Targeting DMRTA2 in Glioblastoma: Epigenetic Regulation, Angiogenesis Disruption, and Biomarker Development

Glioblastoma multiforme (GBM) is the most aggressive form of brain tumor, with a poor prognosis and limited treatment options. GBM is difficult to treat due to its rapid growth, resistance to conventional therapies, and ability to form new blood vessels (angiogenesis), which provide the tumor with the nutrients it needs to grow. A better understanding of the mechanisms driving GBM could lead to more effective therapies. This project focuses on a protein called DMRTA2, a transcription factor that plays a crucial role in brain development and has recently been found to be highly expressed in GBM, particularly around blood vessels.

Preliminary research suggests that DMRTA2 may contribute to GBM's ability to grow and form new blood vessels, making it a potential target for treatment. The project will investigate how DMRTA2 influences angiogenesis, whether it can serve as a biomarker for GBM diagnosis, and how its activity is controlled by epigenetic mechanisms—changes in gene activity without altering the underlying DNA sequence.

One exciting aspect of this research is the potential to develop a liquid biopsy test, allowing doctors to detect traces of tumor DNA in a patient's blood. This non-invasive method could be used to monitor disease progression and guide treatment decisions more effectively. Additionally, by targeting DMRTA2, we aim to disrupt the tumor's ability to form blood vessels, which may improve the delivery of drugs across the blood-tumor barrier (BTB) and enhance the effectiveness of existing therapies.

This research combines innovative techniques, including CRISPR-based gene editing, 3D tumor models, and advanced liquid biopsy technologies, to explore DMRTA2's role in GBM. By gaining a deeper understanding of how this protein influences tumor growth, the project hopes to open new therapeutic avenues and improve the survival rate of patients suffering from this deadly brain cancer.