

How Much is Too Much?

Comparison of Dietary Reference Intake Values (for adult men and women) and Daily Values for Micronutrients with the Tolerable Upper Intake Levels (UL),^{a,c} Safe Upper Levels (SUL),^d and Guidance Levels^d

Nutrient	RDA/AI ^b (men / women) ages 31-50	Daily Value (Food Labels)	UL ^c	SUL or Guidance Level ^d	Selected Potential Effects of Excess Intake
Vitamin A (mcg)	900 / 700	1500 (5000 IU)	3000	1500** (5000 IU)	Liver damage, bone & joint pain, dry skin, loss of hair, headache, vomiting
beta-Carotene (mg)				7 (11,655 IU)	Increased risk of lung cancer in smokers and those heavily exposed to asbestos
Vitamin D (mcg)	5*	10 (400 IU)	50	25 (1000 IU)	Calcification of brain, arteries, increased blood calcium, loss of appetite, nausea
Vitamin E (mg)	15	20 (30 IU)	1000	540 (800 IU)	Deficient blood clotting
Vitamin K (mcg)	120 / 90*	80	-	1000**	Red blood cell damage/anemia; liver damage
Thiamin (B1) (mg)	1.2 / 1.1	1.5	-	100**	Headache, nausea, irritability, insomnia, rapid pulse, weakness (7000+ mg dose)
Riboflavin (B2) (mg)	1.3 / 1.1	1.7	-	40**	Generally considered harmless; yellow discoloration of urine
Niacin (mg)	16 / 14	20	35	500**	Liver damage, flushing, nausea, gastrointestinal problems
Vitamin B6 (mg)	1.3	2	100	10	Neurological problems, numbness and pain in limbs
Vitamin B12 (mcg)	2.4	6	-	2000**	No reports of toxicity from oral ingestion
Folic acid (mcg)	400	400	1000	1000**	Masks B12 deficiency (which can cause neurological problems)
Pantothenic acid (mg)	5*	10	-	200**	Diarrhea & gastrointestinal disturbance (10,000+ mg/day)
Biotin (mcg)	30*	300	-	900**	No reports of toxicity from oral ingestion
Vitamin C (mg)	90 / 75	60	2000	1000**	Nausea, diarrhea, kidney stones
Boron (mg)			20	9.6	Adverse effects on male and female reproductive system
Calcium (mg)	1000*	1000	2500	1500**	Nausea, constipation, kidney stones
Chloride (mg)	2300*	3400	3600		Increased blood pressure in salt-sensitive individuals (when consumed as sodium chloride)
Chromium (mcg)	35*	120	-	10,000**	Potential adverse effects on liver and kidneys; picolinate form possibly mutagenic
Cobalt (mg)				1.4**	Cardiotoxic effects; not appropriate in a dietary supplement except as vitamin B-12
Copper (mcg)	900	2000	10000	10000	Gastrointestinal distress, liver damage
Fluoride (mg)	4 / 3*		10		Bone, kidney, muscle, and nerve damage; supplement with professional guidance
Germanium				zero**	kidney toxin; should not be in a dietary supplement
Iodine (mcg)	150	150	1100	500**	Elevated thyroid hormone concentration
Iron (mg)	8 / 18	18	45	17**	Gastrointestinal distress, increased risk of heart disease, oxidative stress
Magnesium (mg)	420 / 320	400	350 ^e	400**	Diarrhea
Manganese (mg)	2.3 / 1.8*	2	11	4**	Neurotoxicity
Molybdenum	45	75	2000	zero**	Gout-like symptoms; joint pains; increased uric acid
Nickel (mcg)			1000	260**	Increased sensitivity of skin reaction to nickel in jewelry
Phosphorus (mg)	700	1000	4000	250**	Alteration of parathyroid hormone levels; reduced bone mineral density
Potassium (mg)	4700*	3500		3700**	Gastrointestinal damage
Selenium (mcg)	55	70	400	450	Nausea, diarrhea, fatigue, hair and nail loss
Silicon (mg)				700	Low toxicity; possibility of kidney stones
Sodium (mg)	1500*	2400	2300		Increased blood pressure in salt-sensitive individuals (when consumed as sodium chloride)
Vanadium (mg)			1.8	zero	Gastrointestinal irritation; fatigue
Zinc (mg)	11 / 8	15	40	25	Impaired immune function, low HDL-cholesterol

^a Food and Nutrition Board, Institute of Medicine (U.S.). Dietary Reference Intakes Tables.

Available at <http://www4.nationalacademies.org/IOM/IOMHome.nsf/Pages/Food+and+Nutrition+Board>

^b RDA = Recommended Dietary Allowance, AI = Adequate Intake, indicated with *

^c UL = Tolerable Upper Intake Level (from food & supplements combined)

^d SUL = Safe Upper Levels; SULs and Guidance Levels (indicated by **) set by the Expert Group on Vitamins and Minerals of the Food Standards Agency, United Kingdom.

These are intended to be levels of daily intake of nutrients in dietary supplements that potentially susceptible individuals could take daily on a life-long basis without medical supervision in reasonable safety. When the evidence base was considered inadequate to set a SUL, Guidance Levels were set based on limited data.

SULs and Guidance Levels tend to be conservative and it is possible that, for some vitamins and minerals, greater amounts could be consumed for short periods without risk to health. The values presented are for a 60 kg (132 lb) adult. Consult the full publication for values expressed per kg body weight.

This FSA publication, *Safe Upper Levels for Vitamins and Minerals*, is available at: <http://www.foodstandards.gov.uk/multimedia/pdfs/vitmin2003.pdf>

^e The UL for magnesium represents intake specifically from pharmacological agents and/or dietary supplements in addition to dietary intake.

Prepared by C. Alan Titchenal, PhD, CNS. Originally published in: NASM Certified Personal Trainer Course Manual, 2004, pp. 632-633.

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