Controlled Release of Statin Drugs Via Hydrogel Implants

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A key component of regenerative medicine is providing novel biopolymers and hydrogels which more suitably mimic the nanostructural features and responsiveness of ECM and other components of the microenvironment of native tissue. Scaffolds and delivery cells can bioprinted. However, bioprinting is currently limited by a lack of suitable and advanced bioinks. The objective of this research is to develop polymeric hydrogels which has the ability of; (1) stimuli-responsive network formation, (2) controlled delivery of therapeutic molecules for tissue regeneration, and (3) degradable support for cell growth and development into specific tissues such as bone and cartilage. A series of bioink formulations from chitosan-based and polylactide (PLA)-based polymer systems were prepared. These degradable bioinks were 3D-printed into hydrogels with varied physical properties. They can load hydrophobic drugs and growth factors at the specifically designed layers. Simvastatin (SMV) has been applied to improve and accelerate the osseointegration by increasing the quantity and quality of bone tissue.

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