

Evidence-based Vitamin B3 (Niacin) Usage

Name(s): Niacin. Also, niacinamide, nicotinamide, nicotinic acid and inositol hexaniacinate.

Description: This vitamin is also called nicotinic acid, nicotinamide, and niacinamide. It is water-soluble. At one time, vitamin B3 was referred as vitamin G. Niacin is stable in the presence of heat and light. This vitamin acts as a coenzyme for utilising and breaking down proteins, fats, and carbohydrates. Niacin can be made in the body by converting the amino acid, tryptophan, into this vitamin. Vitamin B3 is involved in the Krebb's cycle (a biological pathway converting glucose (sugar) into energy) and plays a role in the central nervous system. Niacin is partially responsible of the synthesis of the sex hormones.¹

Absorption/Storage: Absorbed through the intestine, niacin is then transported where necessary and any excess is eliminated through urination. The body's supply of niacin will be depleted with an excess consumption of sugar, starches, and antibiotics.¹

Recommended Dietary Allowance/Dietary Reference Intake (niacin):²

Persons	U.S. (mg)
Birth to 3 years of age	2-6
4 to 8 years of age	8
9 to 13 years of age	12
Adolescent and adult males	16
Adolescent and adult females	14
Pregnant females	18
Breast-feeding females	17

Optimum Daily Allowance (Adult): 15-50 mg (niacin) and 50-100 mg (niacinamide).³

Tolerable Upper Intake Levels (niacin):²

Persons	U.S. (mg)
Birth to 3 years of age	ND-10
4 to 8 years of age	15
9 to 13 years of age	20
Adolescent and adult males	30-35
Adolescent and adult females	30-35
Pregnant females	30-35
Breast-feeding females	30-35

Principal Uses: Acne (topical niacinamide),⁴ high cholesterol and high triglycerides (niacin only),⁵⁻¹² diabetes

(niacinamide only),¹³⁻¹⁵ intermittent claudication (inositol hexaniacinate),¹⁶⁻¹⁹ and osteoarthritis (niacinamide).²⁰⁻²³

Proposed Uses: Dysmenorrhoea (painful menstruation) (niacin), peripheral vascular disease (inositol hexaniacinate), Raynaud's disease (niacin-inositol hexaniacinate) and schizophrenia.²⁴

Traditional Uses: Alcohol withdrawal support (niacinamide), anxiety (niacinamide), cataracts (niacinamide), dermatitis herpetiformis (nicotinamide, when combined with tetracycline), HIV support, hypoglycemia (niacinamide), hypothyroidism (niacin), multiple sclerosis (niacin), photosensitivity (niacinamide), tardive dyskinesia (niacin or niacinamide).²⁴

Healthy Sources:

High (40%+ US RDA): Brewer's yeast, peanuts with/without skins, rice bran, rice polishings, torula yeast and wheat bran.²⁵

Medium (25-39% US RDA): Brown rice, sesame seeds, sunflower seeds and wild rice.²⁵

Contraindications: If you are taking this dietary supplement without a prescription, carefully read and follow any precautions on the label. For niacin or niacinamide, the following should be considered:

Allergies--Tell your health care professional if you have ever had any unusual or allergic reaction to niacin or niacinamide. Also tell your health care professional if you are allergic to any other substances, such as foods, preservatives, or dyes.

Pregnancy--It is especially important that you are receiving enough vitamins when you become pregnant and that you continue to receive the right amount of vitamins throughout your pregnancy. The healthy growth and development of the foetus depend on a steady supply of nutrients from the mother. However, taking large amounts of a dietary supplement in pregnancy may be harmful to the mother and/or foetus and should be avoided.

Breast-feeding--It is especially important that you receive the right amounts of vitamins so that your baby will also get the vitamins needed to grow properly. However, taking large amounts of a dietary supplement while breast-feeding

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may be harmful to the mother and/or baby and should be avoided.

Children--Problems in children have not been reported with intake of normal daily-recommended amounts.

Older adults--Problems in older adults have not been reported with intake of normal daily-recommended amounts.

Medicines or other dietary supplements--Although certain medicines or dietary supplements should not be used together at all, in other cases they may be used together even if an interaction might occur. In these cases, your health care professional may want to change the dose, or other precautions may be necessary. Tell your health care professional if you are using any other dietary supplement or any prescription or non-prescription (over-the-counter [OTC]) medicine.

Other medical problems--The presence of other medical problems may affect the use of niacin or niacinamide. Make sure you tell your health care professional if you have any other medical problems, especially:

- Bleeding problems or
- Diabetes mellitus (diabetes) or
- Glaucoma or
- Gout or
- Liver disease or
- Low blood pressure or
- Stomach ulcer--Niacin or niacinamide may make these conditions worse.²⁶

Interactions:

Decreases Vitamin Availability:	Carbidopa, ²⁴ oral contraceptives, single B vitamin supplementation and charcoal. ²⁷
Increases Vitamin Availability:	Vitamins B complex and C. ³
Is Decreased By Vitamin Availability:	Cancer drug side effects, diabetic drugs, fibre supplementation, isoniazid, ²⁷ adrenergic blocking agents, insulin and oral anti-hyperglycaemic agents. ²⁸

Is Increased By Vitamin Availability:	Minocycline, tetracycline, thioridazine, ²⁴ antiepileptics, antipsychotics, ²⁷ HMG-CoA reductase inhibitors, ^{24,29-39} tricyclic antidepressants (with tryptophan), ^{24,40} and ganglionic blocking drugs. ⁴¹
Adverse Reactions:	Diabetic drugs, ²⁴ and HMG-CoA reductase inhibitors (with high-dose vitamin B3). ^{24,27}

Deficiency: Lack of niacin may lead to a condition called pellagra. Pellagra causes diarrhoea, stomach problems, skin problems, sores in the mouth, anaemia (weak blood), and mental problems. Your health care professional may treat this by prescribing niacin for you.²⁶

Toxicity/Side Effects: *With prolonged use of extended-release niacin*

- Darkening of urine; light grey-coloured stools; loss of appetite; severe stomach pain; yellow eyes or skin

Other side effects may occur that usually do not need medical attention. These side effects may go away during treatment as your body adjusts to the dietary supplement. However, check with your health care professional if any of the following side effects continue or are bothersome:

- Feeling of warmth; flushing or redness of skin, especially on face and neck; headache

With high doses

- Diarrhoea; dizziness or faintness; dryness of skin; fever; frequent urination; itching of skin; joint pain; muscle aching or cramping; nausea or vomiting; side, lower back, or stomach pain; swelling of feet or lower legs; unusual thirst; unusual tiredness or weakness; unusually fast, slow, or irregular heartbeat

Other side effects not listed above may also occur in some individuals. If you notice any other effects, check with your health care professional.²⁶

Treatment For Overdose: Ipecac and activated charcoal with a laxative.⁴²

Storage: To store this dietary supplement:

- Keep out of the reach of children.
- Store away from heat and direct light.

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- Do not store in the bathroom, near the kitchen sink, or in other damp places. Heat or moisture may cause the dietary supplement to break down.
- Keep the liquid form of this dietary supplement from freezing.
- Do not keep outdated dietary supplements or those no longer needed. Be sure that any discarded dietary supplement is out of the reach of children.²⁶

References:

1. Dr. Morrow's Library of Vitamins, Minerals, Amino Acids, and Herbs: Riboflavin. [Online] <http://www.nutritiondynamics.com/cgi-bin/process.asp?product=Niacin>.
2. National Academy of Sciences Food and Nutrition Board. (2000). Dietary reference intakes: Applications in dietary assessment. Washington, DC: National Academy Press.
3. Balch, P.A. & Balch, J.F. (2000). Prescription for nutritional healing (third edition). Garden City Park: Avery Publishing.
4. Shality, A.R., Smith, J.R., Parish, L.C. et al. (1995). Topical nicotinamide compared with clindamycin gel in the treatment of inflammatory acne vulgaris. *International Journal of Dermatology*, 34: 434–437.
5. Illingworth, D.R. et al. (1994). Comparative effects of lovastatin and niacin in primary hypercholesterolaemia. *Archives of Internal Medicine*, 154: 1586–1595.
6. Guyton, J.R., Goldberg, A.C., Kreisberg, R.A. et al. (1998). Effectiveness of once-nightly dosing of extended-release niacin alone and in combination for hypercholesterolaemia. *American Journal of Cardiology*, 82: 737–743.
7. Vega, G.L. & Grundy, S.M. (1994). Lipoprotein responses to treatment with lovastatin, gemfibrozil, and nicotinic acid in normolipidemic patients with hypoalphalipoproteinaemia. *Archives of Internal Medicine*, 154: 73–82.
8. Lal, S.M. et al. (1995). Effects of nicotinic acid and lovastatin in renal transplant patients: A prospective, randomised, open-label crossover trial. *American Journal of Kidney Disease*, 25: 616–622.
9. Canner, P.L. et al. (1986). Fifteen year mortality in Coronary Drug Project patients: Long-term benefit with niacin. *Journal of the American College of Cardiology*, 8: 1245–1255.
10. Brown, W.V. (1995). Niacin for lipid disorders. *Postgraduate Medicine*, 98: 185–193 [review].
11. Guyton, J.R., Blazing, M.A., Hagar, J. et al. (2000). Extended-release niacin vs gemfibrozil for the treatment of low levels of high-density lipoprotein cholesterol. Niaspan-Gemfibrozil Study Group. *Archives of Internal Medicine*, 160: 1177–1184.
12. Garg, R., Elam, M.B., Crouse, J.R. 3rd, Davis, K.B., Kennedy, J.W., Egan, D., Herd, J.A., Hunnigake, D.B., Johnson, W.C., Kostis, J.B., Sheps, D.S. & Applegate, W.B. (2000). Effective and safe modification of multiple atherosclerotic risk factors in patients with peripheral arterial disease. *American Heart Journal*, 140(5): 792–803.
13. Elliott, R.B., Pilcher, C.C., Fergusson, D.M. et al. (1996). A population based strategy to prevent insulin-dependent diabetes using nicotinamide. *Journal of Paediatric Endocrinology and Metabolism*, 9: 501–509.
14. Pozzilli, P., Visalli, N., Signore, A. et al. (1995). Double blind trial of nicotinamide in recent-onset IDDM (the IMDIAB III study). *Diabetologia*, 38: 848–852.
15. Polo, V., Saibene, A., & Pontiroli, A.E. (1998). Nicotinamide improves insulin secretion and metabolic control in lean type 2 diabetic patients with secondary failure to sulphonylureas. *Acta Diabetol*, 35: 61–64.
16. O'Hara, J., Jolly, P.N., & Nicol, C.G. (1988). The therapeutic efficacy of inositol nicotinate (Hexopal) in intermittent claudication: a controlled trial. *British Journal of Clinical Practice*, 42(9): 377–383.
17. Kiff, R.S. (1988). Does inositol nicotinate (Hexopal) influence intermittent claudication? A controlled trial. *British Journal of Clinical Practice*, 42(4): 141–145.
18. Head, A. (1986). Treatment of intermittent claudication with inositol nicotinate. *Practitioner*, 230: 49–54.
19. Tyson, V.C.H. (1979). Treatment of intermittent claudication. *Practitioner*, 223: 121–126.
20. Kaufman, W. (1953). The use of vitamin therapy for joint mobility. Therapeutic reversal of a common clinical manifestation of the 'normal' aging process. *Connecticut State Medical Journal*, 17(7): 584–589.
21. Kaufman, W. (1955). The use of vitamin therapy to reverse certain concomitants of aging. *Journal of the American Geriatric Society*, 11: 927.
22. Hoffer, A. (1959). Treatment of arthritis by nicotinic acid and nicotinamide. *Canadian Medical Association Journal*, 81: 235–238.
23. Jonas, W.B., Rapoza, C.P. & Blair, W.F. (1996). The effect of niacinamide on osteoarthritis: a pilot study. *Inflammation Research*, 45: 330–334.

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24. Austin, S., Gaby, A., Appleton, J. et al. (2001). HealthNotes Online. [Online] <http://healthnotes.com>
25. Murray, M.T. (1996). Encyclopaedia of nutritional supplements. Rocklin, CA: Prima.
26. National Library of Medicine. (1995). Niacin Vitamin B3 (systemic). [Online] <http://www.nlm.nih.gov/medlineplus/druginfo/niacinvitaminb3systemic202405.html>
27. Meletis, C. & Jacobs, T. (1999). Interactions between drugs & natural medicines. Sandy, OR.: Eclectic Medical Publications.
28. Gillis, C. (editor). (1999). Compendium of pharmaceuticals and specialties. Ottawa, Canada: Canadian Pharmacists Association.
29. Davignon, J., Roederer, G., Montigny, M., et. al. (1994). Comparative efficacy and safety of provastatin, nicotinic acid and the two combined in patients with hypercholesterolemia. *American Journal of Cardiology*, 73: 339-345.
30. Gardner, S.F., Schneider, E.F., Granberry, M.G. & Carter, I.R. (1996). Combination therapy with low-dose lovastatin and niacin is as effective as higher-dose lovastatin. *Pharmacotherapy*, 16: 419-423.
31. Kashyap, M.L., McGovern, M.E., Berra, K., Guyton, J.R., Kwiterovich, P.O., Harper, W.L., Toth, P.D., Favrot, L.K., Kerzner, B., Nash, S.D., Bays, H.E. & Simmons, P.D. (2002). Long-term safety and efficacy of a once-daily niacin/lovastatin formulation for patients with dyslipidemia. *American Journal of Cardiology*, 89(6): 672-678.
32. Wink, J., Giacoppe, G., King, J. (2002). Effect of very-low-dose niacin on high-density lipoprotein in patients undergoing long-term statin therapy. *American Heart Journal*, 143(3): 514-518.
33. Brown, B.G., Zhao, X.Q., Chait, A., Fisher, L.D., Cheung, M.C., Morse, J.S., Dowdy, A.A., Marino, E.K., Bolson, E.L., Alaupovic, P., Frohlich, J., Albers, J.J. (2001). Simvastatin and niacin, antioxidant vitamins, or the combination for the prevention of coronary disease. *New England Journal of Medicine*, 345(22): 1583-1592.
34. McKenney, J.M., McCormick, L.S., Schaefer, E.J., Black, D.M. & Watkins, M.L. (2001). Effect of niacin and atorvastatin on lipoprotein subclasses in patients with atherogenic dyslipidemia. *American Journal of Cardiology*, 88(3): 270-274.
35. Mack, W.J., Xiang, M., Shircore, A.M., Selzer, R.H., Hodis, H.N. & Azen, S.P. (2000). Efficacy of two lipid-lowering treatments on quantitative coronary angiographic endpoints. *Cardiovascular Drugs & Therapies*, 14(4): 411-418.
36. Elam, M.B., Hunninghake, D.B., Davis, K.B., Garg, R., Johnson, C., Egan, D., Kostis, J.B., Sheps, D.S. & Brinton, E.A. (2000). Effect of niacin on lipid and lipoprotein levels and glycaemic control in patients with diabetes and peripheral arterial disease: the ADMIT study: A randomised trial. *Arterial Disease Multiple Intervention Trial. JAMA*, 284(10): 1263-1270.
37. Jacobson, T.A., Jokubaitis, L.A., Amorosa, L.F. (1994). Fluvastatin and niacin in hypercholesterolemia: A preliminary report on gender differences in efficacy. *American Journal of Cardiology*, 96(suppl 6A): 64S-68S.
38. Malloy, M.J., Kane, J.P., Kunitake, S.T. & Tun, P. (1987). Complementarity of colestipol, niacin and lovastatin in treatment of severe familial hypercholesterolaemia. *Annals of Internal Medicine*, 107: 616-623.
39. O'Keefe, J.H., Harris, W.S., Nelson, J. & Windsor, S.L. (1995). Effects of pravastatin with niacin or magnesium on lipid levels and postprandial lipemia. *American Journal of Cardiology*, 76: 480-484.
40. Chouinard, G., Young, S.N., Annable, L. & Sourkes, T.L. Tryptophan-nicotinamide, imipramine and their combination in depression. *Acta Psychiatr Scand*. 59: 395-414.
41. American Society of Health-System Pharmacists. (2000). AHFS drug information. Bethesda, MD: American Society of Health-System Pharmacists.
42. Leikin, J.B. & Paloucek, F.P. (1995). Poisoning & toxicology handbook (second edition). Hudson, Ohio: Lexi-Comp/American Pharmaceutical Assoc.

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