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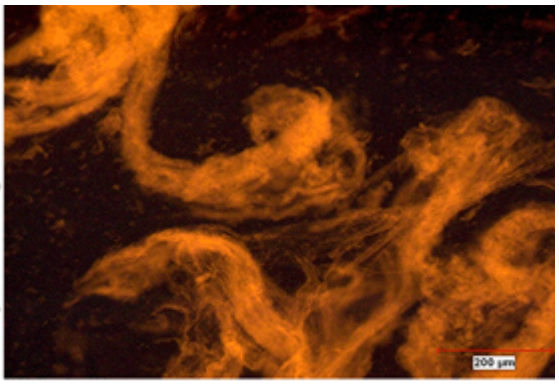
Improving Drug Retention after Knee Injection



Courtesy Michael Morgen

Fluorescent microscopy image of crosslinked hydrogel formed by mixing nanoparticles and human synovial fluid.

Nanoparticles form slow-release gel with synovial fluid

Nanoparticles that combine with the knee joint's lubricating fluid to form a hydrogel could form the basis for extended-release delivery of drugs for osteoarthritis, researchers announced. Experimental work suggests that the gels formed by charged polymeric nanoparticles and the synovial fluid could help to improve the retention of drugs after injection, one of the researchers said.

"The particles we've devised have a positive charge, and they interact with the hyaluronate in the knee, which has a negative charge. That produces a gel to give retention to the particles, which can then release the drug over time without the particles themselves leaving the knee cavity," said Michael Morgen, PhD, director of new technology development at Bend Research in Bend, Ore.

Dr. Morgen was first author of a poster describing the technology presented at the 2011 American Association of Pharmaceutical Scientists Annual Meeting and Exposition (Morgen M, Tung D, Boras B, et al. Poster W4155. Presented at AAPS; Washington, D.C.; Oct. 26).

Proprietary polymeric nanoparticles formed robust crosslinked hydrogels when mixed with synovial fluid in vitro, the researchers reported. The release rate of a conjugated peptide in vitro was about 20% to 25% per week, which could support a monthly dosing regimen, they speculated. After injection into the knee joints of rats, 70% retention of fluorescently labeled polymeric nanoparticles was seen at one week.

"We are now working to fine-tune the release of the drug from the particles. This platform has broad implications and could be used for both new entities and existing therapeutics," Dr. Morgen told *PFQ*. The work was a collaboration between Bend Research and Pfizer (New York).