

## Bankhead-Coley Cancer Research Program

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*2008 Program  
New Investigator (3-year project)*

**Project Title:** Role of RNA Polymerase II in Genome Maintenance

**Project Summary:** Tumorigenesis is a complex, multistage process in which normal cells are transformed into cancer cells. Intensive research efforts have increased our understanding of carcinogenesis, and have identified a genetic basis for the multi-step process of tumor development. Tumors grow through a process of expansion driven by changes in the way normal cells regulate their growth. When these genetic changes occur in critical genes, such as proto-oncogenes and tumor suppressor genes, they result in abnormal control of cell division and cell death, leading to tumor development. These genetic changes often occur at common regions or “hotspots,” which are particularly susceptible to chromosome breakage. Emerging evidence indicates that these hot spots frequently localize to DNA sequences that can assume unusual DNA structures and correlate them with tumor development. However, the molecular mechanisms underlying the genetic instability associated with these structures are poorly understood. In this grant, we are exploring the mechanisms and the factors involved in resolving those DNA structures that have been implicated in carcinogenesis. The results from this research will have significant implications not only for mechanisms of carcinogenesis, but also for the development of novel modes of cancer chemotherapy.