Award ID:
RP180131

Project Title:
DNA methylation signatures of cell-free DNA in CSF as a new response biomarker for pediatric medulloblastoma

Award Mechanism:
Individual Investigator Research Awards for Cancer in Children and Adolescents

Principal Investigator:
Sun, Deqiang

Entity:
Texas A&M University System Health Science Center

Lay Summary:

Brain tumors are the leading cause of cancer-related death in children. Current radiographic techniques to access treatment response, monitor disease progression, and detect early recurrence lack the desired sensitivity. There is an unmet need to provide physicians with improved methods (our proposed biomarker) to accurately and timely deliver the most optimal care to children with brain tumors. 'Liquid biopsy', based on the measurement of circulating particles such as DNA shed into blood or other biological fluid originated from tumor sites, is an important new technology to monitor the state of tumors without subjecting patients to direct biopsies of the tumor.

The proposed studies involve the use of a high-resolution analysis approach to detect and quantitate tumor-derived DNA in cerebrospinal fluids (CSF), which is obtained as a part of routine clinical care for patients with brain tumors. This measurement can accurately evaluate tumor response to therapy and detect early recurrence before changes can be detected on clinical image analysis (MRI or CT).

This study will be focused on the most common type of malignant pediatric brain cancer, medulloblastoma (MB). The investigators have optimize a new technique that allows the analysis of DNA methylation sites from current 1~2% to greater than 80%, and have collected (over the last 20 years) a large panel of MB tumors and CSF samples from patients at Texas Children's Hospital.

This study will be carried out by a team of leading scientists with expertise in brain cancer research, bioinformatics, chemistry of DNA methylation, biostatistics and clinical oncology. We are uniquely positioned to complete the proposed studies.

Our novel discoveries could lead to major improvements in clinical care through the use of liquid biopsy to guide the early detection and treatment of children with various types of brain cancer.