

High Content Imaging of Cell-Cell Interaction and Signaling in 3D Breast Cancer Co-Culture Model

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The desired effect of cancer therapeutics can only be conceived when applied on complex multicellular structures with different cell types and extracellular matrix (ECM) in three-dimensional (3D) space. 3D cell culture systems have become very popular in the field of drug screening and discovery. There is an immense demand of highly efficient and easy methods to produce 3D spheroids in any cell format. Heterogeneity in size, extended cultivation times and reproducibility for high throughput assays are some of the limiting factors in the generation of spheroids. In this study we are using 3D Breast cancer co-culture system to understand the dynamics of tumor microenvironment in-vitro by integrating cell biology and advanced cellular imaging. Recently we have established a naturally transformed breast cancer cell line, KAIMRC1¹ from ductal breast carcinoma. We have already characterized these cells grown in monolayers for the biological and molecular markers, induction of MAPK pathways as well as

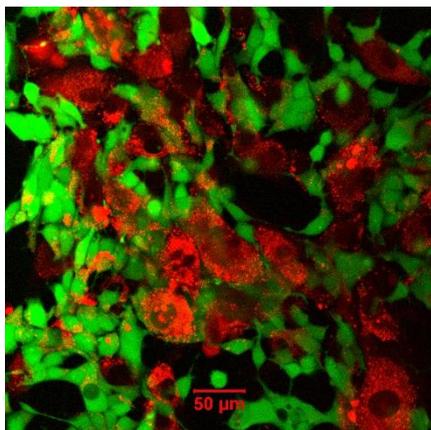


Figure 1 Co-culture of KAIMRC1 (Green) and patient-derived fibroblast-like cells (Red)

its response to different commercially available drugs and compounds. We have developed a novel and easy method to produce spheroids from KAIMRC1 cells in vitro which can be used as a 3D model to study proliferation, differentiation, metabolism, cell death and drug response of cells in tumor microenvironment. We have also developed an in-vitro high content imaging (HCI) based cellular assay using commercially available compound panels to perform initial drug screening in KAIMRC1 spheroids model (Figure 2). Our approach allows rapid screening of panel of drugs to assess inhibitory effects on the growth of tumor cells in 3D cultures. To mimic real in-vivo tumor micro environment, we are now developing a real-time HCI based assay utilizing 3D KAIMRC1 spheroids co-cultured with patient-derived fibroblast cells (Figure 1).

1. Ali, Rizwan et al. "Isolation and Characterization of a New Naturally Immortalized Human Breast Carcinoma Cell Line, KAIMRC1." BMC Cancer 17 (2017)

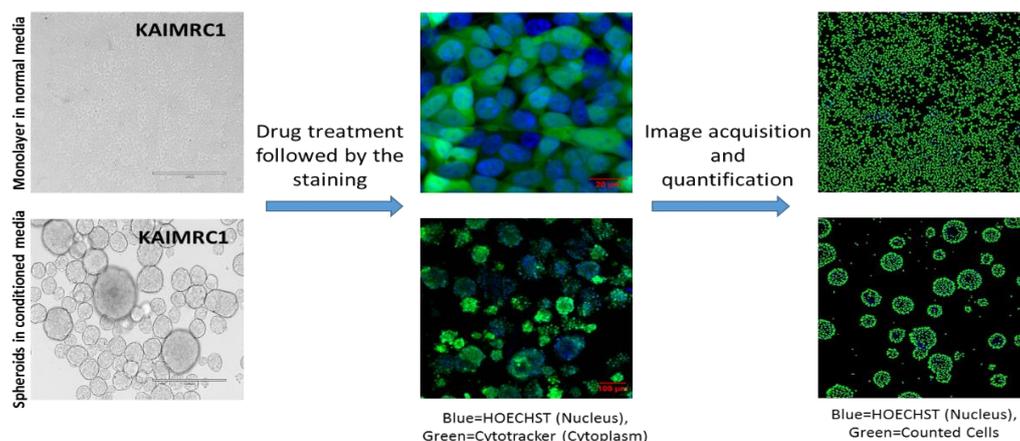


Figure 2 Schematic representation of HCI assay using breast cancer KAIMRC1 2D monolayer and 3D spheroids culture