

## ***DR. BARKER'S ENDURANCE SPORTS NUTRITION GUIDELINES***

### Goals:

1. Provide adequate fuel for endurance activity
2. Replenish glycogen stores
3. Build & repair tissue
4. Maintain body weight
5. Maintain immune and reproductive function

Food should be consumed before, during and after exercise

→Maintains blood glucose levels (energy)

→Maximize performance

→Improve recovery time

### Diet will affect:

1. Body weight (mass) and composition (fat vs. lean tissues)
  - Weight will influence: speed, endurance & power
  - Composition will influence: strength, agility & appearance
- Substrate (energy) availability during exercise
- Recovery time after exercise
- Exercise performance

### Low energy intake (poor/inadequate diet) will lead to:

- Decreased muscle mass (in addition to fatty tissue, lean (muscle) tissue can be used for fuel.
  - Decreased muscle mass = decreased strength & endurance
- Decreased bone density and failure to increase density
- Increased fatigue, injury and illness
- Menstrual and immune dysfunction
  - \* Weight loss, if desired, should occur before the competitive season.

### The Pre-Race Meal should be:

- Low in fat & fiber; these will cause decreased gastric emptying and GI stress
- High in carbohydrate and moderate amounts of protein
- Contain roughly 200 to 300 grams carbohydrate, 3-4 hours prior. Lesser amounts should be consumed within the hour preceding exercise.

### The During Race Meal should consist of:

- Carbohydrates replaced at 30 – 60 grams every hour, especially if event is >1 hour. This will unequivocally extend endurance performance.
- Carbohydrate consumption in sessions >1 hour may benefit performance.

### The Post-Race Meal should consist of:

- 1.5 grams carbohydrate per kilogram body weight (1 pound = 0.45 kg) in the first 30 minutes, then every 2 hours for 4 to 6 hours.
- For highest post-exercise glycogen synthesis; 0.4 g/kg every 15 minutes for 4 hours following activity (this may approximate 2000 kcal).

- High glycemic carbohydrate replacement will improve glycogen stores over that of low glycemic carbohydrates.
- Meals should consist of complex carbs, protein and fat

### **Carbohydrates:**

- Maintain blood glucose
- Replace muscle glycogen
- ➔ 6-10 grams/kg body weight per day, or 55%-58% total energy intake

### **Protein:**

- Builds & repairs lean body tissues
- Ancillary fuel source; what is used must be replaced or lean tissue will decrease
- ➔ 1.4-1.6 grams/kg body weight per day, or 12%-15% total energy intake  
(Strength athletes should consume 1.6-1.7 g/kg/day)

### **Fat:**

- Ancillary fuel source; energy and Essential Fatty Acids
- ➔ 20%-25% total energy intake
- \* No proven benefit of <15% fat diet

➔ The average caloric intake for male endurance athletes is 3000 to 5000 kcal per day; in females intake is typically somewhat less.

➔ Diets under 2000 to 2200 kcal may lead to hormonal & immune dysfunction.

### **Fluid:**

- Performance is directly influenced by hydration status.
- ➔ BEFORE: Intake should be 400-600 milliliters 2 hours prior to exercise
- ➔ DURING: 150-350 ml every 15-20 minutes during exercise
- ➔ AFTER: Replacement should be 450-675 ml for every pound (0.45 kg) body weight lost during exercise. Or, roughly 150% of wt. lost in amount of fluid may cover sweat and obligatory urine fluid losses.
- Beverages should contain 6% to 8% carbohydrate for events lasting one hour or more.

### **Micronutrients (vitamins & minerals)**

- Energy production
- Hemoglobin synthesis
- Bone health
- Immune function
- Protection against oxidative damage
- Assist with building & repair of muscle tissue
- ➔ Exercise results in biochemical adaptations that increase micronutrient needs
- ➔ Exercise can increase turnover leading to increased loss of micronutrients

Energy Production: Thiamin (B1), riboflavin (B2), pyridoxine (B6), niacin (B3), pantothenic acid (B5) and biotin.

Production of red cells, protein synthesis, and tissue repair & maintenance: Folate and B12.

Protection against oxidative damage: A, beta-carotene, C, E and selenium.

Growth, tissue repair and muscle building

\*Data suggests that exercise increases the need for micronutrients up to twice the current recommended amount.

Female athletes are at greatest risk of low iron, calcium and zinc.

Iron depletion (low iron stores) is one of the most prevalent nutrient deficiencies observed in athletes.

Zinc intake is often low as well

### **Vegetarian athletes:**

- Plant protein is not as well digested (and assimilated) as animal protein. Because of this, it is recommended that vegetarians raise protein consumption by 10%. (1.3 to 1.8 g/kg)
- At risk for lower levels of B12, D, riboflavin, iron, calcium and zinc.
- Iron found in plants is less bioavailable than animal foods; consequently iron stores in vegetarians are generally lower, despite consuming equal or sometimes more iron than omnivores.

## **Dr. Jason E. Barker**

*Integrative Sports Medicine & General Practice*

Back In Motion Sports Injuries Clinic

11385 SW Scholls Ferry Road

Beaverton, OR 97008

503.524.9040

\*This information is provided for general informational purposes only and cannot substitute for medical advice, diagnosis or treatment provided by a medical professional. It is not a substitute for a medical evaluation and should not take the place of a proper exam by a physician.

*Copyright 2006 by Dr. Jason E. Barker*