

Cell-free tissue engineering based on drug delivery enhancement of regeneration

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Cell based tissue engineering suffers from wide range of ethical, legal and technical obstacles, which limit clinical use of developed tissue. An alternative approach proposed in present work is based on utilization of scaffolds with embedded drug delivery systems as cell-free systems for regeneration of bone and cartilage.

Composite scaffold for bone tissue engineering is based on collagen/hydroxyapatite foam in combination with grinded nanofibers as drug delivery system for growth factors. The scaffolds were shown to improve bone and cartilage healing of both small and large animal models. The formed tissue showed homogenous distribution and quality bone tissue formation. The presented cartilage cell-free system consisted of grinded nanofibers with adsorbed insulin and bFGF in combination with collagen/hyaluronic acid/fibrin hydrogel. The scaffold showed sufficient mechanical properties and efficient cartilage regeneration on large animal model.

The results of studies demonstrate potential of cell-free scaffolds as an viable alternative of classical route of tissue engineering. Such alternative approach reduces market barriers leading to efficient ATMPs uptake by market.