Development of Glucose-Generating Hydrogels as 3D Cell Culture Matrices

Hydrogels have proven invaluable in various biomedical and biotechnological applications, particularly in combination with cells. However, conventional bulk hydrogels encounter significant challenges related to the diffusion of oxygen, nutrients, and metabolites. This assignment aims to address these limitations by introducing a novel approach wherein glucose is generated in situ inside polysaccharide hydrogels. This will support cell survival, facilitates cellular functions, and promotes tissue growth. As the hydrogels slowly degrade, cells autonomously produce their own extracellular matrix, mimicking the formation of native tissue. This distinctive methodology presents the opportunity to cultivate large constructs, and can be extended in subsequent stages through the utilization of 3D bioprinting technology. The integration of glucose generation within the hydrogel matrix not only addresses challenges related to nutrient diffusion but also establishes a platform for the creation of intricate and physiologically relevant tissue constructs. This approach holds promise for advancing the field of tissue engineering and regenerative medicine, paving the way for the development of sophisticated 3D-bioprinted structures with enhanced functionality and biomimicry.

Project goal

Develop a hydrogel for long-term cell culture

During this project you carry out:

Synthesis of functionalized polysaccharides
Preparation and analysis of the hydrogels
Study the glucose release
Assess cell viability, proliferation, and metabolic activity over extended culture periods.