Studying breast cancer metastasis in 3D tissue scaffolds

Dr. Kaushik Chatterjee
Dept. of Materials Engineering/ BSSE

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Dr. Annapoorni Rangarajan
Dept. of Molecular Reproduction, Development and Genetics/ BSSE
Limitations of conventional models to study breast cancer biology

Tissue culture dishes

- Convenient and less expensive - routinely used
- Loss of cellular organization and morphology
- Altered cell–cell and cell–matrix interactions and altered cellular signaling
- Loss of molecular gradients
- Unrealistic substrate stiffness

Xenografts in mice

- Retain the characteristics of the original tumor – closest to the original tumor
- Patient specific tumor models
- Expensive, laborious and time consuming
- Require immune compromised mice

Cukierman et al., 2001; Yamada and Cukierman, 2007; Wang et al., 1998; Levental et al., 2007
Study models using 3D tissue scaffolds

“An interdisciplinary field that applies the principles of engineering and life sciences toward the development of biological substitutes that restore, maintain, or improve tissue function”

Langer and Vacanti 1993; Fischbach et al., 2007; Debnath et al., 2003; Kim et al., 2012
Breast cancer cells in 3D scaffolds acquire more metastatic properties

Breast cancer cells in 3D scaffolds

Project Objectives:

• Isolate primary cancer and stromal cells from patient derived tumours.
• Measure metastatic activity of human breast tumour cell response in 3D scaffolds and compare with 2D controls.
• Test efficacy of chemotherapeutic drugs on cancer cells in 3D scaffolds and compare with 2D controls.