

NOVEL ULTRASHORT SELF-ASSEMBLING PEPTIDE BIOINKS FOR 3D CULTURE OF MUSCLE MYOBLAST CELLS

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The ability of skeletal muscle to self-repair after a traumatic injury, tumour ablation or muscular disease is slow; limited, and declines steeply with age. Tissue engineering of functional skeletal muscle using 3D bioprinting technology is promising for creating tissue constructs that repair and promote regeneration of damaged tissue. Hydrogel scaffolds used as biomaterials for skeletal muscle tissue engineering can provide chemical, physical and mechanical cues to the cells in three dimensions thus promoting regeneration. Herein, we have developed two synthetically designed novel tetramer peptide biomaterials. These peptides are self-assembling into a nanofibrous 3D network, entrapping 99.9% water and mimicking the native collagen of an extracellular matrix. Different biocompatibility assays including MTT, 3D cell viability assay, cytotoxicity assay and live-dead assay confirmed the biocompatibility of these peptide hydrogels for mouse myoblast cells (C2C12). Immunofluorescence analysis of cell-laden hydrogels revealed that the proliferation of C2C12 cells was well-aligned in the peptide hydrogels compared to the alginate gelatin control. These results indicate that these peptide hydrogels are suitable for skeletal muscle tissue engineering. Finally, we tested the printability of the peptide bioinks using a commercially available 3D bioprinter. The ability to print these hydrogels will enable future development of 3D bioprinted scaffolds containing skeletal muscle myoblasts for tissue engineering applications.

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