Niacin

Physiological Functions

Niacin is an essential vitamin that supports energy metabolism and reactions involving biosynthesis and degradation as part of the pyridine nucleotide coenzymes, **nicotinamide adenine dinucleotide** (NAD) **and nicotinamide adenine dinucleotide phosphate** (NADP). The levels of oxidized and reduced forms of these coenzymes establish the redox potential in cells that regulates metabolic activities involving mitochondrial electron transport and numerous enzyme reactions.

High doses of niacin are also used as a pharmacological agent in blood lipid-lowering therapy.

Factors Affecting Availability

Because niacin is a water-soluble vitamin, significant amounts can be lost if large volumes of liquids are used in preparation and cooking of food sources. As with other B vitamins, niacin is lost in the milling of grains. To compensate for these losses, white flour and rice are enriched with the vitamin.

Niacin can be obtained from consumption of food sources or from biosynthesis with the amino acid tryptophan as a precursor. Approximately 60 mg tryptophan are required for synthesis of 1 mg of niacin. Niacin biosynthesis from tryptophan is dependent on availability of vitamin B_6 and riboflavin.

Deficiency

Clinical evidence of niacin deficiency includes fatigue, poor appetite, diarrhea, irritability, headache, emotional instability and possible memory loss. Pellagra is the clinical manifestation of advanced niacin deficiency that is characterized by dermatitis, dementia, and diarrhea. Niacin deficiency rarely occurs without accompanying riboflavin deficiency. Pyridoxine deficiency may also be present.

Toxicity

Niacin toxicity is rarely observed at doses generally consumed. Administration of pharmacological doses of nicotinic acid (1-2 g three times a day) is used in treatment of high blood cholesterol. At this level of intake, histamine release may be triggered resulting in flushing of the skin which can be harmful to patients with asthma or peptic ulcer disease. Niacin also promotes hepatic toxicity when consumed at high doses found in some supplements.

- *The upper limit of safety for niacin established by the Food and Nutrition Board of the Institute of Medicine is 35 mg daily for adults.*

NiacinTolerable Upper Intake Levels	
Life Stage	Niacin (mg)
Infants	
0-6 mo	N/A
7-12 mo	N/A
Children	
1-3 y	10
4-8 y	15
Males, Females	
9-13 y	20
14-18 y	30
19-70 y	35
≥70 y	35
Pregnancy	
≤ 18 y	30
19-50 y	35
Lactation	
≤ 18 y	30
19-50 y	35

Requirements

The Daily Reference Intakes (DRI) for niacin are shown in the table below.

Life Stage	**Niacin** (mg)
Infants	
0-6 mo	2
7-12 mo	4
Children	
1-3 y	6
4-8 y	8
Males	
9-13 y	12
14-18 y	16
19-30 y	16
31-50 y	16
51-70 y	16
≥70 y	16
Females	
9-13 y	12
14-18 y	14
19-30 y	14
31-50 y	14
51-70 y	14
≥70	14

Pregnancy	
≤18 y	18
19-30 y	18
31-50 y	18
Lactation	
≤18 y	17
19-30 y	17
31-50 y	17

Dietary Sources

Niacin is obtained from, liver, meat, peanuts and other nuts, and whole grains. In general, foods rich in protein, with exception of tryptophan-poor grains, can satisfy some of the demand for niacin. See the table below for dietary sources of niacin.

Dietary Sources of Niacin	
FOOD	**Niacin** (mg)
Beef liver, 3.5 oz cooked	14.4
Peanuts, _ cup	10.5
Chicken, white meat, cooked	13.4
Tuna, canned in water, 3 oz	11.8
Salmon, 3.5 oz cooked	8.0
Corn grits, instant, 1 pkt	6.8
Ground beef, 3.5 oz cooked	5.3
Cheerios, 1 cup	5.0
Peanut butter, 2 Tbl	4.4
Almonds, _ cup	1.4
Potato, baked with skin, 1 med	3.3
Bagel, plain, 2.5 oz	3.3
Flour tortilla, 10”	2.6
Pasta, 1 cup cooked	2.3
Mushrooms, raw, _ cup	1.7
Barley, _ cup cooked	1.6
Corn, yellow, _ cup, boiled	1.3
Mango, 1 medium	1.5
Lentils, _ cup cooked	1.4
Sweet potatoes, _ cooked	1.2
Peach, raw, 1 med	.9
Carrot, raw, 1 med	.7