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Back relief

UVic engineers are developing a new device to diagnose lower back pain

Dennison, holding the probe that has the microscopic pressure sensor on the tip.

by Beth Haysom

People experiencing the excruciating agony of lower back pain will put up with anything to find a solution—including having a large, rigid needle poked into their spine to try to determine the source of their discomfort.

Now, University of Victoria researchers are coming to the rescue with a less painful and invasive alternative.

The current procedure, called discography, is used to examine the condition of the intervertebral discs, the "pads" between the bony segments of the spine that are a common source of lower back pain. However, because the needles used are the thickness of a 2.5-millimetre framing nail and rigid, using them can potentially result in further damage. Discography tends to be a last resort for only the most severe cases of back pain.

UVic mechanical engineer Peter Wild and graduate student Chris Dennison are developing a miniscule flexible probe to use instead of the needle. The probe is 0.4 millimetres in diameter—as thin as fishing line—and measures the pressure inside the disc. This can identify deterioration of the disc and potential sources of back pain.

The pliant probe avoids disc damage previously associated with insertion of the large rigid needles. It could have a major impact in this crucial area of medicine, and may help to solve some of the mysteries still perplexing doctors dealing with spinal disorders.

The UVic researchers have been working with a team of medical researchers in the University of British Columbia's Division of Orthopedic Engineering Research to develop the new probe using fibre-optic technology.

"The breakthrough came when we realized the exciting possibilities of applying this relatively new technology in the medical sphere," says Wild. "This [spinal] pressure sensor is one of the first applications, but the potential is enormous."

The sensor's small size and flexibility make it potentially suitable for various medical diagnostic procedures. Wild and his colleagues will be exploring these applications in their continuing research.

The provisionally patented spinal pressure device is now undergoing trials. It usually takes about five years to pass all the regulatory steps to be approved for clinical use.

Already, the technology is creating a stir and has garnered about $130,000 in grants and seed funding from the Natural Sciences and Engineering Research Council and the Canadian Institutes of Health Research. Dennison was awarded top prize at last year's TechMedBC Conference, which serves as a forum for showcasing medical technology ideas.

More recently, the sensor generated considerable interest when Dennison presented it at this year's annual meeting of the Orthopedic Research Society, the largest annual meeting of orthopedic researchers in North America.

"We're getting an enthusiastic response among medical researchers for the probe's potential," says Dennison. "It's rewarding to be working on something that could have such a powerful impact on helping to alleviate people's pain."

Dennison is focusing his master's thesis on ways to make sensitive measurements of pressure variations using optical technologies. He has already spent two co-op education work terms helping to develop the sensor device. Both Dennison and Wild credit the co-op program with enabling them to advance the technology to its current stage.

UVic knowledge

EDGEwise

Deterioration of the spine begins before age 30 and most of us (60 to 90 per cent) will experience lower back pain in our lifetimes.

Almost 40 per cent of all workplace absences in Canada are due to back pain.

Back injuries may be caused by a single instance of overexertion or develop as a result of repeated motion over time. Over two-thirds of back injuries are a result of overexertion.

As well as aiding in the understanding of back pain, the sensor could potentially be used to assess the efficiency of surgical spinal implants that are designed to alleviate patient pain by restoring the mechanical integrity of the spine.

The UBC team responsible for coordinating medical aspects of this research project includes Peter Cripton, David Wilson, Marcel Dvorak and Amy Saari.

The University of Victoria leads all other Canadian comprehensive universities in medical and science grants per faculty member.