MULTIFUNCTIONAL GLYCOBIOMATERIALS MIMICKING EXTRACELLULAR MATRIX (ECM): FROM 3D TISSUE MIMETICS TO AI-GUIDED PREDICTIVE SYTNEHSIS

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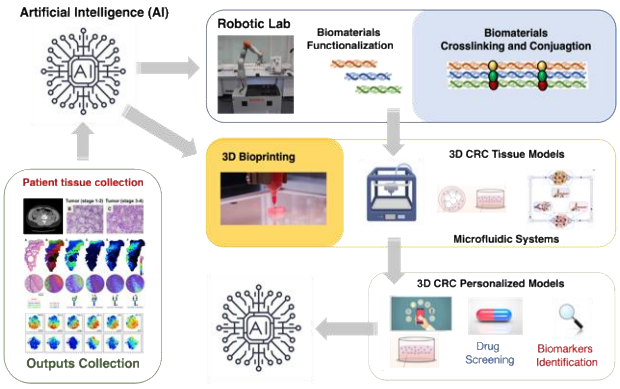
The development of human tissue models is crucial for advancing healthcare management by generating in vitro organs for drug screening and personalized tissue engineering solutions. To achieve this goal, biomaterial mimicking the Extracellular Matrix (ECM) morphology and signaling capacity must be generated [1]. The ECM plays a key role in modulating cell fate, mediated by specific interactions with cell receptors. The generation of multifunctional materials, employable in designing functional organ-like constructs, still represents an open challenge in the field. In this context, the glycosignature and the biomolecular features of the ECM plays a pivotal role in modulating cell fate through specific interactions with cell receptors [2, 3]. This complex interplay is needed to generate tissue in vitro models that accurately patient-specific physiological or pathological conditions. Leveraging technological advancements, such as Artificial Intelligence (AI) algorithms and automated manufacturing systems, including 3D printing, has become instrumental in overcoming obstacles associated with traditional combinatorial and artisanal chemical approaches used to develop diagnostic and therapeutic solutions. In this presentation, I will discuss recent efforts to generate in vitro tissues and multifunctional medical devices with patient-required features, utilizing also AI algorithms.

Key words: *ECM mimics, Glycobiomaterials, AI-predictive synthesis, 3D in vitro models.*



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