

Spine: Unique Muscle Design Stabilises Spine

The novel design of a deep muscle along the spinal column called the multifidus muscle may be key to spinal support and a healthy back, according to researchers.



A small muscle hits big time: the multifidus might have been underestimated for a long time;

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“The multifidus muscle was formerly thought to be relatively unimportant based on its fairly small size,” said Richard L. Lieber, Director of the National Center for Skeletal Muscle Rehabilitation Research in San Diego. “Our research shows that it is actually the strongest muscle in the back because of its unique design. It is like a long, skinny pencil packed with millions of tiny fibres.”

The researchers discovered that the multifidus has a unique packing design consisting of short fibers arranged within rods, and that these fibers are stiffer than any other in the body. Using laser diffraction methods that they developed to measure muscle internal properties during back surgery, the researchers demonstrated that the multifidus’ unique design serves a critical function as a stabiliser of the lumbar spine.

These findings could have implications for surgery: Steven R. Garfin of University of California, San Diego School of Medicine, explained that currently surgery to treat spinal disorders could actually disrupt the multifidus muscle, which could lead to decreased stabilisation and lower back pain.

The lower back, or lumbar spine, can be vulnerable to many pain-causing injuries or disorders because the lumbar vertebrae carry the most body weight and are subject to the most force and stress along the spine. Muscular instability is a risk factor in many injuries and consequent chronic lower back pain, according to Lieber. “The multifidus back muscle keeps us vertical and

takes pressure off the discs," said Lieber. "When muscle function is poor due to back problems, support is lost."

He explained that many muscles get weaker as they are extended. But the researchers discovered that, unlike all other muscles, the multifidus actually becomes stronger as it lengthens, when the spine flexes.

"The length of the sarcomere - the structure within the muscle cell where filaments overlap to produce the movements required for muscle contraction - is shorter in the multifidus than in any other muscle cell," explained study's first author Samuel R. Ward. "But as it gets longer, for instance as a person leans forward, the multifidus actually strengthens."

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