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Annual Conference 2014 Highlights

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The 40th anniversary 2014 ISPAD meeting took place in Toronto, Canada. Our Conference Presidents, Jill Hamilton and Denis Daneman, invited us to a place well known for its diversity and most importantly for Banting and Best's discovery of insulin in 1922. An impressive historical overview of the discovery of insulin presented by Micheal Bliss started off the annual meeting and what followed over the next 4 days was an exciting scientific program that highlighted the conference's theme, Diversity in Diabetes.

Environmental influence on diabetes risk

As one potential modifier of the development of islet autoimmunity in genetically predisposed individuals, the gut microbiome was discussed. Non-obese diabetic (NOD) mouse models were used to show gender effects/differences of gut microbiota (Danska). The differences in gut microbiota between male and female NOD mice increase with age, particularly after puberty, and an androgen-dependent mechanism was identified to play a preventive role. Whether these interesting associations occur in humans needs further research, as well as how these approaches in studying the gut microbiome and virome can be incorporated into large human multi-centered studies (Petrosino) which are assessing the environmental determinants of diabetes, such as the environmental determinants of diabetes in the young (TEDDY) and network for pancreatic organ donors with Diabetes (nPOD) study.

In the TEDDY project (Rewers) with 8500 children enrolled with high-risk human leukocyte antigen genotypes, 600 to date have developed islet cell antibodies, and 100 children developed type 1 diabetes. The highest incidence of islet cell antibodies appears to occur within the first 2 yr of life, irrespective of the country of origin of the child. Early results suggest that probiotic exposure within the first 3 months of life is associated with a 30% reduction in risk of islet autoantibody development, while greater weight gain in the first year of life is associated with a small increased risk. Ongoing data analysis including of genomics, proteomics, and metabolomics will continue as this cohort of children is followed through to 15 yr of age.

Endocrine autoimmunity: mechanisms and consequences of autoimmune conditions

Gut permeability is discussed as modulator of environmental triggers causing autoimmunity (Fasano). Zonulin, regulating the permeability of tight junctions, is a potential modifiable factor of the gut mucosal barrier. In animal models, inhibition of Zonulin lead to decreased gut permeability and reduced islet

autoimmunity. Whether or not celiac disease is an additional risk factor for the development of diabetic complications was discussed (Simsek). Because of heterogeneity of patient populations, evidence is unclear, but observations of adults with celiac disease for more than 10 yr suggest that they appear to have higher rates of both microvascular and macrovascular complications.

Diabetes epidemiology and registries

The importance of diabetes registries was expressed by describing how the International Diabetes Federation, Life for a Child Program is gathering data about diabetes incidence using registries in under-resourced countries such as Fiji, Maldives, Mali, and Mauritania (Ogle). The pediatric diabetes registry established in Kuwait demonstrates a high and increasing incidence of type 1 diabetes within the country (Shaltout). Epidemiologic data and registry data can help to improve diabetes care by gathering more detailed information about needs and potential risk factors for worse outcome (Holl). The Norwegian Childhood Diabetes Registry (Gagnum) has shown that the mortality rate in diabetes is decreasing over time, although the standard mortality ratio is 3.6 times higher than in the general population. Using data from the Quebec Birth Cohort (Rousseau), type 1 diabetes incidence did not differ by the rate of Bacillus Calmette–Guerin (BCG) vaccination. The Type 1 Diabetes Exchange registry (Fox) showed that having a parent with type 1 diabetes does not affect glycemic control, but the risk for ketoacidosis at diagnosis is significantly decreased. These and other interesting results gathered from registries, and comparison of registries, were presented throughout the meeting.

Clinical effectiveness of interventions and regimen-based innovations

After implementation of the diabetes control and complications trial/epidemiology of diabetes interventions and complications (DCCT/EDIC) findings which led to a radical change in overall diabetes care including basal-bolus-insulin regimens and pump use, a dramatic drop of mean HbA1c levels was observed (Cameron). For further improvement, setting a clear HbA1c target may be a key to success as recent comparison data of diabetes registries between countries and continents have suggested. Insulin pump treatment is broadly used as shown by comparing data on insulin pump use and glycemic control from three large registries and five countries: the USA, England, Wales, Germany, and Austria (Maahs). HbA1c was lower in pump vs. injection treatment in all of these countries, and age distribution of pump users differed between continents with a lower age in Europe than in the USA. New input on pump treatment may come through new tools for adjusting boluses (Trend Arrow Adjustment Tool) based on insulin sensitivity factor (Heffernan) and frequent use of automated bolus advisors, which can lead to better glycemic control with no increase in hypoglycemia (Ziegler). Prevention of hypoglycemia in individuals prone to nocturnal hypoglycemia can be performed by the automatic suspension/interruption of basal insulin with reduction of the weekly rate, mean duration, and mean severity of hypoglycemic events (Weiss).

Cardiovascular disease outcome

An overview of the Norwegian studies performed to monitor cardiovascular (CV) risk in young patients with type 1 diabetes (Dahl-Jørgensen) showed that 86% of patients had one or more risk factors and 45% have two or more risk factors for the development of atherosclerosis. In regards to implications of glycemic memory, the speaker highlighted that reduction of HbA1C will take several years before substantiating a preventive effect. Therefore, CV risk factors should be assessed periodically; life style modifications to prevent obesity and insulin resistance should be introduced; and HbA1C, blood pressure, and lipid targets should be reached by all efforts. Summarizing several cohort studies on microvascular complications, Donaghue reported a decline in diabetic retinopathy, which is a promising observation. Hyperglycemia-induced increased hyper filtration and urinary cytokines/chemokines excretion as urine inflammatory markers play a role in early detection of diabetic nephropathy (Cherney).

Obesity and type 2 diabetes

A clinical scoring system utilizing body mass index, ethnicity, and age (Von Oettingen) permits the type of diabetes to be correctly ascertained, obviating the need to test pancreatic autoantibodies in 90% of patients. Insulin resistance, genetic markers, and polymorphisms (DEPTOR 5/UTR, Kotnik; hepatic nuclear factor 1 G319S polymorphism, Sellars) may be of further help in diabetes classification. Youth with type 2 diabetes that have different phenotypes at diagnosis may have different pathophysiology (Sellars).

Food diversity and child health

The concept of fun was the most commonly used persuasion in food ads to target children and the most commonly used for adults and teens was taste. The impact of food branding and advertising on children is impressive (Boyland) as shown in the Liverpool study

with exacerbated brand choice when linked to toys and a celebrity endorser. Regarding eating in absence of hunger as a pathway for childhood obesity, no study has yet examined whether TV advertising may specifically provoke it, as the study showed that food advertising exposure increased food intake in all, but especially in overweight and obese children.

Exercise and diabetes – benefit or risk?

Even young children with type 1 diabetes are less fit than children of the same age, possibly due to fear of hypoglycemia and less exercise (Jones). Although the increased risk of hypoglycemia is evident, clamp studies have shown that irrespective of exercise intensity, the amount of glucose needed to maintain euglycemia during sport is no more than 15 g per hour. Therefore, planning exercise in advance with adaption and correction of insulin dosage can avoid hypoglycemia. The global TEEN study (Hanas) demonstrated that exercise ($\geq$30 mins/wk) was associated with HbA1c target attainment.

In indigenous children and adolescents with type 2 diabetes, activity programs showed that participants had attenuated weight gain and improved healthy living knowledge (McGavock). Focusing on inflammation and exercise in obese children with type 1 diabetes, Galassetti suggested that there might be suboptimal health conditions where exercise is less beneficial, and leads to inflammation. Patients with poor glycemic control, prior hypoglycemic events, obesity, and lipid ingestion lead to impaired glucose counter regulations.

Diabetes and mental health

The diversity of mental health issues in youth living with diabetes underlines the need of psychological support for both, the mother (Horsch) and child. Identifying what makes some patients more resilient in their diabetes management than others is important to help families overcome struggles with type 1 diabetes (Hillard). Different coping styles between individuals, as well as between males and females, had varying effects on glycemic control (Mass-van Schaaijk). Investigation of the various types of conflicts in families and the parent/teen conflict environment, can help determine better interventions to improve care (Lopez-Henriquez). The multinational TEENs study showed that family conflict and living with a single parent are significant risk factors for not attaining glycemic targets (Laffel).

Diabetes education

The global TEENs study demonstrated yet again that there is an increased need for education on fundamental disease management and dietary issues (Waldren). A total of 40% of patients, who monitored food intake by carbohydrate counting, attained HbA1C target. To improve lives of children with diabetes and fight discrimination, the kids and diabetes in schools (KiDS) project was developed to inform school staff, parents, and children about the needs of children with type 1 diabetes at school, and provide information about prevention of type 2 diabetes (Chaney). A Global Diabetes Information Pack (GDIP) was developed for use in India and Brazil to meet cultural and local needs. GDIP is available for free in seven languages on the IDF website and is supported by an App. An online type 1 diabetes educational module for school teachers (Aubrey) was effective in Canada. Online education helped to improve and maintain diabetes knowledge in school teachers. However, online education is not always a preferred method of education, although it has the ability to disseminate knowledge simultaneously to large groups.

The attitude of health care providers toward diabetes had a significant impact on newly diagnosed patients (Gajewski). A survey of health care providers regarding facilitators and barriers to adhering to clinical practice guidelines for the management of youth with type 1 diabetes identified lack of time, lack of resources (i.e., access to mental health professional or social worker), and patient preferences (parents liked higher targets) as common barriers (Khatchadourian). To improve health professionals attitude, the ISPAD Science School for health care professionals gives positive impact in terms of knowledge, confidence, involvement in research, and career development (Aschemeier).

SWEDIABKIDS, the Swedish pediatric diabetes quality registry (Samuelsson), demonstrates that participation of pediatric diabetes teams with access to a quality register in an improvement collaborative could facilitate improvements in the quality of care.

The theme of the 2014 ISPAD Meeting was Diversity in Diabetes, and therefore it was fitting for F. Bonnici (South Africa) to give the closing Plenary Session on resourcing diabetes care in low and middle income countries. He emphasized that children need advocacy for their health care needs as they are voiceless, and their needs are eclipsed by the health care needs of adults. In resource-limited countries, there is lack of data on disease prevalence, health care expenditures, in addition problems with insulin distribution, syringes, and strips, lack of pediatric professionals, traditional belief and neglect all contributing to the increasing rates of complications, and early mortality in children with diabetes. Other barriers to care are poverty, lack of education, and unstable political situations. He emphasized that simple solutions need to be sought that have successfully worked in

other underserviced areas such as pricing initiatives, cheaper insulin (not analogs), trained personnel, and other alternate options in care. It is important to acknowledge the efforts of advocacy organizations such as Insulin for Life, Life for a Child, International Insulin Foundation, and Changing Diabetes in Children. IDF has supported the joint World Health Organization/World bank initiative for Universal Health Coverage as a primary human right along with equity in access to insulin. A worldwide initiative is required from professional and political decision makers to remove constraints to effective diabetes care accessible to all. He left us with the thought that we need passionate, inspirational, and indignant pediatricians and professionals to reduce disparity in diabetes care among youth.