ISPAD 2014

INVITED SPEAKERS' SESSIONS

Presidents Welcome/Opening Lecture

INV1

Diverse views of the coming of insulin

M. Bliss

University of Toronto, History of Medicine, Emeritus, Toronto, Canada

The discovery of insulin at the University of Toronto in 1921-22, while honoured with the quickest award in the history of Nobel Prizes, was one of the most controversial events in the history of medicine. Investigators in other countries claimed priority, and more than 90 years later their champions still dispute the view that insulin was discovered in Canada. Much more significantly, the members of the research team in Toronto disliked one another, disagreed about credit, literally came to blows in the lab, and carried on personal vendettas about this research that endured for many decades.

The lecture explores these controversies and concludes with views of the importance of the coming of insulin about which there was no controversy.

Plenary Session I: Challenges and Opportunities in Diabetes Care

INV2

Toward a biological cure of type 1 diabetes; where to next?

D. Schatz

Pediatrics, University of Florida, Gainesville, FL, USA

Tremendous progress has occurred over the past three decades with respect to the design and performance of appropriately powered-studies seeking to either prevent or reverse type 1 diabetes (T1D). Cure of T1D is impossible without prevention of its recurrence. While studies of both humans with or at various levels of risk for T1D as well as animal models for the disease have increased our understanding of the disorder, the development of safe and effective therapeutic intervention capable of reversing or preventing T1D remains elusive. The quest to understand the complex interaction of genes, the immune system (autoimmunity) and environment that culminate in T1D has proven a formidable challenge and has delayed our hopes for achieving the aforementioned goal. The shortage of pancreatic organs, islets, the development of promising yet unproven stem cell approaches, and both allo- and recurrent autoimmunity are hurdles yet to be overcome in the quest for a biological cure. Emerging data emanating from the Network for Pancreatic Organ Donors with Diabetes (nPOD) effort is contributing much to expanding the concept of T1D heterogeneity as well as providing new insights into the disease (including metabolic dysfunction, pancreatic size and its consequences, lobular destruction, paucity of insulitis etc.). An improved understanding of disease pathogenesis and response to therapies will rely on evolving use of biomarkers. Enhanced biomarkers should emanate from the expanded use of biorepositories, emerging technologies and the design of innovative and shorter clinical trials to more quickly evaluate therapeutic efficacy. Drug combinations (translatable into the general population) should be employed using agents with different mechanisms of action tailored to address pathophysiologic defects present at various stages of the disease process.

Symposium I: When the Rubber Hits the Road – Generalizing from Clinical Trials to Practice

INV3
Why clinical outcomes trials are crucial for clinical medicine

H. Gerstein

McMaster University, Medicine, Hamilton, Canada

Diabetes is a serious chronic disease that is rapidly rising in prevalence. When suboptimally treated, it can lead to death, suffering, or a large number of serious clinical outcomes. Epidemiological approaches can identify risk factors for these clinical outcomes and stratify people into lower and higher risk groups. Such observational studies may also suggest hypotheses regarding the effects of various therapies. However they are unable to determine whether:

a. any particular therapy is effective at reducing outcomes;
b. any benefits of such therapies outweigh their risks; and
c. whether the measured effect is due to the therapy or to patient characteristics associated with the propensity to get the therapy and the outcome.

Conversely, the randomized, controlled clinical trial is able to make this determination. This is because randomization ensures that:

(a) both measured and unmeasured confounders are randomly distributed between the 2 groups; and (if the groups are large enough) the groups are equal on average except for the therapy being provided or not provided. Once the trial is finished, researchers can assume with great confidence that any difference in outcomes between the 2 groups is due to the therapy being assessed. Whereas such clinical outcomes trials are arduous and costly, they are clearly indispensable. Indeed such trials have definitively and unequivocally proven the benefits of intensified insulin therapy in type 1 diabetes as well as the benefits of good glycemic control, blood pressure control, statins, metformin, retinal therapy, ACE inhibitors and lifestyle approaches in diabetes in general. Indeed these trials have provided the evidence base used by governments and other third party payers to justify the widespread adoption of these therapies which have in turn dramatically reduced the morbidity and mortality of diabetes over the last 40 years.

INV4
Exploring the role of benchmarking in influencing patient outcomes in diabetes

T. Danne

Kinder und Jugendkrankenhaus 'Auf der Bult', Diabetes Centre for Children and Adolescents, Hannover, Germany

In the 1990s a group of leading pediatric diabetes centers chose to compare their outcomes by means of a centralized determination of the most relevant laboratory value of prognostic importance for the long-term prognosis, the HbA1c. This Hvid re Study Group on Childrens Diabetes published their first paper in 1997 and showed that there was great variation in mean HbA1c from 7.4% to 9.1% in 2,873 children and adolescents with diabetes between centers in 21 countries. To date, studies suggest that positive outcomes are influenced by consistent messages and philosophies by all team members, good psychosocial support, targets and structured consistent education to achieve active self-management. In addition, regular benchmarking exercises may contribute to better outcomes. Longitudinal analyses within the DPV project (www.d-p-v.eu) over the years in Germany and Austria included data from 30,708 patients documented in 305 diabetes centers between 1995 and 2009. After multiple adjustments, mean HbA1c within this network decreased significantly by 0.038% per year. The Swedish and Norwegian registries also includes longitudinal data for more than ten years. Although there may be a multitude of reasons for this improvement in the outcomes of paediatric diabetes, the longitudinal rather than cross-sectional electronic follow-up appears to be an important tool for local, national as well as international benchmarking and quality control circles. One approach for collecting international data is SWEET based on a partnership of established national and European diabetes organizations (www.sweet-project.eu) led by the International Society for Pediatric and Adolescent Diabetes (ISPAD). Thus, information technology allows transparent analysis of international real life diabetes treatment data for benchmarking as a basis for local center improvement, scientific studies and health economic analyses.

Symposium III: Is Diabetes a Trauma?

INV5
Implications of diabetes for psychosocial functioning among children and parents

V. Helgeson

Psychology, Carnegie Mellon University, Pittsburgh, PA, USA

Objectives: The first goal of this presentation is to review the impact of type 1 diabetes on psychological distress as well as other indices of psychosocial functioning, such as stress-related growth, among children, adolescents, and emerging adults. The question of whether youth grow or benefit in some way from the experience of living with type 1 diabetes will be examined as well as the impact of diabetes on parents own stress-related growth. The second goal is to examine the impact of relationships with friends, romantic partners, and parents on health outcomes among youth with type 1 diabetes.
Methods: Results of a meta-analytic review of case-control studies will be presented as well as results of a longitudinal case-control study of 132 youth with type 1 diabetes and 131 healthy controls (recruited when average age 12). The longitudinal study examined youth as well as parents and examined psychological distress as well as stress-related growth.
Results: The meta-analytic review revealed that youth with diabetes report more difficulties than youth without diabetes in terms of psychological distress, but the effect sizes are small and smaller in more recent studies. The longitudinal study showed that youth as well as parents do report some benefits from having diabetes, which may have implications for their overall psychological health. The longitudinal study revealed some group (diabetes versus healthy) differences in relationship functioning. Consistent with other research, the conflictual aspects of relationships showed stronger links to outcomes compared to the supportive aspects of relationships. In addition, relationships were more strongly linked to health outcomes among those with than without type 1 diabetes.
Conclusions: Explanations for these findings will be discussed and a set of future directions provided for psychosocial research on youth with type 1 diabetes and their parents.

INV6
Cognitive and non-cognitive factors associated with posttraumatic stress symptoms in mothers of children with type I diabetes

A. Horsch

Department of Child and Adolescent Psychiatry, University of Lausanne, Lausanne, Switzerland

Objectives: The experience of having a child diagnosed with IDDM can negatively impact on the parents well-being and trigger posttraumatic stress disorder (PTSD) in parents. Firstly, the most frequently identified diabetes-related traumatic stressors will be presented. Secondly, results of a cross-sectional study investigating the relationship between both non-cognitive factors (trauma severity, psychiatric history, social support) and cognitive factors (negative cognitive appraisals, dysfunctional strategies) and PTSD symptoms in mothers of children who had been diagnosed with IDDM will be shown. Thirdly, results examining the relationship between mothers PTSD symptoms in relation to their childs diagnosis of IDDM and their adherence to the diabetes treatment regimen will be discussed.
Methods: Data from structured clinical interviews and self-report questionnaires from a cross-sectional study of 60 mothers of children diagnosed with IDDM in the last 5 years will be presented.
Results: The diabetes-related traumatic stressor that most mothers identified was the moment when they first heard about their childs diagnosis. All cognitive variables were positively associated with PTSD symptoms. In contrast, of the non-cognitive variables, only social support was negatively associated with PTSD symptoms. Moreover, cognitive variables explained variance in PTSD symptoms over and above that contributed by the non-cognitive variables. Children of mothers with PTSD showed significantly poorer adherence to treatment than the children of mothers without PTSD. However, this was only the case for younger children where mothers played a more active role in their childs treatment.
Conclusions: Identifying and offering early support to mothers who develop PTSD symptoms in relation to their childs IDDM may be one way of improving their adherence to their childs treatment regimen, particularly for younger children.

INV7
Resilience and protection: achieving good outcomes in pediatric diabetes

M.E. Hilliard

Pediatrics, Baylor College of Medicine, Houston, TX, USA

The management of type 1 diabetes (T1D) is complex, demanding, and without respite, and the risk for suboptimal behavioral, clinical, and quality of life (QOL) outcomes is high. Depressive symptoms, diabetes distress, and family conflict are common behavioral complications of T1D that can interfere with effective self-management and impact glycemic control. These risks are particularly relevant during adolescence and transitional periods in diabetes. Yet in the face of the numerous challenges of diabetes management, many youth with T1D and their families demonstrate resilience and achieve excellent outcomes. Who are these resilient youth and families, and what is their secret? Although relatively less is known about factors that promote optimal diabetes outcomes compared to risk factors for poor outcomes, a number of protective personal, family, and environmental characteristics have been identified. The Diabetes Resilience Model posits that resilient youth with T1D and their families are those who achieve good adherence, QOL, and glycemic outcomes by using adaptive coping, communication, problem-solving, behavior management, and social skills to obtain diabetes-related support and to manage day-to-day diabetes stressors. The goal of diabetes resilience research and clinical practice is to develop and disseminate resilience-promotion interventions that recognize and reinforce the strengths of people with T1D and to apply those behavioral strengths for effective diabetes management. Additionally, several existing clinic-based and family interventions teach resilience-promotion skills and encourage developmentally appropriate parent involvement. Such approaches have the potential to help youth with T1D and their families overcome the many challenges of living with T1D to achieve resilience, including effective diabetes management, high diabetes-related QOL, and optimal glycemic outcomes.

Plenary Session II: Cultural Diversity 101: Providing Optimal Care in a Multi-Ethnic World

INV8

Promoting cultural competent services in health care: using the culturagram to work with an immigrant family affected by diabetes

E. Congress

Graduate School of Social Service, Fordham University, New York, NY, USA

Objectives: (1) Understand health disparities and immigrants: Do immigrants have poorer health outcomes? The healthy immigrant phenomenon, suggests that for some immigrant populations, first generation foreign born are actually healthier that their children. Poor social economic conditions and exposure to unhealthy diet along with lack of exercise have been seen as contributing to obesity among children and adolescents which can lead to an increase in type 2 diabetes.

(2) Recognize importance of cultural competent practice: Disparities in health outcomes has been attributed to social-economic and cultural differences. To meet the needs of an increasingly diverse population, providers in the health care professions have become committed to developing cultural competent skills for work with immigrants and their families. These skills are important in reducing health care disparities and negative outcomes.

Methods: This plenary will first explore challenges in providing health education and care to immigrants and then address a family assessment tool the *culturagram* that was developed to increase understanding of families from different cultural backgrounds. This tool addresses the following ten issues: reasons for migration, legal status, length of time in country, language spoken at home and in the community, health beliefs and care, impact of crisis events, religious and cultural customs, history and current discrimination, family values about work and education, and family values about structure, gender, and rules.

Results: A case example that focuses on an immigrant adolescent boy with type 1 diabetes and his family will be presented to illustrate how the *culturagram* can be used in professional work with immigrant families.

Conclusions: The *culturagram* has been found to be effective in working with different age and ethnic populations. More research is needed on the use of the *culturagram* with different immigrant populations and providers.

Symposium V: Early Detection of Kidney and Eye Disease in Type 1 Diabetes: Current Knowledge and Future Direction

INV10

Cardiovascular disease outcomes in childhood onset diabetes

K. Dahl-Jørgensen

Pediatric Dept. Ulleval, Oslo University Hospital, Oslo, Norway

Patients with type 1 diabetes have a two to threefold incresead risk of severe CVD compared to non-diabetics. The OSLO study demonstrated a close relationship between 18 years mean blood glucose and silent coronary atherosclerosis measured by intravascular ultrasound. This finding was supported by the DCCT/EDIC study some years later, demonstrating reduced frequency of cardiovascular events by intensified insulin treatment.

Increased frequency of cardiovascular risk factors has been demonstrated in a nation-wide population based study of intensified insulin treatment in children and adolescents with diabetes. They ate a more atherosclerotic prone diet and had less physical activity and increased inactive time compared to healthy controls. An increased level of HbA1c for every hour watching TV was reported. In a population based, controlled, prospective study Atherosclerosis and childhood diabetes using advanced imaging an increased frequency of early atherosclerosis was measured by carotid intima media thickness compared to healthy controls. Recently an increased vessel stiffness in aorta was demonstrated by MRI when compared to healthy controls.

The OSLO study group focused on mechanisms by which high blood glucose would increase diabetes vascular complications. Recently we described diabetic left cardiac ventricular dysfunction and related this to advanced protein glycation. We early demonstrated increased serum advanced glycation endproducts (AGE) in diabetic children. Recent data show that the most abundant AGE in serum, methylglyoxal-derived hydroimidazolone, is increased, and despite short duration of disease, is an independent risk factor for low grade inflammation indicative of an accelerated early atherosclerotic process in diabetic children. A glycemic memory exists, partly through the mechanism of glycation of collagens, that underline the importance of optimal blood glucose control also through childhood and adolescence to prevent CVD.

Symposium VI: Putting Mindfulness in Diabetes Care

INV11
Effective communication in the multi-disciplinary team: using video interaction guidance to reach the parts other patient safety programmes can't reach

A. Greene

Child Health, University of Dundee, Dundee, UK

Deficiencies in communication and teamwork have been identified as major contributors to poor clinical outcomes[1]. The WHO states that two-way-communication (attunement) is essential to workplace efficiency and the delivery of high quality and safe practice[2]. This is a major issue in type 1 diabetes, a self-managed illness, which relies on collaborative team work between health professionals, young people with diabetes and their families.

Video Interaction Guidance (VIG) is a strength-based psychological intervention used to enhance mindfulness through attuned communication skills training. This has been used successfully to improve professional and client situations in a variety of complex health and social situations; helping them to negotiate their own goals and manage their circumstances[3].

This presentation describes how we are using VIG as a quality-improvement tool to coach both patients and their multi-disciplinary teams (MTD) in communication skills. In particular, VIG is offered to the MTD and young people with diabetes as a way of supporting mindfulness of others in the consultation setting, open disclosure and the art of turning difficult conversations into learning ones.

Our background of anthropology and work with diabetes teams, who wish to improve services for young people, draws on the concept of reciprocity and its synergy with the method of VIG to suggest that the positive characteristics of tribalism, if nurtured carefully, can contribute to safer diabetes services.

References

1. Daniels et al. 2013.
2. WHO: Human Factors in Patient Safety 2009.
3. Kennedy H. et al. 2011.

INV12
Putting mindfulness into diabetes management with VIG

H. Kennedy

Psychology, University College London, London, UK

The presentation will start with an overview of how Video Interaction Guidance (VIG) works, the evidence-base and how it is used in healthcare settings in the UK and the Netherlands.

The theoretical underpinning of intersubjectivity will be introduced exploring how this links to mindfulness.

The importance of developing mindfulness and attuned intersubjective communication for both health professional and patient will be discussed and the way VIG supports strong mindful practice will be described.

The presentation will then chart the development of the use of VIG from the initial project with Diabetes UK handing over to Alex Greene to describe the current exciting VIG projects in Diabetes Care.

Reference

1. Vermeulen H, Bristow J & Landor M. (2011) *Mindfulness, Attunement and VIG: Being Fully present while Communicating* in H. Kennedy, M. Landor and L. Todd (Eds), *Video Interaction Guidance: A relationship-based intervention to promote Attunement, Empathy and Wellbeing* London: JKP

Symposium VII: Exercise: Benefits and Risks

INV13

Inflammation & exercise in children with obesity and type 1 diabetes

P. Galassetti

Pediatrics, UC irvine, Irvine, CA, USA

Obesity and type 1 diabetes (T1DM) are the two most common conditions of altered metabolism in children and adolescents. In both, similar long-term cardiovascular complications are known to occur, mediated in large part by underlying inflammatory and oxidative processes whose biochemical details remain relatively unclear. Physical exercise is a key modulator of inflammatory processes, and regular exercise has been shown to reduce cardiovascular risk. Single exertions, however, have been shown to exert pro-inflammatory effects, while exercise training improves anti-inflammatory status. This balance between pro- and anti-inflammatory effects of exercise may be altered in states of altered metabolism, such as obesity and diabetes, already characterized by elevated baseline inflammation. Through a series of experiments in these patient populations, over the last decade our laboratory has clarified a number of key issues in this field. Interestingly, while obese and type 1 diabetic children, often differed in the specific type and magnitude of molecular alterations, in both groups a clear exaggeration of inflammatory and oxidative activation was detected when compared to healthy, age-matched controls, both in resting conditions and in response to standardized exercise challenges. Our main findings include definition of resting and exercise-induced cytokine patterns and leukocyte profiles, of patterns of activation of immune cells in vitro, and correlation of the magnitude of observed alterations with severity of obesity and quality of glycemic control. Further, we have identified a series of alterations in growth factor profiles during exercise that parallel inflammatory changes in obese children.

Symposium VIII: Striving for Excellence in Diabetes Education

INV14

Does my practice have evidence to back it up? Using evidence to strengthen daily practice

M. McGill

Royal Prince Alfred Hospital, Camperdown, Australia

Evidence-based practice forms the fundamental cornerstone of a diabetes educators clinical practice. In additon to providing high quality education, skills development and support the diabetes educator must take responsibility for on-going progfessional development. Good sources of evidence are the Position Statements and Clinical Practice Recommendations published by the American Diabetes Assocation every January. As practitoners we often do not realise that commonly held dogma may in fact not be based in evidence eg in the Nutrition Guidelines for 2014 it is stated that little evidence exists to determine the ideal percentage of carbohydrate, fat and protein yet for many years the dogma has had set percentages. Equally important to evidence-based practice is the art of practice in which individualisation of care is essential and a strategy less than ideal may need to be employed in certain circumstances eg the young person who regularly omits insulin may need to be put on a simple insulin regimen of basal insulin only to keep them out of trouble. As well as on-going professional development diabetes educators need to protect themselves against burnout which is more common in a job that is repetitive eg teaching blood glucose monitoring and insulin injection technique, a common job description in many countries of the world. A strategy to reduce the potential for burnout is to integrate a simple research project into routine daily practice eg appying a validated questionanare to the clinic population. This can generate an abstract leading to a presentation, making work more interesting. Substantial evidence exists to back up our daily clinical practice but it remains the responsibility of the diabetes educator to ensure this is applied using both science and art so that the best patient outcomes can be achieved.

Symposium IX: JDRF Symposium: High Incidence and High Risk Populations

INV15
The environmental determinants of diabetes in the young (TEDDY)

M. Rewers & TEDDY Study Group

Barbara Davis Center for Childhood Diabetes, University of Colorado Denver, Aurora, IL, USA

While there is a strong genetic component to type 1 diabetes (T1D), the incidence of the disease has increased by 3–5%, annually, over the past 50 years, pointing to a powerful environmental cause, yet to be defined. The ultimate goal of TEDDY is to find cause(s) of T1D and modifiable pathways that could be exploited to prevent it. This NIH-funded consortium follows from birth 8,667 genetically high-risk children for development of persistent islet autoantibodies and clinical diabetes. These children have been identified through a newborn HLA-DR,DQ screening of 430,000 children in Finland, Germany, Sweden and the U.S. TEDDY is evaluating multiple dietary, infectious and other environmental factors that may trigger islet autoimmunity or determine the rate of progression to diabetes. As of May 2014, 581 TEDDY participants have developed persistent islet autoantibodies and 183 have progressed to T1D. These numbers are expected to reach an est. 800 and 400, respectively, as the follow-up continues until age 15 yr. Children are examined every 3 months until 4 yr of age and every 6 months thereafter. Genetic factors and questionnaire-derived environmental exposures are analyzed in the whole TEDDY cohort. Genomic, proteomic, metabolomics, metagenomic and dietary biomarkers are being analyzed in a nested case-control study including multiple serial blood and stool samples from the initial 419 cases and matched controls. This comprehensive characterization of children developing islet autoimmunity and T1D and matched controls is a one of the largest systems biology projects currently underway, to integrate environmental exposure data with genetic and longitudinally defined phenotype information.

INV16
Diabetes on the Rock: the epidemiology of type 1 diabetes mellitus in children 0-14 years in Newfoundland and Labrador (NL), Canada

L.A. Newhook

Janeway Pediatric Research Unit, Memorial University, St. John's, Canada

This presentation will report on the incidence of T1DM in children aged 0–14 years diagnosed over the period 1987–2013. Newfoundland and Labrador (NL) has one of the highest incidences reported worldwide. Genetic and epidemiologic features of this cohort will be reviewed. Possible reasons as to why there is such a high incidence will be discussed including research on the unique genetic background of the population, northern latitude and vitamin D insufficiency, the quality of drinking water, birth by caesarean section and early infant nutrition.

INV17
Increasing incidence of diabetes in Kuwaiti children: second nationwide registry among children below 19 years of age

A. Shaltout

Dasman Diabetes Institute, Paediatrics, Kuwait, Kuwait

Aim: To investigate and monitor the patterns in incidence of childhood diabetes in Kuwait using an nationwide electronic register.
Methods: Establishing an electronic record linkage of multiple data sources to create a diabetes register for Newly- Diagnosed Children and Youth with Diabetes in partnership with Dundee University and Aridhia Informatics as part of the Kuwait- Scotland Health Innovation Network. In a prospective, population-based incidence study, all newly diagnosed patients 0–19 years of age were registered by an information technology platform to create an electronic register for diabetes, type 1, type 2 and hybrid forms using a novel interface between different tiers in Kuwait and named the Childhood Onset Diabetes e Registry (CODeR) The diagnosis type was classified on the basis of clinical and laboratory findings according to ADA criteria. The online portal (http://www.dasmaninstitute.org/kuwait-scotland) was implemented as a Java web application using a server based at the Dasman Diabetes Institute, Kuwait. Via using Apple iPad devices, clinicians were able to use the web-based platform to enter data.
Results: During the observation period, over 900 children and young people with new onset diabetes have been registered from 1st January 2011 to 31st December 2013. Registration included demographic information and laboratory tests. In 2011, the incidence of type 1 diabetes of Kuwaiti children 0–14 was 37.1 (95% CI 31.4–42.8) compared to 20.9 (CI 18.8–23) in the period between 1992 and 1997, representing a 1.7-fold increase in incidence. Similar high incidence rates have been reported from the Kingdom of Saudi Arabia.
Conclusion: The incidence of type 1 diabetes in increasing in Kuwaiti children even faster than before and the number of new cases almost doubled in the last 20 years. CODeR represents a unique nationwide pediatric diabetes registry, and enables build up of rich phenotype dataset for linkage to genomic data in the future.

Plenary Session IV: Food Diversity and Child Health

INV18

Early childhood nutrition and later diabetes risk: birth to twenty cohort

S. Norris

MRC/Wits Developmental Pathways for Health Research Unit, University of the Witwatersrand, Paediatrics, Sandton, South Africa

Early postnatal rapid (catch-up) weight gain has consistently been linked to obesity during childhood and adult life. Catch-up infancy weight gain is transient and tends to be followed by growth faltering in low-income countries. We explored the hypothesis that even transient catch-up weight gain during infancy is associated with later obesity and diabetes risk and earlier puberty in a middle-income country.

Methods: 1,439 (692 males, 747 females) South African subjects of the Birth to Twenty (Bt20) prospective birth cohort underwent serial measurements of body size and composition from birth to age 18 years. At age 18 years, whole-body fat mass and fat-free mass were determined using dual energy x-ray absorptiometry. Fasting glucose concentrations were also determined.

Results: Catch-up weight gain from birth to age 1 year was associated with higher BMI ($p < 0.001$) and thicker skin folds ($p < 0.001$) at age 8 years and higher BMI ($p < 0.001$), whole-body fat mass ($p < 0.001$), whole-body fat mass to height ratio ($p = 0.002$) and whole-body fat mass to fat-free mass ratio ($p = 0.01$), and higher glucose concentrations at age 18 years. These associations persisted after adjustment for sex, gestational age, current age and household socio-economic status. Catch-up infancy weight gain was also associated with younger age at menarche ($p < 0.001$). This association persisted after adjustment for gestational age, household socio-economic status, smoking during pregnancy, birth order and formula-milk-feeding ($p = 0.02$).

Conclusion: Transient catch-up weight gain from birth to age 1 year in children born in a low-income area of South Africa was associated with adiposity at age 8 and 18 years and earlier menarche. This observation is important in terms of public health policy as it suggests that directly modifiable determinants of infancy weight gain may be targeted in order to try and reduce the risk of later obesity and diabetes risk.

INV19

The impact of food and beverage advertising to children: evidence from a series of UK studies and implications for policy

E.J. Boyland, J.C.G. Halford & Appetite Obesity Research Group

Department of Psychological Sciences, University of Liverpool, Liverpool, UK

Objectives: To explore:

1. the exposure of children to food advertising within the context of a changing regulatory landscape,
2. the power of that advertising (e.g. the use of persuasive techniques),
3. the effect on food preferences, choices and consumption and
4. the role of situational factors and individual susceptibilities in determining food advertisement responsivity in children.

Methods: A series of experimental studies were conducted with children aged 6–13 years, typically using the framework of a robust, within-subjects, counterbalanced cue-exposure paradigm. In this paradigm, children were exposed to both food and non-food (toy) advertising followed in each instance by the administration of a food preference checklist, forced food choice measures or an *ad-libitum* eating opportunity. In addition, large content analyses of both TV food advertising and in-store promotional marketing aimed at young people were conducted.

Results: Despite the introduction of statutory legislation governing the advertising of high fat, sugar and salt (HFSS) foods on TV in the UK, children are still exposed to extensive promotion of these foods and techniques of particular appeal to children are still evident and highly effective. All children over consume after exposure to food advertising. However, highly neophobic children (those with a high level of fear of new foods), overweight and obese children and those who habitually watch a lot of commercial television may be most susceptible to the detrimental dietary effects of exposure.

Conclusions: Acute, experimental food advert exposure promotes consumption and affects food preferences towards energy-dense product categories. This, along with other factors, may contribute to the energy imbalance that leads to weight gain and poor health in children. Regulation can be useful but the current UK system has notable gaps. The implications for policy in the UK and elsewhere will be discussed.

Symposium X: Debate: Is New Technology Improving Diabetes Care in Children and Adolescents

INV20

Not perfect yet. . .but definitely better: new technology has improved diabetes care for children and adolescents (Pro Argument)

M.L. Lawson[a,b,c]

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Pediatric diabetes care has changed dramatically over the last 20 years with technological advances leading to new and improved insulins, meters, pumps, continuous glucose monitoring, and data management software. Evidence will be presented to demonstrate that these technologies have improved care and outcomes for children and adolescents with diabetes.

INV21

Is everything new necessarily better? The pros and cons of new technology

C. Acerini

Department of Paediatrics, University of Cambridge, Cambridge, UK

In this lecture, evidence will be reviewed that suggests that the introduction and integration in recent years of medical technologies, such as continuous insulin infusion pumps (CSII) and continuous glucose monitors (CGM), into daily diabetes care has not met with the degree of success and potential expected of it. Clinical observations, including those from controlled trials, have shown that CSII results in improved quality of life, but that modest improvements in blood glucose levels are invariably associated with regression in glycaemic control over time. Similarly, devices designed to give patients more information, including regular use of CGM, do not necessarily impact positively on clinical outcomes. This is evident especially in younger patients with T1D, where CGM produces nonsignificant incremental benefits in HbA1c compared with standard care, and is likely because of reduced levels of device usage. Furthermore, the design and results of these clinical trials are difficult to generalise and extrapolate within the context of a standard clinic population; and the longer-term health economic benefits of the use this technology are far from certain.

The patient-medical device interface is clearly a complex paradigm, and central to its success is the degree of adherence, understanding and engagement demonstrated by the patient with the technology. The introduction CSII/CGM technologies into the daily routine care of the patient, and the need to into interact with them continually, potentially imposes both psychological and time-effort burdens that many patients with T1D will find demanding. The current application of these devices cannot therefore be considered a panacea for the self-management of T1D, and raises a number of challenging issues, including those of a practical, ethical, health-economic and societal nature that need to be resolved before it and other emerging technologies can be considered to have achieved this status.

Symposium XII: Meet the Experts 2

INV9
Meet the experts

L. Lowes

School of Healthcare Sciences, Cardiff University, Cardiff, UK

Professor Lesley Lowes is the Florence Nightingale Foundation Chair of Clinical Nursing Practice Research in Cardiff. This collaborative post between Cardiff University School of Healthcare Sciences, the Foundation, and Cardiff and Vale University Health Board is designed to support clinical nursing research capability and capacity in Wales. Lesley has held a dual clinical academic nursing role since 1999. From 1995 to 2013, the clinical aspect of her role, as a senior paediatric diabetes specialist nurse, concerned the care of children with diabetes and their families. In 2010, she was awarded the inaugural All Wales Outstanding Achievement Award for Nursing and Midwifery. Lesley has a wide range of research interests including childhood diabetes, theories of grief, loss, adaptation and change, service users involvement in research and children/young peoples and parents experiences of health care. She has been key to the development of a sustained and progressive programme of research and is currently Chief Investigator on two competitively funded studies, one a feasibility study and the other, a multicentre randomised controlled trial. She is primarily a qualitative researcher and is a recognised expert in the involvement of service users in the research process. She has an extensive publication portfolio comprising research papers, evidence-based papers and expository articles in academic and professional journals. Her strategic approach to publication ensures that evidence accrued through scholarly activity is also disseminated to nurses in clinical practice. Lesley is an ambassador for the Florence Nightingale Foundation, demonstrating academic leadership in nursing and promoting the translation of research directly into clinical care to enhance the patient experience.

Symposium XI: VIDIS Symposium

INV22
Viral interactions and type 1 diabetes (Teddy cohort)

H. Hyöty

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Several studies have shown that viruses can cause diabetes in animals but studies in human type 1 diabetes (T1D) have been hampered by the complex nature of the disease pathogenesis and the long subclinical phase preceding clinical T1D. The group of enteroviruses is currently considered as the strongest candidate for diabetogenic viruses in man. These viruses have associated with T1D in epidemiological studies and they have been found in the pancreas of T1D patients. On the other hand, viruses may also have a protective effect against T1D as suggested in mouse studies. The role viruses is currently being evaluated in large international research efforts. Some of these studies aim at identification of viruses from the pancreas of T1D patients (e.g. nPOD and PEVNET studies) while others are prospective birth cohort studies following children who have increased genetic risk of T1D (e.g. DIPP, BabyDiab, MIDIA and TEDDY studies). TEDDY (The Environmental Determinants of Diabetes in the Young) study is a large international birth cohort study which evaluates possible role of a wide range of different environmental factors including virus infections. It collects data about clinical infections using comprehensive questionnaires and identifies virus infections by analyzing blood and stool samples taken from the participating children during their follow-up. Metagenomic analyses are carried out using next generation sequencing technologies to identify possible diabetes-associated changes in gut virome and viruses present in plasma. This is the largest effort to date to evaluate the role of several different viruses using an exploratory-type approach without a priori virus-specific hypothesis. In addition, it will give important information about the main candidate viruses such as enteroviruses. The first results of the study suggest that virus infections modulate the risk of islet autoimmunity.

INV23
What can organ donor specimens tell us about type 1 diabetes?

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Type 1 diabetes is a chronic autoimmune disorder resulting in the destruction of the insulin-producing pancreatic beta cells, likely due to a poorly understood combination of genetic, environmental, and immune responses. The nPOD program recovers transplantation quality pancreas, along with immune organs such as spleen, pancreatic lymph nodes, and blood (PBMC) from organ donors throughout the United States. In addition to recovery of donors with type 1 diabetes, control donors include those without pancreas disease, and in some, those with type 1 diabetes autoantibodies. Donors with type 2 diabetes, cystic fibrosis, gestational diabetes, and other conditions are also recovered to aid in understanding the full spectrum of pathophysiological mechanisms affecting the pancreatic beta cell.

One central processing laboratory at the University of Florida, Gainesville, FL, conducts standardized procedures for sample formats intended to provide for current and future cutting edge investigations. Baseline histology characterizations are performed of the pancreas with images of the staining results provided though whole slide digital scans. Uniquely, these samples are provided without expense to investigators working world-wide on prevention and therapeutic strategies. Workgroups are highly encouraged thereby bringing together multiple investigators with different expertise to foster collaborations in areas of critical need. The nPOD-Viral workgroup is composed of more than twenty laboratories whose studies focus on a potential viral etiology for type 1 diabetes.

This presentation will provide key histopathological findings from nPOD including insulin-producing beta cells in chronic type 1 diabetes, immune cells in islet inflammation (insulitis), and pancreas weight reductions. Natural variations in histopathology observed from these organ donors could provide for mechanistic differences related to etiological agents, including those ascribed for viruses.

INV24
Enterovirus infections and type 1 diabetes - can a vaccine test causality?

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Despite numerous observations supporting a possible role for enteroviruses in some cases of type 1 diabetes (T1D), proof that enterovirus infections are involved in T1D is lacking. A way to test their involvement in T1D could be to develop a vaccine. This is nonetheless a challenging task due to the existence of over 100 different members in the enterovirus genus. The use of a vaccine against a virus suspected to induce an autoimmune disease could also be associated with a risk if the vaccine itself induces an autoimmune reaction via for example molecular mimicry. Another important bottleneck is that vaccine effectiveness is low in neonates and young infants, while enterovirus infections are common already before the age of 3 months.

Here the preclinical testing of the efficacy and safety of a new prototype vaccine against a selected enterovirus will be discussed. Using well-established and relevant experimental model systems we have tested the vaccines potential to block virus infection. We have also investigated whether such a vaccine has undesired effects by triggering or accelerating autoimmunity. Finally, we have studied whether maternally transferred antibodies can provide protection from infection and T1D development in young offspring.

Plenary Session V: Societal Impact of Diabetes

INV25

What to learn from a registry?

R.W. Holl & Austrian/German DPV-registry

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Registries in pediatric diabetology differ by aim and scope. Most registries primarily count newly diagnosed patients, evaluating incidence and prevalence of the disease. Other registries follow patients longitudinally, evaluating the quality of care provided. Many registries operate on a regional or national basis, but increasingly, binational or multinational registries are emerging. While many registries focus on medical aspects of pediatric diabetology, and relevant data are often provided by the medical service, other registries include patient-reported data, parent-reported data, or link data to other sources like hospital records, pharmacy databases, mortality statistics etc. Among other topics, longitudinal registries have been used to study the medical and educational therapy provided, as well as the frequency and risk factors for acute (DKA, hypo) or chronic (retinopathy, nephropathy) complications. A new, but increasingly relevant use of registries are economic analyses, providing estimates for direct, in some cases also indirect, costs of diabetes, including the view of the affected family, the insurance/health care system, as well from a societal perspective. Studying rare types of diabetes or unusual courses of the disease, or selecting patients for participation in prospective intervention studies, are further, more scientific uses of registries. Comorbidity, for example celiac disease, psychiatric disease, or immunologic disorders are a further topic to address in registries. Increasingly, clinical registries are combined with biobanks for DNA and/or other biosamples. The protection of personal data and longterm funding are a highly important aspects for registries. Finally, information technology and competent biostatistics, including methodology for observational data and repeated measurements, is required. These aspects will be explained by examples from the Austrian/German DPV-registry, but also from other registries from around the world.

INV26

Resourcing diabetes care in low and middle income countries

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Few official voices speak globally for childrens interests in matters of essential medicines; fewer still address the barriers to affordable insulin and supplies in resource-limited countries. Lack of data on disease prevalence and health expenditures, competing interests from adult diabetes needs, problems with insulin distribution, syringes and strips, lack of personnel and even traditional beliefs contribute to official apathy and neglect resulting in appalling rates of complications and early mortality. The praise-worthy successes of advocacy organizations such as the International Insulin Foundation, T1 International, Life for a Child and many others attest to the failure of governments to address these issues. What else can be done? The recent Joint WHO/World Bank initiative for Universal Health Coverage as a primary human right was supported by the IDF calling for equity in access to insulin but still not highlighting the plight of youths with diabetes. Focusing on availability and cost are unlikely to resolve this on-going tragedy. A simplified situational analysis, differential price initiatives, less reliance on expensive cartridges and analogs, removal of patents and VAT, improved infrastructure, trained personnel and family empowerment are among achievements already attained in some underserviced regions. An international template for action is urgently needed combining the forces of a socially responsible corporate, the countrys general paediatric establishment and local professional or lay champions backed by international organizations to help implement locally owned solutions with inexpensive interventions towards achievable goals. A strong political will from decision makers will then be required to influence government policy, reorient health systems, establish a national diabetes strategy and remove constraints to effective diabetes care accessible to all, hopefully reducing the appalling helplessness and prognosis of youths with diabetes.