Progress in tissue engineering to repair joint damage in osteoarthritis

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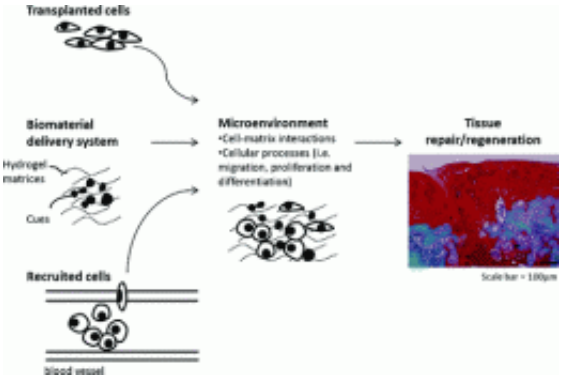

Medical scientists now have "clear" evidence that the damaged cartilage tissue in osteoarthritis and other painful joint disorders can be encouraged to regrow and regenerate, and are developing tissue engineering technology that could help millions of patients with those disorders. That's the conclusion of a new analysis of almost 100 scientific studies on the topic, published in ACS's journal *Molecular Pharmaceutics*.

Tong Cao, Wei Seong Toh and colleagues point out that damage to so-called articular cartilage - the smooth, white, rubbery tissue that covers and cushions the ends of bones in joints - is one of the most challenging problems in medicine. That's because the tissue lacks blood vessels and has little ability to repair itself and regrow. Wear-and-tear damage thus builds up over the years, resulting in conditions like osteoarthritis, which affects 27 million people in the United States alone. Osteoarthritis is a fast-growing public health problem because of the world's aging population and because of a sharp increase in obesity, which increases wear on joint cartilage. To assess progress toward medical use of tissue engineering to treat joint damage, the researchers scanned global research on the topic.

They found that scientists have developed many new tissue engineering methods, including implantation of so-called "scaffolds" made of biomaterials that mimic cartilage matrix in the body. The scaffolds could guide the transplanted cells, orchestrate the host cell response, provide structures and microenvironment substances to help rebuild cartilage at the injury site. "In summary, there is promise in future research involving the development of multi-functional biomaterial delivery systems that affect cartilage tissue regeneration on multiple levels," the article states.

More information: "Biomaterial-mediated delivery of microenvironmental cues for repair and regeneration of articular cartilage" DOI: 10.1021/mp100437a

Abstract

Articular cartilage injuries are one of the most challenging problems in musculoskeletal medicine due to the poor intrinsic regenerative capacity of this tissue. The lack of efficient treatment modalities motivates research into tissue engineering: combining cells, biomaterials mimicking extracellular matrix (scaffolds) and microenvironmental signaling cues. The aim of this review is to focus on the use of biomaterials as delivery systems for microenvironmental cues in relation to their applications for treatment of cartilage defects. The latest advances in cartilage tissue engineering and regeneration are critically reviewed to demonstrate an outline of challenges toward biomaterial-based approaches of cartilage regeneration.

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