

MINIMIZING RECURRENCE OF GLIOBLASTOMA MULTIFORME

PROBLEM OVERVIEW

Glioblastoma multiforme (GBM) is the most common malignant brain tumor and remains highly lethal due to its invasive nature and resistance to treatment. Its development of oxygen-poor regions reduces the effectiveness of radiation, limiting current therapeutic outcomes. We propose a new treatment strategy that delivers oxygen to tumor cells to enhance their sensitivity to radiation and improve patient prognosis.

12k

cases of GBM diagnosed in the United States annually¹

14-16

months life expectancy for GBM patients after diagnosis²

SYMPTOMS OF GBM



Seizures

Triggered by the tumor disrupting nearby neurons



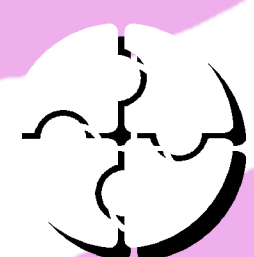
Headaches

Result of higher ICP due to tumor growth



Muscle Weakness

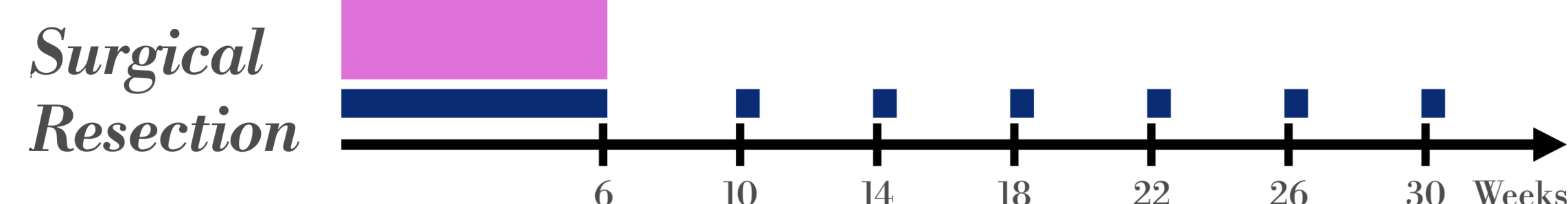
Tumor can affect motor pathways, often one-sided



Personality Shifts

Notable shifts in mood/behavior, memory loss

STUPP PROTOCOL



Radiotherapy (60 Gy over 6 weeks, 2Gy/day)

TMZ (75mg/m² concurrently, 120/m² adjuvantly)

O₂ DEPRIVATION IN GBM

1.

Transient Nature of Oxygenation

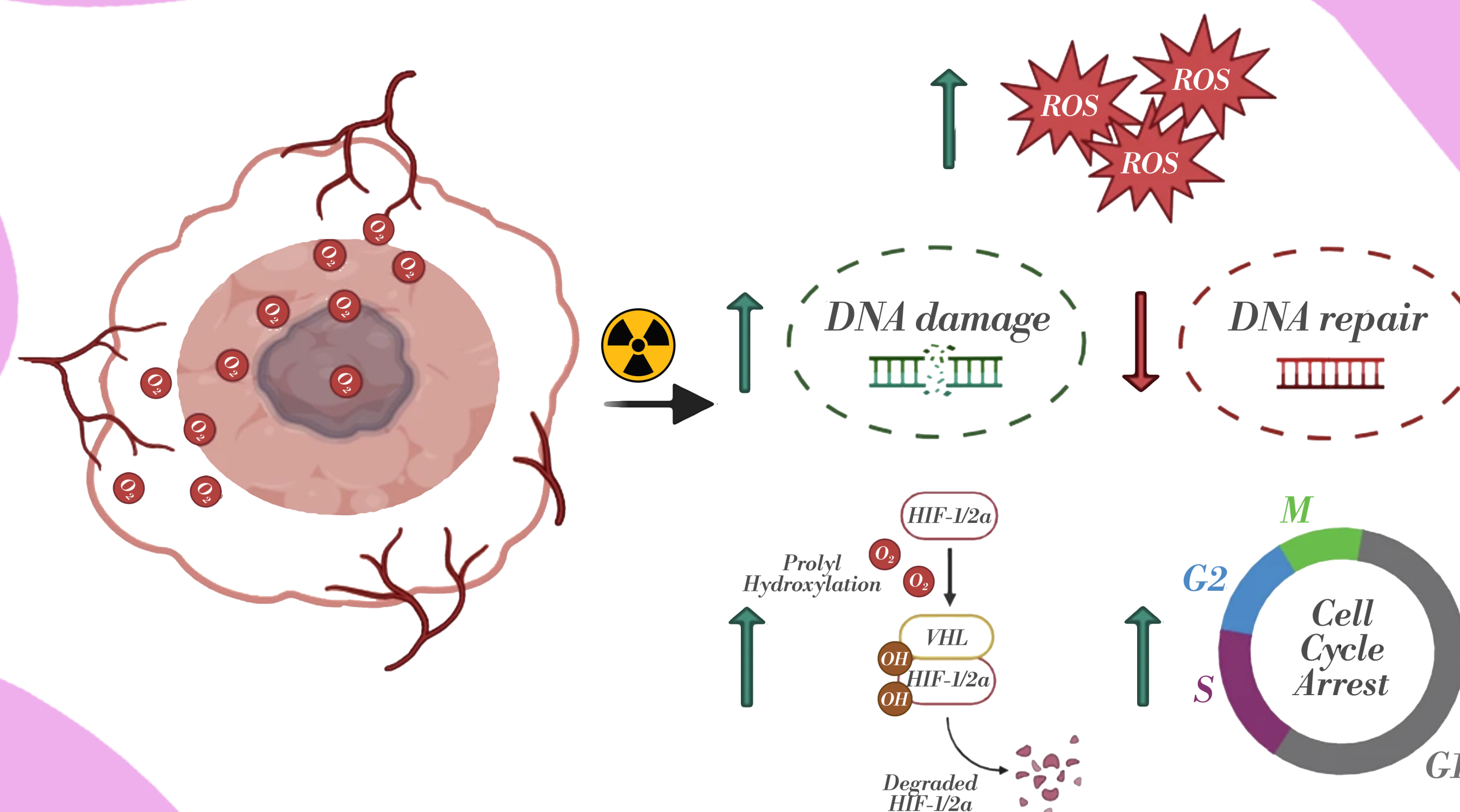
Irregular GBM vasculature causes fluctuating perfusion, resulting in unstable and localized hypoxic tumor regions.

2.

Damaged Vasculature from Resection

Surgical disruption of blood vessels impairs oxygen supply, promoting persistent hypoxic conditions post-resection.

REVERSING HYPOXIA



Hypoxia promotes GBM recurrence by enabling tumor cell survival, stemness, and resistance to radiation therapy. These low-oxygen conditions create a protective niche that supports aggressive regrowth after treatment. Combatting hypoxia can disrupt this niche, improve treatment sensitivity, and reduce the chances of tumor relapse.

Neurosurgeons need a way to target hypoxia-induced treatment-resistant glioblastoma cells in order to slow the proliferation rate of glioblastoma tumors after initial resection.

CURRENT EXPERIMENTAL THERAPIES

Hyperbaric Oxygen Therapy

Shows O₂ therapy to increase efficacy of radiotherapy works

FUS and O₂ Microbubbles

Effective but damages healthy tissue and too transient

O₂ Wafer

Uses GLIADEL as precedent, but relies on wafer degradation which will deplete before RT

OUR SOLUTION

Oxygen8 is an external oxygen delivery system that brings oxygen directly to the post-resection cavity prior to radiotherapy, leveraging the critical role of oxygen in radiosensitizing tumor cells and overcoming the significant barrier caused by hypoxia in recurrent and residual tumors.

Improve Quality of Life

Extend Life Expectancy

Minimize Cost of GBM Care

REFERENCES

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2. Tamimi AF, Juweid M. Epidemiology and Outcome of Glioblastoma. Published online September 27, 2017. <https://www.ncbi.nlm.nih.gov/books/NBK470003/>
3. Bou-Gharios J, Georges Noël, & Hélène Burckel. (2024). Preclinical and clinical advances to overcome hypoxia in glioblastoma multiforme. *Cell Death and Disease*, 15(7). <https://doi.org/10.1038/s41419-024-06904-2>