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Collagen-Targeted Nanoparticles

Functionalized nanoparticles using novel collagen-binding peptides enable specific and targeted delivery of therapeutics, diagnostics, or imaging agents to connective tissues.

Recent advances in nanomedicine have provided effective solutions to several major obstacles in drug delivery. Building upon advances in nanomedicine, researchers at Purdue University have developed a new approach for targeted drug delivery, utilizing the collagen components of the extracellular matrix (ECM) as attachment sites for functionalized nanoparticles. There are more than 20 types of collagen currently identified, with type 1 being the most common. Many tissues are composed primarily of type 1 collagen including tendons, ligaments, and skin. While each of these structures also contain other collagen types, such as proteoglycans and glycosaminoglycans, the principle component is type 1 collagen.

These collagen proteins and their corresponding binding domains have been well studied. Collagen binding domains can be reduced to specific peptide sequences, which bind specifically and exclusively to collagen, the targeted protein.

Utilizing peptide synthesis, Purdue researchers have immobilized a collagen-binding peptide, e.g., collagen types 1 or 2, onto nanoparticles. This allows the nanoparticles to fasten specifically to collagen types 1 or 2, respectively, thereby, allowing the targeted delivery of drugs, diagnostics, or imaging agents to those tissues.

Advantages:

-Novel peptides allow specific tissue targeting of nanoparticles to connective tissues

-Nanoparticles can be used to deliver a variety of therapeutics or other medicinal agents

Potential Applications:

Technology ID

65708

Category

Pharmaceuticals/Pharmaceutical Packaging & Delivery Systems
Pharmaceuticals/Computational Drug Delivery & Nanomedicine

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-Pharmaceutical industry

-Medical/Health

-Targeted drug delivery, diagnostics, or imaging agents

TRL: 3

Intellectual Property:

Provisional-Patent, 2011-02-16, United States | Provisional-Patent, 2011-05-20, United States | PCT-Patent, 2012-02-16, WO | NATL-Patent, 2013-08-16, United States | CON-Patent, 2015-10-15, United States

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