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### Title

IDF21-0157 Trends in Severe Hypoglycemia, Hyperglycemia, and Diabetic Ketoacidosis among American Indian and Alaska Native Peoples

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diabetes complications, hospitalization cost & premature mortality in BC; despite a younger FHA population.

The CFP clinic is an exception with more elderly, Caucasian patients; better diabetes outcomes, performance measures & indicators (compared to FHA & compared to BC provincial data) such as:

- Only 1 lower limb amputation & 3 new renal dialysis cases over 11-years (2007-2018)
- Lower diabetes cardiac co-morbidity (CAD 20.3%) vs. FHA 43.9%, BC 44.2%
- · Lower emergency department visits & hospitalizations
- Decreased family physician (GP all-cause) visits every 8 weeks (CFP) vs. every 5 weeks (FHA, BC)
- Higher Hb<sub>1c</sub> & Lab Testing (2.50 HbA<sub>1c</sub> tests/year); with acceptable HbA<sub>1c</sub> 7.4% (more CFP elderly)
- Lower mean BMI & smoking after new diabetes diagnosis
- Lower diabetes incidence & prevalence

**Discussion & Conclusion:** According to BCPD-KT, the current state of diabetes as an ambulatory-care-sensitive-condition indicates that the overall primary healthcare system is inadequate throughout BC & Canada. Restricted access to diabetes resources contributed to 80% of diabetes care provided by family physicians in BC & Canada. Without coordinated BC provincial diabetes care planning or services, a fragmented, non-standardized patchwork has high impact on the entire healthcare system & negative outcomes (similar across Canada).

Among the exceptions is the successful, 2007-established Chilliwack CFP primary healthcare, team-based clinic with 5 GPs; & 1 private/clinic-funded nurse with advanced clinical skills (diabetes educator, foot care) for primary healthcare & chronic disease management, onsite 4 days/week.

This practical, proven & evidence-based model is more effective diabetes care management for BC & Canada. Substantial variation exists between the Chilliwack CFP primary healthcare clinic, its FHA geographical/regional catchment area & BC; for diabetes outcomes, performance measures & indicators; despite an elderly CFP population.

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#### IDF21-0147

#### Setmelanotide activates MC4R via distinct signaling pathways in a tissue-specific manner

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**Background:** Melanocortin 4 receptor (MC4R), a notable component of the leptin-melanocortin system, regulates appetite, body weight, and energy homeostasis. MC4R is mediated by the melanocortins, a group of peptide hormones that include adrenocorticotropic hormone (ACTH), melanocyte-stimulating hormone (MSH), and Agouti-related peptide (AgRP). MC4R belongs to the group of G protein-coupled receptors (GPCRs). MC4R has been a promising target for the treatment of obesity for a long time. However, animal studies reported serious cardiovascular side effects with the many tested MC4R agonists. Therefore, despite the positive effects on body weight and food intake, these side effects delayed the development of a pharmacological therapeutic option. In November 2020, a new weight-control drug called Setmelanotide was approved by FDA for the treatment of severe genetic obesity in patients suffering from POMC deficiency or leptin receptor deficiency. Our aim from this study is to understand why MSH has cardiovascular side effects while Setmelanotide doesn't. Our hypothesis is that Setmelanotide can activate MC4R via different signaling pathways than MSH. We are using several cell lines (HEK-MC4R, GT1-7 Hypothalamic cells and Human skeletal muscles). We are studying both G protein-dependent (cAMP) as well as G protein-independent (ERK1/2 phosphorylation and Insulin signaling) pathways. We detect distinct MC4R activation by Setmelanotide of the different signaling pathways in a tissue-dependent manner.

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#### IDF21-0157

Trends in Severe Hypoglycemia, Hyperglycemia, and Diabetic Ketoacidosis among American Indian and Alaska Native Peoples L. Jiang<sup>a</sup>, J. Chang<sup>b</sup>, M. Reid<sup>c</sup>, L. Grau<sup>c</sup>, J. Beals<sup>c</sup>, A. Bullock<sup>d</sup>,

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**Background:** American Indian and Alaska Native peoples (AI/ ANs) suffer daunting disparities in diabetes and its complications. Little is known about rates of and changes in acute diabetes complications among AI/ANs.

Aim: Here we investigate the time trends of hospital admissions and emergency department (ED) visits for hypoglycemia, hyperglycemia, and diabetic ketoacidosis (DKA) from 2009 to 2013 among AI/AN diabetes patients.

Method: Data were extracted from the Indian Health Service's (IHS) National Data Warehouse and related electronic health record databases. A total of 48,871 AI/AN adults with diabetes who used IHS services during any of the fiscal years 2009-2013 were included. Observed rates of hospitalizations or ED visits due to each complication were calculated for each year. Generalized estimating equation models with a binomial distribution and logit link were fitted to examine the time trend of each complication.

**Results:** The proportions of AI/AN diabetes patients with severe hypoglycemia (1.35% in 2009 vs. 0.70% in 2013), hyperglycemia (1.72% vs. 1.44%), and DKA (0.54% vs. 0.43%) that led to hospitalizations or ED visits all declined gradually. Male patients and those with Medicaid enrollment had substantially higher rates of these complications across five years, while patients with private insurance had significantly lower rates of them.

**Discussion:** AI/AN adults with diabetes had significant improvements in both hypoglycemic and hyperglycemic crises from 2009-2013. Our findings further support the effectiveness of the systematic diabetes management approach implemented by the IHS in the past few decades.

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#### IDF21-0163

The usefulness of low-intensity physical activity management for malaise in type 2 diabetic patients after ablation A. Kimura

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**Background:** The number of patients with type 2 diabetes mellitus with severe arrhythmias is increasing. The number of ablation procedures for these patients is increasing in Japan. Postoperative general malaise has been reported as a symptom of reduced daily activity. In this study, we applied the low-intensity physical activity management (PAM) technique to improve the symptoms of HIV and longCOVID.

Aim: To report is the data and subjective evaluation of the progress of the application and appropriate use of low-intensity physical activity management techniques to improve the symptoms of daily inactivity due to general malaise experienced by myself.

Method: The patient was 35 years old with type 2 diabetes mellitus. 19 years after the onset of the disease, A1C increased from 6.2% to 12%, SGLT2 was increased and lowered to 9.0%. Shortly afterwards he developed severe atrial fibrillation and underwent an ablation procedure in August at the age of 55. Postoperatively, the patient developed a right recurrent nerve palsy. Afterwards, the patient developed significant dyspnea, and oxygen was administered for 48 hours. Seventy-two hours after the operation, the patient was released from respiratory control and developed marked general malaise and fatigue immediately after movement. PAM was performed using a POLAR M430 active tracker with 24-hour pulse and postural recording and a SPO2 meter. General malaise and daily inactivity were assessed using a 10-point scale, and the number of times per day that the heart rate increase immediately after an ADL activity exceeded 100 beats per minute (the number of spikes) was monitored. When HR 100 and SPO2: 85% or lower for all activities, PAM was performed for 2 months with a measure of 10 minutes of complete rest (based on left lateral recumbency).

**Results:** After discharge from the hospital, the general malaise (M) was 9, the decrease in daily activity (PA) was 8, and the rapidity frequency (T) was 20. This was followed by 2 months of measure B, estimating preoperative ADL physical activity and selecting priority activities using the so-called spoon technique (SPT). M8, PA7, T15. no reduction in beta-blockers. 6 months later, M8, PA7, T12. no improvement in subjective malaise. 15 for 40 kcal/day. After 9 months, marked dyspnoea and pulmonary edema due to recurrent nerve palsy, SPO2 dropped to 82%. Off beta-blockers. Resting heart rate averaged(rHR) 70 to 90 bpm; M7, PA6, T15; A1C 12%. After this, exercise is taken off. After 12 months, M6, PA5, T10, resting HR level of 80 bpm. A1C of 11.5%. 15 months later, SPT for 2 months. M5, PA4, T8, rHR level of 70 bpm. A1C of 10%. PAM completed at 18 months. M3, PA3, T2. rHR66 bpm, A1C of 9.0%. Anxiety about developing motor fatigue associated with activities of daily living disappeared.

**Discussion:** Low-intensity physical activity management techniques, together with glycaemic control, were effective in treating symptoms of reduced daily activity due to general malaise, using active trackers and SPO2 meters. We present an example of the use of low-intensity physical activity management as a method of improving these symptoms.

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#### IDF21-0173

Relationship between periodontal disease and gestational diabetes mellitus: A systematic review

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**Background:** The scientific evidence on the links between periodontal disease and diabetes was presented in a recent consensus report of a joint workshop by the International Diabetes Federation and the European Federation of Periodontology. For the specific case of gestational diabetes mellitus (GDM), this consensus report stated that there was still insufficient evidence of a link between the two conditions.

Aim: The aim of this systematic review is to analyze the studies evaluating an association between periodontal disease and GDM.

Method: The preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement was used as a guideline for the methodology of systematic reviews. A literature search was performed in January 2021 using the PubMed/MEDLINE database on articles published in the last ten years. The inclusion criteria were original clinical studies, systematic reviews or metaanalysis treating on the links between GDM and periodontal disease. A total of 16 articles have been included in a qualitative synthesis.

**Results:** Among the 16 articles included we had 12 original studies (2 cross-sectionals, 4 case control, and 6 cohort or follow-up) and 4 systematic reviews (SR) or meta-analyses (MA). Four themes were explored: links between obesity and periodon-tal disease (one cross-sectional study, one cohort), links between gingivitis and GDM (two case-control studies), links between periodontitis and GDM (one cross-sectional, two case-control, two cohort studies and four SR/MA), consequences in post-partum in case of periodontal disease and GDM (three follow-up cohorts).

Regarding the links between obesity and periodontal disease, both studies showed a significantly higher frequency of periodon-