HYDROGELS FOR THE PRODUCTION OF ARTIFICIAL TISSUE WITH ENHANCED MECHANICAL PROPERTIES

A method for the preparation of hydrogels suitable for producing artificial tissues has been developed. The method combines fibrin, fibrinogen and short-chained peptides, which interact to enhance cell adhesion and proliferation. The resulting tissues could be used as a medicine for organ regeneration, and could restore the functional activity of a damaged or diseased organ.

Technology for Licensing

Keywords:

hydrogel, biomaterial, tissue engineering, biological tissue, regenerative medicine, polymer, scaffold, peptide

Description:

Tissue engineering focuses on the development of strategies to replace, repair, maintain and/or improve biological tissues. There are three approaches: the exclusive use of cells; the exclusive use of polymeric matrices; and the combination of both.

The extracellular matrix plays an essential role since it provides the necessary support for cell proliferation and the maintenance of cell functions. An ideal matrix should be three-dimensional and highly porous; with adequate biomechanical properties for the native tissue intended to replace; and appropriate chemical properties to allow cell adhesion, proliferation and differentiation.

However, materials currently used to generate the polymeric matrix have a lack of well-organized and controlled internal structure, they are biomechanically weak, and rapidly degraded in vivo. It is also hard to balance their mechanical properties and porosity.

This invention consists of a new method for the preparation of a hydrogel suitable for the production of artificial tissues. The interactions between fibrin and fibrinogen with short-chain peptides lead to a more appropriate internal structure compared to current solutions. While showing a high biocompatibility, the resulting material improves the biomechanical properties and the porosity, and enhances cell adhesion and the proliferation of the tissue to be regenerated.

Advantages and Benefits

- **Enhanced biomechanical properties**

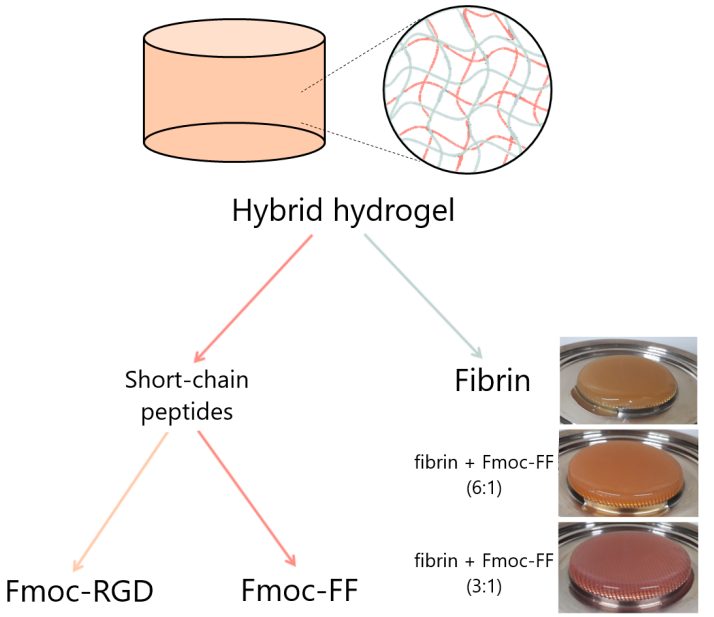
  The use of short-chain peptides improves the mechanical strength of the material, and does not depend on agarose concentration, that would worsen the porosity.

- **Adequate porosity**

  Allowing cell growth in the material

- **Biocompatibility**

  Thanks to the interactions between fibrin, fibrinogen and peptides, biocompatibility improves in comparison to current solutions.



Scheme of the hydrogels of the invention

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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Patent status:
European Patent application number: EP22382231.3
Priority date: 11/03/2022

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