Development of vascularized 3D hydrogels as advanced in vitro cancer models

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Three-dimensional cell cultures are necessary for the advancement of cancer research. In particular, it is important to in vitro approach the level of complexity required for the modeling of some crucial events, such as the tumor vascularization and its role on cancer progression.

Angiogenesis is a complex process, involving cell–extracellular matrix (ECM) interactions covering a pivotal role in tumor development, maintenance, and progression.

The goal of this work is to develop a technology to realize 3D vascularized hydrogels to mimic angiogenesis in tumour progression. Micro-channels will be realized within 3D gels and functionalized with endothelial cells. The gels will be characterized in terms of mechanical proprieties and degradation rate. The effects of the vessels formation on the tumor ingrowth will be evaluated through metabolic assays and histologic techniques. The interaction between the vessels and tumor cells within the gels will be assessed through fluorescent immunostaining and consequent images post-production and data analysis (ImageJ).

The goals of this thesis are:

- Hydrogel processing
- Polymer manufacturing
- Optical microscopy
- Fluorescence confocal microscopy
- Cell culture
- Image analysis

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Self-contained, interest in experimental work; initiative and curiosity.

1