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Short 10-mer therapeutic peptides for osteoarthritic cartilage regeneration

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Post traumatic osteoarthritis (PTOA) is characterized by rapid degradation of articular cartilage brought on by mechanical disruption of the joint environment during injury. This work concentrates on the in-vitro characterization of two 10-mer peptides designed to limit PTOA progression and severity. Joint injury induces apoptosis and dysfunctional repair potential of articular chondrocyte cells responsible for active matrix synthesis. Here, we investigate an anabolic peptide derived from Bone Morphogenic Protein 7 chiefly for its ability to stimulate chondrocyte cell production and retention of matrix components. We explore a second therapeutic peptide, derived from the human IL-1R antagonist; responsible for the blockade of pro-inflammatory cytokine IL-1B mediated production of anti-anabolic and catabolic molecules from primary joint cells. Preliminary real time PCR data has shown functional roles of both peptides to suppress IL-1B mediated upregulation of matrix degrading enzymes and pro-inflammatory genes in the RAW 264.7 mouse macrophage cell line. In-vitro studies in primary articular chondrocyte and synoviocyte cells treated with 10-mer peptides could reveal enhanced matrix production, suppression of pro-inflammatory mediators, down-regulation of catabolic factors and inhibition of apoptotic signaling. We can evaluate peptide activities in specialized ex-vivo cartilage explant models representative of PTOA-like physiological conditions via enzymatically induced cartilage disruption. Further studies are underway to determine the biological mechanisms underlying the therapeutic activities of these free peptides, and their conjugation within a nanoparticle delivery system aimed to counteract cartilage degradation in joint models. These studies are vital to the development of a novel system with applications for osteoarthritis therapy.

Biography

Angelia Szwed graduated Magna Cum Laude from Rutgers University with Bachelors in Molecular Biology and Biochemistry. She is currently a graduate student at Purdue University studying for her PhD under the direction of Dr. Marxa Figueiredo.

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