Blood monocyte-derived macrophages contribute to antitumor immunity against glioblastoma

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Infiltrating tumor-associated macrophages (TAM) are known to impede immunotherapy against glioblastoma (GBM), however, TAMs are heterogeneous, and there are no clear markers to distinguish immunosuppressive and potentially immune-activating populations. Here we identify a subset of $CD169^+$ macrophages promoting an anti-tumoral microenvironment in GBM. Using single-cell transcriptome analysis, we find that $CD169^+$ macrophages in human and mouse gliomas produce pro-inflammatory chemokines, leading to the accumulation of T cells and NK cells. CD169 expression on macrophages facilitates phagocytosis of apoptotic glioma cells and hence tumor-specific T cell responses. Depletion of $CD169^+$ macrophages leads to functionally impaired antitumor lymphocytes and poorer survival of glioma-bearing mice. We show that NK-cell-derived IFN-γ is critical for the accumulation of blood monocyte-derived $CD169^+$ macrophages in gliomas. Our work thus identifies a well-distinguished TAM subset promoting antitumor immunity against GBM, and identifies key factors that might shift the balance from immunosuppressive to anti-tumor TAM.