

Optimal Nutrition for Swimmers *

With endurance training, the main goal is to provide calories for daily activity and those expended through exercise in addition to replenishing glycogen (energy) stores and repairing lean muscle mass. Swimmers should focus on eating often, specifically nutrition pre-exercise, during exercise and post-exercise to fuel training at an optimal level.

Meal Planning Tips

- Eat frequent meals and snacks throughout the day.
- Do not skip meals ... consuming too few calories can lead to fatigue and loss of muscle mass.
- Include whole grain carbohydrate and lean protein / healthy fat with all meals and snacks, to increase fullness.
- Include non-starchy vegetables with meals and snacks.
- Carbohydrate intake should range from 1.4 – 2.3 gm/lb body weight for low-intensity training/rest phase, 2.3 – 5.5 gm/lb body weight for moderate duration training/competition phase, 3.2 – 8.6 gm/lb body weight for moderate-heavy training/championship phase.
 1. Choose whole and high fiber grains as your carbohydrate meal choices (breads, bagels, tortillas, cereals, oatmeal, granola bars, crackers, pasta, rice and potatoes, etc).
 2. Portions of carbohydrate are measured in grams (15 gms = 1 serving). The following items are considered 1 serving of carbohydrate: ½ c potatoes, corn or peas, 1/3 c cooked pasta or rice, 1 slice bread, ½ hamburger or hot dog bun, 1 c milk, 1 c yogurt (unsweetened), 1 piece fruit, ½ c canned fruit, ½ c juice, ½ banana.
 3. Consider the glycemic index (GI) when planning nutrition for exercise. This measures how quickly carbohydrates are broken down into sugar and absorbed into the bloodstream. Low GI foods include most fruits, vegetables, pasta, fruit juices and smoothies, bran cereal, nonfat dairy, popcorn. Medium GI foods include pineapple, wheat bread, pizza, sport and energy bars, cookies and candy bars. High GI foods include corn flakes, bagels, white bread, English muffins, white rice, crackers, pretzels, sports drinks, pancakes, cereal bars and jelly beans.
- Protein intake should range from 0.6 – 0.9 gm/lb body weight.
 1. Choose lean proteins such as chicken or turkey without skin, lean cuts of red meat and pork, fish, low-fat dairy and cheese, eggs, beans, tofu, edamame, whey or soy protein powder.
 2. One ounce of meat contains 7 gms of protein. One ounce of meat is about the size of a golf ball.
- Fat intake should range from 0.35 – 0.9 gm/lb body weight.
 1. Increase intake of healthy fats (peanut and almond butter, nuts, seeds, flaxseed, olive oil, salmon / tuna). Decrease intake of saturated fats (fried foods, baked/packaged goods, cream sauces/spreads).

Nutritional Guidelines for Swimming Training and Events:

Pre-Exercise Nutrition

- Meal timing: 3 - 4 hours before exercise.
 - Meal composition: Low to moderate glycemic carbohydrate (100 – 200 g) and lean protein, low in fiber and fat.
 - Meal Hydration: Four hours before activity, consume 12 – 20 ounces of water or sports drink, and 8 – 12 ounces every 15 minutes prior to practice/event.
 - If the practice/event is early in the morning, consider a pre-exercise snack 30 -60 minutes prior to exercise.
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- Snack composition: High in carbohydrate, moderate in protein, low in fiber and fat.
 - Snack hydration: 5 – 10 ounces water or sports drink.
 - Snack ideas: $\frac{3}{4}$ c raisin bran, 1 c nonfat milk, banana.

During-Exercise Nutrition

- Carbohydrate intake should begin shortly after the onset of activity, to replace glycogen, fluid and electrolyte losses
- Timing: Consume 30 – 90 g carbohydrate/hr spaced every 15 – 20 minutes.
- Composition: High-glycemic carbohydrate such as sports drinks/gels/blocks/beans, fruit, high-carbohydrate bars with moderate protein.
- Hydration: 5 – 10 ounces water or sports drink every 15 – 20 minutes.

Remember: **The day of competition is not the right time to experiment !!!** Once the right nutritional regimen is decided upon, it is helpful to bring your own food to the event.

Post-Exercise Nutrition

Nutritional recovery from exercise refuels the body by replenishing depleted muscle glycogen, rehydrating and restoring normal electrolyte balance. This is especially important when training more than once daily. If the post-event meal is delayed, it may take twice as long to replenish glycogen stores. This may negatively impact athletic performance later in the day.

- Timing: Immediately after the training session (within 30 – 60 minutes).
- Composition: Consume 50 – 100 g of carbohydrate, 6 – 20 g of protein.
- Consume 3 -5 g of carbohydrate/lb of body weight to completely replace glycogen lost in practice. Continue to supply carbohydrate every 2 hours post-training for complete glycogen repletion.

Sample Meal Pattern

(2500 calories, 349 gms carbohydrate, 60% carbohydrate, 20% protein, 20% fat)

Meal	Menu
Breakfast (500 calories)	<p>¾ c low-fat cottage cheese with 2 cups chopped fruit (30 gms carbs)</p> <p>1 slice whole wheat toast with 1 Tbsp peanut butter and 1 Tbsp honey (30 gms carbs)</p>
Snack (250 – 300 calories)	<p>Sweet-n-Salty granola bar (19 gms carbs)</p> <p>½ scoop whey protein powder in 8 oz 1% milk (15 gms carbs)</p> <p>1 serving fruit (15 gms carbs)</p>
Lunch (500 calories)	<p>Sandwich on whole wheat bread with 1 slice 2% cheese, 3 oz meat, lettuce, tomato and 1 Tbsp light mayo (30 gms carbs)</p> <p>15 small pretzels (15 gms carbs)</p> <p>1 fat-free Greek yogurt (15 gms carbs)</p> <p>1 small fruit (15 gms carbs)</p>
Pre-Workout Snack (300 calories)	<p>1 serving reduced-fat crackers (15 gms carbs)</p> <p>1 serving 2% string cheese</p> <p>1 light yogurt mixed with ¼ c whole grain cereal (30 gms carbs)</p>
Post-workout Snack (300 calories)	<p>16 oz 1% chocolate milk (30 gms carbs)</p>
Dinner (500 calories)	<p>1 cup pasta with marinara sauce and 3 oz. chicken breast (45 gms carbs)</p> <p>2 c grilled vegetables</p> <p>1 whole wheat roll (15 gms carbs)</p>
Snack (150 calories)	<p>1 fat-free vanilla pudding (15 gms carbs)</p> <p>1 cup berries and 1 Tbsp nuts (15 gms carbs)</p>

*Adapted from Salo D, Riewald SA. Complete Conditioning for Swimming. USA, 2008.