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Deciphering immune tumor subtypes through microenvironment profiling

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Abstract

Different patterns of immune and stromal interactions within the tumor microenvironment significantly impact tumor behavior and response to treatment. Recent research has identified distinct immune subtypes—immune desert, excluded, and inflamed—each associated with specific mechanisms that impede anti-tumor immune responses. In the era of precision medicine, accurately stratifying patients into these subtypes is essential for optimizing cancer management and personalizing immunotherapy. The research team at National Cancer Institute in Lithuania addresses critical gaps in this field by focusing on several key areas. Our first focus is on developing reliable and accessible tools for determining patient immune subtypes. We are integrating transcriptomics and histology data to create a robust subtyping pipeline, which we are validating with real-world data and streamlining for clinical use. Another aspect of our work involves creating translatable preclinical models for cancer immunotherapy through utilizing 3D cell cultures and biocompatible scaffolds. We are developing druggable syngeneic murine tumor models that accurately reflect the three immune subtypes, enhancing the relevance of preclinical studies. Using both pharmaceutical and non-pharmaceutical approaches, we are tailoring immunomodulatory interventions to address the unique characteristics of each immune subtype. Joint efforts in these research areas could generate translatable insights, contributing to more precise cancer therapies and overcoming resistance mechanisms.