

## Bankhead-Coley Cancer Research Program

**Tan, Weihong**

*Department of Chemistry  
University of Florida*

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Bridge (1-year project)*

**Project Title:** Molecular analysis of liver cancer using aptamers

**Project Summary:** Liver cancer is one of the most deadly and common malignancies in the United States and the world. Currently, there are no good methods to detect early cancer or to treat it. The major reason is that there is no good biomarker for liver cancer identification. Liver cancer development usually takes a long time, which provides a window of opportunity for early detection and therapy. Early diagnosis enables current treatments to be much more effective and leads to greatly improved survival rates. Therefore, one of the major issues in improving cancer survival rates is the accurate and early diagnosis of the disease. To achieve this goal, we need to know liver cancer-specific markers or tumor-specific molecular fingerprints. DNA microarray and proteomics have been recently used for identification of these molecular fingerprints. However, liver-cancer specific markers are still elusive. Therefore, development of novel approaches for the discovery of liver cancer biomarkers is urgently needed. Our research precisely addresses this important issue. Our objective is to identify liver-specific tumor markers using a novel cell-based aptamer selection strategy (cell-SELEX). Using this technology, we have selected a panel of leukemia-specific molecular probes that may have a potential for diagnosis and tumor target therapy. Building on this success, we will take this approach to identify liver cancer-specific molecular probes. For this purpose, we have available a comprehensive aptamer library and paired normal and liver cancer cell lines. Through a series selection process, we will be able to identify a group of aptamers that are highly specific for liver cancer cells. Using several well-established labeling and detection technologies, we will be able to validate these molecular probes in cell culture systems and a mouse model. We expect these to be potentially useful for early cancer detection as they will provide highly sensitive and specific recognition of tumor cells. Moreover, chemotherapeutic drugs can be linked to these aptamer probes and used for target tumor therapy. Furthermore, we will be able to identify specific tumor molecules using these aptamer probes. If successful, our study will provide much needed molecular tools for early liver cancer diagnosis, targeted therapy, and biomarkers for basic and clinical studies of liver cancer.