

Special Issue

Unraveling the Tumor-Immune Microenvironment Using Transcriptomics

Message from the Guest Editor

The immune microenvironment (TIME) is a dynamic ecosystem that plays a critical role in cancer progression, immune evasion, and therapeutic response. The surrounding tumor elements orchestrate complex interactions between tumor and immune cells, promoting or suppressing anti-tumor immunity. TIME's often immunosuppressive nature enables tumors to evade detection through mechanisms like immune checkpoint activation, metabolic reprogramming, and the recruitment of suppressive cells. Such complexity also offers therapeutic opportunities and emerging strategies include immune checkpoint inhibitors, therapies targeting suppressive cells, metabolic modulators, and personalized approaches like neoantigen vaccines. Technological advances such as single-cell RNA sequencing and spatial transcriptomics reveal TIME's heterogeneity and identify biomarkers and therapeutic targets. Reprogramming TIME to enhance immune activation is a leading focus in cancer research, potentially improving immunotherapy, overcoming resistance, and enabling precision oncology.

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