Project 3.2 Empowering microfluidic-assisted bioprinting with artificial intelligence tools for skeletal muscle tissue engineering

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Background:

In vitro tissue models are regarded as a critical component of future biomedical research. Currently, these systems are mostly created using low-throughput approaches based on prior experience, intuition, and trial-and-error methodology. Such constraints result in the creation of valuable in vitro models, albeit far from optimal.

The goal of this project is to address these limitations by creating a data-driven, high-throughput workflow that includes an innovative microfluidic-assisted extrusion bioprinting (μ-eBP) system supported by advanced image analysis tools for capturing key information about in vitro neo-tissue formation dynamics.

Aim:

The core scientific and technical objectives of the MYO-PATH project are:

i) the progress towards a deeper understanding and control of cellular dynamic processes involved in the manufacturing of artificial tissues – specifically of skeletal muscle tissue;

ii) the establishment of blueprints to obtain the highest tissue functionality and scalability potential and prioritize the best cost-effective experimental conditions;

iii) the generation of a developmental atlas of artificial muscle morphogenesis in vitro. We intend to achieve this goal by developing new tools - hardware and software - for all stages of μ-eBP.

Requirements:

- The PhD student should have a background in biology or biotechnology or related fields.