3D printable ECM for cell modelling and bioengineering purpose

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Keywords: 3D - Bioprinting, tissue engineering, ECM mimetics, 3D in vitro models.

Tissue engineering is an inter- and multidisciplinary field that combines the principles and technologies from engineering, material science, chemistry, cell biology. Aim of the field is to develop functional substitutes able to restore and substitue injured or damaged tissues [1].
New technologies are available to produce functional tissues. In particular, by 3D printing and bioprinting today is possible to control both composition and architecture of the final construct. The major challenge of this approach is to print three-dimensional supports preserving cell viability and functionality as well as ensuring the structural integrity of the scaffold. To overcome this challenge, new bioresponsive polymers are needed. With this aim, mimetics of natural ECM components were designed and produced to investigate the influence of polymers properties and different formulation processes. Cell viability and functionalities were also investigated to asses the bioprinting processes and to produce tissue scaffolds with embedded living cells.

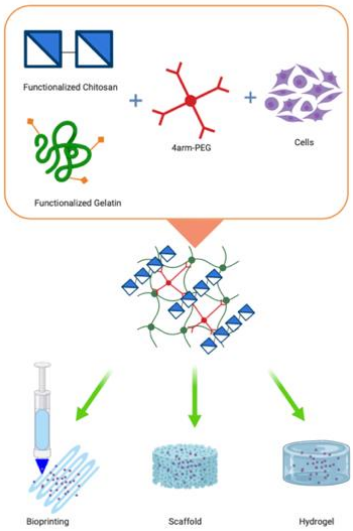

Figure 1: Schematic illustration from biomaterials to bioprinting, scaffold and hydrogel formulation.

In particular, natural polymers such as chitosan and gelatin are promising biomaterials for the preparation of biodegradable hydrogels due to their excellent biocompatibility and biological functions [2]. In this work we propose the development and the assessment of new smart hybrid biomaterials in three different formulations: fibrous scaffold, injectable hydrogel and bioprintable hydrogel.

References:
[1] Hollister SJ. 2005 Porous scaffold design for tissue engineering. Nat. Mater. 4 518- 24.
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Acknowledgments: Ministero della Salute, RICERCA FINALIZZATA 2016 RF-2016-0236294 (1/3/2018-28/2/2021) Theory enhancing Projects. Title: Dissecting the link between pulmonary stromal changes and lung cancer progression for biomarkers discovery and therapeutic intervention.