



NAD+ GOLD®



Supplement Facts		
	Amount Per Serving	% Daily Value
Serving Size: 1 mL (2 pumps)		
Servings Per Container: 50		
NMN (β-Nicotinamide mononucleotide)	50mg	**
Trimethylglycine (as betaine)	50mg	**
**Daily Value not established		
Other Ingredients: Water, glycerin, ethanol, phospholipids (from purified sunflower seed lecithin), vitamin E (as tocopherol, and natural mixed tocopherols)		

NAD+ Gold® is a stable NAD+ activator and potent anti-aging formula containing nicotinamide mononucleotide (NMN) and trimethylglycine (TMG), also known as betaine. NAD+ (nicotinamide adenine dinucleotide) is the celebrated ‘anti-aging’ molecule naturally present in every cell and critical for DNA repair, cellular bioenergetics, genomic signaling and cell survival.^{1,2} NMN is a direct precursor to NAD+. In 2019, a scientific breakthrough by an international team of researchers revealed that NMN has its own, dedicated enzyme transporter that delivers the molecule straight across the cell membrane and into cells, where it can be rapidly transformed into NAD+. In liposomal form NMN is easily absorbed into the bloodstream and converted to NAD+ intracellularly for a fast-acting effect. In turn, TMG assists with methyl donors to facilitate the action of NAD+.

AN INTRODUCTION TO AGING, NAD+ AND NMN

Nicotinamide adenine dinucleotide (NAD+) is essential for life. It has been called “one of the most important and interesting molecules in the body. It is required for over 500 enzymatic reactions and plays key roles in the regulation of almost all major biological processes.”⁴ NAD+ is a true pleiotropic molecule and activator of innumerable protective enzymes; it regulates hundreds of critical functions in the body from energy production to mitochondrial metabolism.^{5,6} In studies on multiple organisms, an increase in intracellular levels of NAD+ triggers shifts that boost energy production and upregulate cellular repair, leading to a longer healthspan and enhanced survival.⁷ New evidence shows that human mitochondria directly import NAD+ from the cell itself.⁸ As we age, however, we experience a steady decrease in systemic NAD+ biosynthesis and a corresponding functional decline in organs and tissues.^{9,10} By middle age, our NAD+ levels have plummeted to half that of our youth.¹¹ NAD+ repletion has been shown to increase the body’s resilience to the diseases of aging, thereby extending healthy human lifespan.¹²

Supplementing with NAD+, however, is not an effective route to increasing levels. It is easily broken down in the gut, and transformed into the precursor molecules NMN and NR (nicotinamide riboside).¹³ NMN, in contrast, is an effective, direct and stable precursor to NAD+ that is rapidly absorbed and converted to NAD+.¹⁴ Human clinical trials have used NAD+ precursors like NMN and NR (nicotinamide riboside), looking at safety and efficacy for metabolic syndrome and glucose intolerance. Human research began in 2016 in Japan¹⁵, and is underway at Washington University School of Medicine, where a double-blind, placebo-controlled study on the physiological effects of NMN is being carried out.¹⁶

WHY NMN?

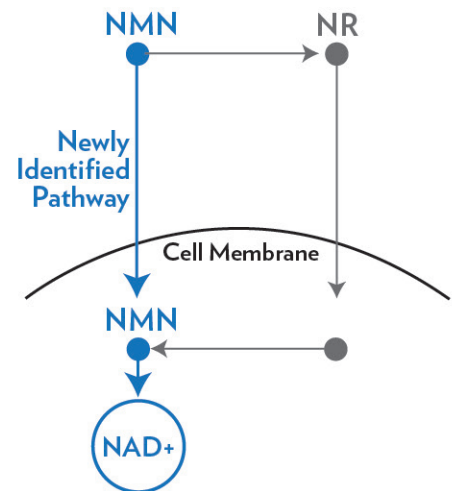
NMN is a potent precursor for NAD+, synthesized from vitamin B3 in the form of nicotinamide. For years, it was thought that NMN was unable to enter cells on its own. It was thought necessary to convert NMN to nicotinamide riboside (NR), a different NAD+ precursor. NR would then enter cells, and be converted back to NMN. Yet no one could explain the fast pharmacokinetics of NMN, the surprising speed with which it moved from the gut to the bloodstream and then tissues throughout the body. Animal experiments had already proven that this entire journey takes place in a matter of minutes—too fast for multiple biochemical transformations.¹⁷ In 2019 groundbreaking research showed that NMN has a unique and dedicated transporter (Slc12a8) that can move the molecule quickly across the cell membrane and into the cell where it can be transformed rapidly into NAD+.³ The researchers report that this NMN transporter is critical for aging individuals; as NAD+ levels fall with age, levels of this transporter are upregulated so that more NMN can enter cells and enrich levels of NAD+. These new findings suggest that, due to NMN’s critical role in repleting NAD+, the body has more than one route of bringing it into the cell—both directly with its own transporter, and by moving NR into the cell and then transforming NR into NMN.

Supplementing with NMN may improve adult human metabolism, rendering it more like that of someone ten or twenty years younger.¹⁸ In animal studies, NMN has enhanced NAD+ biosynthesis in pancreas, adipose, heart, eyes, blood vessel, skeletal muscle, kidney tissues and more.^{8,19,20}

NMN has been shown to improve against age-associated physical decline, weight gain, energy decline, and decreased physical activity, without any obvious toxicity.¹⁷ NMN also suppresses age-related adipose tissue inflammation, enhances insulin secretion and insulin action, supports healthy mitochondrial

BENEFITS & APPLICATIONS:

- Anti-aging^{2,4,5,8}
- Protects against metabolic disorders^{8,9,10}
- Enhances insulin function and sensitivity^{16,23,24}
- Suppresses age-related inflammation^{8,25}
- Protects against diabetes²⁷
- Protects against cardiac ischemia¹⁷
- Enhances mitochondrial function³⁵
- Restores skeletal muscle²⁰
- Repairs vascular system²⁶
- Enhances exercise ability²⁰
- Improves neuronal function²⁹
- Improves lipid profiles⁶
- Slows cognitive decline⁶
- Protects against amyloid plaque (Alzheimer’s)^{30,32,33}
- Maintains integrity of blood-brain barrier³⁴
- Reduces reactive oxygen species⁵
- Repairs retinal damage³⁸



function, improves neuronal function in the brain, stimulates new blood vessel growth, helps ameliorate cardiac and cerebral ischemia, and increases exercise capacity.^{21,22,23}

WHY TMG?

As NAD⁺ biosynthesis rises, methylation activity increases. Trimethylglycine (TMG) is a methyl donor that supports the action of NMN and the liver.²⁴ TMG provides significant methylation support by donating three methyl groups. Methylation is needed by the 'longevity' enzymes known as the sirtuins, which depend on NAD⁺ and which require the methylation of nicotinamide (NAM), a form of vitamin B3.^{25,26} The sirtuin family is thought to delay fundamental aspects of aging and to be responsible, in great part, for the cardiometabolic benefits of lean diets and exercise.²⁷ Nicotinamide (NAM) has been shown to consume a significant amount of TMG when being methylated by the body.²⁸

HOW LIPOSOMAL NMN EMULATES THE BODY'S OWN NATURAL VESICLES

Extracellular vesicles (EVs) are a subject of extraordinary interest in the scientific community because of their role in intercellular communication. Adipose tissue actively secretes EVs that are enriched with NMN, and can circulate through plasma. These EVs are membrane-derived particles surrounded by a phospholipid bilayer that are released by cells in the human body.^{29,30} A liposomal version of NMN may well mimic the body's own transport system, enhancing uptake and delivery, providing the most effective and fast-acting formulation of this molecule available. NMN is stable in water, rendering it perfect for liposomal delivery systems. Long-term NMN given orally, in doses of up to 300 mg/kg, has been safe and well tolerated in mice.⁶

In sum, NAD⁺ Gold™ may be a novel, elegant, effective anti-aging intervention with beneficial effects upon a wide array of physiological functions.³¹ Our stable, liposomal delivery technology offers rapid action and uptake into tissues, providing the most powerful delivery method for this state-of-the-art age management molecule.

NMN RESEARCH

1. ENHANCE INSULIN SENSITIVITY AND ACTION

Both insulin sensitivity and secretion are modulated by NAD⁺ metabolism.³² In mice studies, NMN improved glucose-stimulated insulin secretion³³, corrected impaired pancreatic islet function and restored decreased insulin secretion.³⁴ When given long-term NMN ameliorated age-associated insulin resistance and improved lipid profiles.⁶

2. RESTORE SKELETAL MUSCLE, VASCULAR INTEGRITY AND EXERCISE CAPACITY

Long-term NMN administration has reversed vascular atrophy and restored blood vessel growth in mice, augmenting the physiological response to exercise and boosting stamina and endurance.⁶ It has improved mitochondrial respiratory capacity in skeletal muscle.²⁰ In aged mice, NMN has restored aspects of arterial function to that of young mice, and reduced vascular oxidative stress, in part by increasing superoxide dismutase and NAD⁺.³⁵

3. PROTECT AGAINST METABOLIC DISORDERS INCLUDING DIABETES, OBESITY, NAFLD

A decline in NAD⁺ levels is closely correlated with diabetes and fatty liver disease (NAFLD), and intracellular NAD⁺ levels decrease with obesity.³⁶ Long term NMN administration protects against both diet- and age-associated weight gain. NMN prevents lowered NAD⁺ levels in diet-induced obese mice. NMN also reduces age-associated weight gain.⁵ NMN can restore NAD⁺ levels that have been depleted due to a high-fat-diet and obesity.³⁷

4. DIMINISH COGNITIVE DECLINE AND PROTECT THE BRAIN

NMN has impressive effects on the brain and increases intracerebral NAD⁺.³⁸ In mice, NMN inhibits A-beta, a neurotoxic protein which forms plaques in the brains of Alzheimer's patients.³⁹ NMN slowed cognitive decline in a mouse model of Alzheimer's disease by improving the survival of neurons, improving energy metabolism, and reducing reactive oxygen species.³⁰ NMN has been shown to reduce the production of amyloid plaque, as well as DNA damage and neuroinflammation in the hippocampus.^{40,41} NMN also helped maintain the integrity of the blood brain barrier.⁴²

5. SUPPRESS INFLAMMATION ASSOCIATED WITH AGING

NMN has been found to reduce inflammatory cytokines such as TNF-a and IL-6 in skeletal muscle. NMN is able to reduce adipose tissue inflammation associated with age.⁴⁴

5. SUPPORT MITOCHONDRIAL FUNCTION AND METABOLISM

Mitochondrial dysfunction is a molecular hallmark of aging, and NMN has enhanced mitochondrial function in numerous studies. NMN increased mitochondrial metabolism and restored mitochondrial function in skeletal muscle.³⁵ NMN also promoted mitochondrial function in the liver⁴⁵ and eye, repairing severe retinal degeneration in mice.⁴⁶

6. SUPPORT THE LIVER AND METHYLATION FOR OVERALL HEALTH

Aging predisposes to functional and structural impairment of the liver, as well as risk for non-alcoholic fatty liver disease.^{47,48} The liver utilizes TMG for methylation, and the abundance of TMG in the liver exceeds that of any other organs. TMG can halt and reverse deterioration of liver function.⁴⁹ TMG has been shown to offer remarkable benefits to human health, addressing conditions ranging from diabetes to obesity and Alzheimer's disease.⁵⁰ It has been used to lower the concentration of plasma total homocysteine (tHcy) in patients with homocystinuria.⁵¹ TMG is widely found in foods and is well tolerated in supplement form.⁵²

NAD⁺ IS AN ESSENTIAL ELEMENT OF DETOXIFICATION

Detoxification is a complex set of bodily processes that occur on both a microcosmic and a macrocosmic level, ultimately processing and eliminating toxins from the body. At the microcosmic level, toxins are mobilized and shuttled out of cells via special transporters. At the macrocosmic level, toxins are ushered through the liver, kidneys, and GI tract to be eliminated via the urine or stool. Most detoxification protocols target the macrocosmic level of detox, ignoring crucial processes that occur at the cellular level. However, when we ignore the microcosmic level of detoxification, toxins may remain within cells and even the most well-intentioned detox protocol may fall flat. Cellular energy is crucial for driving the microcosmic level of detoxification. By enhancing our NAD⁺ levels with NMN, we can bolster our cellular energy production, drive detoxification bioenergetics, and more efficiently mobilize and eliminate toxins from the body.

Optimal NAD⁺ levels may be particularly important for the detoxification of mercury. One study found that treatment of mercury-exposed *Caenorhabditis elegans*, a worm commonly used for preclinical research, with supplemental NAD⁺ provided protection against mercury-induced oxidative stress and mitochondrial dysfunction.⁵³ These findings suggest that the enhancement of NAD⁺ levels should be a central part of any comprehensive mercury detoxification protocol.

NAD⁺ FORTIFIES THE BODY'S ANTIOXIDANT DEFENSES, PROMOTING EMF PROTECTION

Advancements in technology have inundated much of the world with non-native electromagnetic fields (nnEMF). It's becoming increasingly difficult to reduce exposure incurred from electronic devices, Bluetooth, and wireless networking technology. Non-native EMF is a form of man-made, non-ionizing radiation that deranges biological processes by disrupting the activity of the electrons that make up each and every molecule of the body. By disturbing electron homeostasis, nnEMF triggers oxidative stress, which damages proteins, lipids, and DNA. Down the line, this sub-cellular damage impairs processes ranging from mitochondrial function to metabolic health.⁵⁴

While reducing exposure to nnEMF through lifestyle changes is a crucial step towards better health, it is impossible to completely avoid nnEMF. Bolstering cellular antioxidant capacity may support the amelioration of nnEMF-induced oxidative damage, helping further mitigate the overall body burden of nnEMF stress. Supplemental NMN supports the increase of cellular NAD⁺ and may improve the body's antioxidant defenses, defending the body against radiation sources such as nnEMF.⁵⁵

LIPOSOMES OFFER SUPERIOR BIOAVAILABILITY

Rapid action is a hallmark of our Quicksilver Delivery Systems[®], which improve upon liposomal and emulsification technology with smaller, more stable particles made from the highest-grade ingredients available. These particles offer exceptional absorption rates, allowing rapid uptake of molecules into the bloodstream. In the body, NMN is carried by liposomes called extracellular vesicles. A liposomal version of NMN may well mimic the body's own transport system, enhancing uptake and delivery, providing the most effective and fast-acting formulation of this molecule available.

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