Bioprinting of 3D Tissue Models for Breast Cancer

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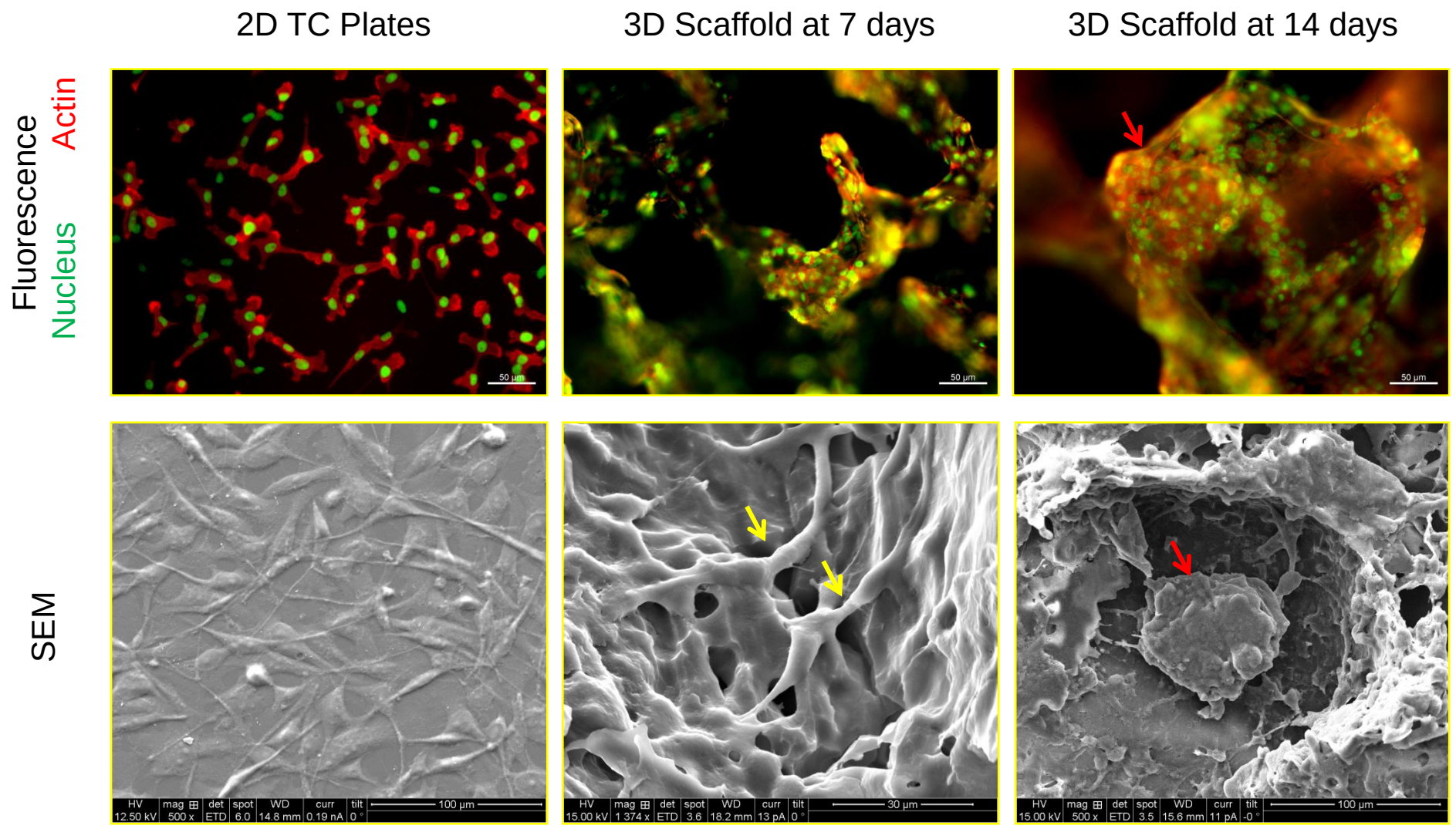
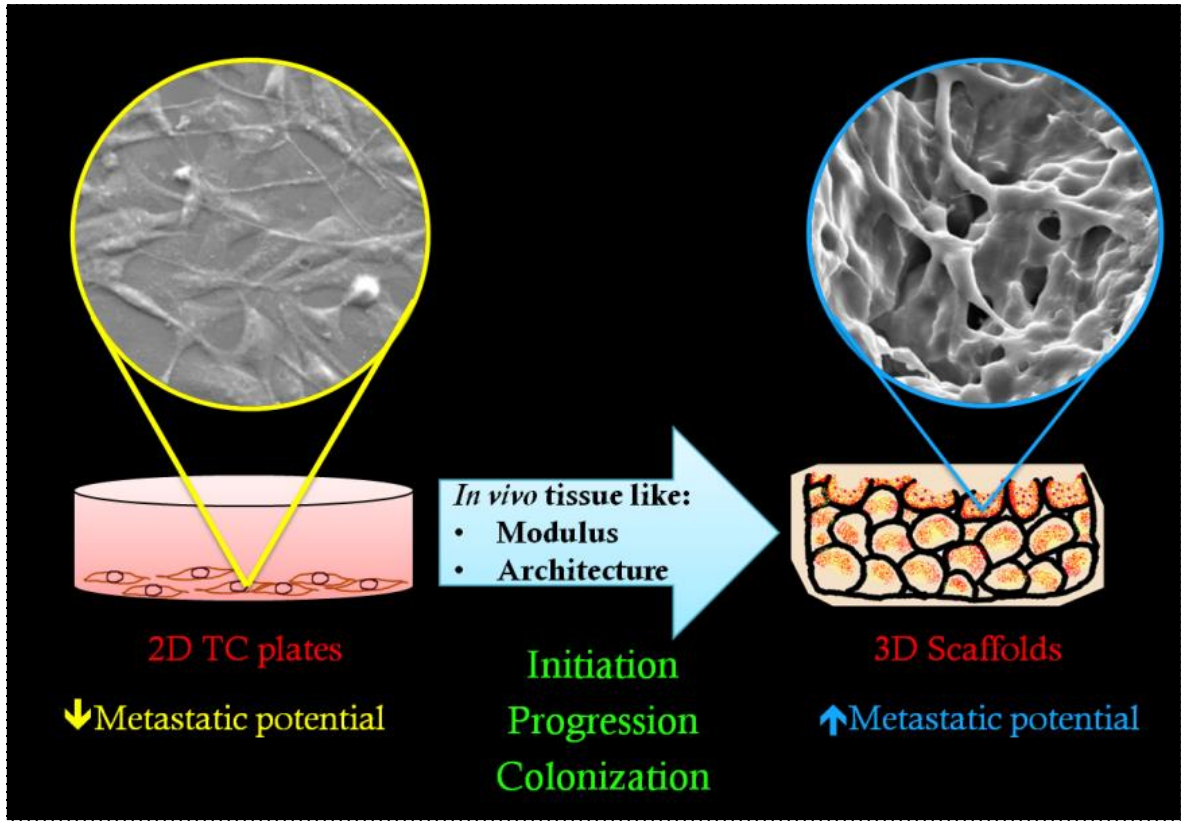
Cancer Cells form Tumor-like Masses in 3D but not in 2D

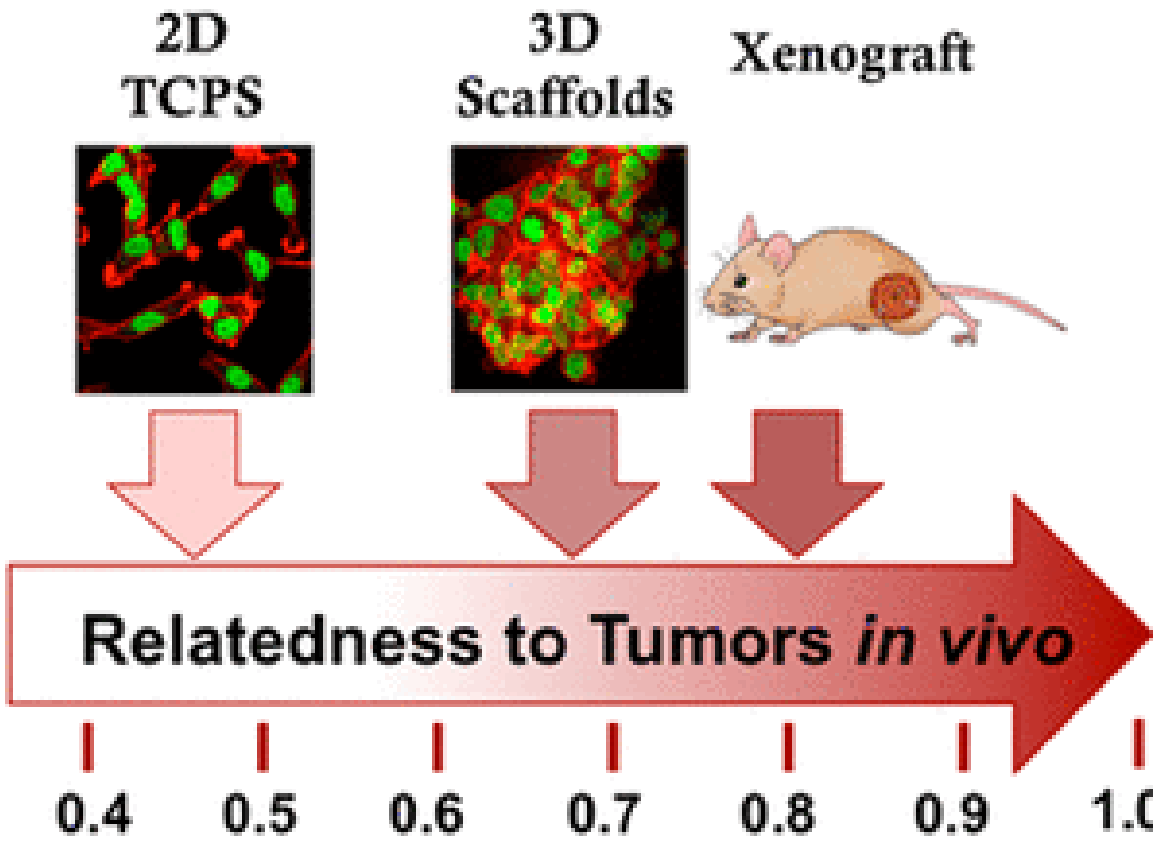


Breast Cancer Cells in 3D Scaffolds have Higher Tendency for Metastasis



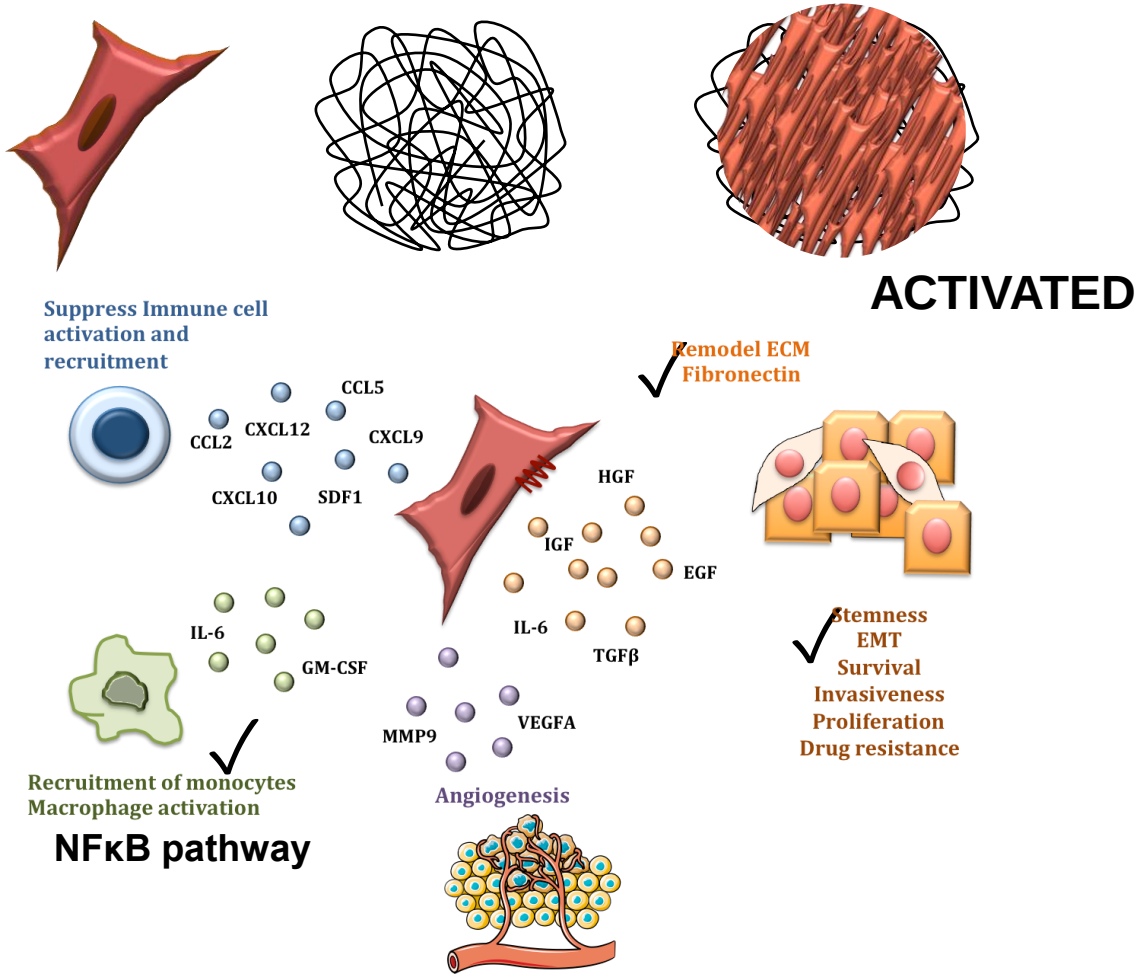
G.M. Balachander et al, ***ACS Applied Materials & Interfaces*** 2015, 7: 27810–27822

Cells in 3D Better Mimic Tumors in Vivo than 2D Culture



G.M. Balachander, et al, ***ACS Biomaterials Science & Engineering*** 2018, 4: 116–127

Cancer Associated Fibroblasts Maintain their in Vivo Phenotype on 3D Fibrous Scaffold but not in 2D Culture



G.M. Balachander, et al, ***ACS Applied Materials & Interfaces*** 2018, 10: 33814–33826

Project Aims

In earlier work (done by a former BSSE student, Dr. Gowri Balachander), we have established in vitro models for metastatic breast tumors using 3D tissue scaffolds. We propose to use 3D bioprinting to prepare the next generation breast tumor models with the following focus areas:

- Culture patient-derived cancer cells in 3D bioprinted tissues and assess patient-specific response for personalized medicine
- Culture multiple types of cells (fibroblasts, adipocytes, endothelial cells) in bioprinted scaffolds to result in a comprehensive tumor-like tissues to study stemness, metastasis and inflammation in breast cancer