**Adheres to Cartilage Surface to Sustain Drug Localization for Better Therapeutic Effect**

These biodegradable drug nanocarriers adhere to the extracellular matrix of cartilage, improving drug efficacy in joints during surgery or arthroscopy for those with osteoarthritis. Osteoarthritis (OA) is a disease characterized by the degeneration of cartilage in any joints in the body. This disease affects approximately 27 million Americans and has no cure. Available intra-articular medications for osteoarthritis are largely unsuccessful because they clear from the joint before the therapy can take full effect.

Researchers at the University of Florida have developed a site-specific drug delivery platform that binds directly to cartilage tissue after direct application. Within this therapy lies a strategic solution for prolonging drug retention in the targeted cartilage, enhancing the efficacy of osteoarthritis drug candidates.

**Application**

Drug delivery nanoparticles improve retention and targeting of osteoarthritis therapeutics

**Advantages**

- Improves drug efficacy, minimizing dosing requirements and lowering costs
- Presents an opportunity for early intervention in high-risk patients, potentially preventing the progression of post-traumatic osteoarthritis (PTOA) and other joint diseases
- Utilizes a direct application mechanism to apply drug onto the cartilage surface during arthroscopy, minimizing adverse off-target drug interactions and effects
- Amendable for delivery of a wide range of drugs, proteins, and nucleic acids, giving rise to more efficient OA drugs

**Technology**

This drug delivery platform comprises biodegradable drug nanocarriers functionalized to bind to the extracellular matrix of cartilage or adhere to cartilage surfaces when directly applied. Because they adhere to the cartilage with the help of a sealant, the nanoparticles are sealed in place with the drug, which enables sustained drug localization at target tissue sites. Researchers envision surgeons would paint or spray these drug delivery nanoparticles into joints during surgery or arthroscopy to minimize or eliminate the need for intra-articular drug injections. Ultimately, this site-specific drug delivery platform
could improve the retention of drugs in the cartilage at effective concentrations. It can also minimize off-target effects and lower drug dosing requirements.

Inventors

**Blanka Sharma, Ph.D.**, is an assistant professor in the Department of Biomedical Engineering at the University of Florida. She earned her Ph.D. at Johns Hopkins University and completed a postdoctoral fellowship at Cleveland Clinic, both in biomedical engineering. Dr. Sharma also served as the director of research for Cartilix, Inc., a start-up company based on her doctoral research. She was featured among “20 under 40” outstanding young faculty by the American Society for Engineering Education and has been recognized for her contributions to teaching and mentorship by the UF Graduate Student Council and the Department of Biomedical Engineering. Dr. Sharma’s research focuses on the development of biomaterials for applications in regenerative medicine and cancer. In particular, she is interested in how to apply targeted drug delivery systems to mitigate the dysfunctional immune responses that propagate disease.

**Shannon B. Brown**, is a Ph.D. candidate in Dr. Sharma’s lab. She earned her bachelor’s degree in agricultural and biological engineering at the University of Florida. Ms. Brown’s research interests include nanotechnology, osteoarthritis, and advanced drug delivery.

Contact:
Zahara M. Jaffer • 352-392-8929 • zjaffer@ufl.edu
UF #16485