Washington University in St. Louis
Office of Technology Management

MANIPULATING TRICELLULAR JUNCTION PERMEABILITY IN BLOOD BRAIN BARRIER TO TREAT BRAIN TUMORS

Gong, Yong-feng, Hou, Jianghui

Richards, Jennifer

T-017092

Background: Brain tumors are the most lethal disease known to mankind with approximately 170,000 annual diagnoses and 13,000 deaths attributed to brain cancer. Glioblastoma, the most common and aggressive, has a median survival of approximately 18 months. Chemotherapeutic agents have been approved but have shown modest effects due to the inability of the small molecule drugs to pass through the blood brain barrier and reach the tumor cells. The blood brain barrier has proved to impede drug delivery and thus treatments for brain tumors will need to be designed with this selectively permeable barrier in mind.

Technology Description: Researchers at Washington University in St. Louis have identified the angulin protein, found at tricellular tight junctions, as the protein responsible for limiting the permeability of large molecules through the blood brain barrier at specifically the tricellular tight junctions while leaving the bicellular tight junctions functionally unaffected. They have also shown that tricellular tight junctions are the site of large molecule permeation whereas small molecules such as ions are transported at areas of bicellular tight junctions. Based on these observations, these researchers have identified modulation of tricellular tight junction permeability as a safe, feasible, and controllable mechanism by which to increase the permeability of the blood brain barrier to allow the diffusion of cancer drugs into the brain and allow the drugs to reach the tumor cell. This increased targeting efficiency can dramatically improve the prognosis of patients with brain tumors.