Review Cytokine Growth Factor Rev. 2024 Oct 31:S1359-6101(24)00088-1.
doi: 10.1016/j.cytogfr.2024.10.009. Online ahead of print.

Glioblastoma-associated macrophages: A key target in overcoming glioblastoma therapeutic resistance

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PMID: 39510901 DOI: 10.1016/j.cytogfr.2024.10.009

Abstract

Glioblastoma multiforme (GBM) is recognized as the most aggressive and malignant form of brain cancer, characterized by a highly heterogeneous phenotype, poor prognosis, and a median survival time of less than 16 months. Recent studies have highlighted the critical role of glioblastoma-associated macrophages (GAMs) in promoting tumor progression and resistance not only to immunotherapy but also to radiotherapy and chemotherapy. GAMs actively suppress immune responses, promote angiogenesis, facilitate tumor metastasis, and induce therapy resistance, through various mechanisms such as cytokines production, signaling pathways regulation, and angiogenesis. In this context, understanding these regulatory mechanisms is essential for developing efficient therapies. Preclinical studies have investigated diverse approaches to target these cells, both as monotherapies or in combination with other treatments. While these approaches have shown promise in strengthening antitumor immune responses in animal models, their clinical success remains to be fully determined. Herein, we provide a comprehensive overview of GAMs's role in GBM therapeutic resistance and summarizes existing approaches to target GAMs in overcoming tumor resistance.

Keywords: Cancer treatment; Glioblastoma multiforme; Therapy resistance; Tumor associated macrophages.