

Sports Nutrition

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Keys to Optimal Sports Performance

- Proper Training (periodization of training, not overtraining or undertraining)
- Proper diet
- Adequate Sleep/Rest

A Note Of Caution:

- When making changes to your diet, don't experiment with new routines prior to an important race.
- Make changes during training phase or non important events.

Considerations for Building an Optimal Diet

- Nutritional quality for current and life long health
- Sport Specific
- Individualized
- Palatable/Enjoyable
- Tolerance
- Convenient/Portable

Meeting Energy Needs

- To Support growth
- To promote healthy weight loss or gain
- To maintain healthy weight and meet exercise needs

Carbohydrate Sources

- Muscle Glycogen: 300-400g.
- Liver Glycogen: 75-100g.
- Blood glucose: 25g.

Carbohydrate Needs per day

- Very light training (low intensity or skill based): 3-5g./kg.
- Moderate intensity 60 min/day: 5-7g./kg
- Moderate-high intensity endurance 1-3 hr./day: 6-10g./kg
- Moderate-high intensity 4-5 hr./day: 8-12 g./kg.

Carbohydrate sources

- Fruits/fruit juice
- Milk/dairy products
- Grains and products made with grain/flour such as breads, cereals, rice, pasta, etc.
- Vegetables, especially starchy vegetables such as potatoes, peas, corn
- Sugar and sugary products such as sports drinks, gels, bars, cookies, sodas, etc.

Carbs before exercise

- Consuming foods with carbohydrate in the 4 hours prior to exercise helps to:
- Restore liver glycogen (especially for morning exercise)
- Increase muscle glycogen stores if they are not fully restored from previous exercise session
- Prevent hunger, and provide a psychological boost

Liquid Meals

- Helpful for athletes with “nervous stomach” prior to competition or who otherwise can not tolerate solid meal before exercise
- Helpful for very long distance endurance events
- Produce a low stool residue
- Ex: Ensure/Sustacal/Boost/Nutrament/Gatorade Nutrition Shake/Go!

Carbohydrate During Exercise

- For exercise lasting at least 1 hour, consuming carbohydrate during exercise can delay the onset of fatigue and improve endurance
- Carbohydrate during exercise may influence central nervous system , possibly by activating areas of the brain associated with motivation and reward.
- May also improve performance in high intensity stop-and-go sports such as basketball, soccer, football, tennis, field hockey.

- Carbohydrate containing drinks during exercise can also increase fluid intake, as opposed to plain water

How Much?

- Max amount of carb that can be oxidized during exercise from a single carb source, such as glucose is about 1g per minute.
- When multiple carb sources that use different intestinal transporter are used, the total amt of carb absorbed and oxidized increases.
- Glucose+fructose or Glucose, fructose, and sucrose together: 1.7g/minute (Also less likely to cause g.i. distress)

- Optimum consumption: 30-60g carb per hour in exercise lasting 1.5-2 hours
- Events lasting 2.5-3 hours: 80-90g. Per hour
- Not practical or necessary for events <45 minutes
- 45-75 minutes: small amounts sports drinks or foods

Carbohydrate content

• Gatorade/Powerade	1 quart (1 liter)	60g
• Power Bar	1 bar	47g
• Gu gels	2 gels	50g
• Sport Beans	28	50g
• Cliff Shot Blok	6	50g
• Fig bars	4 bars	42g
• Banana	1	30g

Carbs after exercise

- Goal: start consuming carbs as soon as possible after exercise session, especially when recovery period is <24 hours (muscle glycogen synthesis is greatest at this time)
- First 4 hours: 1-1.2 g./kg/hour
- Consume small amounts of carbs every 15-30 minutes
- Choose medium to high GI foods
- Add small amounts of protein (15-25g.) to first feeding to stimulate muscle protein synthesis/repair

- Glucose and sucrose (starchy foods and sugary foods) are more effective than fructose (fruits/fruit juices, sodas) in restoring muscle glycogen after exercise

Protein

- Provides only 2-4% of energy for muscle contraction during prolonged, dynamic exercise
- Protein is important for growth, muscle repair and muscle building

How much?

- Endurance training: 1.2-1.4g./kg/day
- Resistance training: 1.6-1.7g./kg/day
- After resistance training: about 20g. High quality Protein, such as milk/whey/casein/soy following workout
- About 18 oz. low fat milk supplies 20g. Protein (plus about 30g. Carbohydrate)

Fats

- Concentrated calorie source- useful to help meet energy needs
- Fat sources should focus on Monounsaturated (olive oil, avocado, nuts) for health benefits
- Fish oil (omega 3 fatty acids) have not been shown to enhance athletic performance, but research is ongoing. They may be beneficial for athletes with asthma, though, as several studies have shown they seem to improve pulmonary function indicators during exercise.

Hydration

- Water acts as a solvent, reactant, product, carrier, lubricant, shock absorber, coolant, catalyst, ionizing agent, messenger, controller, and primary volumetric constituent of most cells in the body.
- Even slight dehydration (1% body weight loss, which is 1.3 lbs. in a 130# athlete) in a warm environment can impair the body's ability to cope with physical activity.

How Much?

- 2004 Dietary Reference Intake recommendation:
- 3.7 L/day for males
- 2.7 L/day for females
- Needs vary greatly depending on body size, activity level, temperature and humidity
- Food provides about 20% of daily fluid intake

Monitoring Hydration Level

- Pre and post exercise weighing
- Urine color/concentration
- Urine volume

More Tips...

- Experiment with fluid and electrolyte replacement during training, not on race day.
- Don't rely on thirst to gauge how much to drink. Thirst is a sign of dehydration.

Ergogenic Aids

- Keep in mind that dietary supplements are not generally regulated by the FDA.
- Ask yourself: Is it safe? Is it effective? Is it contaminated? Also, Is it legal?

A few common supplements

- Caffeine: Can enhance endurance performance (runners, cyclists, cross-country skiers).
- Also evidence that caffeine can improve performance for those engaged in high-intensity activities lasting 1-20 minutes (runners, cyclists, swimmers, rowers).
- 2-3 mg. per kg. body weight (higher dose not found effective).
- Acts as a central nervous system stimulant, masking mental and physical fatigue.
- Timing? Results not conclusive

Caffeine content

- Strongly brewed coffee: about 85 mg. per 8 oz.
- Soda: about 36 mg. per 12 oz.
- Caffeine containing pills: 100mg. Per tablet

Adverse side effects

- Insomnia
- Increased heart rate and blood pressure
- Intestinal distress
- Concern for caffeine intoxication for youth, as energy drinks marketed to youth contain high caffeine levels: Some have 200mg of caffeine as well as herbal sources of caffeine in 2.5 oz. There are some products that contain approx. 500 mg. caffeine in 20 oz.

Multivitamins

- Seem to be safe, although there is potential to consume high doses.
- Effective to help reverse nutrient deficiencies. Not likely to improve performance or prevent chronic disease in those without nutrient deficiencies.

The Bottom Line

- Proper training, adequate rest, and healthy diet have been proven over and over to have a significant effect on athletic performance.
- A healthy sports diet can provide short term and lifelong health benefits as well as enhanced athletic performance.

Resources

- Nancy Clark's Sports Nutrition Guidebook
- Academy of Nutrition and Dietetics
- American College of Sports Medicine



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