

## WHY IS MUSCLE RECOVERY SO IMPORTANT?

- Strenuous exercise can cause physical damage to muscle and feelings of soreness after exercise
- Rapid supply of nutrients to recovering muscle can:
  - Speed healing of damage.
  - Replenish the muscle's stored fuels: carbohydrate (glycogen), fat (intramuscular triglyceride)
- Faster recovery means faster return of the muscle to full function

### Why is the timing of nutrient intake after exercise so important?

- Exercise increases the ability of muscles to take up glucose (fuel) from the blood.
- Exercise makes muscles more sensitive to the effects of insulin, a hormone that helps get glucose and amino acids into cells.
- The enzyme that rebuilds carbohydrate stores (glycogen) in the muscles is at peak activity within 2 hours after exercise.
- Eating as soon as possible after exercise is best. Delaying eating for 2 hours or more reduces the benefit of nutrients after exercise.

### What nutrients are particularly important for muscle recovery?

- **Carbohydrates:** Increase glycogen stores and elevate insulin.
- **Protein:** Elevates insulin and promotes repair of muscle tissue.
  - High-quality proteins containing branched-chain amino acids can help to reduce muscle soreness.
- Other nutrients (fats, vitamins, minerals) and water are also needed to repair cell membranes and regulate metabolism.

### How does the combination of carbohydrate and protein promote muscle recovery?

- The combination of carbohydrate and protein elevates insulin to a greater degree than either one alone.

### How should I eat for fastest muscle recovery?

- Eat as soon as possible after exercise (within 2 hours)
- Get a combination of carbohydrate and protein
  - 2-3 g carbohydrate for every 1 g protein
- Eat every 2-3 hours or so to continue to replace glycogen.
- Consume adequate levels of fluid as well to ensure good hydration for next exercise bout

### What foods and nutrition products can help?

- High carbohydrate foods like breads, cereals, crackers, pasta, and fruits
- Convenient, high protein foods that don't require cooking, such as peanut butter, low or nonfat white or chocolate milk, part-skim mozzarella string cheese, low fat cottage cheese, yogurt, soy milk
- Commercial protein drinks/shakes (ready to drink and powder), protein powders (dairy or soy)

### Sample recovery meals

- Option 1 (645 Calories, 94 g carbohydrate, 25 g protein, 20 g fat, 3.8:1 carb:pro)
  - 1 Regular bagel • 2 T. peanut butter
  - 8 oz. 1% lowfat chocolate milk • 1 oz. (30 g) seedless raisins
- Option 2 (627 Calories, 93 g carbohydrate, 39 g protein, 11 g fat, 2.4:1 carb:pro)
  - 2 cups flavored soy milk plus 3 heaping tsp. (30 g) soy protein isolate
  - 4 graham cracker squares • 1 medium apple
- Option 3 (380-510 Calories, 72-76 g carbohydrate, 22-44 g protein, 2-3:1 carb:pro)
  - 11-17 oz. commercial protein drink/shake • ice cubes (optional) • 2 medium bananasCan be made into a smoothie in a blender.



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