Glioblastoma and chemoresistance to alkylating agents: Involvement of apoptosis, autophagy, and unfolded protein response.


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Despite advances in neurosurgical techniques and radio-/chemotherapy, the treatment of brain tumors remains a challenge. This is particularly true for the most frequent and fatal adult brain tumor, glioblastoma (GB). Upon diagnosis, the average survival time of GB patients remains only approximately 15 months. The alkylating drug temozolomide (TMZ) is routinely used in brain tumor patients and induces apoptosis, autophagy and unfolded protein response (UPR). Here, we review these cellular mechanisms and their contributions to TMZ chemoresistance in brain tumors, with a particular emphasis on TMZ chemoresistance in glioma stem cells and GB.

KEYWORDS: Alkylating drugs; Apoptosis; Autophagy; Bcl-2 family protein; Brain tumor; Cancer therapy; Cell death; DNA repair; Glioblastoma; Glioblastoma stem cells; Temozolomide; Unfolded protein response

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