

Science of NAD⁺

The nicotinamide adenosine dinucleotide (NAD) molecule has two forms: NAD⁺, the reduced (active) form of the molecule, and NADH, the oxidized (inactive) form. Energy production, production of ATP in our mitochondria, totally depends on NADH (the inactive form) being recycled back to NAD⁺ (the active form). If this recycling stops, then NADH accumulates the cell runs out of energy and it may die. So depleted levels of NAD⁺ and accumulation of NADH, or a low ratio of NAD⁺/NADH, can create problems for our mitochondria and our cells, due to low levels of cellular energy. And it is one of the primary contributing factors of mitochondrial dysfunction, which is implicated in a wide variety of chronic illnesses including neuropsychological and neurodegenerative disorders, autoimmune disorders, diabetes, and many others. Restoring NAD⁺ levels reverse this and allow cells to return to full energy status, offering a possible way to undo the resulting chronic illness.

NAD⁺'s Role in Addiction:

The most exciting use for NAD⁺ so far is in the treatment of drug and alcohol dependency. The basic science is sound, and the early results are extraordinary. Patients are reporting total recovery from addiction within 7-15 days with no subsequent craving for their substance of choice and few to no withdrawal symptoms.

To understand NAD⁺'s relationship to drug and alcohol abuse, let's look at its role in the metabolism of alcohol:

After a person drink, the body needs to process and eliminate every molecule of alcohol. It is done in the liver where ethyl alcohol is converted to acetaldehyde. NAD⁺ is critical to this process. Alcohol donates one hydrogen molecule irreversibly to NAD⁺ converting it to NADH. That NAD⁺ molecule is now gone and the NADH in your system begins to build. As this happens repeatedly, the NAD⁺/NADH balance swings out of favor, and serious problems can occur.

In a 2012 review article, the authors conclude that it is this NAD⁺ depletion and NADH accumulation that disables the mitochondria in your liver cells from being able to make energy ATP. This leads to liver cell death. Your body is then even less capable of processing the alcohol out of your system, which may set the stage for chemical dependency.

Building on this principle, several addiction clinics in the United States have been using IV NAD⁺ combined with IV/oral amino acid therapy with great success. Dr. Richard Mestayer III of the [Springfield Wellness Clinic](#) in Louisiana (since 2001, more than 1300 patients) and Dr. Ken Starr of the [Wellness Group](#) in California have been treating patients for 10-15 consecutive days to drastically alleviate the symptoms of withdrawal and craving from alcohol, opiates, and benzodiazepines.

IV NAD⁺ is the most profound and effective treatment for alcohol and drug dependence. Patients are able to make a lifelong recovery, with little to no withdrawal symptoms, and no toxic side effects.

NAD⁺ as an Anti-Aging Molecule

Medical researchers have long known that a group of enzymes called sirtuins play a crucial role in how the body ages—especially SIRT1 and SIRT3. We don't yet understand precisely how they work, but what we do know is exciting. SIRT enzymes appear to switch off genes that promote aging such as those that cause inflammation, fat synthesis and storage, and blood sugar management issues.

Up until now the only way we knew to positively impact these SIRT enzymes was to go on a very low-calorie diet. As uncomfortable as it may be, caloric restriction is one of the few ways that has repeatedly been shown to lead to a longer life.

Doctors from Department of Developmental Biology at the Washington University School of Medicine were the first to show this link in 2014.²:

“NAD(+) levels decline during the aging process and may be an Achilles’ heel, causing defects in nuclear and mitochondrial functions and resulting in many age-associated pathologies. Restoring NAD(+) by supplementing NAD(+) intermediates can dramatically ameliorate these age-associated functional defects, counteracting many diseases of aging, including neurodegenerative diseases.”

These findings were corroborated in 2016 when the scientific journal *Rejuvenation* published an article discussing how low NAD+ levels are directly associated with cellular aging. They emphasized that this process can be prevented by increasing the levels of NAD+ within cells.

Is NAD+ a fountain of youth? It could be! More research needs to be done, but one thing seems clear: NAD+ certainly has an impact on your body at the cellular level.

NAD+'s Role in Exercise and Endurance

It is well known that ATP levels get depleted in muscles while exercising. Recent researches found out how NAD+ was implicated in this process.

A 2010 study using both trained and untrained healthy volunteers helped find out the relationship. The researchers showed that intense exercise *decreases* NAD+. When the study participants took an antioxidant supplement containing pycnogenol (which stimulates NAD+ production and protects it from turning into the inactive, oxidized form of the molecule), NAD+ levels increased and exercise performance and “time to fatigue” also improved.

Since we know that this IV can improve athletic performance, getting a direct IV infusion of NAD+ is certainly a most efficient way of raising NAD+ levels than taking an indirect, oral supplement that acts as a stimulator for NAD+.

NAD+'s Role in neuro and other cell damage to help Reversing Chronic Illness and Neurodegenerative Disease

Healthy energy production is needed for maintain optimal health. If mitochondria dysfunction, or function at less than optimal level, it does not produce enough energy, we are going to experience symptoms. When mitochondria dysfunction becomes too severe it turns into illness.

The link between NAD+, energy production, and chronic illness really are very clear now. Low NAD+ results in low ATP levels. Low ATP levels quickly depletes your cell's energy reserves. Left unsolved, this can lead to cell death.

How all of this shows up in your body depends on which cells are being affected. When nerve cells (most sensitive cells in our body) are affected, the lack of energy may manifest itself as depression, anxiety, fatigue and lack of focus. In severe cases where the nerve cells are dramatically impacted or even die, causing symptoms of neurodegenerative illness like Multiple Sclerosis, Alzheimer's and Parkinson's disease. In mass cellular death, it may lead not only transient symptoms such as tremors, spasms, tingling, numbness and blurred vision, but to permanent, irreversible disability.

If your heart cells are affected, it can lead to cardiovascular disease.

If your lung cells are affected pulmonary disorders may present themselves.

When the cells in your organs and tissues don't have enough energy, illness results.

IV NAD BR+ combined with IV/oral amino acids can be beneficial in restoring energy production, especially in the nerve tissue, and may even prevent permanent damage.

One 2014 study showed that rat nerve cells pre-treated with high concentrations of NAD+ *before* being deprived of oxygen survived the challenge and recovered much faster than cells not bathed in the extra protective NAD+.

One 2015 study builds on 2014 study: after research scientists examined all of the available scientific evidence, they recommended NAD+ supplementation and restoration as a new therapeutic opportunity for a wide variety of neurodegenerative diseases.

References

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