Glioblastoma Immune Checkpoint Inhibitor Therapy

- Single-dose radiotherapy is more effective than fractionation when combined with anti-PD-1 immunotherapy in glioblastoma
- Simultaneous TGF-β and GITR pathway modulation promotes anti-tumor immunity in glioma
- Epigenetic Alterations in Glioblastoma Multiforme as Novel Therapeutic Targets: A Scoping Review
- Unlocking glioblastoma: breakthroughs in molecular mechanisms and next-generation therapies
- Immunotherapy for High-Grade Gliomas
- Current Progress and Future Perspectives of RNA-Based Cancer Vaccines: A 2025 Update
- BRAF/MEK inhibition induces cell state transitions boosting immune checkpoint sensitivity in BRAF(V600E)-mutant glioma
- Loss of LAPTM4A inhibits M2 polarization of tumor-associated macrophages in glioblastoma, promoting immune activation and enhancing anti-PD1 therapy

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Immune Checkpoint Inhibitor Therapy has shown great potential in the treatment of malignant tumors, but its effect on glioblastoma treatment is unsatisfactory because of the low immunogenicity and T cell infiltration, as well as the presence of blood-brain barrier (BBB) that blocks most of Immune Checkpoint Inhibitor agents to the GBM tissues.

Sun et al. developed a biomimetic nanoplatform of AMNP@CLP@CCM for GBM-targeted photothermal therapy (PTT) and ICB synergistic therapy by loading immune checkpoint inhibitor CLP002 into the allomelanin nanoparticles (AMNPs) and followed by coating cancer cell membranes (CCM). The resulting AMNP@CLP@CCM can successfully cross the BBB and deliver CLP002 to GBM tissues due to the homing effect of CCM. As a natural photothermal conversion agent, AMNPs are used for tumor PTT. The increased local temperature by PTT not only enhances BBB penetration but also upregulates the PD-L1 level on GBM cells. Importantly, PTT can effectively stimulate immunogenic cell death to induce tumor-associated antigen exposure and promote T lymphocyte infiltration, which can further amplify the antitumor immune responses of GBM cells to CLP002-mediated ICB therapy, resulting in significant growth inhibition of the orthotopic GBM. Therefore, AMNP@CLP@CCM has great potential for the treatment of orthotopic GBM by PTT and ICB synergistic therapy. STATEMENT OF SIGNIFICANCE: The effect of ICB therapy on GBM is limited by the low immunogenicity and insufficient T-cell infiltration. Here we developed a biomimetic nanoplatform of AMNP@CLP@CCM for GBM-targeted PTT and ICB synergistic therapy. In this nanoplatform, AMNPs are used as both photothermal conversion agents for PTT and nanocarriers for CLP002 delivery. PTT not only enhances BBB penetration but also upregulates the PD-L1 level on GBM cells by increasing local temperature. Additionally, PTT also induces tumor-associated antigen exposure and promotes T lymphocyte infiltration to amplify the antitumor immune responses of GBM cells to CLP002-mediated ICB therapy, resulting in significant growth inhibition of the orthotopic GBM. Thus, this nanoplatform holds great potential for orthotopic GBM treatment [1)]

[1)]

Sun M, Li Y, Zhang W, Gu X, Wen R, Zhang K, Mao J, Huang C, Zhang X, Nie M, Zhang Z, Qi C, Cai K, Liu G. Allomelanin-based biomimetic nanotherapeutics for orthotopic glioblastoma targeted photothermal immunotherapy. Acta Biomater. 2023 May 24:S1742-7061(23)00300-8. doi:

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