

Nutrition and Sports PET3361

EXAM II REVIEW

1. Define postabsorptive and postprandial states and explain how each of the macronutrients is absorbed into the system.

- **Postabsorptive:** after overnight fast, when blood glucose is maintained by glycogenolysis & gluconeogenesis in the liver
 - Glycogenolysis → 65-75% of glucose released
 - Gluconeogenesis → 25-35% of glucose released
 - Muscle glycogen cannot be converted to blood glucose b/c glucose-6 phosphate cannot be converted to glucose in muscle
- **Postprandial:** after a meal; absorbed glucose being stored as glycogen in skeletal muscles & liver (glucogenesis); most cells removing glucose for energy (glycolysis); adipose cells remove glucose to form glycerol needed for triglycerides formation from fatty acids

2. Which hormones control blood glucose and how? How does exercise influence these responses?

| | |
|-----------------|----------------------|
| Insulin | Lowers Blood Glucose |
| Glucagon | Raises Blood Glucose |
| Epinephrine | Raises Blood Glucose |
| Nor epinephrine | Raises Blood Glucose |

**Exercise increases response of all except

Insulin

3. What factors influence CHO use during exercise and how?

- **Exercise intensity:** high intensity more dependent on CHO; mod less CHO-dependent; CHO is only fuel during anaerobic exercise
- **Exercise duration:** longer duration, less dependent on CHO, FA as a main source of energy during prolonged exercise
- **Initial glycogen levels:** higher glycogen levels allow for longer hours of running before exhaustion (chart on slide 24)
- **Training status:** higher trained athletes have higher PNS activity; higher trained athletes more efficient with energy use; for marathon runners may be more efficient at dipping into FA sooner

- **Metabolic primer role of carbs:** glycogen ↓, fat catabolism ↓, ketone ↑
4. What is the recommended timing for the feeding of CHO before exercise?
 - CHO feeding 3-4 hours before endurance exercise has shown improvements in performance (3-5 g/kg BW)
 5. What are the general guidelines for a pre-competition meal?
 - 3-4 hours before
 - 150-300g CHO (3-5g/kg)
 - Solid or Liquid
 - Relatively little fat or fiber
 - Limit Protein
 6. When is it most beneficial to feed CHO during exercise? What are the guidelines?
 - Good for exercise lasting more than 60 mins.
 - Spares muscle glycogen
 - Maintains blood glucose levels
 - High conc. Of glucose during exercise can cause GI distress
 - Feeding guidelines:
 - o -not necessary for less than 45 mins
 - o 45-75 mins small amount (mouth rinse)
 - o 1-2.5 hours - 30-60 g/hr
 - o More than 2.5 hours - 60-90g/hr
 - o (2:1 glu:fru may allow for enhanced intestinal absorption)
 7. How does CHO feeding during recovery influence muscle glycogen?
 - High levels of CHO during recovery showed better results
 - Adding protein with CHO doesn't really make a big difference
 - High CHO feeding will help restore depleted glycogen as well as increase stored glycogen due to activation of GSI.

- CHO → ↑ insulin → glucose into the cells → glycogen synthesis

8. What factors enhance glycogen synthesis and how?

- Glycogen depletion-increases percentage of activated GS-I form (the more active form of glycogen synthase enzyme with stimulates muscle glycogen growth)
- Presence of Insulin enhances glycogen synthesis
- After Exercise there is more GLUT-4 present at the cell membrane
- Glucose is better than sucrose and much better than fructose
- Med-high levels of glucose are better than low levels

•**Timing of carbohydrate ingestion** - CHO feeding immediately rather than delayed improves glycogen synthesis; presence of insulin enhances glycogen synthesis

•**Type of carbohydrate fed** - medium levels (0.7g/kg BW) of glucose/sucrose have higher effect on glycogen synthesis than medium levels of fructose

•**Amount of carbohydrate fed** - medium levels (0.7g/kg BW) of glucose has a higher effect on glycogen synthesis than high levels (1.40g/kg BW) of glucose both had greater effect than low levels (0.35g/kg BW)

•**Presence of other nutrients with CHO** - protein + carbs has no significant effect on muscle glycogen synthesis

•**Effect of exercise type** - eccentric exercise causing muscle soreness & damage is accompanied by reduced muscle glycogen resynthesis.

•**Effect on subsequent performance** - runners who received 6.3 gCHO/kg ran significantly less time than on day 1, while the runners who received 8.8 gCHO/kg were able to run slightly longer

9. Know the recovery feeding guidelines for enhancing muscle glycogen storage.

- Feed approximately 1.0-1.5 g of carbohydrate per kg body weight each hour for the first 4 hours after exercise for fast recovery.
- Within the first 6 hours after exercise, high glycemic index foods or simple carbohydrates (glucose, sucrose, maltodextrin) provide the best glycogen replacement. These foods increase insulin levels in the blood, which stimulate both glucose transport into the cells and glycogen synthesis.