The Kerr Lab

Once a localized, primary cancer has metastasized; the survival rates for patients drop dramatically. Metastatic tumors, particularly bone metastases, cause pain and mobility difficulties in patients. However, current diagnostic techniques, particularly for prostate cancer, are incapable of accurately predicting which patients are likely to progress to metastasis. Thus, all patients are treated aggressively resulting in over-diagnosis and over-treatment of clinically insignificant cancers. Effectively identifying patients at risk of dying from metastatic disease requires discovering the mechanisms controlling the initiation and progression of bone metastasis.

The Kerr lab is focused on uncovering the mechanisms driving cancer metastasis with an emphasis on prostate cancer bone metastasis. Our goal is to discover new biomarkers capable of differentiating patients likely to progress to metastasis from those with indolent disease. Within the primary tumor, we study angiogenesis, extracellular matrix proteins, and cancer stem cells. In the circulation, we focus on platelets and disseminated tumor cells. We use live cell imaging, 3D cell culture systems, and in vivo fluorescent imaging among other methodologies to examine metastatic initiation and spread.

In the bone microenvironment, we examine changes in the pre-metastatic niche in response to tumor growth including bone-marrow derived progenitor cell mobilization and structural changes in the bone using microCT. The Kerr lab is developing a model of bone metastasis using scaffolds seeded with mesenchymal stem cells and cancer cells. Scaffolds are studied in vitro, in vivo and in live imaging models. We are also combining the scaffolds with intravital and PET imaging to examine metastasis and bone structure changes, respectively. By understanding how metastasis is initiated, we hope to develop new treatments to prevent or slow metastasis.