ADVANCED TRACK

ADVANCED EXERCISE CONCEPTS

Amanda Turner MS, RDN, CSSD
Owner/Sports Dietitian

ACTIVE FUELING
NUTRITION COACHING

#EPICconf2019
www.EPICconferences.org
OBJECTIVES

1. Identify energy systems working during anaerobic (without oxygen) and aerobic (with oxygen/low intensity) exercise.

2. Identify optimal blood sugar ranges before, during and after exercise and how to achieve those targets.

3. Identify optimal recovery strategies post-exercise for performance enhancement and blood sugar stability.
ENERGY UTILIZATION PER SPORT

Power/Aerobic
- Fuel used: Phosphocreatine (PCr), anaerobic glycolysis
- Sports: Powerlifting/Olympic Weightlifting, Sprinting, High intensity intervals, Intense bursts in team sports

Endurance/Aerobic
- Fuel used: aerobic glycolysis
- Sports: Endurance- running, cycling, triathlon, Team sports, Walking

IMPACT OF DIET ON ENERGY UTILIZATION

- Low creatine availability: low PCr
  - Seen in vegan populations
- Low protein availability: muscle wasting, strength declines
  - Seen in some vegan/vegetarian athletes or those with poor food variety
- Low fat availability: total energy availability possibly impaired, hormone disruption
  - Seen in individuals with chronic dieting history
- Low carbohydrate availability: low glycogen storage, inadequate metabolism anaerobic/aerobic glycolysis
  - Most common, promoted by current fad diets.

#EPICconf2019
www.EPICconferences.org
GUIDELINES FOR FUELING: PRE-EXERCISE

Timing of meal/snack: 30 minutes – 2 hours pre-exercise

Choose: carb choices based on blood sugar, easily digestible foods

Carb Ex): bread, crackers, potatoes, rice, fruit

Low-carb Ex): protein shake, deli meat, eggs, peanut butter, cheese, sugar-free Greek yogurt

#EPICconf2019
www.EPICconferences.org

GUIDELINES FOR FUELING: PRE-EXERCISE

Power/Aerobic: blood sugar rise common at beginning of exercise, increased insulin sensitivity post-ex

High-stress events (i.e. competition): blood sugar rise common at beginning of exercise, increased insulin sensitivity post ex

Aerobic: consistent blood sugar drop common, increased insulin sensitivity post-ex

#EPICconf2019
www.EPICconferences.org
## GUIDELINES FOR FUELING: PRE-EXERCISE

<table>
<thead>
<tr>
<th>Blood Glucose Level</th>
<th>Rec's for Exercise</th>
<th>Rec's Snack Based on Length of Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100mg/dL</td>
<td>Eat a snack pre-exercise</td>
<td>&gt;30min exercise: 1-2 carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: 2 carb choices plus protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: Wait until &gt;100 to exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fueling during exercise imperative</td>
</tr>
<tr>
<td>100-150mg/dL</td>
<td>Safe to exercise, may need a snack</td>
<td>&gt;30min exercise: 0-1 carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: 1-2 carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: 2 carb choices plus protein</td>
</tr>
<tr>
<td>150-200mg/dL</td>
<td>Safe to exercise</td>
<td>&gt;30min exercise: no snack needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: 0-1 carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: Test glucose every hour</td>
</tr>
</tbody>
</table>

#EPICconf2019
www.EPICconferences.org

## GUIDELINES FOR FUELING: PRE-EXERCISE

<table>
<thead>
<tr>
<th>Blood Glucose Level</th>
<th>Rec's for Exercise</th>
<th>Rec's Snack Based on Length of Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-250mg/dL</td>
<td>Safe to exercise, may not feel well</td>
<td>&gt;30min exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: Test glucose every hour</td>
</tr>
<tr>
<td>250-300mg/dL</td>
<td>Safe to exercise, may not feel well</td>
<td>&gt;30min exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: Test glucose every hour</td>
</tr>
<tr>
<td>300mg/dL or higher</td>
<td>May be too high to exercise</td>
<td>&gt;30min exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1hr exercise: No carb choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2+ hr exercise: Test glucose every hour</td>
</tr>
</tbody>
</table>

#EPICconf2019
www.EPICconferences.org
GUIDELINES FOR FUELING: DURING EXERCISE

**Purpose:** maintaining performance throughout activity

**Strength:** likely not necessary, test glucose to learn predictions

**Aerobic:**
- low intensity <1hr – water only
- moderate/high intensity <1hr – test glucose to learn predictions;
- >1hr – carb/electrolyte replacement needed, test glucose to learn predictions

**Goal of fuel:** maintain energy availability, maintain normal/safe blood sugar, maintain adequate hydration

---

**Carbohydrate Needed Per 60 Minutes of Physical Activity**

<table>
<thead>
<tr>
<th>Intensity</th>
<th>50 lbs (23 kg)</th>
<th>100 lbs (45 kg)</th>
<th>150 lbs (68 kg)</th>
<th>200 lbs (91 kg)</th>
<th>250 lbs (114 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Intensity</td>
<td>5-8 g</td>
<td>10-16 g</td>
<td>15-23 g</td>
<td>20-32 g</td>
<td>25-40 g</td>
</tr>
<tr>
<td>Moderate Intensity</td>
<td>10-13 g</td>
<td>20-26 g</td>
<td>30-40 g</td>
<td>40-52 g</td>
<td>50-65 g</td>
</tr>
<tr>
<td>High Intensity</td>
<td>15-18 g</td>
<td>30-36 g</td>
<td>45-53 g</td>
<td>60-72 g</td>
<td>75-90 g</td>
</tr>
</tbody>
</table>

GUIDELINES FOR HYDRATION: DURING EXERCISE

Drink every 15-20 minutes during exercise. Amount depends on type and intensity of exercise and sweat rate.

1 L (32oz) fluid lost = 2lb body weight lost and 500-800mg sodium lost

Sweat rate testing:
Pre-exercise weight - post-exercise weight x 16.02 = sweat out during exercise / minutes performed * 60 = fluid lost/hour

Goal: <2% body weight lost during exercise
Weight gain during exercise = you're drinking too much!!!
Glucose impact...

#EPICconf2019
www.EPICconferences.org

GUIDELINES FOR FUELING: POST-EXERCISE

Considerations for level of sport and goals

- Recreational athlete vs weigh loss goals vs elite athlete
- Recovery is 24-48 hour process; one meal doesn’t determine recovery
- Considerations to improve performance:
  - Leucine content of recovery meal: 2g target
  - Total protein: 0.25-0.3g/kg body weight (15-20g)
  - Carb content of recovery meal: 1.2g/kg target
  - Sooner is better. Peak absorption within 60 minutes post-exercise
  - High nutrient density/antioxidant lowers free radical damage
  - 1.25-1.5L fluid for every kg lost

#EPICconf2019
www.EPICconferences.org
GUIDELINES FOR FUELING: POST-EXERCISE

Test... Test... Test

Ideal meal/snack options:
Protein shake with or without carbs based on blood glucose
Deli meat sandwich
Fruit and cheese
Yogurt parfait
Shelled edamame
Eggs and toast or fruit

Insulin sensitivity elevated post-exercise

CREATE YOUR WORKOUT PLAN

- Keep a log of workouts, meals, med changes and blood sugar
- Test and retest
- What works for one person doesn’t necessarily work for another
- Consider time of day

#EPICconf2019
www.EPICconferences.org
THANK YOU!

Amanda Turner MS, RDN, CSSD
Owner/Sports Dietitian

ACTIVE FUELING

#EPICconf2019
www.EPICconferences.org

GUIDELINES FOR FUELING: PRE-EXERCISE

PRE-EXERCISE MEAL INSULIN ADJUSTMENTS

<table>
<thead>
<tr>
<th>Activity</th>
<th>Short Duration (15-20 minutes)</th>
<th>Moderate Duration (30-60 minutes)</th>
<th>Long Duration (1-2 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low intensity (relatively easy)</td>
<td>.90</td>
<td>.80</td>
<td>.70</td>
</tr>
<tr>
<td>Moderate intensity</td>
<td>.75</td>
<td>.67</td>
<td>.60</td>
</tr>
<tr>
<td>High intensity (very challenging)</td>
<td>.67</td>
<td>.60</td>
<td>.33</td>
</tr>
</tbody>
</table>

https://www.betterhelp.com/health-and-exercise/lifestyle/challenges/blood-sugar-control

#EPICconf2019
www.EPICconferences.org
GUIDELINES FOR FUELING: PRE-EXERCISE

<table>
<thead>
<tr>
<th>Meds that CAN cause hypoglycemia (in addition to insulin)</th>
<th>Meds that DO NOT cause hypoglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Sulfonylureas (glyburide, glipizide)</td>
<td>* Metformin (Glucophage)</td>
</tr>
<tr>
<td>* Meglitinides (Prandin, Starlix)</td>
<td>* DPP-4 Inhibitors (Januvia, Onglyza)</td>
</tr>
<tr>
<td>* Combinations that contain any of the above medications</td>
<td>* Acarbose (Precose)</td>
</tr>
<tr>
<td></td>
<td>* Thiazolidinediones (Actos, Avandia)</td>
</tr>
<tr>
<td></td>
<td>* GLP-1 Agonists (Byetta, Victoza)</td>
</tr>
</tbody>
</table>


#EPICconf2019
www.EPICconferences.org