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# NMN 30000

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$\beta$  nicotinamide mononucleotide





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## David A. Sinclair, A.O., Ph.D.

David A. Sinclair, A.O., Ph.D Professor in the Department of Genetics and co -Director of the Paul F. Glenn Center for Biology of Aging Research at Harvard Medical School.

His research has been primarily focused on the sirtuins , protein -modifying enzymes that respond to changing NAD<sup>+</sup> levels and to caloric restriction (CR) with associated interests in chromatin, energy metabolism, mitochondria, learning and memory, neurodegeneration, and cancer.

The Sinclair lab was the first one to identify a role for NAD<sup>+</sup> biosynthesis in regulation of lifespan.

He is an inventor on 35 patents and has received more than 25 awards and honors.

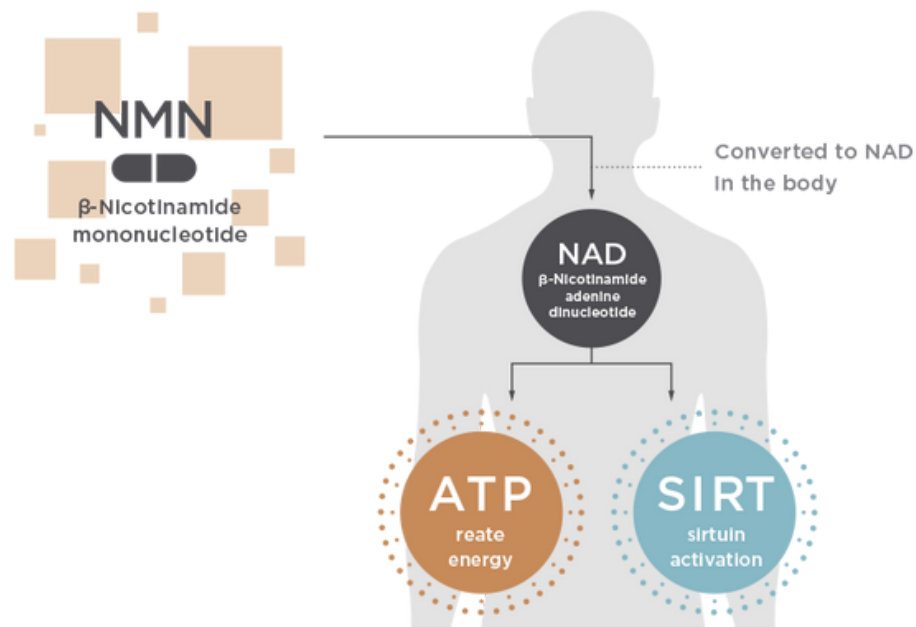




## What is NMN? (Nicotinamide Mononucleotide)

NMN (Nicotinamide Mononucleotide) is the main molecule that participates in a chemical reaction that produces NAD<sup>+</sup> (Nicotinamide Adenine Dinucleotide) an essential enzyme for various critical cell functions, including metabolism, DNA repair, cell growth and survival.

NMN supplementation has been shown in human clinical trials to safely and effectively increase NAD<sup>+</sup> levels.





## What is NAD+? (Nicotinamide Adenine Dinucleotide)

NAD+, an essential coenzyme and key metabolite involved in over 500 different cellular reactions to make life possible.

It plays crucial role in metabolism by facilitating the conversion of food nutrients into energy within cells.

NAD+ is involved in many biological processes such as DNA repair, gene expression and lifespan regulation.



# The Science Behind NMN – A Stable, Reliable NAD+ Activator and Anti Aging Molecule



[Integr Med \(Encinitas\)](#), 2020 Feb; 19(1): 12–14.

PMCID: PMC7238909

PMID: [32549859](#)

## The Science Behind NMN—A Stable, Reliable NAD+Activator and Anti-Aging Molecule

[Christopher Shade, PhD\\*](#)

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In June of 2018, the World Health Organization (WHO) released the 11th edition of its *International Classification of Diseases*, and for the first time added aging.<sup>1</sup> The classification of aging as a disease paves the way for new research into novel therapeutics to delay or reverse age-related illnesses such as cancer, cardiovascular and metabolic disease, and neurodegeneration.<sup>2,3</sup> Nutrient sensing systems have been an intense focus of investigation, including mTOR (the mammalian target of rapamycin) for regulating protein synthesis and cell growth; AMPK (activated protein kinase) for sensing low energy states; and sirtuins, a family of seven proteins critical to DNA expression and aging, which can only function in conjunction with NAD+ (nicotinamide adenine dinucleotide), a coenzyme present in all living cells.<sup>4</sup>

Across the kingdom of life, an increase in intracellular levels of NAD+ triggers shifts that enhance survival, including boosting energy production and upregulating cellular repair.<sup>5</sup> In fact, the slow, ineluctable process of aging has been described as a “cascade of robustness breakdown triggered by a decrease in systemic NAD+ biosynthesis and the resultant functional defects in susceptible organs and tissues.”<sup>6</sup> Aging is marked by epigenetic shifts, genomic instability, altered nutrient sensing ability, telomere attrition, mitochondrial dysfunction, cellular senescence, stem cell exhaustion, and dysregulated intercellular communication.<sup>7,8</sup>

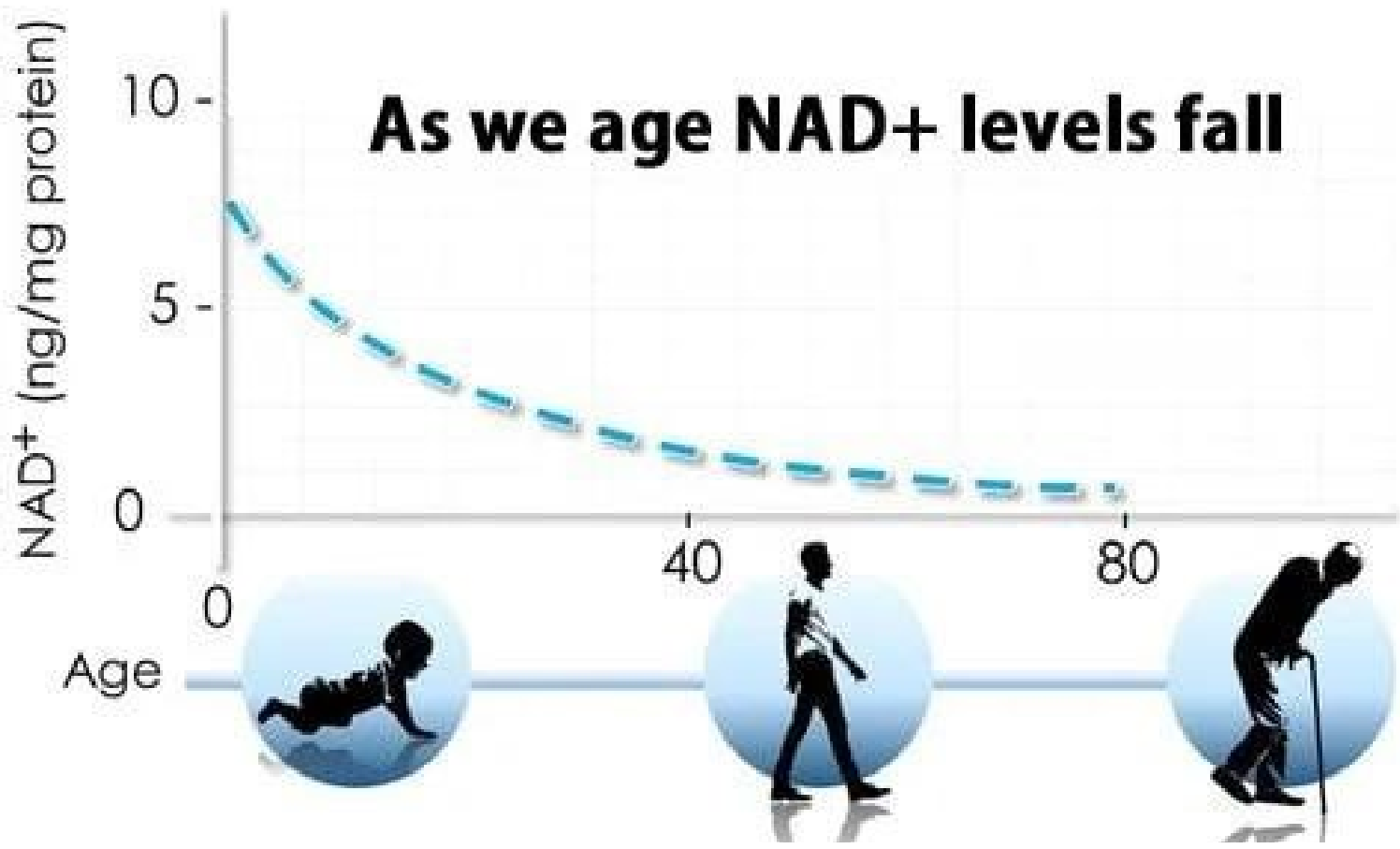
Integr Med (Encinitas)

Integr Med (Encinitas)





As we age, NAD<sup>+</sup> levels naturally decline leading to cellular damage, increase the risk of diseases and aging.





# Studies



Aging & Longevity

## Scientists Demonstrate Increasing NAD<sup>+</sup> Levels Restores Mitochondrial Function and Limits Aging

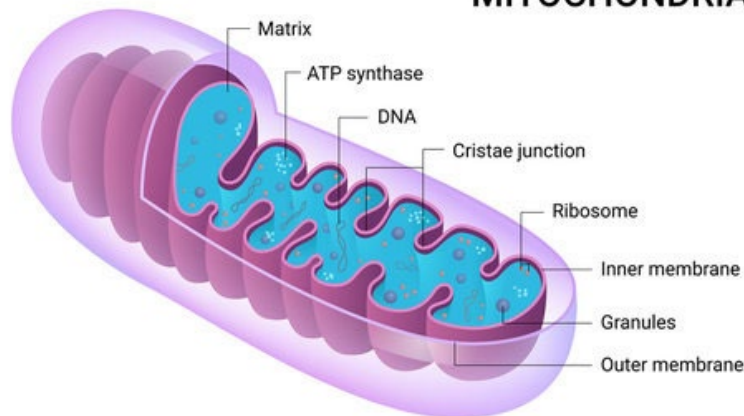
A recent study presents data showing nicotinamide adenine dinucleotide (NAD<sup>+</sup>) restoration limits mitochondrial dysfunction and aging in Werner syndrome.

Nov 21, 2019

The most crucial function of mitochondria is to produce ATP which is the primary source of energy in the cells and have important role in other metabolic processes.

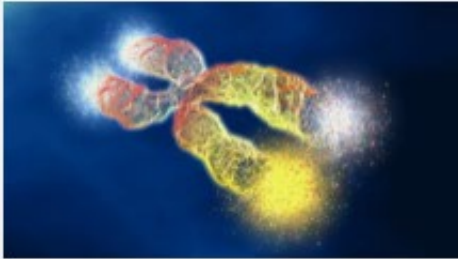
Dysfunction of mitochondria can lead to various diseases including metabolic disorders, neurodegenerative diseases and aging.

### MITOCHONDRIA





## Studies



NMN

### **NMN Increases Telomere Length in Middle-Aged Adults**

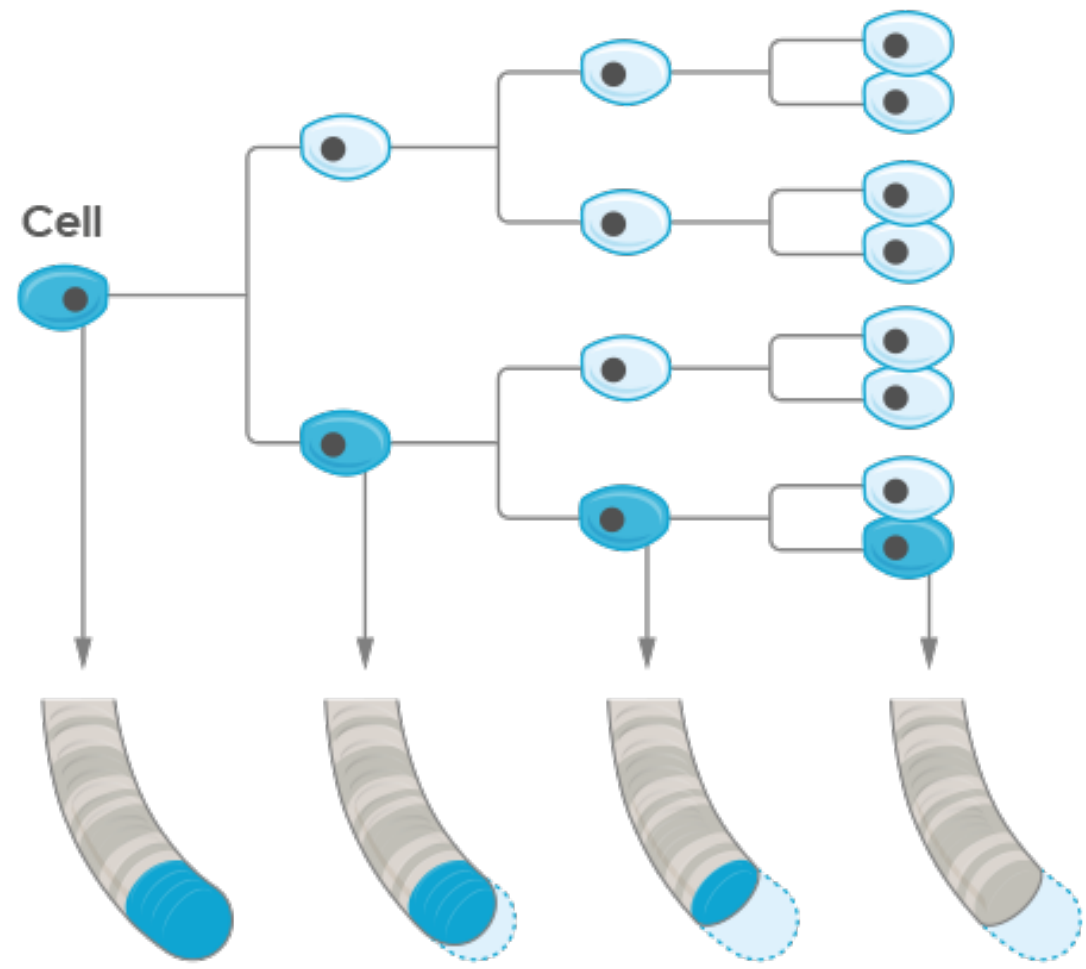
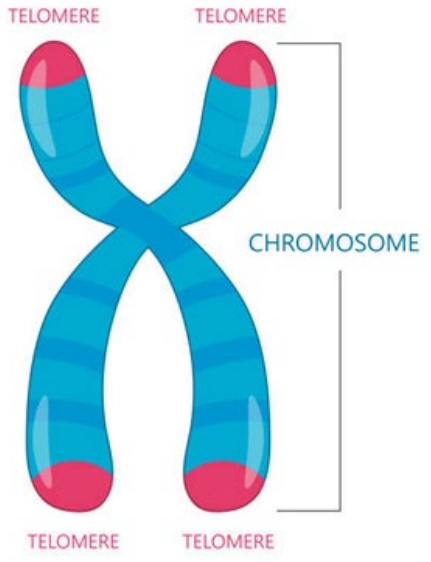
Research shows that taking nicotinamide mononucleotide (NMN) improves intestine bacteria composition and telomere length.

Jan 18, 2022

Telomere shortening is associated with aging, mortality, and aging-related diseases. Based upon comparison between individuals of different ages, telomere length is negatively associated with the number of cell divisions in germ and tumor cells.

Telomeres are critical for maintaining genomic integrity and may be factors for age-related diseases. Laboratory studies show that telomere dysfunction or shortening is commonly acquired due to the process of cellular aging and tumor development. The function of telomeres is widely accepted as a buffer against tumor growth, to protect chromosome structure, and prevent the loss of vital genetic information during replication. While telomeres keep the growth and division of somatic cells in check, this can inadvertently select for rapidly dividing cells that have suffered telomere damage. As other cells divide as they are supposed to, the abnormal cells divide much quicker, outcompeting the undamaged cells, while acquiring more DNA damage that could further increase their ability to grow. This results in tumor formation.





As cells divide over time telomeres shorten, and eventually cell division stops.

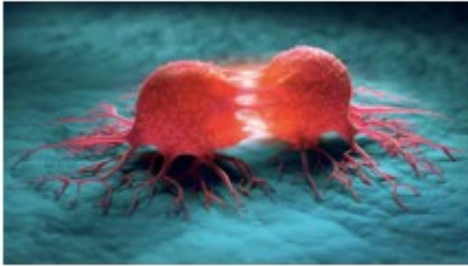


## Benefits NAD+

- reversing age
- increase lifespan
- repair DNA damage
- activate sirtuin STR1 and STR3 (longevity gene)
- improve stem cell health
- mitochondrial health
- enhance energy metabolism
- improve insulin sensitivity
- improve eye function
- reducing heart diseases
- promoting grown new neurons in the brain
- reverse skin aging
- restore blood vessel health



# Studies

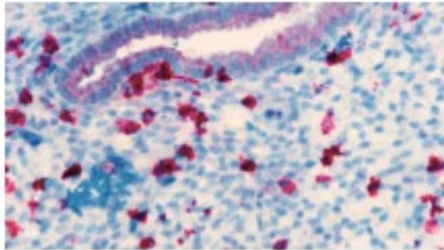


Cancer

## **Increased NAD<sup>+</sup> Promotes Sensitivity to Anti-Cancer Therapy**

NAD<sup>+</sup> supplement combined with PD-L1 antibody provides a novel therapeutic strategy for immunotherapy-resistant tumors

Nov 16, 2020



Immunity

## **Study Shows NMN Enhances Activation of Cancer-Fighting Immune Cells**

Taking NMN by under-the-skin injections or oral consumption improves immune cells that attack cancer and virally infected cells in mice.

Sep 27, 2021



DNA Repair

## **NAD<sup>+</sup> Regulates Specific Protein Interactions that may Protect the Cell from DNA damage**

Scientists from Harvard Medical School found that NAD<sup>+</sup> directly regulates protein interactions, which may protect the cell against cancer, radiation and aging.

Apr 1, 2017



# Studies



Bone, Muscle & Skin

## **NMN as Potential Therapeutic Agent for Neuromuscular Disease**

Scientists from the University of Missouri report disruptions of the NAD+ biosynthesis pathway in mice facilitating malformed mitochondria and cell structur...

Jan 16, 2020



Cancer

## **NMN Limits Breast Cancer Growth and Spread, According to Chinese Study**

Researchers find NMN impedes the growth and spread – metastasis – of a common, hard-to-treat form of breast cancer and improves survival odds with cancer in mice.

Jan 31, 2023



Cancer

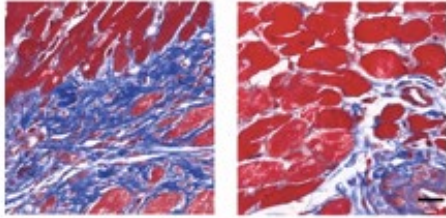
## **NMN Boosts the Efficacy of Cancer-Fighting Immune Cells**

Nicotinamide mononucleotide (NMN)-treated antitumor CAR-T cells display enhanced effectiveness to combat cancer cells and reduce tumor growth in mice.

May 17, 2022



# Studies

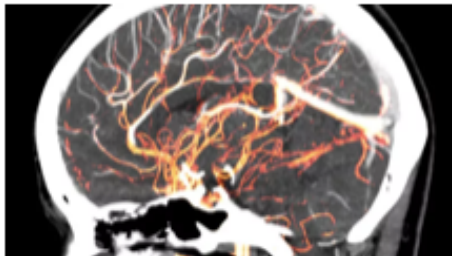


Cardiovascular

## Study Shows NMN Enhances Stem Cell Vesicle Therapy for Heart Attack Damage

Vesicles secreted from NMN-treated stem cells improve heart function while promoting blood vessel formation and reducing tissue damage after myocardial inf...

Mar 7, 2023

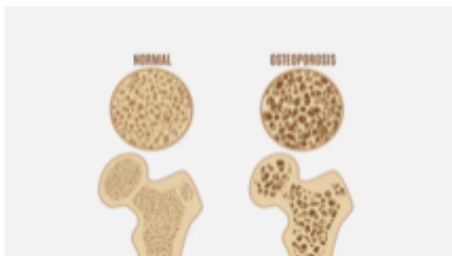


Neurological

## Recent Research Suggests NMN Supplementation Improves Brain Function in Aging

Data suggest NMN administration improves brain blood vessel dilation (vasodilation) and blood flow to the brain

Apr 17, 2019



Bone, Muscle & Skin

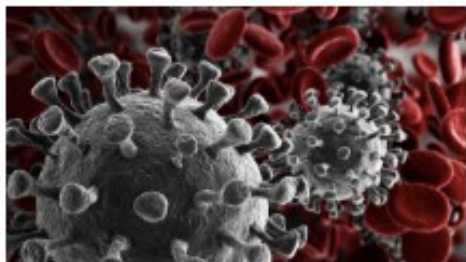
## Scientists Improve Bone Formation Deficiencies in Glucocorticoid-Induced Osteoporosis

Scientists at Nanchang University discovered NMN may be a therapeutic option for glucocorticoid-induced osteoporosis.

May 11, 2020



# Studies

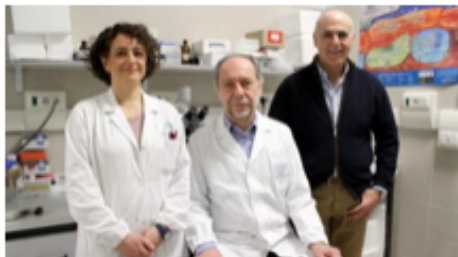


Immunity

## Doctor's Study Indicates COVID-19 Patients Improve with NMN Cocktail Treatment

COVID-19 patients treated with a nicotinamide mononucleotide (NMN) cocktail showed clinical improvements.

Sep 21, 2020

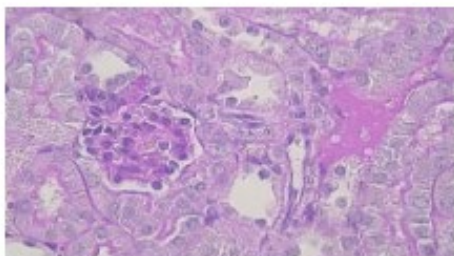


Immunity

## New European Study: Restoring NAD+ with NMN Rescues Immune Cell Function Against Hepatitis B

Treating immune cells that target hepatitis B with nicotinamide mononucleotide (NMN) restores their DNA repair mechanisms and antiviral function.

Mar 28, 2023



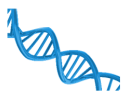
Kidney, Liver & Lungs

## NMN Prevents Kidney Damage and Restores Kidney Function, Japanese Study Indicates

Nicotinamide mononucleotide (NMN) supplementation activates longevity-promoting enzyme Sirtuin-1 to correct kidney damage and function in mice.

Sep 6, 2022

<https://www.nmn.com>



NMN 30000  
Nicotinamide  
Mononucleotide

Regeneration (i.e. the physiological process of removing old and damaged cells and replacing them with new cells) is always happening in the human skin. Proper gene expression in the cells is necessary for this process. Because  $\beta$ -Nicotinamide mononucleotide (NMN) enters the cells and changes into NAD<sup>+</sup>, it acts against the problems caused by aging: a shortage of NAD<sup>+</sup>, abnormal gene expression, and disrupted physiological processes such as cellular regeneration.

# NMN 30000

## Nicotinamide Mononucleotide

Nicotinamide mononucleotide (NMN) enters the cells and changes into NAD+, it acts against the problems caused by aging.

Accelerates regeneration (i.e. the physiological process of removing old and damaged cells and replacing them with new cells).

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