Swell gel could bring relief to back pain sufferers

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Scientists at The University of Manchester believe injections of tiny sponge-like particles could provide an alternative to major surgery in the treatment of chronic lower back pain.

Dr Brian Saunders from The School of Materials and Professor Tony Freemont from The Faculty of Medical and Human Sciences have developed tiny gel particles that swell and stiffen when injected into a damaged area.

Investigations have revealed that degenerated animal intervertebral discs containing the injected 'microgels' regain their mechanical properties.

This development opens up the possibility of human patients being able to regain full mobility and flexibility after receiving spinal injections.

This would compare favourably with spinal fusion - a major surgical procedure with considerable recovery time for the patient, resulting in a significant loss of mobility at the fused and adjacent discs.

Degeneration of intervertebral discs causes holes in the load-bearing tissue of the disc, decreasing disc height and resulting in pain.

The microgel particles the research team have developed are like 'smart sponges' when dispersed in water.

The material is a fluid at a low pH - in other words, a low level of acidity

- and can be injected through a syringe. It changes to a stiff gel at physiological pH values - that is, once it enters the body - due to absorption of water by the particles.

During their investigations, the research team injected the material into a damaged bovine intervertebral disc and increased the pH to biological levels by injecting an alkaline solution.

Professor Freemont, who works in the Division of Regenerative Medicine in the School of Medicine, said: "This research was motivated by the urgent need for a non-surgical method for repairing intervertebral discs.

"Our approach has the advantage of restoring spinal mobility whereas spinal fusion surgery results in a significant loss of mobility at the fused and adjacent discs."

Dr Saunders said: "Although we are encouraged by our findings, much work lies ahead to develop a viable non-surgical repair technology to replace spinal fusion as the standard surgical treatment for chronic lower back pain."

He added that future work will investigate biodegradable microgels that release additives to stimulate regeneration of intervertebral disc tissue.

Source: University of Manchester