Brief Synopsis of Selected Popular Dietary Supplements*

Type of Supplement	Common Popular Uses (Claims)	Considerations & Concerns
5-hydroxytryptophan (5-HTP)	Used to increase serotonin levels in the brain to reduce appetite and carbohydrate craving; promote sleep; reduce depression	Used instead of the amino acid tryptophan (illegal in U.S.); potential association with fatal Eosinophilia-Myalgia Syndrome needs clarification via additional research [1]
Acetyl-L-carnitine (see also: carnitine)	Used to enhance brain function and reduce depression in elderly	May benefit certain types of dementia; more research needed [2,3]
Alpha-ketoglutarate	Used to prevent muscle protein breakdown during periods of stress such as recovery from surgery; anticatabolic	Can be converted to the amino acids glutamate and glutamine; research supports medical use as anticatabolic; use as sports supplement needs more study; similar to glutamine, may benefit athletes involved in heavy training [4,5]
Alpha-ketoisocaproate (KIC)	Precursor for the BCAA leucine; claims are made for prevention of muscle protein catabolism and reduction of fatigue during exercise	May have medical applications; unlikely to provide any ergogenic benefit beyond BCAA supplementation; it is primarily converted to leucine [6]
alpha-linolenic acid (also see DHA & EPA)	Used to Increase omega-3 fatty acid intake; usual sources are flax oil, walnut oil, Canola oil, and soybean oil	Not equivalent to omega-3 fatty acids in fish oils; can be converted to the longer "fish oil" omega-3 fatty acids, but conversion may be too inefficient to meet needs for EPA and DHA [7]
Androstenedione	Precursor for testosterone; intended to increase testosterone; enhance muscle protein synthesis	Claims not consistently supported by research; may increase estrogen in men more than testosterone; no evidence for increased protein synthesis; may produce positive urine test for nandrolone [8-10]
Arginine	Increase growth hormone; promote muscle protein synthesis; enhances nitric oxide synthesis and relaxation of smooth muscle in blood vessels	Significance of increased growth hormone is questionable except for disease conditions; good potential for reducing the risk of heart attack and possibly stroke [11,12]
beta-carotene	Antioxidant; prevention of exercise-induced muscle soreness; enhanced recovery from exercise stress	Additional research is needed to understand possible health risks vs benefits of beta-carotene supplementation [13-16]
Branched chain amino acids	Suppress muscle protein degradation; enhance exercise recovery; reduce perception of fatigue during endurance exercise	Some research (but not all) indicates prevention of muscle protein breakdown as well as reduced fatigue by inhibiting tryptophan uptake into the brain [17-19]
Beta-hydroxy-betamethylbutyrate (see: HMB)	Promoter of increased lean body mass and strength by inhibiting the rate of muscle breakdown	Research results equivocal; may benefit untrained individuals more than trained [20-22]
Bromelain	Complex of proteolytic enzymes extracted from the base of pineapple plants; used to aid protein digestion or as an anti-inflammatory agent	Use as digestive aid questionable; some of this enzyme escapes digestion and affects eicosanoids in a way that reduces inflammation [23-27]

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Caffeine	Stimulates central nervous system; improves reaction time, alertness, concentration; enhances mobilization of fat from fat cells; improves endurance performance	Claims are supported by research; diuretic effect increases urine production at rest, but not during exercise; combination with sources ephedrine sources like ephedra (ma huang) may increase risk of adverse reactions [28-30]
Carnitine (L-carnitine)	Used to enhance utilization of fat (fatty acids) as an energy source and improve endurance by decreased reliance on carbohydrate (muscle glycogen)	Some studies support claims, however others do not; potential benefit likely depends on dosage, length of time taking supplement, and type of performance being tested [31-35]
Casein	The principal protein of milk and primary protein component of cheese; frequently a component of protein supplements	Casein has a lower biological value than whey protein, but casein has been shown to support more sustained protein synthesis due to more gradual digestion and absorption [36,37]
Chitosan	A form of chitin extracted from the shells of crustaceans; used as a "fat blocker" to reduce absorption of dietary fat and cholesterol	Can help to reduce absorption of dietary cholesterol but apparently it does not bind enough fat to assist in weight loss [38-40]
Cholecystokinin (CCK)	CCK supplements are taken to stimulate satiety and reduce food intake	Injected CCK can decrease appetite and food intake; it is thought that oral supplements of this peptide hormone are ineffective because the peptide is likely digested, however no human studies have been conducted [41]
Chondroitin sulfate (see also Glucosamine)	Used to promote joint health and to treat osteoarthritis; usually combined with glucosamine sulfate	Perhaps the most thoroughly studied nutraceutical, generally shown to enhance joint health [42-45]
Chromium picolinate	Used to enhance loss of body fat with maintenance of lean tissue	Claims not supported by research; chromium is an essential trace element, but the picolinate form has been associated oxidative damage to DNA and cell membrane lipids [46]
Chromium nicotinate (chromium + niacin) Chromium chloride	Used to enhance loss of body fat with maintenance of lean tissue	Claims not supported by research; these forms of chromium are apparently safe as a source of chromium in a dietary supplement [46]
Chrysin	Used by men to reduce the production of estrogen and increase testosterone levels	No studies exist on efficacy and safety in humans
Citrus aurantium – bitter orange (source of synephrine)	Used as a thermogenic to increase resting energy expenditure; contains synephrine and N-methyltyramine	Can increase blood pressure, especially in combination with stimulants like caffeine; interacts with several drugs [47,48]
Coenzyme Q-10 (ubiquinone)	Used to enhance energy metabolism and exercise performance; also used for various medical purposes	Does not clearly affect exercise performance in normal healthy people; may benefit some disease conditions, but can have negative interactions with several drugs [49,50]
Cola nut	Common herbal source of caffeine	See: Caffeine

Type of Supplement	Common Popular Uses (Claims)	Considerations & Concerns
Conjugated linoleic acid (CLA)	Used for fat loss and cancer prevention; most common food source is milk fat	This is a trans fatty acid that is likely beneficial to health; effectiveness in fat loss and cancer prevention requires further research [51, 52]
Creatine	Used to enhance high intensity exercise performance	Generally effective for enhancing maximal power/strength exercise performance; apparently safe for short term use; safety of long term use not known [53, 54]
DHA (docosahexaenoic acid) (also see alpha-linolenic acid & EPA)	Long chain omega-3 fatty acid found in fish oils and some algae oils; used to reduce the risk of cardiovascular disease and age-related macular degeneration, protect brain function, and reduce plasma triglycerides	DHA is the major fatty acid in the brain and the retina; deficiency may adversely affect mental function and vision; supplementation combined with “blood thinner” drugs requires medical supervision [7]
DHEA (dehydroepiandrosterone)	Used to increase levels of steroid hormones that may increase protein synthesis; slow changes associated with aging	Potential benefits and risks require additional clarification; use only with medical supervision; some preparations can give positive drug test [55-57]
EPA (eicosahexaenoic acid) (also see alpha-linolenic acid & DHA)	Long chain omega-3 fatty acid found in fish oils and some algae oils; used to reduce the risk of cardiovascular disease	EPA has important functions and can be elongated to DHA; supplementation combined with ”blood thinner” drugs requires medical supervision [7]
Ephedra (ma huang)	Used for weight loss (usually combined with a source of caffeine), enhancing athletic performance, and treatment of allergies and asthma	Causes slight increase resting meta-bolic rate; banned substance for sports competition; may be unsafe for some people, especially during exercise [58]
Ginkgo biloba (leaf extract)	Major use is to enhance mental function in elderly who have limited blood circulation to the brain	Do not use during pregnancy, lactation; people with blood disorders and those on medication should avoid use without medical supervision [59]
Glucosamine	Used in combination with condroitin to treat joint problems like those associated with osteoarthritis; to prevent development of age-related joint problems	Generally considered effective for adjunctive treatment of osteoarthritis [60]
Glutamine	Used for a variety of purposes such as gastrointestinal support, prevention of muscle wasting, immune system support	Non-essential amino acid produced by muscle protein catabolism; used by gastrointestinal tract and immune system as energy source; supplementation beneficial for some conditions [61,62]
Green tea extract	Used for weight control and general health promotion; has replaced ephedra as key ingredient in many weight loss products	Potentially beneficial for intended uses; can interact with many drugs; avoid use with medication without medical supervision [63,64]
HMB (hydroxymethylbutarate)	Used to reduce protein degradation and promote muscle protein accretion during resistance training	Likely beneficial and apparently safe; possibly effective for enhancing recovery of damaged muscle [65,66]
HCA (hydroxycitric acid) (Garcinia Cambogia is a natural source of HCA)	Used for weight loss by enhancing fat oxidation and reducing appetite	Some research supports appetite control and enhanced fat oxidation effects; possibly enhances endurance; fat loss not supported by all studies [67-71]

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Type of Supplement	Common Popular Uses (Claims)	Considerations & Concerns
Inositol	Used as a lipotropic substance to enhance liver handling of increased fatty acid levels during weight loss	Human research is lacking to support the claims; potential benefit to some mental disorders [72,73]
Leucine (L-leucine) (see branched chain amino acids)	See branched chain amino acids	Leucine is one of the three branched chain amino acids
Lipoic acid (alpha lipoic acid)	Used as an antioxidant and by people with diabetes to lower blood glucose and prevent complications	Some research supports antioxidant claims; fairly high doses are required to benefit diabetes [74,75]
Ma huang (see ephedra)		
Medium-chain triglycerides (MCTs)	Used to facilitate weight loss and to enhance endurance performance	Possible weight loss benefit requires substitution of MCT for other dietary fat which is generally impractical; use for endurance controversial[76-77]
Pyruvate (pyruvic acid)	Used as a weight loss aid and to enhance eudurance performance	Claims are not consistently supported by research; very large amounts were used in studies showing benefit [78]
Taurine	Used for management of diabetes, heart problems, and miscellaneous other health problems	Non-essential amino acid that is synthesized in the body and is not essential in the diet; limited research to support claims [79,80]
Valine (see branched chain amino acids)	See branched chain amino acids	Valine is one of the three branched chain amino acids
Vanadyl sulfate	Used to enhance control of blood sugar level and enhance muscle development with strength training	Claims of benefit in normal healthy adults are not supported by current research [81]

*The information in this table is for instructional purposes only to describe the major purported uses of these components of dietary supplements. Many of these substances are powerful chemicals and should be used only with medical guidance and proper dosage. Caution is especially important for anyone using medication, for children, and for women during pregnancy and lactation. Always consult with your physician and pharmacist before taking any dietary supplement.

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