USC Stevens Center for Innovation

USC University of Southern California

Microdevice to Recapitulate Hypoxic Microenvironments for Tumor Modeling

USC Case #2016-162

Market Opportunity:

Hypoxia is a state in which oxygen is deficient in tissues and is involved in many biological processes involving health and diseases. In the context of cancer, hypoxia plays a significant role in cancer phenotype, metabolism and progression. Despite the obvious importance of studying hypoxia, state-of-the-art engineering tools to replicate a cancer or model cancer tumors is limited. 3-D models have been explored, such as tumor spheroids; however, they do not allow high-content analysis such as live-cell tracking and gene expression assays, and require deep imaging capabilities such as two-photon or confocal imaging. In addition, artificial or chemical induction of hypoxia may adversely affect off-target signaling pathways, and commercially available hypoxia chambers limit high throughput applicability. Therefore, there is a need to model naturally occurring hypoxia in cancer tumors in vitro.

USC Solution:

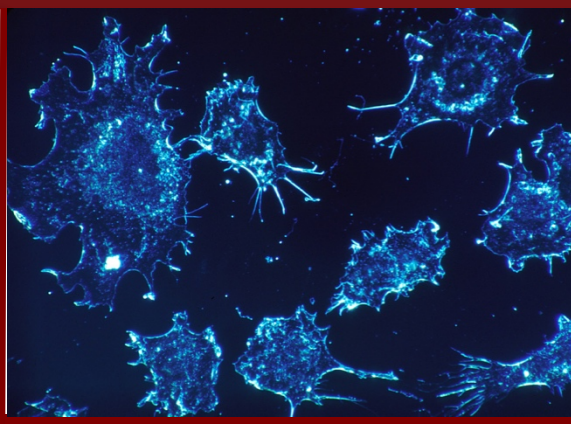
USC researchers have designed a microdevice that recapitulates natural, cell-driven hypoxia with the ability to interface with high-content, high-throughput analyses. The device provides a physical barrier, which prevents passive diffusion of oxygen to a cancer cell monolayer, much like in the case of limited oxygen diffusion in a hypoxic core of a tumor. Furthermore they mimicked the real tumor by micropatterning the cancer cells into designated shapes and sizes, and surrounding the micropatterned “tumor island” with a monolayer of stromal cells.

Value Proposition

- Microdevice is capable of live-cell tracking and single-cell capture
- Will be useful in downstream genetic, proteomic and metabolic analyses
- Can serve as predictive models for mechanistic research, drug screening and personalized medicine

Keywords:

Microdevice, hypoxia, cancer, tumor microenvironment



Applications

- Tumor microenvironment models
- Measure hypoxia in tumor cells

Stage of Development

- Experimentally validated
- Available for exclusive and non-exclusive license

Intellectual Property

Status:

Provisional Patent Application Filed

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