

VITAMINS, MINERALS AND THEIR FUNCTIONS TABLE

▲The nutrient and energy standards known as the RDA are currently being revised. The new recommendations are called Dietary Reference Intakes (DRI). The following chart provides the most updated goals for nutrient intake available for males and females between 31 - 50. For information about other ages, or special populations such as pregnancy or lactation, please go to www.nal.usda.gov.

Nutrient	RDA or DRI	Functions in the Body/Benefits	Dietary Sources
FAT-SOLUBLE VITAMINS			
Vitamin A Retinol, beta-carotene and various other carotenoids	RDA Males: 1000 ug RE Females: 800 UG RE	Helps maintain good vision (necessary for night vision), resistance to infections, and supports growth and repair of body tissues. Also maintains integrity of white and red blood cells, assists in immune reactions, helps maintain the stability of cell membranes.	Milk, eggs, meat, fish liver oils. Beta-carotene and other carotenoids are found in: Green leafy vegetables - kale, spinach, broccoli, collard greens, parsley, turnip greens, escarole. Yellow vegetables - carrots, sweet potatoes, winter squash, pumpkin. Yellow and orange fruits - mango, cantaloupe, papaya, and apricots.
Vitamin D Cholecal-ciferol, ergocal-ciferol	DRI Males: 5.0 ug Females: 5.0 ug	Member of a large and cooperative bone-making and bone maintenance team. Regulates absorption of calcium and phosphorus for bone health.	Formed in skin when exposed to sunlight. Also found in dairy products, egg yolk, fish liver oils, tuna, mackerel, herring, sardines, oysters, yeast.
Vitamin E Tocopherol, Tocotrienols	RDA Males: 10 mg α-TE Females: 8 mg α-TE	Fat-soluble antioxidant. Helps maintain cell membranes, red blood cell integrity, protects vitamin A and fatty acids from oxidation.	Found primarily in plant oils, green, leafy vegetables, wheat germ, whole grains, egg yolk, nuts, seeds, and liver.
Vitamin K	RDA Males: 80 ug Females: 65 ug	Helps make factors that promote blood clotting.	Bacterial synthesis in the digestive tract. Diet generally supplies remaining need. Green, leafy vegetables, cabbage-type vegetables and milk.
WATER-SOLUBLE VITAMINS			
Vitamin B1 Thiamine	DRI Males: 1.2 mg Females: 1.1 mg	Helps metabolize carbohydrates, maintain appetite and normal digestion. Part of a coenzyme used in energy metabolism. Supports normal appetite and nervous system function.	Found in many foods: whole grain cereals, legumes, beans, nuts, brewer's yeast, wheat germ, pork, ham, and liver.
Vitamin B2 Riboflavin	DRI Males: 1.3 mg Females: 1.1 mg	Part of coenzymes used in energy metabolism, supports normal vision and skin health.	Milk, yogurt, other dairy, meat, leafy greens, whole grains.
Vitamin B3 Niacin, nicotinic acid, niacinamide	DRI Males: 16 mg NE Females: 14 mg NE	Part of a coenzyme used in energy metabolism, supports health of skin, nervous system and digestive system. High (pharmacological) doses may help manage cholesterol.	Tuna, dairy, meat, whole grains, nuts and all protein containing foods.
Vitamin B5 Pantothenic Acid	DRI Males: 5.0 mg Females: 5.0 mg	Part of Coenzyme A, which is used in energy metabolism	Widespread in foods.
Vitamin B6 Fyridoxine, pyridoxal, other forms	DRI Males: 1.3 mg Females: 1.3 mg	Part of a coenzyme that helps the body synthesize nonessential amino acids. Significant role in protein metabolism.	Green leafy vegetables, meats, fish, poultry, shellfish, legumes, fruits, whole grains.
Vitamin B12 Cobalamin	DRI Males: 2.4 ug Females: 2.4 ug	Part of coenzymes used in new cell synthesis; helps to maintain nerve cells.	Animal products (meat, fish, poultry, shellfish, eggs, cheese, milk).
Biotin	DRI Males: 30 ug Females: 30 ug	Part of a coenzyme used in energy metabolism, fat synthesis, amino acid metabolism and glycogen synthesis.	Widespread in foods.

Vitamins, Minerals and their Functions Table, Cont.

Nutrient	RDA or DRI	Functions in the Body/Benefits	Dietary Sources
Folic acid Folate, folacin	DRI Males: 400 ug Females: 400 ug	Part of coenzymes used in new cell synthesis. Essential for blood cell formation, protein metabolism, and prevention of neural tube defects.	Green leafy vegetables, liver, fortified grain products, legumes and seeds.
Vitamin C (ascorbic acid)	RDA Males: 60 mg Females: 60 mg	Essential element in collagen formation (strengthens blood vessels, forms scar tissue, is a matrix for bone growth); an antioxidant; strengthens resistance to infections; and improves absorption of iron.	Abundant in most fresh fruits (esp. citrus) and vegetables.
SELECTED MINERALS			
Boron	NO RDA or DRI	Bone health, prevention of osteoporosis.	Non-citrus fruits, leafy vegetables.
Calcium	DRI Males: 1000 mg Females: 1000 mg	The principal mineral of bones and teeth, also involved in normal muscle contraction (including heart muscle).	Milk and milk products, small fish with bones, tofu, broccoli, chard and legumes.
Chloride	No RDA or DRI	An electrolyte that maintains normal fluid balance and proper acid-base balance, part of hydrochloric acid found in the stomach.	Salt, soy sauce, moderate quantities in whole, unprocessed foods and large amounts in processed foods.
Chromium	No RDA or DRI	Associated with insulin and required for the release of energy from glucose.	Brewer's yeast, unrefined whole grain cereals, fats, vegetable oils.
Copper	No RDA or DRI	Supports healthy bones, muscles, and blood vessels. Assists in iron absorption.	Liver, legumes, nuts, seeds, raisins, whole grains, shellfish, shrimp.
Nutrient	RDA or DRI	Functions in the Body/Benefits	Dietary Sources
Fluoride	DRI Males: 3.8 mg Females: 3.1 mg	Involved in the formation of bones and teeth.	Drinking water (if fluoridated) tea, seafood.
Iodine	RDA Males: 150 ug Females: 150 ug	Essential component of thyroid hormones that regulate tissue growth and cell activity.	Iodized salt, seafood, plants.
Iron	RDA Males: 10 mg Females: 15 mg	Part of the protein hemoglobin which carries O ₂ in the body. Part of the protein myoglobin in muscle which makes O ₂ available for muscle contraction. Necessary for the utilization of energy as part of the cells' metabolic machinery.	Red meats, liver, poultry, fish, shellfish, beans, peas, dried fruit, eggs. Certain foods contain phytates, which may inhibit iron absorption.
Magnesium	DRI Males: 420 mg Females: 320 mg	Involved in bone mineralization, the building of protein, enzyme action, normal muscular contraction, and transmission of nerve impulses	Nuts, legumes, whole grains, beans, green leafy vegetables, seafood, chocolate.
Manganese	No RDA or DRI	Involved in the formation of bone, as well as in enzymes involved in amino acid, cholesterol, and carbohydrate metabolism.	Nuts, whole grain cereals, beans, rice, dried fruits, green leafy vegetables.
Molybdenum	No RDA or DRI	Important in a variety of enzyme systems.	Legumes, grains, organ meats.
Phosphorus	DRI Males: 700 mg Females: 700 mg	A principal mineral of the bones and teeth; part of every cell; maintains acid-base balance.	Abundant in all animal foods.

ERGOGENIC AIDS

(from American Family Physician, March 2001)

TABLE 3
Ergogenic Aids: A Summary of An Assessment of the Current Literature

Ergogenic aid	Action	Research on ergogenic effects	Side effects	Legality
Alcohol	Decreases anxiety	No benefits	Significant	Banned for shooting events
Amphetamines	Improve concentration, decrease fatigue and appetite	Mixed, some positive	Significant, dangerous	Illegal
Anabolic steroids	Increase strength, lean muscle mass and motivation	Positive	Significant, dangerous	Illegal
Androstenediol	Same as steroids	Limited, refutes	Unknown	Banned by IOC
Androstenedione	Same as steroids	Refutes, no benefits	Significant	Banned by IOC, NCAA
Antioxidants	Decrease muscle breakdown	Mixed, no clear benefits	Mild at high doses	Legal
Arginine, ornithine, lysine	Stimulate growth hormone release	No benefit	None at doses used	Legal
Aspartates	Increase free fatty acid use, sparing muscle glycogen	Mixed, some positive benefits	Mild at high doses	Legal
Aspirin	Decreases pain with muscle fatigue and muscle breakdown	No benefit	Mild	Legal
Avena sativa	Increases steroid production	Limited, refutes	None	Legal
Bee pollen	Increases strength and endurance	Refutes, no benefits	Allergic reaction	Legal
Beta blockers	Decrease anxiety	Positive effect on fine motor control, negative effect on aerobic capacity	Significant	Banned by IOC
Beta ₂ agonists	Increase lean muscle mass	Mixed, no benefit from inhaled formulations	Mild	Banned by IOC, legal when prescribed
Blood doping	Increases aerobic capacity	Supports	Significant, dangerous	Illegal

Boron	Increases endogenous steroid production	Refutes, no benefit	Mild at high doses	Legal
Branched chain amino acids	Decrease mental fatigue	Mixed, negative	Mild at high doses	Legal
Caffeine	Increases muscle contractility and aerobic endurance, enhances fat metabolism	Supports	Mild	Legal to urine level of 12 to 15 µg per mL
Calcium	Increases muscle contractility, enhances glycogen metabolism	Refutes, no benefit	Mild at high doses	Legal
Carbohydrates	Increase endurance, decrease fatigue	Supports	Mild at high doses	Legal
Carnitine	Increases fat metabolism	Refutes	None	Legal
Choline	Increases endurance	Mixed, inconclusive	None	Legal
Chromium	Increases lean mass	Refutes, no benefit unless prior deficiency	Safe to 400 µg daily, potentially dangerous above this level	Legal
Chrysin	Inhibits aromatase, increases endogenous steroids	Limited, refutes	None	Legal
Cocaine	Stimulates CNS, delays fatigue	Mixed	Significant, dangerous	Illegal
Coenzyme Q ₁₀ (ubiquinone)	Delays fatigue, acts as antioxidant	Refutes, no benefit	None	Legal
Coenzyme Q ₁₂	Increases aerobic capacity, speeds muscle repair	Refutes, no benefit	None	Legal
Creatine	Increases muscle energy, endurance, strength and lean muscle mass	Supports, insufficient data on long-term use	Mild	Legal
DHEA	Increases endogenous steroid production	No benefit in healthy athletes	Potentially dangerous	Banned by IOC, some other organizations
Diuretics	Decrease body mass	Limited benefit	Potentially dangerous	Banned by IOC
Ephedrine, other sympathomimetics	Stimulate CNS, increase energy, delay fatigue, stimulate weight loss	No benefit	Potentially dangerous	Illegal (2004)
Ephedrine plus caffeine	Increases energy, stimulates weight loss	Supports	Potentially dangerous, fatal at high doses	Banned by IOC, some other organizations
Erythropoietin	Increases aerobic capacity	Supports	Significant, dangerous	Illegal

Fat supplements	Increase endurance	Refutes	Mild	Legal
Fluids	Increase endurance	Supports	Mild	Legal
Folic acid	Increases aerobic capacity	Refutes	None	Legal
GHB	Stimulates growth hormone release and muscle growth	Limited, refutes	Significant, dose-related; abuse potential	Illegal
Ginseng	Increases endurance, enhances muscle recovery	Limited, refutes, no benefit	Mild, abuse syndrome reported	Legal
Glucosamine	Serves as NSAID alternative, enhances recovery	Limited, may have limited NSAID abilities	None	Legal
Glutamine	Boosts immunity and growth hormone levels	May boost immunity, no other benefits	None	Legal
Glycerol	Improves hydration and endurance	Limited, supports	Mild	Legal (oral)
Guarana (herbal caffeine)	Same as caffeine			
HMB	Decreases muscle breakdown, enhances recovery	Limited, some strength benefits	None	Legal
Human growth hormone	Anabolic effect on muscle growth, increases fat metabolism	Refutes, limited ergogenic benefits	Significant, dangerous	Illegal
Inosine	Enhances energy production, improves aerobic capacity	Refutes, no benefit	Mild	Legal
Iron	Increases aerobic capacity	No benefit unless preexisting deficiency	Mild, toxic at high doses	Legal
Leucine	Decreases muscle breakdown and spare muscle glycogen stores	Limited, no ergogenic effect	None	Legal
Ma huang (herbal ephedrine)	Same as ephedrine			
Magnesium	Enhances muscle growth	No benefit unless preexisting deficiency	Mild at high doses	Legal
Marijuana	Decreases anxiety	Refutes, negative effect	Significant, dangerous	Illegal
Multivitamins	Increases energy, endurance and aerobic capacity, enhances recovery	No benefit unless preexisting deficiency	None at RDA, some toxicities at high doses	Legal
Narcotics	Increase endurance by suppressing pain, decrease anxiety	Mixed, negative	Significant, dangerous	Illegal

Niacin	Increases energy and endurance	No benefit unless a preexisting deficiency	Mild at high doses	Legal
Oxygen	Increases aerobic capacity, enhances recovery	No benefit if given before or after activity	Mild	Legal
Phosphates	Increase ATP production, energy and muscle endurance	Mixed, negative	Mild at high doses	Legal
Phytosterols	Stimulates release of endogenous steroids and growth hormone	Refutes, no benefit	Little data, allergic reaction possible	Legal
Protein	Optimizes muscular growth and repair	Supports, increased need for protein with activity	None unless underlying medical condition	Legal
Pycnogenol	Boosts antioxidant levels, enhances recovery	Supports, dietary sources offer same benefit	None	Legal
Pyruvate	Increases lean body mass	Limited research, benefit only in specific cases	None	Legal
D-Ribose	Increases cellular ATP and muscle power	No human research	None known	Legal
Selenium	Enhances antioxidant functions	Limited, no benefit	Mild at high doses	Legal
Sodium bicarbonate	Buffers lactic acid production, delays fatigue	Supports	Mild, dangerous at high doses	Legal
Strychnine	Unknown	No research on ergogenic benefits	Significant, dangerous	Legal
Tribulus terrestris	Increases endogenous steroid production	Refutes	Potentially dangerous at high doses	Legal
Tryptophan	Decreases pain perception, increases endurance	Mixed, no benefit in trained athletes	Mild, potentially dangerous	Legal
Vanadyl sulfate	Increases glycogen synthesis, enhances muscle recovery	Refutes, no benefit in healthy individuals	Mild	Legal
Vitamin B ₁ (thiamin)	Enhances energy production, increases aerobic capacity, improves concentration	No benefit unless preexisting deficiency	None	Legal
Vitamin B ₂ (riboflavin)	Increases aerobic endurance	No benefit unless preexisting deficiency	None	Legal
Vitamin B ₆ (pyridoxine)	Enhances muscle growth, decreases anxiety	No benefit unless preexisting deficiency	Mild at high doses	Legal

Vitamin B ₁₂ (cyanocobalamin)	Enhances muscle growth	No benefit unless preexisting deficiency	None	Legal
Vitamin B ₁₅ (dimethylglycine)	Increases muscle energy production	Mixed, negative	None proven, but concerns raised	Legal
Vitamin C	Acts as antioxidant, increases aerobic capacity and energy production	No benefit unless preexisting deficiency	Mild at high doses	Legal
Vitamin E	Acts as antioxidant, improves aerobic capacity	Mixed, some positive	Mild	Legal
Yohimbine	Increases endogenous steroid production	Refutes, no benefit	Mild	Legal
Zinc	Enhances muscle growth, increases aerobic capacity	Limited, negative	Mild	Legal

IOC = International Olympic Committee; NCAA = National Collegiate Athletic Association; CNS = central nervous system; DHEA = dehydroepiandrosterone; GHB = gamma-hydroxybutyrate; NSAID = nonsteroidal anti-inflammatory drug; HMB = calcium beta-hydroxy beta-methylbutyrate; RDA = recommended daily allowance; ATP = adenosine triphosphate.

If your lifestyle doesn't control your meal plan, your diet will control your meal plan..

Nutritional Analysis Sheet

All References taken from American Dietetic Association

$$\text{Body Mass Index} = \frac{\text{weight (lbs.)}}{\text{height inches} \times \text{height inches}} \times 705 = \text{BMI}$$

BMI	
20-25	very low risk
26-30	low risk
31-35	moderate risk
36-40	high risk
40 +	very high risk

Activity Range
.30-.40- sedentary
.50-.60- moderately active
.70-.80- vigorously active
.90- athlete/instructor
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$$\text{Base Metabolic Rate} = \frac{\text{MBMR}}{\text{(10 women, 11 men)}} \times \text{(body weight)} = \text{_____ calories /day}$$

(maintenance basal metabolic rate/MBMR)

$$\text{Activity Calories} = \frac{\text{[.30-1.0] range of activity}}{\text{range of activity}} \times \text{(MBMR)} = \text{_____ calories}$$

(Activity Calories/AC)

$$\text{Daily Energy Expenditure} = \frac{\text{(MBMR)}}{\text{(MBMR)}} + \frac{\text{(AC)}}{\text{(AC)}} = \text{_____ calories}$$

(DEE) (DEE)

Body weight = _____ DEE = _____

Activity Level = Low-Moderate Active/Athlete

Specific & individualized calculations

CHO (carbohydrates)	55-60% ()g CHO ----- ----- 3g/lb __ x __ lbs = ____	60-75% ()g CHO ----- ----- 3-4.5 g/lb. __ x __ lbs = ____	$\frac{\text{____} \times \text{.____} \sim \text{.____}}{\text{cals}} = \frac{\text{____}}{\text{____}}$ $\text{____} \div 4\text{cals/g} = \text{____}$ $\text{____} \sim \text{____} \text{ g CHO}$
PRO (teins)	10-15% ()g PRO ----- ----- .4g/lb ()g PRO	10-20% ()g PRO ----- ----- .5-.8g/lb ()g PRO	$\frac{\text{____} \times \text{.10} \sim \text{.____}}{\text{____}} = \frac{\text{____}}{\text{____}}$ $\text{____} \div 4 \text{ cals/g} = \text{____}$ $\text{____} \sim \text{____} \text{ g PRO}$
FAT [____ = my fat goal]	25-30% <10% saturated fat ()g FAT	25% ()gFAT	$\frac{\text{____} \times \text{____}}{9\text{cals/g}} = \frac{\text{____}}{\text{____}} \text{ cals} \div$ $\text{____} \text{ g FAT or less}$ <p>-----</p> $(\text{____} \text{ g} \times \text{.10} = \text{____} \text{ g of saturated fats or less})$