Spinal Cord, Heal Thyself

UCLA researchers discovered that a diet enriched with a popular omega-3 fatty acid and an ingredient of curry spice preserved walking ability in rats with spinal-cord injury. Published June 26 in the Journal of Neurosurgery: Spine, the findings suggest that these dietary supplements help repair nerve cells and maintain neurological function after degenerative damage to the neck.

"Normal aging often narrows the spinal canal, putting pressure on the spinal cord and injuring tissue," explained principal investigator Dr. Langston Holly, associate professor of neurosurgery at the David Geffen School of Medicine at UCLA. "While surgery can relieve the pressure and prevent further injury, it can't repair damage to the cells and nerve fibers. We wanted to explore whether dietary supplementation could help the spinal cord heal itself."

The UCLA team studied two groups of rats with a condition that simulated cervical myelopathy – a progressive disorder that often occurs in people with spine-weakening conditions like rheumatoid arthritis and osteoporosis. Cervical myelopathy can lead to disabling neurological symptoms, such as difficulty walking, neck and arm pain, hand numbness and weakness of the limbs. It's the most common cause of spine-related walking problems in people over 55.

The first group of animals was fed rat chow that replicated a Western diet high in saturated fats and sugar. The second group consumed a standard diet supplemented with docosahexaenoic acid, or DHA, and curcumin, a compound in turmeric, an Indian curry spice. A third set of rats received a standard rat diet and served as a control group.

Why these supplements? DHA is an omega-3 fatty acid shown to repair damage to cell membranes. Curcumin is a strong antioxidant that previous studies have linked to tissue repair. Both reduce inflammation.

"The brain and spinal cord work together, and years of research demonstrate that supplements like DHA and curcumin can positively influence the brain," said coauthor Fernando Gomez-Pinilla, professor of neurosurgery. "We suspected that what works in the brain may also work in the spinal cord. When we were unable to find good data to support our hypothesis, we decided to study it ourselves."

The researchers recorded a baseline of the rats walking and re-examined the animals' gait on a weekly basis. As early as three weeks, the rats eating the Western diet demonstrated measurable walking problems that worsened as the study progressed. Rats fed a diet enriched with DHA and curcumin walked significantly better than the first group even six weeks after the study's start.

Next, the scientists examined the rats' spinal cords to evaluate how diet affected their injury on a molecular level. The researchers measured levels of three markers respectively linked to cell-membrane damage, neural repair and cellular communication.

The rats that ate the Western diet showed higher levels of the marker linked to cell-membrane damage. In contrast, the DHA and curcumin appeared to offset the injury's effect in the second group, which displayed equivalent marker levels to the control group.

Levels of the markers linked to neural repair and cellular communication were significantly lower in the rats raised on the Western diet. Again, levels in the animals fed the supplemented diet appeared similar to those of the control group.

"DHA and curcumin appear to invoke several molecular mechanisms that preserved neurological function in the rats," said Gomez-Pinilla. "This is an exciting first step toward understanding the role that diet plays in protecting the body from degenerative disease."

"Our findings suggest that diet can help minimize disease-related changes and repair damage to the spinal cord," said Holly. "We next want to look at other mechanisms involved in the cascade of events leading up to chronic spinal-cord injury. Our goal is to identify which stages will respond best to medical intervention and identify effective steps for slowing the disease process."

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