Engineered Cell-Secreted Extracellular Matrix

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Technology description

Extracellular matrix (ECM), because of its role in regulating and maintaining progenitor cells, is of great commercial interest for the development of novel biomaterial surfaces. Creating cell culture interfaces that allow cells to reside in their native cellular state or to transform phenotype has the potential for advancing cell-based therapies and tissue engineering. However, current methods have failed to successfully mimic the complex cellular environment within the endogenous ECM.

Researchers at the University of California, Davis have developed a controlled means of depositing a mesenchymal stem cell-secreted ECM on polymeric implants of any size and geometry for use as tissue culture substrates, osteogenic gels, or for medical devices. This matrix is produced by cells on tissue culture plastic under controlled conditions, then decellularized, leaving behind only the cell-secreted components without the antigenic cellular structures or contaminating DNA. The ECM produced can be reset on other substrates in a controlled manner. This creates a powerful tool to coat any implant with an engineered ECM without requiring cells to deposit the ECM on the substrate by culturing for prolonged durations. The application of this complex matrix provides cells with a natural substrate for interaction, allowing enhanced cellular adhesion, viability, survival, and accelerated tissue formation, thereby making possible implantable materials that are more patient-friendly with enhanced integration into the patient through presentation of a cell-derived surface coating.

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Related Materials

Transferable Cell-Secreted Extracellular Matrices Enhance Osteogenic Differentiation; Decaris et al.; Department of Biomedical Engineering, University of California, Davis, Davis, CA 95616, USA

Design of Experiments Approach to Engineer Cell-Secreted Matrices for Directing Osteogenic Differentiation; Martin L. Decaris and J. Kent Leach; Annals of Biomedical Engineering, 2011, Volume 39, Number 4, Pages 1174-1185

DECELLULARIZED EXTRACELLULAR MATRIX. WO/2012/142569

Additional Technologies by these Inventors

Resorbable, Injectable Hydrogel for Use in Bone Repair and Tissue Engineering

Application area

Tissue culture substrates
Medical devices/implants
Osteogenic gels
Biomedical engineering and tissue formation

Advantages

Accelerates tissue formation in a natural manner
More patient-friendly, non-immunogenic implantable materials
Provides cells with natural substrate for interaction for enhanced cellular adhesion

Institution

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