Tumor-associated macrophages (TAMs) are a class of immune cells present in high numbers in the microenvironment of solid tumors. They are heavily involved in cancer-related inflammation.

Macrophages are known to originate from bone marrow-derived blood monocytes (monocyte-derived macrophages) or yolk sac progenitors (tissue-resident macrophages), but the exact origin of TAMs in human tumors remains to be elucidated.

The composition of monocyte-derived macrophages and tissue-resident macrophages in the tumor microenvironment depends on the tumor type, stage, size, and location, thus it has been proposed that TAM identity and heterogeneity is the outcome of interactions between tumor-derived, tissue-specific, and developmental signals.

The tumor microenvironment (TME) of recurrent GBM (rGBM) is highly immunosuppressive, dominated by tumor-associated macrophages (TAMs). TAMs consist of tissue-resident microglia and monocyte-derived macrophages (MDMs), which are essential for favoring tumor growth, invasion, angiogenesis, immune suppression, and therapeutic resistance; however, restricted by the absence of potent methods, the heterogeneity and plasticity of TAMs in rGBM remain incompletely investigated. Recent application of single-cell technologies, such as single-cell RNA-sequencing has enabled us to decipher the unforeseen diversity and dynamics of TAMs and to identify new subsets of TAMs that regulate anti-tumor immunity. Here, we first review hallmarks of the TME, the progress and challenges of immunotherapy, and the biology of TAMs in the context of rGBM, including their origins, categories, and functions. Next, from a single-cell perspective, we highlight recent findings regarding the distinctions between tissue-resident microglia and MDMs, the identification and characterization of specific TAM subsets, and the dynamic alterations of TAMs during tumor progression and treatment. Last, we briefly discuss the potential of TAM-targeted strategies for combination immunotherapy in rGBM. We anticipate the comprehensive understanding of the diversity and dynamics of TAMs in rGBM will shed light on further improvement of immunotherapeutic efficacy in rGBM [1)]

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Zhang L, Jiang Y, Zhang G, Wei S. The diversity and dynamics of tumor-associated macrophages in recurrent glioblastoma. Front Immunol. 2023 Sep 4;14:1238233. doi: 10.3389/fimmu.2023.1238233. PMID: 37731483; PMCID: PMC10507272.