 1 or type 2 diabetes.

## P/179/WED

### Family history of type 1 and type 2 diabetes in the Swedish childhood diabetic population

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**Objective:** There is a marked increase in childhood diabetes worldwide. With the accelerator hypothesis in mind claiming that type 1 diabetes (T1DM) and type 2 diabetes (T2DM) have a common pathway with insulin resistance, the aim of this study was to asses family history of both T1DM and T2DM and the association with age of onset, body mass index, autoantibodies, and human leukocyte antigen (HLA) genotypes in children with newly diagnosed diabetes in Sweden.
**Method:** The Better Diabetes Diagnosis (BDD) study is a national prospective population based study. All children below 18 years with newly diagnosed diabetes are invited and we included 2657 children, clinically diagnosed as T1DM.
Antibodies for: IA2A, GADA, IAA, ZNT8RA, ZnT8WA and ZnT8QA were analyzed. High risk T1DM genotype markers along with lower risk genotypes markers were determined. BMI was calculated when the patients were stabilized. Family history of diabetes in three generations was obtained from the BDD questionnaire.
**Results:** Logistic regression analysis was performed. Patients with age of onset 12-14.9 years were least likely to have a family history of type 1 diabetes, OR = 0.68 (CI 0.49–0.96) P = 0.03, while children between 0–2.9 years were most likely to have a family history of T2DM OR = 1.48 (CI 1.00–2.16), P = 0.04.
Antibodies to IAA is less frequent in the youngest patients (0–2.9 years) with heredity to T2DM OR = 0.82 (CI 0.68–0.99), P = 0.04.
No significant differences in family were observed between HLA genotype groups.
Overweight or obese children were more likely to have a family history of T2DM, OR = 1.79 (CI 1.08–2.96) P = 0.02 and OR = 4.29 (CI 1.38–15.97) P = 0.01 respectively.
**Conclusions:** We found differences in age at onset as well as BMI depending on family history of T1 and T2DM in this study of children with T1DM. This suggests that development of diabetes in childhood, may not only be influenced by predisposition to autoimmunity but also factors important for insulin resistance.

## P/180/WED

### Present incidence of type 1 diabetes (T1DM) in Poland in children vs. primary prediction for 2009 – do they fit?

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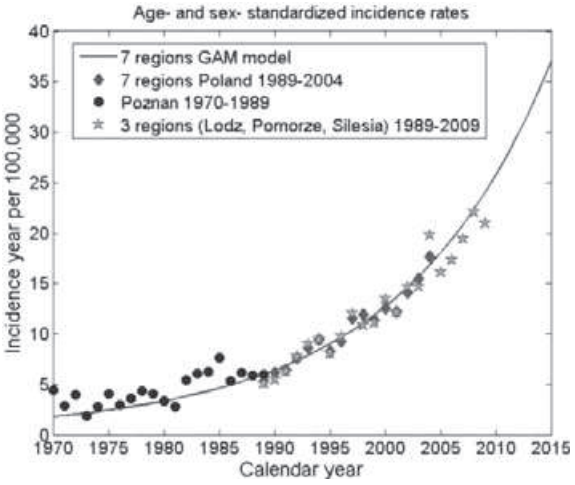
Rapid T1DM incidence increase (1989–2004) in Polish children resulted in an estimation for 2005–2025 (Diabetologia 2011).
**Objectives:** To assess if present changes in T1DM incidence in Polish children fit the primary predictive model for 2005–2009.
**Methods:** Newly diagnosed T1DM patients aged <15 years are ascertained prospectively (EURODIAB criteria) in 7 regional Polish registers (~35% of Polands population). 1989–2004 incidence data was used to construct a prediction (GAM – general additive model), which was validated using Wielkopolska (Poznan) region data (1970–1989). Updated age-, sex- standardized data (2005–2009) represents ~25% of Poland's population (regions: Lodz, Pomorze, Silesia).
**Results:** Age- and sex- standardized IR increased significantly in the last five years (2005–2009): from 16.1/100,000 to 21.0; P = 0.02. This is consistent with GAM predicted dynamics (1.19/year/100,000) and higher than in previous 5 years (2000–2004) – figure. The most significant raise, consistent with GAM prediction, is observed among children aged 10–14 (16.0/100,000 to 23.4; annual increase 2.07/year/100,000; P = 0.02). IR increase in children aged 0–4 and 5–9 is not significant (respectively: 11.8 to 14.3; P = 0.24 and 20.1 to 24.4/100,000; P = 0.08), which disagrees with GAM prediction.
[Fig.]




**Conclusion:** Temporal T1DM incidence in Polish children fits the primary prediction. The intuitively expected indicators of incidence saturation have not been observed yet.
Supported by MNiSW grant NN519579938.

## P/181/WED

### Type 1 diabetes is associated with enterovirus infection in gut mucosa

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**Objectives:** Enterovirus infections have been linked to type 1 diabetes in a number of epidemiological studies. These viruses have tropism to pancreatic islets and can cause beta cell damage in experimental models. Viral persistence has been suspected to be an important factor in enterovirus-induced autoimmunity. The primary replication site of enteroviruses is the gut mucosa. However, the possible presence of enteroviruses in human intestine has not been studied in detail. The present study evaluates the hypothesis that gut mucosa is a reservoir for

enterovirus persistence in type 1 diabetic patients, maintaining continuous inflammatory state which can spread to the pancreas and play a crucial role in enterovirus-induced diabetes.
**Methods:** Small bowel mucosal biopsy samples from 39 type 1 diabetic patients and 41 disease controls as well as 40 patients with celiac disease were analyzed for the presence of enterovirus using *in situ* hybridization, RT-PCR and immunohistochemistry. The presence of virus was compared to inflammatory markers such as infiltrating T-lymphocytes, HLA-DR expression and transglutaminase 2-targetted IgA deposits.
**Results:** Enterovirus RNA was found in the gut mucosa of type 1 diabetic patients more frequently (74%) than in control subjects (29%) ($P < 0.001$) and was associated with a clear inflammation response in the gut mucosa. Viral RNA was often detected in the absence of viral protein, suggesting defective replication of the virus. Patients remained virus positive in follow-up samples taken after 12 months' observation.
**Conclusions:** The results suggest that a large proportion of type 1 diabetic patients have prolonged/persistent enterovirus infection in the small intestinal mucosa. This infection is associated with an inflammation process in gut mucosa. The results support the role of enteroviruses in the pathogenesis of type 1 diabetes.

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### Antecedent maternal infection protects genetically susceptible offspring from virus-induced type 1 diabetes

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**Background:** Enterovirus infections, in particular those with Coxsackievirus B serotypes (CVBs), have been strongly associated with Type 1 Diabetes (T1D). However, epidemiological studies have also shown that the incidence of T1D is often inversely correlated with the prevalence of enterovirus infections. These counterintuitive observations could be explained by an extension of the so-called poliovirus hypothesis, stating that low herd immunity to a pathogen leads to more severe disease in infected individuals, while the presence of neutralizing antibodies protect from aggressive infections.
**Objective:** To determine if previously infected females protect offspring from virus-induced T1D, as this would support the extended poliovirus hypothesis to explain the high incidence of T1D in countries where enterovirus infections are less common.
**Methods:** SOCS-1-transgenic (SOCS-1-tg) NOD mice, but not NOD mice, develop T1D rapidly after infection with CVBs. Female NOD mice, naïve or infected three times with a low dose CVB3, were bred with SOCS-1-tg NOD male mice and SOCS-1-tg offspring were infected with a diabetogenic dose of CVB3. T1D incidence, presence of neutralizing antibodies, viremia and pancreatic damage was compared between offspring from infected and naïve females.
**Results:** SOCS-1-tg offspring from infected females were protected from CVB3-induced T1D. Offspring from infected females were positive for neutralizing virus-antibodies in serum, had lower levels of viremia and their pancreases were protected from damage.
**Conclusions:** Offspring from previously infected females are protected from disseminated viral replication and virus-induced T1D. This indicates that maternally transferred antibodies are important in protecting neonates from enterovirus infections and genetically susceptible offspring from virus-induced T1D. Our data support proof-of-concept for the extended poliovirus hypothesis to explain the inverse correlation between enterovirus infections and T1D.

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### The use of information and communication technology to design the Childhood-Onset Diabetes eRegistry in Kuwait

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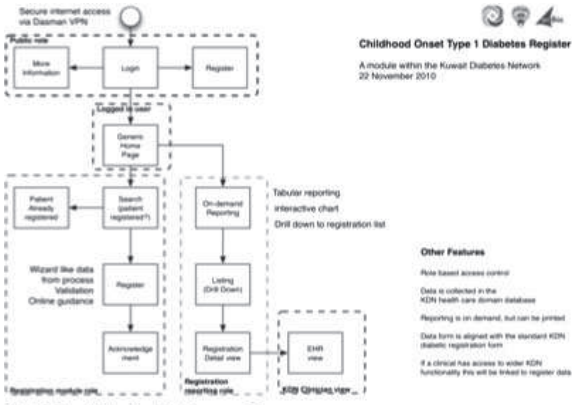
**Objectives:** An information and communication technology (ICT) system was designed to register newly diagnosed children and adolescents in Kuwait as part of the 'Kuwait Scotland eHealth Innovation Network ( KSeHIN) project.. The Childhood – Onset Diabetes eRegistry (CODeR) enables the epidemiology of diabetes and its complications to be robustly monitored and functions as a tool for research.
**Aims:** To design an electronic register to record children and adolescents (0–19 years) newly diagnosed with diabetes in Kuwait using a novel interface between different tiers in Kuwait.
**Method:** CODeR provides a robust web-based clinical informatics platform which serves for recording diabetes incidence data. The register includes a number of dataset record definitions about diabetes. The Dasman Diabetes Institute is providing an intelligent ICT infrastructure and acts as a repository for CODeR, training facilities and technical assistance. Via using Apple iPad devices, clinicians are able to use the web-based platform to enter data, The data is tagged with a unique civil identifier which guarantees integrity and improves tracking information.
**Results:** Preliminary results demonstrated the effectiveness of the software program as an innovative and valuable tool in registering data and being accessible from different areas in the country obviating paper held registers.



*[Module within the KHN network]*

**Conclusion:** The electronic software will prove to be an invaluable innovation in the area of Pediatric Diabetes Epidemiology.

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## Incidence and trends of childhood (ages 0–14) Type 1 diabetes in Lombardy, Italy from 2002 to 2007

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**Aims:** To examine the incidence and trends of Type 1 diabetes mellitus (T1D) in Lombardy from 2002 to 2007 in children (ages 0–14 years).
**Materials and methods:** The incidence of T1D (per 100,000/year) was evaluated in children in Lombardy from 2002 to 2007. Two independent sources were used. The primary source consisted of prescription data collected from Regional Institutions and elaborated by Mario Negri Institute for Pharmacological Research. The secondary source consisted of new cases of T1D diagnosis according to ADA criteria from three Lombard hospitals (San Raffaele of Milano, AO Spedali Riuniti of Brescia, Ospedale del Ponte of Varese). Hospital registries were prospective and/or retrospective. The data sources contained information on sex, gender, age at diagnosis and date of birth. The two dataset were compared and found almost identical (case ascertainment >95%). Incidence rates and 95% CI were calculated assuming the Poisson distribution. Trend of type 1 diabetes incidence was analyzed using the Poisson regression model.
**Results:** A total of 1136 new cases of T1D were diagnosed in a children population (mean population 0–14 years in the study period: 1,251,000). Raw incidence rate was 14,48/100.000 in 2002, 16,70/100.000 in 2003, 14,62/100.000 in 2004, 15,40/100.000 in 2005, 12,99/100.000 in 2006, 16,55/100.000 in 2007. Age- and sex- adjusted incidence did not change significantly during the observed years, although the 0–4 class showed a significant decrease relative to 10–14 class (OR = 0.91 95% CI = 0.83–0.99).
**Conclusion:** T1D mean incidence rate in Lombardy (2002–2007) has increased by approximately two-fold compared to the EURODIAB study (1989–1994, mean incidence 7.0). However, there was no significant increase from year 2002 to 2007. Furthermore, a significant decrease in the incidence rate was found in the 0–4 age range. Further studies are needed to clarify the factors contributing to region-specific trends in T1DM incidence rate.

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## Familial spread of enteroviruses (EV) in pediatric cases of type 1 diabetes at clinical onset

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**Objectives:** Familial spread of EV and geographic clustering of infections are well known. In relation to the early stages of T1D, we tested whether EV were present in blood of newly-diagnosed diabetic children and their first-degree relatives along with whether geographic and temporal clusters of cases existed.
**Methods:** On the day of diagnosis, Pediatric Endocrinology Centers collected blood samples from 16 T1D children (median age 8.0 year; 3–16 years) and their first-degree relatives (n = 41). EV-susceptible cell lines were co-cultured with PBLs of test subjects. For detecting EV, highly sensitive RT-PCR assays were run both on plasma and tissue culture medium from cells co-cultured with PBL. HLA types and diabetes related auto-Abs were determined for all subjects. T1D cases were diagnosed and treated according to standard protocols. Families were followed for 2 years. Geographic and temporal clusters of T1D cases (i.e., developing within 10 months of diagnosis, within a 20 km radius) were identified.
**Results:** EV infectivity and genome were found in blood of 15/16 (94%) diabetic children, 11/15 (73%) non-diabetic siblings, 15/26 (58%) parents. Virus-positive members of each family shared the same EV species. EV of the B and C species were responsible for the majority of infections (88%). Three geographic and temporal clusters of T1D (each of 2–4 families) were detected. During follow-up, 4 brothers/sisters of diabetic probands developed T1D (latency 3–14 mos.). These children were EV-positive at the time of their proband's diagnosis and carried high risk HLA haplotypes. Non-diabetic children and all parents were negative for diabetes auto-Abs.
**Conclusions:** EV of the B and C species were present in children with newly diagnosed T1D and in their family members. In the latter, infection seemed to cause no clinical symptoms. Association of EV infections with T1D onset, as well as geographic clustering, strongly suggest that viruses may act as triggering agents.

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## Clinical and laboratory differences between children younger than six years and the other age groups with type 1 diabetes at the first admission

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**Objective:** In recent years, the incidence of type 1 diabetes (T1DM) is increasing particularly for children younger than 6 years old. The purpose of our study is to reveal the differences of clinical and laboratory findings on admission between children younger than 6 years and older ages of children with T1DM.
**Methods:** In endocrinology department, type 1 diabetic children file's in the last 10 years were evaluated retrospectively (49 of them were ≤6 years and 50 of them were >6 years). Age, gender, clinical and laboratory data were evaluated.
**Results:** Mean age of the younger group was 3.7 ± 1.5 years while the mean age for the older children was 10.4 ± 2.7 years. In the younger age group, mean duration of symptoms was shorter (15.2 ± 1.9 and 27.7 ± 5.1 days, respectively) and transition to the subcutaneous insulin treatment from the insulin infusion was significantly longer (17.1 ± 1.3 and 13.6 ± 1.2 hours, respectively) than in the older patients. Weight loss was found to be more in the older children among the presenting symptoms. HbA1c was significantly lower in the younger group of children (9.6 ± 2.0%) than in the older children (11.8 ± 2.6%). Between the groups, gender distribution, serum glucose, ketones, pH, insulin and C-peptide levels were not significantly different. Among the diabetes-related autoantibodies, at least one antibody positivity was significantly higher in younger age group.
**Conclusion:** As a result, patients with type 1 diabetes in the young age group, the clinical process progressed more rapidly and intravenous fluid and insulin therapy was needed more longer time.

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### Diabetes and ethnicity in Nordic countries

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**Background:** Several cross-sectional studies have documented significantly poorer metabolic outcome in diabetic children from other ethnic background than the original population. We set out to discover the degree of disparity between Nordic children and children of non-Nordic origin in two Nordic populations with equal access to health care and analyze factors possibly responsible for these differences.
**Methods:** A multicenter collaborative study reviewing patient data in well established national childhood diabetes registries in Denmark and Norway. The registries have comparable information making it possible to conduct a joint analysis.
**Results:** A total of 5595 recordings (3032 patients from Norway & 2563 patients from Denmark) during the period 2006–2009 were included in this analysis. The percentage of non-Nordic patients was 3% and 5.1% in Norway and Denmark, respectively. Results from a multiple regression analysis demonstrate significantly poorer metabolic outcome in the non-Nordic patients. HbA1c (NGSP) was higher in the non-Nordic patients in both countries; in Denmark 0.34% ($P < 0.001$) and Norway 0.48% ($P < 0.001$). Poorer metabolic outcome could not be explained by different prevalence of insulin pump users amongst non-Nordic and Nordic patients; Norway (60% and 52%, respectively), Denmark (13% and 37%, respectively). Furthermore, our data demonstrates significantly higher insulin bolus doses in children of Nordic origin in both Denmark and Norway.
**Conclusion:** Poorer metabolic outcome in non-Nordic children cannot be explained by less intensive treatment. Our results shed light on the need for a better understanding and a more tailored management approach towards diabetic children of non-Nordic origin.

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### Dietary patterns, nutritional status and a prevalence of impaired fasting glucose in Indian children

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**Aim:** The pace for teens and children is fast and getting faster. Added to the pressures from school and increasing competitiveness to prepare for college and the sedentary life style has changed the nutritional demand and eating patterns of children. Owing to that, it was planned to study the dietary patterns and nutritional status of urban school children using anthropometric parameters like BMI for age and bio-chemical parameters of Fasting blood glucose, serum cholesterol.
**Methodology:** A sample of 156 school aged urban middle and upper class physically and mentally healthy children were selected from the schools of Bhopal city of India. A comprehensive dietary schedule was used by the investigator consisting of, Physical Profile, Biochemical Profile, and Dietary Profile.
**Results:** The total calorie intake of the sample was found to be below or near the normal, however, calories from fat and simple carbohydrates intake were relatively high. Incidence of impaired fasting glucose (above100mg/100ml) was found in 3.3% children. Serum cholesterol levels above acceptable limits (above 200mg/100ml) were also found in half of the sample putting them at high risk of developing hypercholesterolemia in later life. Children who were on high junk food diet with a high impact of visual media like TV advertisements and show higher levels of serum cholesterol and were overweight/ obese along with higher incidence of impaired fasting glucose level.
**Conclusion:** Sedentary life style with high junk food intake is responsible for obesity, impaired fasting glucose and high cholesterol level in Indian urban children.
**Keywords:** Dietary Patterns, junk food, Impaired fasting glucose, Indian urban children

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### Being born in Sweden increases the risk for type 1 diabetes - a study of migration of children to Sweden as a natural experiment

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**Aim:** To investigate whether the age of first exposure to a high-incidence country like Sweden determines the risk of T1DM in children with an origin in a low incidence region of the world.
**Methods:** Register study in a Swedish study population in the age 6–25 years in three categories of residents with an origin in low incidence regions of T1DM (Eastern Europe, East Asia, South Asia and Latin America); 24,252 international adoptees; 47,986 immigrants and 40,971 Swedish-born with two foreign-born parents and a comparison group of 1,770,092 children with Swedish-born parents. Retrieval of a prescription of insulin during 2006 was used as an indicator of T1DM and analysed with logistic regression.
**Main results:** The odds ratios (OR) for T1DM were lower than the Swedish majority population for residents with an origin in the four low incidence regions. Being Swedish-born implied a higher risk for T1DM in the four low incidence study groups compared with the internationally adopted with an OR of 1.68 (CI 1.03–2.73).
**Conclusions:** Being born in Sweden increases the risk for T1DM in children with an origin in low incidence countries. This may imply that exposures in utero or very early infancy are important risk factors for T1DM.