American Association of Diabetes Educators

Research Update 2019

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AADE American Association of Diabetes Educators

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Dr. Dennis Pillion - None

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Learning Objectives

- 1. Compare and contrast the health care team's role at **diabetes camp** this year versus previous years. Describe how the team handled the challenges of allowing new technology, including **cell phones**, at camp and the potential **measles** outbreak of 2019. Describe how the team can create a positive learning environment for **health care students** as well as for campers.
- 2. Discuss the impact of breaking **research** including the team's approach to using **nasal glucagon**.
- 3. Explain the impact of previous research studies on the team's approach to the treatment of T1D and T2D.

1. What happened at diabetes camps in 2019:

a. cell phones in camp!?! (Oh my!!)

b. measles (prepare for the worst and hope for the best)

c. outcomes research on nursing student, nutrition student and pharmacy student learning at camp

d. development of a new diabetes knowledge test to quantitate knowledge acquired at diabetes camp

e. the need for an equivalent to diabetes camp for teenagers and young adults who get diagnosed with T1D after the age of 18

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Cell phones in camp!?! (Oh my!!)

- Continuous glucose monitoring
- Electronic medical records
- Night rounds
- Parents' expectations
- The joy of being a child with no electronics

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Measles (prepare for the worst and hope for the best)

- What if one child developed measles…..?
- The intestinal virus from he..

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Outcomes research on nursing, nutrition and pharmacy student learning at camp

- Performance of students on standardized tests of diabetes knowledge and attitudes before and after camp
- **Hypothesis: Students know more about T1D after spending time at diabetes camp**

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The Team

- Dennis Pillion, PhD, UAB
- Heather Whitley, PharmD, CDE, Auburn
- Julia Blanchette, RN, CDE (PhD?), Case Western
- Vicki Moran, RN, CDE, PhD, St. Louis
- Anna Albritton, RN, CDE Camp Kudzu
- C. J. Jacobson, PharmD and Nancy Kawahara, PharmD, Loma Linda

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Development of a new diabetes knowledge test to quantitate knowledge acquired at diabetes camp by health care students

- Diabetes Knowledge Test 2
- Diabetes Attitude Survey
- **Beta test**: “Pillion-Moran Diabetes Camp Knowledge Test”

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Links to the Qualtrics system

- DAS survey
  link: https://slu.az1.qualtrics.com/jfe/form/SV_beVO3xsNr5ausx7
- Pillion/Moran survey
  link: https://slu.az1.qualtrics.com/jfe/form/SV_cBDQewQhtEi32ZL
- DKT2 survey
  link: https://slu.az1.qualtrics.com/jfe/form/SV_5claehjMWdz1YEt

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2. Discuss the use of **nasal glucagon**: Powder and Liquid

3. Discuss research results from previous years that remain unexplained:
   a. **Nasal insulin delivery** to the brain to improve early learning loss in **Alzheimer's patients**, compared to nasal insulin delivery to the blood to lower the blood glucose concentration
   b. **Microbiome** effects on diabetes/glycemia
   c. **Insulin receptors** in the gut
   c. **CPAP effects** on nocturnal polyuria

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2. Nasal glucagon: Powder

Baqsimi™ Nasal Glucagon Powder
Lilly USA, LLC, approved August 2019

3 mg dry glucagon powder

Formulated with dodecylphosphocholine and beta-cyclodextrin (7 glucose molecules joined into a cylindrical shape)

Response time equivalent to 1 mg injected

Better percentage of successful nasal administration than injections

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Nasal glucagon: Liquid

- FDA approval pending
- Xeris Pharmaceuticals
- Glucagon pen for injection
- Glucagon liquid for continuous administration in pumps

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3. Discuss research results from previous years that remain unexplained:

- Nasal insulin delivery to the brain can improve early learning loss in **Alzheimer's patients.** **What?!**
- In contrast, nasal insulin delivery in the presence of an **excipient** gets absorbed into the blood (much like nasal glucagon does)

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My Favorite Excipient

- **Dodecylmaltoside**:
- 12 carbon alkyl chain linked to maltose
- 6-10 carbon chains are ineffective
- 12-14 carbon chains are best
- Permeabilize epithelial cell membranes
- Allow rapid uptake of insulin, calcitonin, low molecular weight heparins and many other charged molecules

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Evidence that low levels of insulin in the brain impact patients with Alzheimer's Disease

- Autopsy shows **brain atrophy** in AD
- **CSF insulin levels** lower than normal
- Rodents treated with intrathecal or intranasal insulin **learn mazes more quickly**
- Humans with early onset AD **improve short term memory** test scores following nasal insulin delivery (with no excipient)

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What does the future hold for nasal insulin delivery?

- A. Nasal delivery of insulin to the brain, with no excipient added, triggers no fall in glucose, no risk of hypoglycemia
  - This may be a safe **early treatment for AD**
- B. Nasal delivery of insulin to the blood, with excipient added, triggers a rapid fall in blood glucose.
  - This may be a **fast-acting insulin delivery** option for patients who are "needlephobes."

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Microbiome effects on diabetes/glycemia

- Higher incidence of obesity/diabetes in patients treated frequently with oral antibiotics as children
- Fecal transplant research
- The conundrum with weight loss in persons using artificial sweeteners
- The brain-mouth-gut hormone axis

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Insulin receptors in the gut

- Receptors for insulin found on the apical membranes of gut epithelial cells- **WHY?**
- Do gut bacteria produce insulin?
- Does gut insulin help us survive when we get T1D?
- **Why** does a diabetic rodent not treated with insulin break down adipose, muscle and virtually all other organs, but grow an enormous gut???
- Why does an enema with insulin work??

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CPAP effects on nocturnal polyuria: No more trips to the toilet?!

- Some people with Obstructive Sleep Apnea don't produce as much urine at night when they go on CPAP therapy
- They apparently produce less ANP (and possibly BNP and RNP) because their hearts do not stop and overfill
- That change may decrease natriuresis
- Case study: Urine output fell from 1500 mL to 600 mL when patient started CPAP

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Questions???

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