BIOINK FOR 3D BIOPRINTING OBTAINED FROM DECELLULARIZED MATRIX

New biomimetic hydrogel based on decellularized extracellular matrix (dECM) obtained from mesenchymal stem cells (mdECM) for tissue engineering (cartilage, bone, skin, etc.). Its excellent biocompatibility and physicochemical and mechanical properties, suitable for injectability, demonstrate for the first time the potential of this hydrogel for applications in tissue repair and regeneration.

Technology for Licensing

Keywords:

Cellular product, decellularized extracellular matrix, monolayer, biomaterial, bioink, hydrogel scaffold, regenerative medicine.

Description:

Three-dimensional (3D) printing technology application in tissue engineering has made it possible to create biomimetic tissue constructs through controlled deposition of living cells, biomaterials and/or signaling molecules.

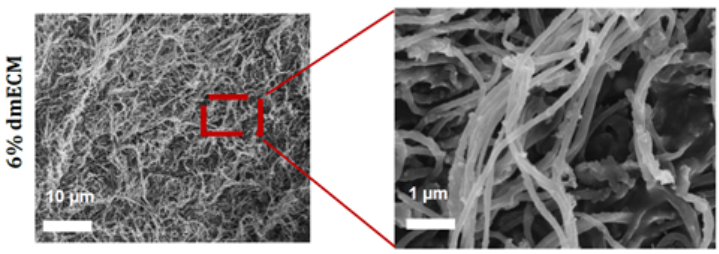
The use of extracellular matrix (ECM) from tissues has been an important step forward in this field, considering that it provides unique biochemical signals and a microenvironment that promote cell adhesion, growth and differentiation. However, involves two main problems: immune responses and limited availability of donor tissue.

Recently, cell-derived matrix (CDM) has emerged as an alternative source of ECM for tissue engineering as it can be easily obtained on a large scale from autologous or allogeneic cells and is readily customizable. Although its application in regenerative medicine is relatively recent, it has exhibited excellent biocompatibility and bio-inductive properties, supporting and directing cell proliferation and differentiation. However, the development of biomimetic bioink based on CDM has not yet been investigated.

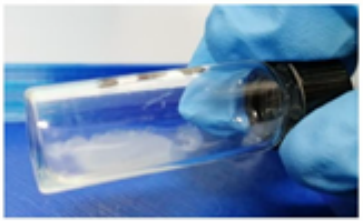
Therefore, researchers at the University of Granada have developed biomimetic hydrogels based on CDM that provide a favorable environment for cells with suitable physicochemical and biological properties and promote specific regeneration of skin, bone and cartilage tissue *in vivo* or *in vitro*, all supporting high cell viability at different concentrations of dECM. In addition, its potential use not only in bioprinting but also as a component for hydrogels and other formulations (cosmetic creams, injectability, etc.) is also noteworthy.

Advantages and Benefits

- Highly biocompatible material
- Simple manufacturing
- Customizable
- Provides a complete microenvironment rich in glycosaminoglycans and fibrillar proteins
- Extrusion capacity
- Potential use as a component of hydrogels and other formulations
- Reduction of production cost



Scanning electron micrographs of crosslinked dmECM bioink



Differenciated fibroblast (MSCs) - derived Extracelllular Matrix

Actuación en el marco del Proyecto ILIBERIS: Actuaciones Singulares de Transferencia de Conocimiento en el CEI BIOTIC. Objetivo prioritario OP.01 "Potenciar la investigación, el desarrollo tecnológico y la innovación"

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Contact:
Oficina de Transferencia de Resultados de Investigación (OTRI) - Universidad de Granada

patentes@ugr.es www.otri.ugr.es