Week 9:

The Wisconsin AD Exercise Newsletter

Pro Tip

Exercising on a budget

Exercise doesn't have to break the bank!
Here are some tips to stay healthy without spending a lot!

- Consider getting used equipment, even workout clothes, from eBay, Facebook Marketplace, Craigslist, or friends/family/neighbors.
- Getting outside during the nice weather for a walk, run, or hike.
- Use your body weight to exercise; push-ups, lunges, planks, and wall sits.
- Search YouTube, or your listing of TV stations, for free routines. Explore dancing or boxing as different ways to exercise.
- Make weights by filling gallon jugs with water. Easily customized by adding/removing water.

Coach's Playbook

Exercise and Glucose Control - Evans et al (2019) and Olver et al (2019)

Our muscles use glucose for fuel and so think of exercise (the intentional use of muscles) as an ally for combating dysfunctional glucose metabolism. The beta cells of the pancreas are responsible for secreting insulin in response to the glucose that we ingest and help usher glucose into our cells for fuel. Often these states occur together. Here are some definitions to understand these concepts:

1. *HbA1c or glycated hemoglobin A1c:* A blood test that can help assess the average blood glucose level over 2-3 months due to a chemical reaction on the surface of red blood cells. Think of this as a better view of the average daily blood sugar.

2. *Impaired fasting glucose:* Serum blood sugar 100-125 mg/dL when in a fasted state for 8 hours.
3. *Type 2 diabetes, or sometimes seen as Type 2 DM:* Insulin secreted is either ineffective or not enough insulin is produced.
4. *Insulin resistance:* Muscles, liver, and fat cannot effectively use insulin in order to take up blood glucose for energy.

Labs that demonstrate normal blood glucose include:

- <100 mg/dL in a fasted state
- HbA1c of <5.7%
- <140 mg/dL two hours after a standardized glucose challenge.

How can exercise help these conditions?
By two mechanisms—**increased** skeletal muscle glucose transport and **increased** glucose metabolism (actual use of glucose).

Skeletal muscles use 70-90% of the glucose we ingest. This is accomplished by the uptake of blood glucose through surface membrane transporters on the muscle cell call GLUT4. Aerobic exercise can increase GLUT4 levels by 20-70% after as little as six weeks of exercise. Resistance training also increases glucose transport into muscles, occurring even if the muscles don't get drastically bigger.

Exercise can also affect our blood vessels and their insulin sensitivity through the *exercise hyperemic response.* During exercise, blood flow increases to our skeletal muscles and our brains because of increased heart rate and volume of pumped blood. This increase in blood flow causes enlargement of the blood vessels and activation of the P13K/Akt/NO pathway, which increases the delivery of glucose to muscles. The more muscles that undergo the *exercise hyperemic response,* the better the insulin sensitivity. This makes a case for

full-body exercises such as swimming or cross country skiing.

Studies have also demonstrated that increased insulin sensitivity can occur even after a short episode of exercise and that the effect can last 48-72 hours. Those who exercise 150 minutes/week or more also show a significant decrease in HbA1c.

Ask the Exercise Physiologist

Do you have a question for our Exercise Physiologists?

Send your question(s) to Camille Conway.

You may be featured in an upcoming newsletter!

Tune in next week to learn how exercise positively impacts cognition.

Going the Extra Mile...

Check out these additional resource to help you on your exercise journey.

Brain Glucose Metabolism, Cognition, and Cardiorespiratory Fitness Following Exercise Training in Adults at Risk for Alzheimer's Disease - Gaitan, et al (2019)

Dementia Matters: Finding the link between high blood pressure and Dementia, October 23, 2018