

# Stopping low back pain: Researchers discover molecular mechanism responsible for vertebral column degeneration

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Italian researchers at the Catholic University of Sacred Heart in Rome found an important molecular mechanism responsible for low back pain and other acute vertebral problems like cervical axial pain, all due to aging and degeneration of the vertebral column.

The team led by Dr. Luigi Aurelio Nasto and Enrico Pola also developed an [experimental drug](#) to inhibit this degenerative mechanism, by blocking its principal culprit, the molecule, "NF-kB" and tested it successfully in mice. The study was carried out in collaboration with the University of Pittsburgh research team led by Paul Robbins, James Kang and Nam Vo.

Researchers reported their findings in the February 16 online edition of the journal *Spine*.

Nasto and Pola found that high concentration of NF-kB causes the degeneration of [intervertebral discs](#) (the structures that separate and damp the vertebrae), a degenerative process that could affect also young adults (30 year old), especially if they adopt a sedentary lifestyle. In other words when NF-kB becomes overactive, it triggers a series of deleterious reactions that ultimately affect the physiological structure of the vertebral column.

Due to aging, obesity and [sedentary lifestyle](#), intervertebral discs

degenerate, leading to the progressive stiffening of the column. The intervertebral disc degeneration is responsible for syndromes such as [chronic low back pain](#) or neck [pain](#) that affects a large proportion of the [adult population](#).

Back pain and neck pain are ranked among the leading causes of lost working hours and disability in adults. Italian scientists found the mechanism behind the degenerative processes of the column. They studied mice that are genetically programmed to age rapidly (progeroid mice). The [average lifespan](#) of normal mice is 2 years. The progeroid mice age more quickly and have a lifespan of 8 months. The progeroid mice perfectly mimic the process of spine degeneration that occurs in old people and young adults who suffer from low back pain.

The researchers found that NF-kB plays a role in the degeneration of the spine. NF-kB is a transcription factor, it modulates the activation of specific target genes. Researchers found that NF-kB activates many genes related to inflammation and turns off anti-inflammatory protective genes. Moreover, in many studies NF-kB was found hyperactive in both the spines of old [mice](#) and old people.

The results of the Italian research suggest that NF-kB induces the onset of deleterious inflammatory processes and inhibits anti-inflammatory mechanisms. Moreover, "our study shows that by inhibiting NF-kB, we can stop spine degeneration", Dr. Nasto says. "Drugs that turn off or even only partially inactivate NF-kB could be used to prevent the degeneration of intervertebral discs in patients."

"In our study, we developed a specific drug, called NBD peptide, able to specifically inhibit the deleterious action of NF-kB – Dr. Pola explains. NBD has been already successfully tested by a US team in Pittsburgh to slow the course of muscular dystrophy in an animal model (NF-kB is also involved in this disease). This peptide will be soon tested in a

clinical trial (phase I) to study its therapeutic effects on Duchenne muscular dystrophy".

According to Nasto and Pola, NBD may also be used to counteract the aging of the [vertebral column](#). "We hope to develop other selective inhibitors of NF-kB to slow the degeneration of intervertebral discs" and cure [low back pain](#), Pola concludes.

Provided by Catholic University of Rome

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