Glycosignature in 3D-printed extracellular matrix in gastrointestinal cancer

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Abstract:

Extracellular matrix (ECM) glycosignature influence cell behaviour and is associated to pathological events such as tumorigenesis [1]. We developed 3D bioprinted ECM models glycosylated with selected glycans to replicate gastrointestinal cancer tissues. Our aim was to study the effect of different glycans in the ECM properties and cell signaling, and correlate them with the pathological event.

We selected gelatin and hyaluronic acid as starting materials to formulate a hydrogel upon proper crosslinking and glyco-conjugation with 3'-sialylgalactose, 6'-sialylgalactose and 2'-fucosylgalactose. The hydrogels were 3D-bioprinted with human colon cancer cells (HT29) as models and with patient-derived colon cancer tumoroids and patient-derived gastric cancer organoids.

Single cell proteomic analysis on bio-printed HT29, swelling test, SEM and SAXS/WAXS analysis on the 3D-printed matrices, showed significant differences depending on the different glyco-signature.

The 3D-printed constructs were tested for their capacity to growth patient derived gastrointestinal organoids. Preliminary results indicate that the matrices are suitable for organoids culture and that the behaviour is once more related to the glycosignature.

[1] Barbugian, F. et al. Diagnostic glycotools. Carbohydr. Chem. 45, 572–608 (2021).

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