

Sports Nutrition 101

Just like a car needs fuel, the body needs food to keep it running. A balanced diet of carbohydrate, fat, and protein provides the body with the energy it needs for optimal performance. Adequate fluid intake is another key to successful performance

Carbohydrate

- Recommended intake of 1.8-4.5 gm/lb of body weight
- Maintains blood glucose levels
- Replaces muscle glycogen

Fat

- Recommended intake of 20-30% of total energy intake
- Intake of less than 20% does not benefit performance
- High-fat diets not recommended

Protein

- Recommended intake of ~ 0.7- 0.9 gm/lb body weight
- Builds and repairs muscle tissue
- Helps boost immune system
- Helps to maintain lean body mass when losing weight

The Power of Water

- Transports glucose and oxygen to muscles
- Helps to prevent dehydration
- Regulates body temperature
- Aids in digestion of foods

Fluid Recommendations for Competition

When to drink	Amount
2 hours before	2 cups
10-20 minutes before	1 cup
Every 10-15 minutes during exercise	1 cup
After	Drink 20 oz for every pound of weight lost to optimally rehydrate.

Nutrition—The Winning Edge

Athletes (and non-athletes!) should choose a variety of nutrient-dense foods from the following food groups.

Whole Grains

- Provide energy for muscles and prevent muscle fatigue
- Whole grains and foods high in fiber help regular gastrointestinal tract
- Aim to make the majority of your grain intake from whole grains like whole wheat pasta, brown rice, whole wheat pita, whole wheat tortillas

Vegetables

- Provide carbohydrate (some more than others)
- Many vegetables are sources of phytochemicals
- Good source of Vitamin C, Vitamin A, and potassium
- Recommended intake: 2 1/2 cups per day

Fruits

- Provide carbohydrate
- Many fruits are sources of phytochemicals
- Good source of fiber, potassium, and Vitamin C
- Recommended intake: 1 1/2 cups per day

Milk & Dairy

- Provides protein
- Good source of calcium and Vitamin D

Meat & Beans

- Provides protein
- Good source of iron and zinc
- Recommended intake: varies based on body weight and goals

Fats & Oils

- A balanced diet is not fat-free as fat is essential for bodily functions
- Fat adds flavor to the diet
- Choose healthier fats like fatty fish, nuts, seeds, and avocados instead of trans and saturated fats (e.g. partially hydrogenated oils)

Carbohydrates

Carbohydrates play a vital role for the athlete. Maintaining an optimal intake of carbohydrates is essential for all athletes. Quality carbohydrates are:

- ⇒ The primary fuel for providing energy to the muscles
- ⇒ Fuel for the brain which is very important for concentration and focus.
- ⇒ Vitally important for exercise recovery.
- ⇒ Necessary to spare protein (muscle) – otherwise it's burned for energy
- ⇒ Packed with vitamins, minerals, and fiber.

An appropriate recovery diet allows you to maintain a good glycogen (muscle energy) content after strenuous activity. Consuming too little can impair performance by leading to poor energy, inadequate recovery and fatigue.

There is a big difference in carbohydrate, so it's important to focus on quality and not just quantity. The majority of your carbohydrate intake should come from whole grains, beans, fruits and vegetables.

Fuel Tips

- ⇒ Include whole grains with each meal
- ⇒ Choose carbohydrates that have ≥ 3 g fiber & < 10 g sugar
- ⇒ Include a fruit and/or vegetable with every meal and snack
- ⇒ Aim for carbohydrate based products that list "100% whole grains" or "100% whole wheat" as the first ingredient on the label

Calculating approximate carbohydrate needs based upon continuous aerobic activity:

- ⇒ 1.8-2.7 g/lb average daily training < 60 minutes
- ⇒ 2.7-3.6 g/lb average daily training 60-90 minutes
- ⇒ 3.6-4.5 g/lb average daily training > 90 minutes

Sample Carbohydrate Food Sources

<u>Food</u>	<u>Amount</u>	<u>CHO (g)</u>	<u>Total Calories</u>
Fruit			
Apple	1 medium	20	80
Orange	1 medium	15	65
Banana	1 medium	25	105
Raisins	1/3 cup	40	150
Apricots, dried	10 halves	20	85
Vegetables			
Corn	1/2 cup	15	70
Winter squash	1/2 cup	15	60
Tomato sauce	1/2 cup	10	95
Peas	1/2 cup	10	60
Carrot	1 medium	10	40
Green beans	1/2 cup	5	20
Broccoli	1/2 cup	5	20
Zucchini	1/2 cup	2	10
Breads/Grains/Pastas/Starches			
Whole wheat bread	1 slice	18	90
Whole wheat pita	1 small	35	150
Whole wheat pancakes	4inch	35	185
Saltines	5	10	60
Graham crackers	2 squares	10	70
Baked beans	1 cup	50	260
Lentils, cooked	1 cup	40	230
Whole wheat spaghetti	1 cup	37	175
Brown rice, cooked	1 cup	44	216
Breakfast Cereals			
Raisin Bran	3/4 cup	30	120
Cheerios	1 cup	20	100
Vive	1¼ cups	43	170
Frosted MiniWheats	24 biscuits	48	200
Oatmeal, dry	½ cup	27	150
Oatmeal, instant	1 packet	30	165
Cream of wheat	3/4 cup	24	115
Beverages			
Apple juice	8 oz	30	120
Orange juice	8 oz	25	105
Gatorade	12 oz	22	90
Cola	12 oz	39	155
Milk, chocolate	8 oz	25	180
Milk, 2%	8 oz	12	120
Milk, skim	8 oz	12	90

<u>Food</u>	<u>Amount</u>	<u>CHO (g)</u>	<u>Total Calories</u>
Sweets/Snacks/Desserts			
Maple syrup	1 tbsp.	13	50
Strawberry jam	1 tbsp.	13	50
Honey	1 tbsp.	15	60
Greek yogurt	6 oz	20	140
Frozen yogurt	1 cup	44	240
Energy Bars			
Clif Nectar	1 bar	27	160
Lara Bar	1 bar	28	200
Pure Bar	1 bar	26	200

Protein

Protein is an essential nutrient for a variety of reasons. While most focus solely on the “muscle building” effects of protein, it’s essential for:

- ⇒ Physical performance because of its role in building and repairing muscles
- ⇒ Improving the immune system
- ⇒ Manufacturing hormones that regulate metabolism, maintain fluid balance, carry oxygen and nutrients in and out of cells
- ⇒ Regulate blood clotting

When you do not consume enough calories and protein from your food, your body uses its own protein (muscles) to make up for the lack of fuel. Therefore, you may not have the energy and protein you need to perform at your best.

Recreational exercisers and athletes have higher protein needs than sedentary individuals because of increased protein breakdown and also to improve muscle protein synthesis (necessary for building muscle).

The recommended amount of protein varies for each athlete depending on current body weight, caloric intake, type, frequency, and intensity of exercise and overall goals (e.g. gain muscle mass or maintain).

Athletes who restrict calories need higher amounts of protein because they are burning protein for fuel instead of using it to build and repair tissues. Athletes need to make sure to consume enough protein and calories to fuel the body, or strength goals will be more difficult to achieve. The risk of becoming ill or injured also increases.

Protein Recommendations

- ⇒ Recreational exerciser: 0.5-0.8 gm/lb
- ⇒ Competitive athlete, adult: 0.6- 0.9 gm/lb
- ⇒ Growing teenage athlete: 0.7- 0.9 gm/lb
- ⇒ Athlete restricting calories: 0.8- 0.9 gm/lb

Fuel Tips
Quality Sources of Protein

- ⇒ Chicken
- ⇒ Turkey
- ⇒ Lean red meat
- ⇒ Eggs
- ⇒ Beans
- ⇒ Organic milk
- ⇒ Organic cottage cheese
- ⇒ Cheese
- ⇒ Yogurt

Based on current goals and body weight, I need approximately:

Protein needs (using values above) * Body weight (pounds) = _____ grams of protein each day.

Protein Source	Amount	Protein (grams)
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Fish/Meats

Salmon, grilled	3 oz	23
Snapper, broiled	3 oz	23
Tuna in water	3 oz	25
Chicken breast (no skin)	4 oz	30
Pork tenderloin	3.5 oz	28

Eggs

egg	1 large	6
egg whites	2	7

Dairy/Non-Dairy Substitutes

1% organic milk	1 cup	8
Hemp milk	1 cup	4
Rice milk	1 cup	1
Almond milk	1 cup	1
1% organic cottage cheese	½ cup	14
Greek yogurt	6 oz	14
Hard cheese	1 oz/1" cube	7

Soy Products

Edamame (soybeans)	1 cup	26
Tempeh	½ cup	19

Beans/Legumes

Most beans	1 cup	14-15
Lentils	1 cup	18
Black-eyed peas	1 cup	10

Nuts/Seeds

Peanuts/almonds	1 oz	6
Cashews	1 oz	4
Peanut butter	2 T	9
Sunflower seeds	1 oz	6
Walnuts	1 oz	7

Grains (cooked)

Amaranth	1 cup	9
Barley	1 cup	4
Millet	1 cup	6
Oats	1 cup	6
Quinoa	1 cup	8
Rice, brown	1 cup	5

Nutritional Supplements

Whey protein powder	1 scoop	25
Accelerade	1 cup	4
CherryPharm Recovery	1 cup	8

Miscellaneous

Pasta (whole wheat-dry)	¾ cup	7
Lara Bar	1 bar	5
Raw Revolution Bar	1 bar	7
Pure Bar	1 bar	6

**My Personal Daily Protein
Goal is:**

Grams

Protein Tips

1 oz protein = ~7 grams of protein
3 oz = size of deck of cards

Fat

Fat intake for athletes should be about 25-30% of your total daily calories. The key, though, is to focus on the quality of the fat, not just the quantity. A diet which is high in unhealthy fats will impair your performance and contribute to many health problems including obesity and diabetes.

What are unhealthy fats?

- ⇒ Saturated fats
- ⇒ Trans fats

Both can lead to weight gain and health problems. These fats are the high octane fuel that an athlete needs to optimize performance. Instead, they primarily come from animal products as well as processed and packaged foods. Many of these same packaged and processed foods containing partially hydrogenated oils as well, including chips, cookies, pies, and other snacks. That means they contain trans fats. Trans fats and saturated fats are like putting sludge in the engine of a race car.

On the flip side, healthy fats include containing omega 3 fatty acids which may actually help to decrease inflammation – which can help with performance. And, a added benefit is that they'll improve health too. Let's delve into this topic a bit further.

Omega-3's: The Healthy Fat

While most fats are considered harmful if eaten in excess, due to their link to heart disease, obesity, and diabetes, there are others that are essential to your health. These are the Omega-3 essential fatty acids (EFA). Omega-3 EFA's are known as polyunsaturated fatty acids – more specifically, the umbrella term omega-3 EFA's can be “divided” into a few different types: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA).

Omega-3's and Health

- ⇒ Inhibiting the formation of blood clots which can get stuck in blood vessels leading to the heart.
- ⇒ Decreasing your risk for deadly heartbeat abnormalities.
- ⇒ Lowering triglyceride (fat) levels in the blood.
- ⇒ Decreasing joint tenderness and inflammation around the joint.
- ⇒ Decreasing age related memory loss, cognitive function impairment, and possibly lowering the risk for Alzheimer's disease.
- ⇒ Playing a role in preventing depression—a low level of Omega-3's has been linked to depression.

What are the best sources for Omega-3's?

The main sources of omega-3's are fatty fish, such as salmon or mackerel, and shellfish. **These foods contain the EPA and DHA types of omega-3's which have been identified to be the most beneficial.**

Other sources of omega-3's can be found in flaxseed oil, walnut oil, and soybeans. These foods contain the ALA type of omega-3's. Although they can convert to DHA and EPA, the conversion is minimal, so focusing on fish consumption is a best bet.

Food Item	EPA grams	DHA grams	ALA grams
Salmon (3.5 ounces)	0.8	0.6	
Tuna (3.5 ounces)	0.3	0.9	
Swordfish (3.5 ounces)	0.1	0.5	
Flax seed oil (1 Tablespoon)			7.5
Flax seed, ground (2 Tablespoons)			3.5
Walnuts (1 ounce, about 14 halves)			7.5
Soybeans, boiled (1 ½ cups)			0.5

Tips to boost your Healthy Fat Intake:

- ⇒ Eat two servings of fish or shellfish a week.
- ⇒ Use cooking methods like baking, broiling, and steaming.
- ⇒ If you don't like fish, include as many plant based sources of omega-3's in your diet daily....one easy way is to use two tablespoons of ground flaxseed in your favorite foods. Flax seed oil can be used on soups and salads; however, it is not heat stable for cooking.
- ⇒ You can take a high quality fish oil supplement daily to help meet your needs, but food is always the best bet over any supplement.
- ⇒ Use raw nuts, avocados, olive or canola oil, fatty fish, and flax seed and/or oil

Fluids and Hydration

Hydration is most important component of an athletes' diet. Making the right choices can be confusing, though.

What is a sports drink?

Sports drinks are a combination of water, carbohydrates, and electrolytes (e.g. sodium and potassium). They offer a variety of benefits:

- ⇒ Provide the necessary fluids an athlete needs
- ⇒ Can also help maintain stamina during training and competition
- ⇒ Enhance fluid absorption in the small intestine due to the carbohydrate and sodium content
- ⇒ Can have a positive effect on performance
- ⇒ Enhanced taste encouraging greater hydration

Sports drinks provide calories (energy), electrolytes (sodium and potassium) and help young athletes replace fluid losses. An added benefit is they taste good so typically young athletes will hydrate better.

Fuel Tips – Hydration Danger Zone

- ⇒ Athletes should weigh pre and post training to determine body weight change
- ⇒ Losses during this time are fluid losses, not body fat.
- ⇒ 1-2% body weight loss (~1.5 lbs in a 150 lb athlete) can negatively affect physical performance
- ⇒ 2-4% loss of body weight can impair mental and physical performance
- ⇒ Greater than 6% body weight loss is dangerous and can lead to heat stroke which needlessly takes the young lives of athletes every year in the US.

Warning signs of Dehydration:

- Dark urine
- Flushed skin
- Fatigue
- Light-headedness
- Loss of appetite
- Headache

How Fluid Losses can Negatively Impact Performance:

- Increase heart rate
- Decrease in cardiac output
- Decrease muscular endurance
- Increase core body temperature (makes the body work harder and increases fatigue)
- Muscle cramping from electrolyte loss (sodium and potassium)
- Decreased balance
- Reduced strength and power
- Heat exhaustion
- Heat stroke

Optimal Fluid Replacement with Sports Drink

- ⇒ Fluids should be cooled and flavored to enhance taste and increase voluntary fluid intake.
- ⇒ Fluids should contain carbohydrate to enhance performance.
- ⇒ Fluids should include sodium to stimulate thirst and fluid retention.

Optimal Hydration Plan:

Hydration Plan

1. Drink 16 oz (2 cups) of fluid 2 hours before practice or game.
 2. Drink 8 oz (1 cup) of fluid 10-20 minutes before practice or game. (In very hot or very cold weather you need 12-20 oz 10-20 minutes prior to practice or game).
 3. Drink 7-10 oz every 10-20 minutes during exercise.
 4. After practice or game drink 20 oz for every pound of weight lost. Ideally, complete rehydration within 2 hours of exercise.
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- ⇒ Aim to consume carbohydrates at a rate of 30-60 grams per hour.
 - ⇒ Don't wait until you are thirsty, by then you have already lost 1-2% of body weight as sweat and your performance will be impaired.

A few commonly asked questions about sports drinks and fluid needs:

1. **Question: How do I pick out the best sports drink for me?**

Choose a sports drink that is 6-8% carbohydrates or 50-80 calories per 8 oz with 120-170 mg sodium. Beverages with higher carbohydrate content (e.g. sodas, orange juice) are too concentrated and delay absorption, causing stomach pain and impaired performance. When evaluating different sports drinks, look for a sports drink that replaces body water losses, provides fuel if necessary, tastes good, and does not cause any GI discomfort.

2. **How do I know if I am drinking enough fluid during the day?**

The most simple way to assess this is to monitor urine color. It should look like pale lemonade vs. apple juice. This can vary depending on use of supplements and medications. Thirst is not an adequate way to determine hydration status; when thirsty, the body is already mildly dehydrated. Do not use thirst as an indicator for fluid needs. Drink regularly throughout the entire day.

Vitamins and Minerals

Vitamins and minerals are necessary for virtually all reactions to occur in the body. While each has its own unique properties, they work together to ensure reactions in the body occur appropriately. Vitamins are essential molecules that cannot be made in the body and therefore, must be eaten through from foods. Vitamins and minerals do not directly supply energy – only calories can do that; however, they are both required in energy metabolism in the body.

There are essentially two categories of vitamins:

1. fat soluble
2. water soluble

Fat Soluble Vitamins	Water Soluble Vitamins		
A	C	Pyridoxine	Cobalamin
D	Thiamin	Pantothenic acid	
E	Riboflavin	Biotin	
K	Niacin	Folic acid	

Vitamin deficiencies reduce body function and impair health. This can also negatively affect performance. **However, over consuming vitamins and minerals is also not healthy—nor will it enhance performance.** It's particularly important to note that fat soluble vitamins can all be stored in the body, increasing the likelihood of toxicity if megadoses are consumed. The water soluble vitamins on the other hand can be excreted, but still put undo stress on the body when over consumed. Both extremes can be avoided by eating a wide variety of whole foods and enough total calories. The Institute of Medicine recently released updated tables and recommendations for all vitamins and minerals. These tables are summarized below, along with food sources for each nutrient.

Whole foods are the optimal way to obtain all nutrients. Food provides much more than just a single nutrient (such as a vitamin tablet) and **no pill, potion, or powder will ever give the same benefit as eating real food.** Taking a basic multivitamin/mineral is suggested, though, but it should not contain 1000's% above the RDA. Look for products that provide 100% of the RDA for all vitamins and minerals. **It is to act as insurance, not replace or make up for a poor diet.**

Fuel Tip

Research studies suggest vitamin and mineral intake among athletes in general is sufficient. Athletes tend to ingest above average quantities of micronutrients because of their increased energy intake. Moreover, additional supplementation does not appear to improve performance in any way.

In the recently released Dietary Reference Intakes, some definitions were established that are important to discuss:

Dietary Reference Intakes

Recommended Dietary Allowance (RDA): the average daily nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 or 98 percent) healthy individuals in a particular life stage and gender group.

Adequate Intake (AI): the recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate-used when an RDA cannot be determined.

Tolerable Upper Intake Level (UL): the highest average daily nutrient intake level that is likely to pose no risk of adverse health effects to almost all individuals in the general population. As intake increases above the UL, the potential risk of adverse effects may increase.

Estimated Average Requirement (EAR): the average daily nutrient intake level estimated to meet the requirement of half the healthy individuals in a particular life stage and gender group.

Dietary Reference Intake: Minerals

Adapted from www.nap.edu

Mineral	RDA		RDA		UL	Food Sources
	Males Major Functions 19-30 years Intake/day	Females	Males	Females		
Arsenic	ND	ND	ND	ND	ND	Dairy products, meat, poultry, fish, grains, cereal
	No biological function in humans					
Boron	ND	ND	ND	ND	ND	Potatoes, legumes, milk
	Reproductive and avocado, peanut butter		developmental effects			
Calcium (mg) set	1000	1000	1000	1000	2500	Dairy products, calcium-tofu, kale, broccoli, salmon with bones
canned	Essential in blood clotting, muscle contraction, bone and tooth formation					
Chromium (µg) fish	35	25	35	25	ND	Some cereals, meats, poultry
	Helps maintain normal blood glucose levels					
Copper (µg) nuts, products	900	900	900	900	10,000	Organ meats, seafood, Seeds, whole grain
	Component of enzymes in iron metabolism					
Fluoride (mg) products	4	3	4	3	10	Fluorinated water, teas, fluorinated dental
	Inhibits beginning of dental carries and stimulates bone formation					
Iodine (µg)	150	150	150	150	1100	Foods of marine origin, iodized salt
	Component of thyroid function					
Iron (mg) bread	8	18	8	18	45	Meat, poultry, fortified and grain products
	Component of hemoglobin and many enzymes					
Magnesium nuts, (mg)	400	310	420	320	350	Green leafy vegetables, unpolished grains
	Cofactor for enzyme systems					
Manganese (mg)	2.3	1.8	2.3	1.8	11	Nuts, legumes, tea, and whole grains
	Involved in formation of bone, and in enzymes involved in		amino acid, cholesterol, and			carbohydrate
metabolism						

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Molybdenum products, nuts (µg)	45	45	45	45	2000	Legumes, grain
	Cofactor for enzymes in catabolism of sulfur amino acids, purines, and pyridines					

Dietary Reference Intake: Minerals

Adapted from www.nap.edu

Mineral	RDA		RDA		UL	Food Sources
	Males	Females	Males	Females		
	Major Functions		31-50 years			
	19-30 years		Intake/day			
	Intake/day		Intake/day			
Nickel (mg)	ND	ND	ND	ND	1.0	Nuts, legumes, cereals, chocolate milk powder
	No clear biological function in humans					
Phosphorus (mg)	700	700	700	700	4000	Milk, yogurt, ice cream, cheese, peas, meat, some cereals, and breads
	Maintenance of pH, storage and transfer of energy and nucleotide synthesis					
Selenium (µg)	55	55	55	55	400	Organ meats, seafood, (dependent on soil selenium)
	Defense against oxidative stress and regulation of thyroid hormone action					
Silicon	ND	ND	ND	ND	ND	Plant-based foods
	No biological function in humans					
Vanadium (mg)	ND	ND	ND	ND	1.8	Mushrooms, shellfish, Pepper, parsley, and sill seed
	No biological function in humans					
	has been identified					
Zinc (mg)	11	8	11	8	49	Red meat, oysters and other seafood, fortified cereals
	Component of multiple enzymes and proteins; involved in the regulation of gene expression					

Dietary Reference Intake: Vitamins

Adapted from www.nap.edu

Vitamin	RDA		RDA		UL	Food Sources
	Males	Females	Males	Females		
Biotin (µg)	30	30	30	30	ND	Liver, meats, and fruits
	Coenzyme in synthesis of		fat, glycogen, and amino			acids
Choline (mg)	550	425	550	425	3500	Milk, liver, eggs,
		Precursor for acetylcholine, peanut butter		phospholipids, and betaine		
Folate (µg)	16	14	16	14	35	Meat, fish, poultry,
	Coenzyme in the enriched and whole grain		metabolism of nucleic and breads, bread products,			amino acids fortified ready to eat cereals
Niacin (mg)	16	14	16	14	35	Meat, fish, poultry,
	Involved with many enriched and whole grains		biological reactions			
Pantothenic Acid (mg)	5	5	5	5	ND	Chicken, beef, potatoes, oats, cereals, liver, yolk
	Coenzyme in fatty acid metabolism					
B ₂ (mg) bread, (Riboflavin)	1.3	1.1	1.3	1.1	ND	Organ meats, milk, and fortified cereals
B ₁ (Thiamin) (mg)	1.2	1.1	1.2	1.1	ND	Enriched, fortified, or whole-grain products,
	Coenzyme in the metabolism of bread, and bread products		carbohydrates and BCAA			
A (µg) fish	900	700	900	700	3000	Liver, dairy products,
	Required for normal vision, development, and		immune function			

Dietary Reference Intake: Vitamins

Adapted from www.nap.edu

Vitamin	RDA		RDA		UL	Food Sources
	Males	Females	Males	Females		
B ₆ (mg)	1.3	1.3	1.3	1.3	100	Fortified cereals and and amino acids
	Coenzyme in the organ meats		metabolism of glycogen			
B ₁₂ (mg)	2.4	2.4	2.4	2.4	ND	Fortified cereals, meat, fish, poultry
	Coenzyme in nucleic acid metabolism, prevents		megaloblastic anemia			
C (mg)	90	75	90	75	ND	Citrus fruits and many vegetables
	Cofactor in many reactions					
D (µg)	5	5	5	5	50	Fish liver oils, liver, fortified milk
	Maintain serum calcium					
E (mg)	15	15	15	15	1000	Vegetable oils, nuts, unprocessed grains
	Powerful antioxidant					
K (µg)	120	90	120	90	ND	Green vegetables
	involved in blood clotting					