NC STATE UNIVERSITY

Comparative Medicine Institute

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Engineering and analyzing functional tissue and tumor models

Research emphasis:

We utilize paper-based scaffolds to generate 3D structures that model tumor- and tissue-like environments. By combining microfluidic-based approaches and analytical biosensors we can readily control and measure the gradients of oxygen and nutrients that form in these tissue structures.

We are specifically focused on answering if the increased invasiveness, drug resistance, and senescence in hypoxic regions of solid tumors is a binary (on/off) response to oxygen tension or a more nuanced process.

We also are generating heterotypic tissue-like cultures of the breast lumen and liver as high-throughput screening platforms for drug metabolism and toxicity.

Application:

- 3D tumor and tissue model systems
- Integrated sensors for 3D cultures
- High-throughput, high-content screens
- Oxygen (redox) biology

Collaboration potential:

- Engineering tumor- and tissue-like environments
- *In vitro* screening of small molecules and potential drugs
- Paper-based microfluidic devices
- Optical and biochemical analyses

Selected publications:

A.S. Truong and M.R. Lockett (2016). Oxygen as a chemoattractant: Confirming cellular hypoxia in paper-based invasion assays, *Analyst*, 141(12). 3874-3882.

M.W. Boyce, R.M. Kenney, A.S. Truong, and M.R. Lockett (2016) Quantifying oxygen in paper-based cell cultures with luminescent thin film sensors, *Anal. Bioanal. Chem.*, 408(11) 2895-2992.

R.M. Kenney, M.W. Boyce, A.S. Truong, C.R. Bagnell, and M.R. Lockett (2016) Real-time imaging of cancer cell chemotaxis in paper-based scaffolds, *Analyst*, 141(2). 661-668.

A.S. Truong, C.A. Lochbaum, M.W. Boyce, and M.R. Lockett (2015) Tracking the invasion of small numbers of cells in paper-based assays with quantitative PCR, *Anal. Chem.*, 87(22). 11263-11270.