

Bankhead-Coley Cancer Research Program

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*2011 Program
New Investigator Research
(3-year project)*

Project Title: Derivation of Molecular Signatures for Accurate Breast Cancer Prognosis

Project Summary: Previous studies have demonstrated the potential values of molecular signatures in assessing the risk of post-surgical breast cancer recurrence. However, many existing prognostic models were developed based on a limited number of samples, and their optimality has not yet been well established. Due to a high incident rate of breast cancer, a large number of tumor tissues have been archived, the majority of which lack clinical follow-up information. The goal of this project is to investigate whether we can use data obtained from these non-annotated samples to significantly improve prognostic accuracy by using advanced computational techniques, and thus pave the way for future multi-institutional cohort studies. To this end, a new computational algorithm will be developed to efficiently mine information from both annotated and non-annotated data, and advanced machine learning algorithms will be used to derive accurate prognostic signatures. A large-scale validation study will be performed to evaluate the performance of the constructed prognostic model against existing approaches on publicly released datasets. If successfully implemented, this work will have a significant impact on cancer research and patient management, and lead to a paradigm shift in the derivation and validation of gene signatures for accurate breast cancer prognosis. The developed innovative approach can also be used in other cancer studies where the lack of follow-up information is a ubiquitous problem.