Glioma-supportive macrophages

Glioma-supportive macrophages refer to a specific population of immune cells known as macrophages that play a role in supporting the growth and progression of gliomas. Gliomas are often associated with a complex tumor microenvironment, where various immune cells interact with cancer cells and influence tumor behavior.

Here are key points regarding glioma-supportive macrophages:

Tumor Microenvironment:

Gliomas create a microenvironment that includes immune cells, blood vessels, and other non-cancerous cells. This environment plays a critical role in tumor growth, invasion, and resistance to treatment.

Macrophages in Gliomas:

Macrophages are a type of white blood cell that can be found in the tumor microenvironment. In gliomas, a subset of macrophages is often skewed towards a phenotype that supports tumor growth rather than attacking cancer cells.

M2 Macrophages:

Macrophages can adopt different phenotypes based on the signals they receive from their environment. The glioma-supportive macrophages are often associated with the M2 phenotype, which is considered anti-inflammatory and has been implicated in promoting tumor growth and suppressing the immune response.

Immunosuppressive Functions:

Glioma-supportive macrophages may contribute to an immunosuppressive microenvironment within the tumor. They can inhibit the activity of other immune cells, such as T cells, and promote an environment that facilitates tumor evasion from the immune system.

Therapeutic Implications:

Understanding the role of glioma-supportive macrophages has implications for developing therapeutic strategies. Researchers are exploring ways to modulate the activity of these macrophages to enhance anti-tumor immune responses or to target them directly.

Research and Targeted Therapies:

Ongoing research aims to uncover the molecular mechanisms that drive the interaction between gliomas and supportive macrophages. Targeted therapies that aim to alter the behavior of these macrophages or inhibit their supportive functions are areas of active investigation. In summary, glioma-supportive macrophages represent a subset of immune cells within the tumor microenvironment that contribute to the growth and progression of gliomas. Understanding their functions and interactions with cancer cells provides insights into potential therapeutic strategies for treating gliomas.

Dong et al. found that cholesterol levels in GBM tissues are abnormally high, and glioma-supportive macrophages (GSMs), an essential “cholesterol factory”, demonstrated aberrantly hyperactive cholesterol metabolism and efflux, providing cholesterol to fuel GBM growth and induce CD8+ T cells exhaustion. Subsequent bioinformatics analysis confirmed that high 7-Dehydrocholesterol reductase (DHCR7) level in GBM tissues was concomitant with increased cholesterol biosynthesis, suppressed tumoricidal immune response, and poor patient survival and DHCR7 expression level was significantly elevated in GSMs. Therefore, they reported an intracavitary sprayable nanoregulator-encased hydrogel system to modulate the cholesterol metabolism of GSMs. The degradable nanoregulator-mediated ablation of DHCR7 in GSMs effectively suppressed cholesterol supply and activated T-cell immunity. Moreover, the combination of Toll-like receptor 7/8 (TLR7/8) agonists significantly promoted GSM polarization to antitumor phenotypes and ameliorated the immunosuppressive TME. Treatment with the hybrid system exhibited superior antitumor effects in the orthotopic GBM tumor model and postsurgical recurrence model. Altogether, the findings unravel the role of GSMs DHCR7/cholesterol signaling in the regulation of immunosuppressive TME, presenting a potential glioblastoma treatment strategy that warrants further clinical trials [1)].

1)
Dong Y, Zhang J, Wang Y, Zhang Y, Rappaport D, Yang Z, Han M, Liu Y, Fu Z, Zhao X, Tang C, Shi C, Zhang D, Li D, Ni S, Li A, Cui J, Li T, Sun P, Benny O, Zhang C, Zhao K, Chen C, Jiang X. Intracavitary Spraying of Nanoregulator-Encased Hydrogel Modulates Cholesterol Metabolism of Glioma-Supportive Macrophage for Postoperative Glioblastoma Immunotherapy. Adv Mater. 2023 Dec 21:e2311109. doi: 10.1002/adma.202311109. Epub ahead of print. PMID: 38127403.