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WILEY ISPAD

FACULTY ABSTRACTS

Plenary Session I - Reaching the Unreached

INV1
Access to other aspects of care

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Based on the ISPAD Declaration of Kos and the many years of ISPAD Guidelines, many parts of the world continue to have problems with access to specialty care. Not just physician diabetes specialty care but nurse educators, dieticians, social workers, psychologists, psychiatrists as well as exercise specialists all have a place in multidisciplinary care. If this is not available, then the physician responsible for providing care must fill this role since all such aspects of care must be taught and empowered to motivate change and fit into the day to day decisions of optimizing glucose control without excessive or severe hypoglycemia. Financial challenges and not just psychological challenges to monitoring also must be addressed and strategies created to bring value so that information can be provided for assisting day-to-day decisions. Individual and group teaching opportunities can also be encouraged and created to address all of these concerns with assistance from CDIC, LFAC and ISPAD.

Diabetes 101 - Monitoring and Follow up

INV2
Growth and puberty

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Type 1 Diabetes is a condition that frequently affects children and adolescents. Like any chronic condition T1DM can have a negative impact on growth and pubertal development. The negative impact on linear growth is related to disease duration and poor metabolic control. Several studies describe delayed onset of puberty in both genders, delay in menarche, irregularities in menstrual cycle and secondary amenorrhea. In T1DM children the timing and duration of pubertal growth spurt has remained the same but blunted growth spurt has been seen that affects the final adult height. The impaired growth is related to the poor glycemic control and adopted insulin regimes. In the early years of insulin therapy severe growth retardation with pubertal delay like in Mauriac syndrome had been reported. With intense insulin therapy from the time of diagnosis, there is a positive impact on growth, puberty and achieving final adult height. It is still not clear whether a subtle growth failure still persists despite optimization of therapy.

One of the main goals of treating children and adolescents with diabetes is to maintain normal growth in both height and weight and normal timing of onset and tempo of puberty. This can be achieved by longitudinal evaluation and plotting on appropriate growth charts. This will allow early recognition from normal and allow evaluation and intensifying of insulin therapy.

Recommendations:

- Height, weight and BMI to be plotted on appropriate growth charts at every clinic visit.
- Regular monitoring for progression of secondary sexual characteristics to be done from 10yrs of age
- Blood monitoring yearly
- Early testing for other causes that can affect growth (hypothyroidism, celiac disease)
- Aiming for good metabolic control

Symposium I - Nutrition

INV3
Managing special occasions and fasts

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Once a child reaches puberty, fasting during Ramadan becomes obligatory for Muslims. Fasting entails abstention from eating, drinking, taking oral medications, and smoking, from early dawn until sunset. Evidence-based guidelines for fasting during Ramadan are lacking and advice is based on expert opinion. During Ramadan, a 4.7fold increase in the incidence of severe hypoglycemic conditions has been noted in patients with Type1DM, and a 3-fold increase in hyperglycemia. Other risks include, DKA, dehydration and thrombosis. Few studies have been conducted in adolescents with T1DM and fasting during Ramadan. A prospective study conducted in 33 adolescents with T1DM in BIRDEM in Bangladesh, showed that most could complete their fast, whereas hypoglycemia was the main reason in those who couldn't.

Fasting can be undertaken only if patients have good hypoglycemic awareness, good glycemic control pre-Ramadan, can undertake SMBG, and are able to adjust insulin dosage, and are supervised by an expert Health Care Professional team. Fasting is not recommended if there is history of recurrent hypoglycemia, hypoglycemia unawareness, poor diabetes control, brittle diabetes, non-compliance with medical treatment, and in patients who are "unwilling" or "unable" to monitor and manage their blood glucose levels. Frequent blood glucose monitoring, observing the breaking fasting rules, and avoiding fasting on sick days are essential to prevent complications during fasting.
ISPAD guidelines recommend 5 general sick day diabetes management principles:
Sick day guidelines, including insulin adjustments, should be taught in order to reduce risk for DKA and for severe hypoglycemia (with GI illnesses)
More frequent blood glucose and ketone (blood or urine) monitoring
DO NOT STOP INSULIN
Monitor and maintain hydration with adequate salt and water balance
Treat any underlying, precipitating illness
Food and Fun: parties
Inform host that child has diabetes, and the child may need to test and inject. Share with host and child what treats are allowed
Thus, if recommendations are followed a child will be able to fast, take part in special occasions like birthday parties, and keep safe on sick days.

Plenary Session II - Reaching the Disadvantaged

INV4
Refugees, ethnic minorities

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Historically, migration has been an on-going movement, mainly based on difficult living circumstances, such as war and/or poverty. Ethnicity is a versatile construct with no absolute consensus of the concept. It embodies geographical as well as social, historical and cultural factors, linguistic background, lifestyle and religion.
Ethnicity is a factor of changeability which to a certain degree can be influenced by migration and can change over time. There is no gold standard for its definition. Even if genetic co-variation often is included in the concept of ethnicity, the link between ethnicity and genetics is not always clear. In migration research it is possible to study which ethnical features that are influenced by genetical disposition and/or environmental factors.
According to WHO, World Health Organization, more people are on the move now than ever before. There are 1 billion migrants in the world today – one in seven of the world's population. 65 million of the world's internal and international migrants are forcibly displaced today. This has important public health implications, and requires an adequate response from the health sector. Developing countries host 86% of the forced displaced population. The recent large-scale population movement has posed epidemiological and health system challenges, to which public health and health systems must adjust.
Ratified international human rights standards and conventions exist to protect the rights of migrants and refugees, including their right to health. Nevertheless, many refugees and migrants often lack access to health services and financial protection for health.
The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014 and the global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Diabetes prevalence has been rising more rapidly in middle- and low-income countries. In the light of the increasing migration and larger proportion of patients with immigrant background, intercultural competence has become even more important for medical staff and in particular in the care of patients with chronic diseases such as diabetes.

INV5
Diabetes in School - Optimal management of children with type 1 diabetes in school should be the norm…shouldn't it?

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Introduction: Students living with type 1 diabetes (T1D) globally face a wide variation in resources and circumstances.
The minimal aim of T1D care in all schools must be to:

- Keep students safe
- Provide equal opportunity for education, and participation in all activities.
- Provide the means to check blood glucose levels, and respectfully treat those out of target range in an agreed, appropriate place

The aim for all students must be normoglycemia during school hours, and to manage T1D as optimally at school as it is managed at home.
Background: Type 1 diabetes is a complex medical condition with relentless emotional impact on the entire family. Optimal management of T1D at school is essential to reduce the risk of acute and long-term complications, whilst enabling the student to learn and perform to the best of their ability. Intensive management leads to improved health outcomes, however, school staff may perceive this as over-dramatic and unnecessary, resulting in misconceptions and fears on all sides.
Students spend over half of their waking hours at school, in addition to participating in after-school activities, sports days, excursions and school camps. The amount of time spent away from the security of family supervision is significant for the student with T1D.
The normal school day comprises many variables that influence blood glucose levels, varied levels of learning time, meal and snack times, excitement, stress, peer interaction and physical activity. The expectations of the student, parent, school staff, and diabetes team must all be considered to properly meet international consensus guidelines. Unfortunately, negative (with some positive) school stories are common from both well and less-resourced sources, illustrating the dire need for action, and provide safe, practical advice.
Discussion: In an effort to address the issue, ISPAD charged a working party of experienced health professionals and key stakeholders, from a diversely resourced global diabetes community, to develop the first ISPAD position statement on Diabetes in School.
Conclusion: The position statement aims to provide practical guidelines to health professionals, parents and school staff so that optimal diabetes management at school is the norm, ensuring all students feel safe, and have the best chance to learn and avoid complications.

Symposium IV - IDF

INV6
Measurement of HbA1c: the problems clinicians should know about

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Glycated hemoglobin, most commonly measured as hemoglobin A1c (HbA1c), has an integral role in the management of patients with diabetes. Large prospective clinical studies have clearly documented that HbA1c is both an indicator of long-term glycemic control and predicts risk for the development of microvascular complications. These attributes, combined with low intra-individual variability and the lack of influence of food ingestion (a fasting sample is not necessary), make HbA1c appealing for the diagnosis of diabetes. The recent adoption of HbA1c by several influential clinical organizations for the screening and diagnosis of diabetes increases the need for further understanding the reliability of HbA1c results. Conditions that change erythrocyte lifespan (e.g., hemolytic anemia, certain hemoglobin variants and blood transfusion) alter HbA1c concentrations. Race has also been reported to influence HbA1c values independently of blood glucose concentrations. Published reports indicate that some diabetic individuals have HbA1c values that are lower or higher than expected based on their clinical presentation and blood glucose results. Non-glycemic factors that may influence the glycation of hemoglobin or interfere in the measurement of HbA1c will be discussed.

Symposium V - Epidemiology

INV7
Heavy burden of diabetes in U.S. youth- update from the SEARCH for diabetes in youth study

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SEARCH is an on-going, culturally diverse, multi-center and population-based epidemiological study of youth with diabetes. Over the last 18 years SEARCH has made important contributions to the field of pediatric diabetes, including but not limited to the following:
1) Establishing the increasing burden of both type 1 (T1D) and type 2 diabetes (T2D) among U.S. youth. SEARCH has published recently the first comprehensive assessment of trends in the incidence rates of type 1 diabetes and type 2 diabetes in U.S. youth between 2002 and 2012. Age, sex and race/ethnicity-adjusted type 1 rates increased on average by 1.8%/year (P = 0.03), with the greatest increase seen among Hispanic youth. Type 2 diabetes rates also increased by 4.8%/year on average (P < 0.001), with the largest increases in American Indian (8.9% per year) and Black youth (6.3% per year). Projections suggest that, by 2050, the number of youth with T1D age <20 years will increase in the U.S. more than threefold, with the highest relative increase among minority youth, and numbers of youth with T2D will quadruple.
2) Assessing the burden of diabetes-related complications and comorbidities. SEARCH identified a troublesome constellation of complications and comorbidities among youth with both types of diabetes. For each complication (i.e., diabetic kidney disease, diabetic retinopathy, peripheral neuropathy, arterial stiffness, hypertension, with the exception of cardiac autonomic neuropathy), the prevalence was significantly higher in type 2 vs. type 1 diabetes, and especially among minority youth. However, the prevalence is high in both types. At an average age of 21 years and a duration of disease of a little less than eight years, one in three youth with type 1 diabetes and three in four youth with type 2 diabetes had at least one such complication or comorbidity.
In conclusion, diabetes presents a significant burden to the health of U.S. youth and a major clinical and public health challenge. The data summarized above have shown and increasing incidence of both type 1 and type 2 diabetes, especially among minorities and a high burden of early complications, higher in youth with type 2 diabetes and in minority youth. These patterns suggest that higher costs and greater societal burden are very likely in the next 20-30 years. Clearly, we need to urgently develop effective prevention approaches.

Symposium VI - Under to over Nutrition APPES

INV8
Disease prevention: where are we now?

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Youth and adolescents with type 1 diabetes (T1D) are at high risk for the development of vascular complications of diabetes. Poor glycemic control and an adverse cardiometabolic risk profile are common. Further, the prevalence of overweight and obesity among individuals living with T1D now parallels that of the general population and contributes to an adverse cardiovascular disease risk profile. We also know that usual dietary intake of youth with T1D generally does not meet common guidelines for a healthy diet. The objective of this talk is to provide an overview of current evidence for the role of nutrition in relation to long-term glycemic control based on HbA1c, cardiometabolic risk profile and weight status. The review will consider evidence for specific nutrients to impact on the health of individuals with T1D, as well as consideration of food groups and dietary patterns. The relative merits and potential weaknesses of different study designs to understand the complex and sometimes conflicting nutrition literature will be highlighted.

Diabetes 101 - Follow up

INV9
Diabetes self-management education and psychosocial support

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Diabetes care in children and adolescents is an exercise in applied behavioral pediatrics- getting patients and families to engage in an unremitting routine of painful and counter-intuitive practices under an ever-present Damoclean existential threat of acute and chronic complications. Plato recognized that "Human behavior flows from three main sources: desire, emotion and knowledge." Knowledge: Traditionally diabetes care deals with this area well. When a patient is newly diagnosed, much of the focus of care is upon an exchange of information ("diabetes education") to diabetes-knowledge-naïve families. Arguably there is a surfeit of diabetes knowledge resources with a cornucopia of textbooks, center-specific and society consensus documents and company-produced literature available in print and on line. Information is presented in many forms including printed documents, video films and interactive websites/apps. Social media is also very active in this space. Thus in this sea of information, when patients with suboptimal clinical outcomes are described as "needing more education" it is difficult to envisage how "more education" might be conceived. There is though, an increasing interest in assumed levels of literacy and numeracy competence in families which may be misplaced and assumptions may need to be re-evaluated. Emotion: There is an extensive literature highlighting the very high prevalence of disturbed mental health in both patients and their parents. Mental health issues and psychosocial chaos will in turn impact on patients' and families' ability to adhere to the arduous task of daily diabetes care. In many, if not most, centers mental health care is an area that has been poorly resourced and supported apart from crisis care. Desire: This is perhaps the most important but least well-resourced aspect of diabetes care. Numerous interventions have been attempted to increase motivation in children and adolescents but the results to date have been underwhelming. In an ideal world "Diabetes nurse educators' would be re-framed as "Diabetes nurse motivators" but the skills required to meet this goal remain somewhat illusory. The advent of automated or "closed-loop" systems promises much in terms of relieving the burden of daily diabetes care but tap into a new dimension of the human condition- trust. Trust is particularly important for understanding human-automation partnerships. Self-management is the key to diabetes care and all of these areas must be addressed.

INV10
Special situations: surgery, contraception, pregnancy

E. Codner[1]

[1]*Institute of Maternal and Child Research, School of Medicine, University of Chile, Santiago, Chile*

This talk will discuss the new recommendations about special situations for children and adolescents with diabetes. This talk will address the considerations about the use of insulin pumps, glucose monitoring, and new medications during surgery.

A review of the care of the pregnant teenager and the use of long-acting reversible contraception and hormonal contraception in the young women living with diabetes will be performed.

Meet the experts - Living with diabetes, not for diabetes

INV11
Realistic targets; weight, blood pressure, lipids, junk food

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The atherosclerotic process begins in childhood, and although cardiovascular disease (CVD) events are not expected to occur during childhood, observations using a variety of methodologies show that youth with type 1 diabetes (T1D) may have subclinical CVD abnormalities within the first decade of diagnosis. Hence, in addition to blood glucose control, treatment must include management of comorbidities such as obesity, hypertension and dyslipidemia that may contribute to premature CVD.

Excessive weight gain which is more common during and after puberty, may indicate high energy intake, and this may be related to excessive exogenous insulin. Girls seem to be more at risk of overweight, a recognized risk factor for later development of disturbed eating behavior and eating disorders. As obesity is a modifiable CV risk factor, careful monitoring and management of weight gain, as well as avoiding junk food should be emphasized in diabetes care.

High blood pressure (BP) and alterations in the circadian BP rhythm have been associated with the risk of developing nephropathy and retinopathy in youth with T1D. Hypertension has a greater impact on CVD in diabetic patients than in non-diabetic individuals. BP control (<130/80mmHg in adults) is effective in decreasing CV morbidity and mortality in diabetes. As such, BP should be measured at least annually, with a target of consistently <90th percentile for age, sex and height or <130/80 mmHg for adolescents. ACE inhibitors or angiotensin receptor blockers are recommended for the initial pharmacological treatment in children with diabetes and hypertension.

Although intervention data are sparse, the American Heart Association (AHA) categorizes children with T1D in the highest tier for CV risk and recommends both lifestyle and pharmacological treatment for those with elevated LDL-cholesterol levels (defined as ≥2.6 mmol/L (100 mg/dL)). If this is present, interventions to improve metabolic control, dietary changes, and increased exercise should be instituted. If the above interventions do not lower LDL cholesterol to <4.1 mmol/L (or <3.4 mmol/L or <130 mg/dL with one or more CVD risk factors), statins should be considered in children aged >10 years, although long-term safety is not established.

For youth with type 2 diabetes, comorbidities may already be present at the time of diagnosis. Therefore, blood pressure measurement and a fasting lipid panel should be performed at diagnosis. Thereafter, screening guidelines and treatment recommendations for hypertension and dyslipidemia, are similar to those for youth with T1D.

INV12
Diabetes education for adolescents: alcohol, driving, smoking and contraception, how to talk so teens will listen and listen so teens will talk

H. Phelan[1]

[1]*The John Hunter Children's Hospital, Newcastle, Australia*

New health behaviors are laid down during adolescence as young people explore "adult" health behaviors including smoking, sexual intimacy and alcohol. It is well documented that these health behaviors track into adulthood. For youth with diabetes these "adult" health behaviors can significantly impact their risk for severe hypoglycemia and diabetic ketoacidosis and the long-term complications of diabetes. It is therefore imperative that diabetes health care professionals have the skills and experience to provide effective targeted education to support clear health promoting messages from early adolescence. Diabetes health care professionals should act as advocates on behalf of their patients and provide the most relevant and up to date evidence based information. In this session we will explore simple tips for engaging with teens around these topics and explore the latest evidence relating to managing diabetes through adolescence.

Diabetes 101 - Handling the Problems

INV13
Retinovascular geometry: what does it tell us about complications?

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Computer assisted programs and artificial intelligence have facilitated sophisticated methods to describe the microvasculature captured on retinal images. This development started in 1999 as an extension of the known retinovascular changes in hypertension. Retinal vessel changes were independently associated with subsequent cardiovascular disease and stroke, these changes being namely narrower arterioles, and more tortuous and dilated venules. Interestingly smaller birth size associates with narrower arterioles in children and adolescents potentially explaining their increased risk of CVD as adults.
Further development of these techniques has occurred and been applied to diabetes cohorts for understanding of the pathophysiology of microvascular disease, newer measures include fractal dimension and retinovascular geometry (tortuosity and branching angles).
In adults with diabetes, it has been mostly wider venules and lower fractal dimension which predict retinopathy, nephropathy and neuropathy. In adolescents, however, it has been wider more tortuous arterioles and greater fractal dimension that have predicted subsequent retinopathy; whilst narrower and less tortuous venules predicted albuminuria. Repeated measures of vascular caliber in adults in Wisconsin Epidemiological Study of Diabetic Retinopathy (mean age 41 yrs, duration 11 yrs) have shown small reduction in arteriolar width (−0.37 um) and increase in venular diameter (2.54 um) over 4 years, whereas adolescents (mean age 14yrs, duration 7 yrs) demonstrate larger increases in width of both arterioles (9 um) and venules (14 um) and increase in tortuosity over 3 years.
Even more intriguingly, at baseline in the Adolescent Type 1 Diabetes Cardiorenal Intervention Trial (AdDIT), narrower and more tortuous peripheral vessels associated with high normal ACR potentially the basis for increased vascular risk. Longitudinal study is needed to confirm these vascular changes between adolescence and adulthood.

INV14
Obesity/T2D/PCOS

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Obesity is emerging as a major clinical challenge in pediatrics, complicating the management of classic pediatric disorders, including type 1 diabetes, while also being associated with increased risk for historically uncommon disorders in the pediatric population, including type 2 diabetes, dyslipidemia, hypertension, sleep apnea, and fatty liver. Management of these problems is often outside the expertise of pediatricians and pediatric endocrinologists. This talk will provide an approach to the evaluation and general management of obesity and obesity related disorders.

Diabetes 101 - Handling Technology

INV15
Insulin injection technique - guidelines

S. Kalra[1]

[1]*Journal of Social Health in Diabetes (JoSH Diabetes), Karnal, India*

The global FIT (Forum for Injection Technique) guidelines helped establish the importance of insulin technique in diabetes care. FIT guidelines from various countries have taken this effort further. Current FITTER guidelines represent a significant improvement in our understanding of this subject, including the importance of lipohypertrophy, needle length and avoidance of needle reuse.
This year's ASPED guidelines are a landmark in pediatric diabetes care, as they focus on the needs of children and adolescents with diabetes. Excellence is a never-ending pursuit, and we must not lose sight of the softer side of injection technique and technological aspects of insulin delivery.

INV16
Insulin pumps

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To mimic the physiological insulin profile, insulin needs to be given with each meal. Insulin delivery with MDI (multiple daily injections) makes it easier to do so. In spite of finer needles, injections may be painful for some children. This can be overcome by using an injection aid in form of an indwelling catheter. An insulin pump makes it

possible to tailor the basal insulin to the individual's circadian rhythm over 24 hours, instead of being dependent upon the action profile of the injected basal insulin. Bolus doses can easily be given for any kind of meal, even snacks. Especially young children benefit from insulin pumps, as they most often have erratic eating habits, and often are "grazers". With the use of more physiological insulin treatment, the risk of complications can be decreased. It is important that a good metabolic control is established early in the course of the disease, as this has a large impact on the risk during future years through the "metabolic memory."
The basal rate should not be more than 50% of the total daily dose. Young children need more basal insulin during the hours before midnight, while teenagers often need more in the morning (the dawn phenomenon). Boluses should always be given before meals, also in young children.
Some pumps can automatically suspend the basal infusion when the glucose level is predicted to become low. The pump will restart once the glucose is rising again. The latest generation of pumps can also increase the basal rate if the glucose level goes high. The closed loop, where the sensor regulates the pump infusion automatically both after meals and during fasting, may seem like a dream, but promising results have been published both for children and adolescents.
In conclusion, pumps are very useful to improve diabetes care, especially when used with glucose sensors. However, the cost may be prohibiting in many countries. Eventually the new technique will hopefully be made available to all children with diabetes.

Symposium VII - Registries

INV17
How SWEET changed diabetes care

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The mission of SWEET to "harmonize care to optimize outcomes" is a challenging task. Some countries already have a long history of creating networks, which compare their results to share their experiences and challenge themselves for better outcomes. To bring this concept to an international level is the fundamental idea of SWEET. SWEET is building up a network of centers, which are willing to share their approaches, experiences and results.
Starting in 2008 as a European project with the support of the EU public health program SWEET became a legal entity in 2011 based in Hannover, Germany (chair T. Danne).
Based on the close ties with ISPAD, its Executive Committee has one representative in the SWEET steering committee (currently D. Maahs).
Now SWEET is encouraging centers worldwide to participate. Today 76 centers from 41 countries contribute to the registry including 10 centers from India.
The main pillars of SWEET are benchmarking, research, peer review and education founded on the SWEET database.
The database is managed at the University of Ulm/Germany by R. Holl and his team.
For data collection, the centers can use different supports (DPV software, data files created by their electronic health record or manually managed datasheets [xcel, csv etc.]).
The database includes in total 497,641 datasets from 46,154 patients. In 2017, there were 30,927 patients: 46.8% female, median age 14.5 years, type 1 diabetes 94.6%, type 2 diabetes 2.1% and other types 3.3%. Mean HbA1c is 7.9 % (62.8 mmol/mol). The quality of data is improving despite the rapid increase of the group.
There are different levels of membership in SWEET. Centres of Reference and Collaborative Centres are those approved by the SWEET peer review program. Also, centers with a lower number of patients have the opportunity to participate as Associated Centers with support from ISPAD. Industry contributes as collaborative members as equal partners.

INV18
Status of SWeeT in the Indian subcontinent

D. Hasnani[1], M. Saiyed[1], B. Saboo[1]

[1]*Diacare - Diabetes Care & Hormone Clinic, Ahmedabad, Gujarat, India*

This talk will discuss the new recommendations about special situations for children and adolescents with diabetes. This talk will address the considerations about the use of insulin pumps, glucose monitoring, and new medications during surgery.
A review of the care of the pregnant teenager and the use of long-acting reversible contraception and hormonal contraception in the young women living with diabetes will be performed.

Symposium VIII - Winners of the JDRF Fellowship

INV19
Role of taste in metabolic control of type 1 diabetes mellitus

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The sense of taste is one of the main factors that determine the choice of food and feeding behavior with important implications on health status.
In the last years, studies have highlighted the existence of taste receptors also in the gastrointestinal tract, where they seem involved in digestion and in food refusal. Activation of sweet taste receptors in the bowel can trigger the release of the incretin hormones that control blood glucose level, through an increase of insulin secretion, a reduction of glucagon secretion and consequent slowing of gastric emptying and intestinal motility.
An impact of taste perception and genes coding for taste receptors on type 2 diabetes as well as on glucose homeostasis has been reported, but there are few data on the perception of taste in patients with type 1 diabetes. Moreover, although many predisposing gene variants have been discovered for both T1D and T2D, little attention has been paid to the possible impact of genes that affect taste perception and preferences. Furthermore, differences in metabolic control among patients treated for diabetes are well known; however, there are no studies that evaluate whether these differences have a genetic basis or not.

Considering the emerging implication of taste receptors in incretin secretion and glucose homeostasis, the present project aimed to evaluate whether taste perception and genetic variants in taste receptors genes and pathways (TAS1Rs, TAS2Rs, GLUTs, GLP-1, GIP, etc...) can have a role in predisposition or protection to T1D and in its metabolic control.
Specifically, the project proposed to analyze:
- differences in taste perception and related genes among patients with type 1 diabetes (T1D) and healthy subjects as controls;
- differences in taste perception and related genes among patients with T1D in good and poor metabolic control.
Moreover, thanks to the availability of whole-genome-wide data, this project can identify new genes influencing T1D metabolic control.

INV20
Looking for needle in a haystack - high-throughput data serving patients with rare diabetes syndrome

B. Małachowska[1,2], J. Janikiewicz[3], K. Pietrowska[4], J. Madzio[5], K. Wyka[5], M. Ciborowski[6], A. Krętowski[4], M. Borowiec[5], A. Dobrzyń[3], W. Młynarski7, W. Fendler[1,8]

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HNF1B-MODY is a rare autosomal dominant monogenic form of diabetes coexisting with kidney abnormalities.
Objectives: Identification of altered serum metabolites among HNF1B-MODY patients and investigating its function in syndrome pathogenesis.
Methods: We recruited patients with HNF1B-MODY (N = 10), HNF1A-MODY (N = 10), polycystic kidney disease: non-dialyzed and dialyzed (N = 8 and N = 13 respectively) and healthy controls (N = 12). Serum samples were fingerprinted by LC/MS. Observed metabolic changes were validated. A HepG2 cell line was used in order to study in vitro the cellular effect of selected serum metabolite stimulation.
Results: From serum metabolomics fingerprinting we identified eight metabolites that had convergent fold change for comparison of HNF1B-MODY versus all other groups. Three of them were lysophosphatidic acid species (LPAs: 18:1, 18:2, 20:4) that proved to be the best biomarkers for HNF1B-MODY (Area under ROC curve 1.00 (95%CI 0.91-1.00); 1.00 (95%CI 0.91-1.00); 0.92 (95%CI 0.80-0.98) respectively). On a second set of samples we confirmed elevated levels of LPA among HNF1B-MODY patients (p=0.0063). The main enzyme producing serum LPA – autotaxin – was down-regulated in sera of HNF1A- vs HNF1B-MODY patients (p=0.0173) but did not differ between HNF1B and other groups (all p values >0.84). Upon LPA stimulation of human hepatocytes with HNF1B-silenced the downregulation of autotaxin expression. Functionally, in the absence of functional Hnf1b, the stimulatory effect of LPA on the Wnt pathway was disrupted and reversed, with LPA stimulation leading to a decrease of phospho-GSK-3a/b protein (p=0.0169).
Conclusions: An important lipid mediatory compound - LPA was found to be elevated in serum of patients with HNF1B-MODY. LPA can be involved with pathogenesis of HNF1B-MODY syndrome via the disruption of LPA-mediated Wnt pathway regulation.
The study was funded by the PRELUDIUM grant (2016/21/N/NZ5/01448) of the National Science Center, Poland and by ISPAD Research Fellowship Award 2017.

Symposium IX - Guidelines Release

INV21
What's new in 2018 guidelines

E. Codner[1]

[1]Institute of Maternal and Child Research, School of Medicine, University of Chile, Santiago, Chile

The new edition of ISPAD´s "Clinical Practice Consensus Guidelines" is the fifth update of the guidelines released by ISPAD. All the chapters of this new Consensus have been modified and updated to reflect the advances in scientific knowledge and clinical care that have occurred since 2014. This new version is evidence-based.
This talk will describe the new recommendations which are included in the 2018 Guidelines.

INV22
Important of clinical practice guidelines: are they all that matter?

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Clinical practice guidelines (CPGs) are a familiar part of everyday clinical practice. Their aims include improving effectiveness and quality of care, decreasing variations in practice, and reducing preventable and costly mistakes or adverse events. CPGs make recommendations intended to optimize patient care that are informed by a systematic review of the evidence base and an assessment of the benefits and harms of alternative care options. They also represent a convenient way of packaging evidence and presenting recommendations to healthcare decision makers.
Despite the intended benefits and range of purposes of CPGs, the processes by which they are commissioned, produced and communicated raise a number of concerns which potentially limit their usefulness and, in certain circumstances, may do more harm than good. CPG's are therefore not necessarily a panacea for good medical practice and, indeed, are not the only option for improving the quality and delivery of care. Clinical decision making should not only be influenced by a "best estimate" of the expected benefits and harms of a therapy / intervention, but also by other factors. These include confidence in these estimates (quality of evidence), consideration of patient values and preferences and, for policy makers in particular, availability of resources and equity of access. In many instances CPGs have been lacking or inconsistent in their production and as a result, users face challenges in understanding their messages, questioning their rigor and limiting their trustworthiness. Furthermore, "inflexible" CPGs with rigid rules are decried by healthcare professionals faced with complex or "atypical" clinical scenarios and are viewed as invalid when there is a lack of supporting data.
This lecture will review these issues and will consider the factors needed to "bridge the gap" between CPG developers and users, as well as the alternative approaches to delivering high quality, cost effective and efficient care.

Diabetes 101 – Social Issues

INV23
Education in remote areas, poverty

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For patients with type 1 diabetes (T1D), the basal/bolus regimen utilizing multiple dose insulin injections (MDI) is the ideal way to control the hemoglobin A1c, without hypoglycemic episodes. This requires diabetes self-management education (DSME) for both patient and caregiver to perform self-monitoring of blood glucose, counting carbohydrates, and calculating insulin dosages on multiple occasions. In India, the role of a diabetes educator is woefully under-recognized and locally-relevant DSME program is absent and therefore, many thought it was impossible to implement a MDI program.
In 2005, I visited the Rama Krishna Mission (RKM), a charitable hospital in Haridwar, India, serving an indigent population. I learned that the medical staff accepted the fact that T1D patients were not expected to survive to adulthood. I learned that the major factors contributing to this dismal prognosis were the lack of affordable insulin and access to diabetes specialty care. I wondered – if sufficient resources could be provided, could this poorly-educated, marginalized population learn the requisite DSME to practice MDI? I became determined to find the answer. In 2006, I started training a team of a local Indian physician, a diabetes educator and a social worker to assist in this endeavor.
I studied the cultural and social issues that influenced patient's acceptance of diabetes care. I discovered that children and their caregivers could grasp DSME if it was taught it in the form of a respectful dialogue. I also wrote a book on DSME that is available in both English and Hindi. The International Diabetes Federation supplied free diabetes-care supplies and we established our foundation to provide additional resources. We published our results in the Journal of Diabetology in Feb 2016. In summary, our program demonstrated that good clinical outcomes can be obtained in a marginalized patient population by providing adequate resources and DSME via innovative methods.

INV24
Social issues and type 1 diabetes

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The impact of social issues on diabetes is two fold, both affect each other. Social issues play relevant role in control and fluctuations in blood sugar values are responsible for diabetes distress and depression. Social issues may be divided into 3 categories- in developed countries, in south East Asia and in India.
In developed countries- The dominant issues are financial, housing, relationship, break up, social stigma and acceptance along with emotional burden.
In South East Asia (India, Nepal, Bangladesh, Pakistan, Srilanka and Myanmar) - Financial, Insulin storage, diabetes as a social stigma and emotional burden.
In India-social acceptance of disease, schooling and education, food choices, revealing diabetes to society, jobs, relationships, marriage and financial issues (Poverty)
Financial issues are relevant issues all across the world. The social acceptance of T1DM is better in Western society as against South East Asia. The Breakups are more common in the west. Emotional burden also affects T1DM people, almost 30 % are without a partner which is important reason for stress. Factors associated with emotional burden in South East Asia are – being female, lower duration of diabetes and lower education level.
Revealing diabetes to society is an important issue in Indian and South East Asian Countries, it is not taken positively by the society. Relationship and marriage are another relevant social issues and it is equally important for South East Asian countries. Breakups are common once diabetes is revealed to the partner. In case of arranged marriage it is tough to get the match, especially among females. For this the best solution is good education and financial independence. Poverty is another issue due to which people often skip insulin, do infrequent blood sugar monitoring and it is difficult to educate them about diabetes.
The solution to all problems are –Structured education program to be a made available to all people with T1DM and to their families.

INV25
School, toddlers, teenagers

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Epidemiological research is showing us that the number of newly diagnosed children with type 1 diabetes is increasing all over the world in average with 3-4% on yearly basis. From many countries we have reports that children are younger at diagnose. Germany for example reports that in average children with diabetes are at least one year younger at diagnose than 20 years ago; Slovenia reports a drop of age at diagnosis from 12,9 to 8,9 years in the last 15 years and analyses from other countries show an increased incidence in the youngest age group (bellow 5 years).
According to this data, we have to consider that the number of children with T1D that need support to deal with their diabetes - not only at home, but especially at school or at different sport or other activities; is increasing.
Technological advances in the modern diabetes treatment with new insulin pump generations, continuous or flash glucose monitoring are a challenge for every family, next to it awareness that children up to a certain age (10-12 years) will not be able to completely cope with complicated rules of carbo counting, internal pump computers and sensor information's make the need for support in school as one of the priorities for a complete care for these children. (5,6,7,8 carb counting ref.)
So, we must confront the increased need for education of school personnel, sports trainers, and other teachers that is absolutely necessary for a good diabetes care and support in schools. In many countries children stay in schools more than 8 or 10 hours daily, having two or three meals in the school environment, which is a significant proportion of their time, and the reason to optimize diabetes treatment at school otherwise these children will have a poor metabolic control.
Caregivers can be confused with the number of rules, dietary needs, dealing with different types of glucometers, pen injectors, insulin pumps and also continuous glucose monitoring systems. Their fear of acute complications – especially severe hypoglycemia can influence their behavior while dealing with diabetes. Many countries still do not have the free access to glucagon for home or school needs.
Younger children need more support and care, but at which age can we say that a child is taking the complete responsibility for diabetes self-management?
Legal problems can appear, and many countries do not have nurses to assist children with chronic illnesses, therefore school teachers, caregivers need to support the child.
Often there is lack of place to perform blood glucose measurements, insulin injecting, these procedures are frequently performed away from the classroom and separate children from their peers.
What about school camps, different excursions, sport activities – how should be children supported, what knowledge should teachers have for these special events.
So, all aspects of managing diabetes in the school environment have to be considered: next to glycemic targets, glucose monitoring and insulin therapy must be discussed as well as nutrition and a healthy diet will be of special concern; the importance of carb counting must be emphasized. Meal alternatives are important in multicultural environment (religious/vegan/vegetarian) as well as appropriate diet for children with celiac disease or

overweight problems. Physical activity is of extreme importance, so daily recommendations and information about diabetes and competitive activities is given. Psychological burdens are important – children can be afraid of hypoglycemia, they can be bullied or exposed because of their diabetes.
Psychological background, emotional burden, influence of exams and stress on BG must be announced as well as the possibility of neurocognitive (dis) functioning in hypo/hyperglycemia.
Peer relations, local social stigma, racial and religious perspectives can be a burden in many countries.
Diabetes teams / families / schools should perform team work, school stuff should be well educated, responsibility on administering medication must be recognized and
Roles and responsibilities clearly given. Individual Health Care Plans can be supportive, next to an emergency plan for hypo/hyperglycemia with exact instructions for severe hypoglycemia and early recognition of ketoacidosis.
Legal/Governance & Insurance are different all over the world

Plenary Session IV - Closing the Loop

INV26
Closed loop insulin delivery. Where are we now?

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The proof-of-concept of the "artificial pancreas" (AP), an extracorporeal device delivering subcutaneous (Sc) insulin continuously via a fully or semi-automated closed-loop (CL) system, is now firmly established. Initial studies conducted in the controlled environment of the clinical research facility, have clearly demonstrated that these AP systems (comprised of standard, commercially available, Sc continuous insulin infusion pumps and Sc continuous glucose monitoring devices which are regulated by a glucose responsive insulin algorithm controller unit) are safe and efficacious, resulting in significant improvements in blood glucose (BG) control in young people with Type 1 diabetes (T1D), with almost complete avoidance of nocturnal hypoglycemia (BG < 3.9 mmol/L) and with increased time with blood glucose values within physiological normal target range.
Subsequent clinical studies in the outpatient / home setting to assess the performance of the AP in unsupervised, free living, "real-life" settings have also been performed in children and adults with T1D, and demonstrate similar efficacy and safety to those studies carried out in supervised conditions. As a result the first commercially available "hybrid" AP systems have recently have been launched onto the market, and represent the first steps towards realizing a fully closed loop AP system. This lecture will review and summarize the recent progress associated with the outpatient application of the AP and will consider the challenges that lie ahead.

INV27
Closing the loop in poor control

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Type 1 diabetes mellitus represents 5–10% of diabetes cases worldwide. The incidence of type 1 diabetes is increasing, and there is no immediate prospect of a cure. As such, lifelong management is required. Despite ongoing development of more physiological insulin preparations, recent advancements in insulin pump technology and more accurate blood glucose monitoring, in clinical practice it remains challenging to achieve normoglycemia whilst reducing the risk of hypoglycemia, particularly in young people with type 1 diabetes.
Closed-loop insulin delivery (the artificial pancreas) is an emerging technology gradually progressing from bench to clinical practice. Closed-loop systems combine glucose sensing with computer-based algorithm informed insulin delivery to provide real-time glucose-responsive insulin administration. In my presentation I highlight published literature on the effectiveness of closed loop technology in outpatient settings. The focus will be on randomized controlled trials conducted in sub-optimally controlled pediatric and adolescent populations who may accrue particular benefits subject to satisfactory compliance and regular closed-loop use.

INV28
Pumps and exercise: an open challenge

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Physical activity (PA) is considered the third cornerstone in the management of type 1 diabetes (T1D) along with insulin therapy and a healthy diet. However, PA represents a double-edge sword in population with T1D. If a regular PA has been shown to have a positive impact on cardiovascular health, body composition, insulin requirement and metabolic control, several studies also showed that youth with T1D are less active compared to their peers without diabetes because of the increase risk of hypoglycemia associated with exercise and the necessity of a more intense blood glucose monitoring during and after PA. Efforts to avoid hypoglycemia, suspending or reducing basal insulin delivery in pump-treated children, or eating a snack before exercise, represent strategies not often adequate and that result in hyperglycemic events during or after exercise.
Over the last years, the spread of technological advances has created new possibilities for T1D management. New insulin pumps and continuous glucose monitoring devices have dramatically improved glycemic control and outcomes.
Closed loop systems (CL) represent the current state-of-the-art technology that directs insulin delivery in response to glucose sensor data. Most of reports showed the superiority of CL over sensor augmented pump therapy, in terms of increased time within target glucose range, reduced incidence of hypoglycemia with a better overnight control.
Different strategies have been used to prevent exercise-induced hypoglycemia in association with CL system: dual-hormone CL, administration of snack before PA, the use of heart-rate monitor to inform the CL system during exercise, the use of ultra-fast insulin are considered possible strategies to decrease the magnitude of exercise-induced glucose reductions and the glycemic variability after exercise, waiting for more complex system for exercise detection with automatic adjustments of algorithm parameters.
Lifestyle unpredictability and CL system represents the future challenge. Aims of this talk include a review on the influence of PA on glycemic profile and the strategies to applied in order to avoid glycemic fluctuations; an update of recommendations for PA in youth with T1D and the use of the new technologies, as well as an overview regarding the challenges still open.

Symposium X - Complications and Co-morbidities

INV29
AdDIT follow up

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The risk for vascular complications in young people with type 1 diabetes is linked to disease duration and the trend towards a younger age at diagnosis will significantly impact future outcomes. The acceleration of risk for complications is related to puberty and this is not entirely explained by poor glycemic control, as rapid growth and dramatic physiological changes may also be relevant. This effect of puberty is supported by data from the Oxford Regional Prospective Study (ORPS), which demonstrated that individuals destined to develop microalbuminuria (MA) and macroalbuminuria could be identified by increasing rates of urinary albumin-creatinine ratios (ACRs) from diagnosis and through puberty. Further support for these observations comes from the Adolescent Type 1 Diabetes Cardio-renal Intervention Trial (AdDIT) which showed, in a large population from Canada, Australia and the UK, associations between the ACR in repeated urines at age 10-16 years with other risk factors such as hyperfiltration, hyperlipidemia, pulse wave velocity; potentially predictive of future diabetic nephropathy and cardiovascular (CVD) disease. The recently published observations of outcomes in low-ACR subjects from the AdDIT Observational cohort and high-ACR subjects randomized to placebo/placebo indicate that those in the highest tertile showed an increased rate of progression to MA and were generally renal hyperfiltrators. In addition, they showed an accelerated increase in carotid intima-media thickness, higher hsCRP and blood pressure and retinopathy progression over the subsequent 2-4 years of follow-up.
These data support the importance of ACR screening during adolescence not just to identify the occasional subject who reaches the cut-off for MA but as a way of identifying future renal, retinal and CVD complications risk. Full analysis of the AdDIT data is yet to be completed but one could anticipate that predictive models would not only include changes in HbA1c, ACR but also GFR, lipids, inflammatory markers and blood pressure data. Data arising from AdDIT concerning the safety and efficacy of ACE inhibitors and statins could then be used with the prediction models in informing treatment strategies. These predictions models could also be used to stratify subjects in future studies to evaluate complications prevention in this vulnerable group of adolescents.

Symposium XI - Acute Complications

INV30
Diabetes dysglycemia, cognition and the developing brain

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Glucose is the preferred metabolite of the brain with 25% of circulating blood glucose in adults destined for cerebral metabolism. It is intuitive then that type 1 diabetes mellitus (T1DM), a disorder characterized by perturbations in blood glucose ("dysglycemia"), should cause acute and chronic brain dysfunction. These cognitive and affective impacts appear to be greatest in the developing brain of children and adolescents with T1DM. Aspects of diabetic dysglycemia that appear to be most significant are hypoglycemia, hyperglycemia and diabetic ketoacidosis (DKA). Some early in vitro work suggest that glycemic variability may also play a significant role in neural cell injury. Prospective observational data from the point of diagnosis to neuromaturation in the Royal Children's Hospital Diabetes Cohort Study revealed a rather lamentable "rule of thirds"- one third of subjects developed a DSM IV threshold mental health disorder, one third did not complete secondary schooling and one third did not continue in adult care after transition. This was coincident with a 0.3 SD loss of full scale IQ and changes in regional brain volumes. There is an emerging literature showing that adults with T1DM from childhood have significant rates of cognitive impairment by middle life. More recent functional imaging studies have provided insight into some of the mechanistic aspects of dysglycemia-induced brain injury. DKA at the point of diagnosis is associated with acute grey and white matter volume and spectroscopic changes that are associated with neurocognitive outcome in the medium term. Clamp studies combined with MRI have shown that hypo- and hyperglycemia result in distinct regional changes in brain perfusion and metabolic activity. Potential synergies of chronic and additive dysglycemic insults are difficult to quantitate largely due to an inability to fully record all aspects of glycemic perturbation over a life course. In addition to this, pre-conditioning and programming may also play significant mediating roles. However, developmental age at the time of diabetes onset appears to have a critical influence upon outcome. A nascent understanding of mechanism of neural injury is providing some insights as to potential non-glycemic interventions that might be used to protect the developing brain.

Symposium XII - Communication

INV31
Teaching the illiterate

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Diabetes need to be managed 24 × 7. Skills to cope with the changes it brings to life are the soul for this lifelong disorder that requires diabetes self-management education appropriate to age and eco-system. It is essential for everyone but even more for Children and parents of children with type 1diabetes. The education begins with survival skills that are to be taught immediately after diagnosis and that continues for rest of live to learn about living with diabetes.
Human beings are governed by their needs. They only understand things which their mind wants them to know. While considering illiteracy and diabetic education we need to focus on two terms.

Health Illiteracy - inability to interpret and understand health information needed at a particular time.
Illiteracy or low literacy- Inability to read, write and understand
If we combine both these terms; initially most of the patients and their families come in this category. Things which can make a huge difference are
1.Listening and talking sessions with experts e.g. - Counseling session with doctor, diabetes educator
2.Demonstration of skills e.g. – How to take insulin; use glucometer
3.Peer group sessions.
For self- reinforcement of complex diabetes and other health education topics, illiteracy seems to be a barrier to learning but it should not make learning impossible as health illiteracy can be deadly in diabetes. There can be many tools and techniques which can be used; many of them have been made and used in Changing Diabetes in Children program
1.Education toys e.g. Notti- A soft toy which demonstrates insulin sites selection and helps in learning self-injection
2.Pictorial Maps and charts e.g.- Make your own plate which demonstrates food exchange system
3.Audio Visual stories and narrations – Mishti video
4.Plays and skits by exerts and peers
5.Games and fun activities involving sibling and parents
Whatever may be the method; love and patience are the essentials for any educator to make children and their families live and understand about diabetes.

Diabetes 101 - Co-morbidities, Complications

INV32

Co-morbidities in type 1 diabetes - catching the hidden wolf under a sheep's clothing

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Children with Type 1 diabetes mellitus must be periodically screened for co-morbid conditions. At the time of diagnosis of type 1 DM, screening with Thyroid Stimulating Hormone (TSH), Anti Thyroid peroxidase antibody (TPO), Immunoglobulin A (IgA) antibodies - transglutaminase (tTG-A) and/or endomysial (EMA) is mandatory.
a)If TSH is elevated, thyroxine replacement is necessary.
b)Asymptomatic individuals with negative TPO antibodies and no goiter – 2 yearly reassessment
c)Subjects with goiter or positive TPO antibodies and normal TSH require 6 monthly reassessment.
Glycemic control is not significantly affected by hypothyroidism. Principles of therapy of hypothyroidism is similar to those with and without diabetes. Children with diabetes who have weight loss tremors, eye signs, loss of appetite, tremors and heat intolerance should be screened for presence of hyperthyroidism.
Subjects with a positive celiac screen should be referred to a pediatric gastroenterologist, those with a negative screen should be retested every 1-2 years. If there is a clinical pointer to celiac disease or a first degree relative with celiac disease, more frequent retesting may be needed. IgA testing must complement testing for celiac disease. Addisons disease must be suspected in case of unexplained hypoglycemia, weight low, low requirements and increased pigmentation. Subjects must be tested for autoimmune adrenalitis with ACTH, serum cortisol and anti adrenal antibodies when there is a clinical suspicion of adrenal insufficiency. Vitamin B12 testing to diagnose pernicious anemia, Bone mineral density assessment and vitamin D testing must be done on an individual case to case basis.

Plenary Session V – ADA – Newer Treatments

INV33

Medication management in type 2 diabetes

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Type 2 diabetes in adolescents and young adults has unique pathophysiological features that can be expected to have an impact on response to pharmacologic therapy. This talk will review the mechanism of action of the various treatment modalities available for the management of type 2 diabetes and provide an approach to initial and subsequent pharmacologic management and monitoring considering these unique pathophysiological characteristics.