Chemical Engineering Thesis Defense

Hydrogel Facilitated Melanoma Cell-Macrophage Coculture Tumor Microenvironments

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Abstract

Cellular models have been the backbone of models for drug therapeutics, discovery, or diagnostics, and for modeling a tumor microenvironment to understand the proliferation, migration, invasion, dormancy, angiogenesis, Conventional two-dimensional (2D) cell culture models are used because of the cost-effectiveness compared to animal models. But these models fail to mimic the cellular phenotype of a three-dimensional (3D) microenvironment. As a result, it is important to develop a 3D model that predicts cellular behaviors and their interaction with neighboring cells and extracellular matrix (ECM) in a more realistic setting. Various 3D cell culture methods have been employed to generate spheroids, in vitro, but most of these platforms face drawbacks such as spheroid size heterogeneity, low yield, use of specialized instruments etc. The hydrogel platform mentioned here was able to solve all the previous problems and can create a novel 3D tumor microenvironment. This thesis is focused on developing an in-vitro 3D model which can modulate the tumor microenvironment consisting of cancer cells and macrophages and how the Amikagel platform modulated the macrophage phenotype is discussed in detail here. This platform can be an ideal platform for macrophage phenotype modulation.

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