



## CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:  
RP180846

Project Title:  
Molecular Opening of the Blood-Brain Barrier by Molecular Hyperthermia

Award Mechanism:  
High Impact/High Risk

Principal Investigator:  
Qin, Zhenpeng

Entity:  
The University of Texas at Dallas

### Lay Summary:

Glioblastoma, the most common primary adult brain tumor, is among the most lethal of all solid tumors with a median survival of 14.6 months, which has remained unchanged for over a decade despite intense therapeutic efforts. A unique and major unmet challenge of treating brain tumor is difficulty of delivering effective drugs across the blood-brain barrier (BBB). Our long-term goal is develop an effective strategy to transiently increase BBB permeability that will permit effective delivery of antineoplastic drugs. The specific goal of this project is to design and synthesize light absorbing nanoparticles that target endothelial cell tight junction associated proteins, which form a critical component of the blood-brain barrier. By using tissue-penetrating near-infrared pulsed laser, we will introduce nanoscale effects that selectively disrupt tight junction proteins and temporarily render the BBB permeable to circulating drugs. This combined molecular – nanotechnology approach is in marked contrast to previous methods that relied on non-specific osmotic forces to disrupt the BBB, which have largely been abandoned since they were inefficient and unreliable. We will test our hypothesis using both highly standardized in vitro cell culture based BBB model system as well as an in vivo genetically engineered mouse glioma model. Success of this proposed work would provide a significant conceptual and technological advance for brain tumor drug delivery. The ability to optically trigger BBB opening for improved delivery of systemic therapies could improve the overall survival for brain tumor patients after decades of disappointment.