

Bankhead-Coley Cancer Research Program

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*2010 Program
Postdoctoral Research Fellowship
(3-year project)*

Project Title: Epigenomic Mapping of Mammary Epithelial Stem Cells and Tumor-Initiating Cells

Project Summary: Despite a promising initial response to modern breast cancer therapies, many patients relapse and develop recurrent tumors. One explanation for this recurrence is the existence of small populations of tumor cells that resemble stem cells. These cells are unique in their ability to continually grow, initiate tumors, and evade conventional therapies. Our broad objective is to identify the unique biological properties of tumor-initiating cells, which could help us design therapies to target these cells, thereby eradicating primary tumors and preventing recurrent disease. Improper genetic and epigenetic information contribute to tumor formation and disease progression. While genetic mistakes are permanent, epigenetic mistakes can be reversed, making them attractive targets for cancer therapy. Our specific aims are to isolate and characterize tumor-initiating cells from patient breast tumors and to examine their epigenetic marks at thousands of regions across the genome. By comparing their features to those from non-tumorigenic cells, we expect to identify the epigenetic abnormalities that make tumor-initiating cells unique. These findings will help us: 1) understand the origin and disease-forming capabilities of tumor-initiating cells, 2) uncover new targets for epigenetic-based drug therapies, and 3) uncover epigenetic patterns that will provide important information to cancer clinicians for diagnostic or prognostic purposes.