Microfluidic 3D Co-culture of Estrogen Receptor Positive Breast Cancer and Stromal Cells to Study Endocrine Resistance

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Breast cancer is the most prevalent cancer among women. Endocrine therapy (ET) has been shown to be an effective treatment against estrogen receptor positive (ER+) breast cancer (BC); however, ~40% of diagnosed patients present acquired resistance to this therapy. One cell type of interest in the tumor microenvironment (TME) is adipose-derived stem cells (ASCs) which has the potential to affect cancer treatment efficacy. Moreover, there are several studies on the patient response to different therapies that show diverse behavior under similar conditions in patients with different age and BMI. The goal of this project is to analyze the data of monoculture (only cancer cells) and co-culture (cancer cells + ASCs) experiments, and understand the role of ASCs in affecting endocrine resistance in ER+ breast cancer cells by studying cellular proliferation under drugged and basal conditions. The microfluidic trapping device was imaged every 24 hours followed by terminal immunostaining and image analysis for proliferation markers was performed. After obtaining microscopic fluorescent images, pictures are numerically quantified using the Fiji application. Normalization of the data occurs by gathering the signal from the proliferation marker Ki-67 and dividing by DAPI (nuclei marker) to normalize the data. Final data shows that the complete co-culture exhibited higher resistance to forms of endocrine therapy, and that higher BMI and younger ages have less extreme reaction in response to estrogen and fulvestrant (current treatment for ER+ breast cancer).

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