

# Researchers explore new ways to prevent spinal cord damage using a vitamin B3 precursor

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Substances naturally produced by the human body may one day help prevent paralysis following a spinal cord injury, according to researchers at Weill Cornell Medical College. A recent \$2.5 million grant from the New York State Spinal Cord Injury Research Board will fund their research investigating this possibility.

The Weill Cornell team believes that permanent nerve damage may be avoided by raising levels of a compound that converts to nicotinamide adenine dinucleotide (NAD+) -- the active form of vitamin B3. The compound would potentially be administered immediately following spinal cord injury.

"Boosting NAD+ after injury may prevent permanent nerve death," explains Dr. Samie Jaffrey, associate professor of pharmacology at Weill Cornell Medical College. "Our study is aimed at synthesizing a molecule that, when given soon after injury, may augment the body's production of NAD+ and rescue these cells before they are stressed beyond recovery."

The compound, called nicotinamide riboside (NR) -- a natural NAD+ precursor found in foods like milk -- as well as other NR derivatives have already been proven to protect against cell death and axonal degeneration in cultured cells and in models of [spinal cord](#) injury. In 2007, the authors reported results of laboratory experiments finding that

NR can increase NAD<sup>+</sup> concentrations as high as 270 percent when compared with untreated control cells. No other known agent has been shown to achieve these types of increases in cells.

NAD<sup>+</sup> is known to play a key role in human cells by activating proteins called sirtuins that help the cells survive under stress. Sirtuins, which can be activated by compounds like [resveratrol](#) (found in large concentrations in the skin of grapes used to make [red wine](#)) have been shown to possess anti-aging and healing properties. The researchers believe that quickly increasing the NAD<sup>+</sup> levels may help to activate the sirtuin levels in the cells and prevent cell death. This is especially important because when cells and tissues experience extreme trauma, NAD<sup>+</sup> levels drop quickly.

In the newly funded research, the Weill Cornell team will conduct a lab study to see how NR compounds can raise NAD<sup>+</sup> levels in cells that are stressed to the point that they will die within three to four hours, and instead survive as a consequence of treatment. In a separate study, Dr. Brett Langley from the Burke Rehabilitation Center in Westchester, N.Y. -- a hospital affiliated with Weill Cornell Medical College -- will test the compounds in mice with spinal injuries, with the hope of observing physical recovery and improvement in behavioral testing.

"We hope to show that a natural compound that can be produced cheaply and efficiently could be the key to preventing permanent injury," explains Dr. Anthony Sauve, associate professor of pharmacology at Weill Cornell Medical College. "We also believe that the compound would be perfectly safe to use in humans, since it is a vitamin that has not been shown to have negative effects on the body when artificially elevated."

Dr. Sauve has patented and pioneered a way to produce compounds that regulate NAD<sup>+</sup> and specializes in making an array of NAD derivatives

to determine which one best augments NAD<sup>+</sup> levels in neurons.

"If this study is successful in animal testing, we hope to study the compound clinically," says Dr. Jaffrey.

Source: New York- Presbyterian Hospital ([news](#) : [web](#))

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