

NMN Regenerative

Cellular Health and Healthy Aging*

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TANDEMLABS

Advancing Health • Restoring Vitality

This information is provided as a medical and scientific educational resource for the use of physicians and other licensed health-care practitioners ("Practitioners"). This information is intended for Practitioners to use as a basis for determining whether to recommend these products to their patients. All recommendations regarding protocols, dosing, prescribing, and/or usage instructions should be tailored to the individual needs of the patient considering their medical history and concomitant therapies. This information is not intended for use by consumers.

NMN Regenerative is a potent formula containing nicotinamide mononucleotide (NMN) and trimethylglycine (TMG) to support healthy aging and cellular energy.* The main ingredient, NMN, is a direct and stable precursor to nicotinamide adenine dinucleotide (NAD+), a widely studied coenzyme present in all living cells and critical for energy production, DNA repair, and cell survival.* TMG provides support by being a methyl donor, which is in increased demand with NMN supplementation.*

Formula Highlights

- Synergistic combination of nicotinamide mononucleotide (NMN) and trimethylglycine to support cellular energy and healthy aging*
- Enhanced absorption and bioavailability with phospholipids derived from sunflower lecithin
- Pleasant taste, lightly sweetened with stevia
- Gluten-free, dairy-free, non-GMO

NAD+ and Healthy Aging*

NAD+ is a pyridine nucleotide present in all living cells.¹ It is essential in over 500 enzymatic reactions related to energy production, metabolism, aging, gene expression, stress responses, calcium-dependent secondary messenger signaling, immunoregulatory roles, and DNA repair.¹⁻³ The body can produce NAD+ from dietary tryptophan through the kynurenine pathway. However, the primary source of NAD+ in mammals is the salvage pathway, which recycles intermediate breakdown products of NAD+, such as nicotinamide (NAM), nicotinamide riboside (NR), and nicotinic acid (NA). Key enzymes convert NAM and NR into NMN, which is then used to produce NAD+.^{4,5}

Increasing NAD+ status may support healthy aging.* Both animal and human studies have found a significant decline in NAD+ levels with the natural aging process.^{1,6,7} Low NAD+ status has been associated with type 2 diabetes,⁸ neurodegenerative conditions,^{7,9} cardiovascular disease, obesity, and other various age-related diseases.^{3,10,11} A systematic review of 147 studies (113 preclinical and 34 clinical) explored the potential benefits of increasing NAD+ levels through supplementation. It found that NAD+ precursors, including NMN, had a favorable impact on several age-related disorders, particularly those associated with chronic oxidative stress, inflammation, and impaired mitochondrial function.¹

The relationship between NAD+, aging, and chronic disease may result from a redox imbalance caused by increased turnover or reduced synthesis of NAD+.¹² This imbalance can affect sirtuins or decrease levels of nicotinamide phosphoribosyltransferase (NAMPT), a key enzyme in NAD+ synthesis.^{13,14} Both human and animal studies have shown that disruptions in NAMPT can interfere with glucose metabolism,^{15,16} circadian rhythms,¹⁷ and neural stem cell proliferation.¹⁸ Additionally, certain NAD+-consuming enzymes, such as PARP1 and CD38, are more active with age, which may contribute to reduced NAD+ levels.^{13,19}

Silent information regulators (Sir), such as Sir2, are histone deacetylases that depend on NAD+ for their activity.²⁰ There are seven sirtuins (SIRT) in mammalian cells, each contributing to various cellular functions, including energy homeostasis, cell cycle regulation, and apoptosis. Sirtuins consume NAD+, with NAD+ acting as a SIRT activator, while NAD+ substrates like NADH and nicotinamide serve as inhibitors.^{5,21} Increasing NAD+ levels has been shown to activate SIRT1, mitigating some adverse age-related outcomes and promoting mitochondrial function.²² This activation may also support healthy inflammatory and stress responses, promote cardiovascular and neurological health, and potentially promote a healthy lifespan.²³ Genetic studies have linked specific single nucleotide polymorphisms in SIRT1 to increased risks of obesity, type 2 diabetes, and cardiovascular disease, underscoring SIRT1's role in metabolic health.²⁴⁻²⁶

Nicotinamide Mononucleotide (NMN) Supports Healthy NAD+ Status*

As a direct precursor to NAD+, NMN status correlates with NAD+ status and its associated bodily functions, supporting overall wellness and healthy aging.¹⁻⁵ In a 12-week clinical study of healthy middle-aged adults (n = 36), participants who received 125 mg/day of NMN supplementation exhibited significantly elevated NAD+ metabolites compared to the placebo group.²⁷

Another 12-week, placebo-controlled, double-blind clinical trial involving older adults (n = 60) examined the effects of 250 mg/day of NMN supplementation on blood NAD+ levels and physical function, particularly walking ability. By 12 weeks, the NMN group showed a markedly shorter four-meter walking time compared to the placebo group, alongside higher blood levels of NAD+ and its metabolites. Additionally, the NMN group reported better sleep quality, reflected in lower "Daytime Dysfunction" and "Global PSQI" scores on the Pittsburgh Sleep Quality Index.²⁸

Benefits*

- Supports healthy aging^{1-7,10-12,17,22,28,31,32}
- Promotes healthy cellular function^{1-5,12,13,22,32,34,35}
- Supports energy production^{1-5,22,28,30,31}
- Supports metabolic health^{1-5,8,15,16,27,30,32-36}
- May support cognition and brain function^{1,2,4,5,7,9,17,18,37-39}

Supplement Facts

Serving Size 1 mL (approx. 2 pumps)
Servings Per Container 50

Amount Per Serving	% Daily Value
β-Nicotinamide Mononucleotide (NMN)	50 mg *
Trimethylglycine (as Betaine)	50 mg *

*Daily Value not established.

Other Ingredients: Water, glycerine, ethanol, natural flavors, phospholipids (from sunflower lecithin), rebaudioside A (from *Stevia rebaudiana* Leaf). LPONMN-3

A 10-week randomized, placebo-controlled, double-blind trial (n = 25) investigated the effects of supplementing with 250 mg of NMN per day on postmenopausal women with prediabetes who were overweight or obese. The NMN group showed improved insulin-stimulated glucose disposal, as assessed by the hyperinsulinemic-euglycemic clamp, and enhanced skeletal muscle insulin signaling. The NMN experimental group also had an upregulation of genes associated with muscle remodeling.²⁹

Additionally, a randomized, double-blind, placebo-controlled study (n = 108) in older adults found that 250 mg/day of NMN improved lower limb function and reduced drowsiness in participants, supporting NMN's role in energy production and physical function in aging populations.³⁰

Animal studies further illustrate the potential benefits of NMN on healthy aging.* Long-term NMN supplementation in mice (12 months) reduced age-related physiological changes, such as body weight gain, metabolic dysfunction, and immune decline, while promoting mitochondrial function, physical activity, and energy expenditure.³¹ Animal research also suggests that NMN helps support metabolic and cardiovascular health by promoting vascular function and healthy blood sugar regulation, insulin metabolism, and inflammatory responses.^{15,32-36} NMN has been shown to restore SIRT1 activity to regulate oxidative stress and circadian rhythms.¹⁵ Additionally, NMN may support brain and cognitive health by helping to support mitochondrial function, cerebrovascular function, and energy production in the brain while helping to mitigate neuronal cell death and the adverse effects of oxidative stress, which may be clinically beneficial to those with age-related cognitive decline or neurodegenerative conditions.^{15,37-39}

Across several clinical trials, NMN supplementation has been generally well tolerated in both men and women, even at serving sizes as high as 1,250 mg/day for four weeks.⁴⁰⁻⁴²

Liposomal Delivery

Liposomes are spheres made of phospholipids — the primary building blocks of cell membranes. Owing to this structure, liposomes bond easily with cell membranes to facilitate intracellular delivery of their nutrient cargo. Thanks to this enhanced delivery and absorption, nutrients delivered in liposomal form at lower doses may have equal or greater efficacy than higher doses provided in less bioavailable forms.*

NMN Regenerative uses liposome particles that are 50 nm to 400 nm in size, which contrasts with the more commonly available particles that are 200 nm to 600 nm in size from other manufacturers. The smaller-sized particles result in increased oral and cellular uptake and faster transmucosal absorption in the mouth, in addition to enhanced absorption throughout the rest of the gastrointestinal (GI) tract.* A portion of liposomes are broken down at the border of enterocytes, where they release their load and support its enhanced absorption and bioavailability. The rest of the liposomes contribute to higher bioavailability by being absorbed as integral vesicles via the specialized epithelial cells called membranous/microfold cells (M-cells). M-cells are located in the Peyer's patches of the GI tract and are easily accessible for liposomes through endocytosis and phagocytosis mechanisms. M-cells play a key role in the induction of immune responses through their capacity to deliver liposomes, macromolecules, and microorganisms by transepithelial transport from the lumen to the lymph circulation.⁴³ Additionally, clearance of these particles from the bloodstream (through the liver and the spleen) is inversely related to size, with the smallest particles circulating the longest while increasing the likelihood of absorption at their target tissues.*

Benefits of Liposomal Delivery*

- Superior absorption and intracellular delivery of nutrients
- Phospholipid structure allows for effective delivery of compounds with different solubilities carried within the same particle (e.g., water- and lipid-soluble compounds)
- Liposomes penetrate the blood-brain barrier, an obstacle for other various formulations
- Although there is an opportunity for quick absorption in the mouth, liposomes also survive the acidic environment of the stomach, ensuring intestinal uptake and delivery to the lymphatic system
- Liquid liposomal formulations are convenient for those who prefer not to swallow pills and for easy dosing
- The use of this technology overcomes the limitation of oral servings that can cause gastrointestinal distress at certain levels

Recommended Use: Take 1 mL (approx. 2 pumps) and hold in mouth for 30 seconds before swallowing or as directed by your health-care practitioner. Take on an empty stomach at least 10 minutes before meals.

Warning: If pregnant, breastfeeding, or planning to become pregnant, consult your health-care practitioner before use.

For a list of references cited in this document, please visit:

www.tandemregenerative.com

Dosing recommendations are given for typical use based on an average 150-pound healthy adult. Health-care practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage.

***These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.**

To contact Tandem Labs, please call us at (888) 788-0795 or visit us at www.tandemregenerative.com