Review Life Sci. 2024 Nov 5:359:123218. doi: 10.1016/j.lfs.2024.123218. Online ahead of print.

Radiation-induced senescence in glioblastoma: An overview of the mechanisms and eradication strategies

Neda Dehghan [1], Seyedeh Nasibeh Mousavikia [2], Younes Qasempour [1], Hosein Azimian [3]

Affiliations

PMID: 39510171 DOI: 10.1016/j.lfs.2024.123218

Abstract

Radiotherapy as a treatment method for glioblastoma is limited due to the intrinsic apoptosis resistance mechanisms of the tumor. Administration of higher radiation doses contributes to toxicities in normal tissues and organs at risk, like optic chiasma. Cellular senescence represents an alternative mechanism to apoptosis following radiotherapy in glioblastoma, occurring in both normal and neoplastic cells. Although it impedes the growth of tumors and sustains cells in their cycle, it can also act as a cause of tumor development and recurrence following treatment. In this review, we discuss detailed insights into the significance of radiation-induced senescence in glioblastoma and the underlying mechanisms that lead to radioresistance. We also discuss senescence biomarkers and the role of senescence-associated secretory phenotype (SASP) in tumor recurrence. Finally, we review the studies that have administered potential interventions to eradicate or inhibit senescent cells in glioblastoma after treatment with radiation.

Keywords: Cell signal pathway; Glioblastoma; Radiation-induced senescence; Senescence associated secretory phenotype (SASP); Tumor recurrence.