



## Aging better with Tru Niagen: A view from the discoverer of nicotinamide riboside as a powerful vitamin precursor of NAD



*I recently had the pleasure of interviewing Dr. Charles Brenner on the **Intelligent Medicine** radio show and podcast. He's the Roy J. Carver Chair and Head of Biochemistry at the University of Iowa, as well as a founding co-director of the University of Iowa Obesity Initiative. In 2004, Brenner, then a faculty member at Dartmouth College, discovered nicotinamide riboside (NR) to be a vital precursor of nicotinamide adenine dinucleotide (NAD+). I've spoken about it as a possible **Supplement of the Decade**, and it can be found in Tru Niagen Pro, one of our great sponsors.*

*—Dr. Hoffman*

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I'm not anti-aging. The reality is that we all experience aging. Why do we act like aging is such a downer? Aging affords us the opportunity to gain wisdom, mastery and

the ability to provide for others. But this is often not the vision we conjure when hearing the term. Instead we may think of a process of decline and accumulation of damage. The challenge of healthy aging is to be able to continue to gain mastery while avoiding damage and decline. Our research indicates that common types of damage can upset NAD, the central catalyst of metabolism, and that maintaining NAD can help relieve a wide variety of metabolic stresses that underlie age-related damage and decline.

Most people understand metabolism as how efficiently our bodies burn calories versus store fat on our waistline. However, the totality of metabolism encompasses thousands of chemical transformations that allow every organ system to function and for the body to repair itself. Four compounds that biochemists call NAD<sup>+</sup>, NADH, NADP<sup>+</sup> and NADPH are central catalysts that all of our cells need to function. We discovered that a variety of common conditions upset this NAD system, thereby disrupting healthy functions and youthful repair. And we discovered that a compound called nicotinamide riboside (NR) is a powerful way to keep NAD at levels that maintain resistance to metabolic stresses.

The NAD system is required for us to convert food into energy, to make sex hormones like androgens and estrogens, to have an idea, to flex our muscles, to detoxify reactive oxygen species, to repair DNA. All of these processes depend on NAD. All of these processes are required for health, and all of them decline as a function of stresses and aging, which is why we tend to lose our youthful bounce as we age.

#### *STRESS & NAD*

You can think of metabolism as a combination of offense and defense. The NAD system comprises the central catalysts and a limited resource, particularly during stressful conditions. If NAD is tied up in repairing DNA damage, for example, it is less available for us to convert our food into energy. We have discovered that the NAD system is disrupted by metabolic stresses, many of which occur as a part of daily life. When I lecture, I typically ask the audience how many people would like to hop on a plane to Ibiza, where they would eat, drink and listen to music out in the sun. Almost everyone says they would. However, every component of this holiday has the potential to constitute a metabolic stress.

**Alcohol and Overeating.** It has long been known that alcohol disturbs the NAD system in the liver. We showed that mice who are put on a high-fat diet also have a disturbed NAD system. Both alcohol and overeating can compromise liver health. In addition, NADPH is important for detoxifying free radical species that are produced when the liver metabolizes food or alcohol.

**Sun and Oxygen Damage.** Though sunlight and fresh air are good for us, there is also inevitable damage to DNA, proteins and tissues. The NAD system is required for repair.

**Loud Noises and Irregular Hours** – Jet lag, sleep disruption and loud noise all have the potential to affect the NAD system, such that protection of our NAD systems may help cells be resilient to these common stresses.

It has also been widely reported that in aging, NAD is in decline. Any condition that tends to use up NAD more than replenish NAD runs the risk of disturbing broad metabolic and repair processes.

#### *NR IS THE BEST ROUTE TO REPLENISHING AND INCREASING NAD*

Classically, tryptophan and two forms of vitamin B3 (niacin and nicotinamide) have

been used to prevent deficiency in NAD. However, in 2004, I discovered that nicotinamide riboside (NR) is a third vitamin precursor of NAD that would work in people. We've subsequently shown that NR has a unique pathway to form NAD and has several unique properties that make it a superior NAD precursor. Our patents on nutritional uses of NR were exclusively licensed by ChromaDex, which produces NIAGEN® (the pure vitamin ingredient that can be put in a capsule or food), TRU NIAGEN® (our direct-to-consumer product), and TRU NIAGEN® PRO (the higher serving of NIAGEN® available exclusively to health professionals).

1. TRU NIAGEN®-branded products contain the only form of NR with notifications from the US Food & Drug Administration as a new dietary ingredient and as a compound that is generally recognized as safe. NIAGEN has also been clinically tested in people at doses of 100 mg to 2000 mg per day in healthy and overweight adults. This safety, purity and regulatory dossier is not available for oral NAD+, NADH or NMN. On top of this, these molecules have to be broken down to NR, niacin or nicotinamide in order to raise cellular NAD.
2. At upwards of 100 mg, niacin causes a very uncomfortable side effect called flushing. NR has no known adverse effects.
3. At high doses, nicotinamide inhibits sirtuins, which have been associated with maintaining cellular health in model systems. NR does not inhibit sirtuins.
4. Newer preclinical data shows that when cells and NAD are under attack, the pathways for niacin and nicotinamide are shut down, whereas the NRK pathway is ramped up. This emerging difference in NAD pathways has big implications for the value of NR.

#### *TRU NIAGEN PRO*

While pellagra—true NAD deficiency—is now quite rare, evidence is growing that NAD insufficiency occurs in a wide variety of conditions of metabolic stress and as a function of age. Wherever you are on the scales of age, activity and diet, you are likely to experience the inevitable stresses of life that test their metabolic resiliency. TRU NIAGEN PRO is the leading evidence-based way to safely increase cellular stores of NAD.

*[Click here to learn more about Dr. Brenner.](#)*