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A Patient-Centric Multi-Omics Strategy in Immunotherapy: Uncovering Targets and Markers for Tailored Cancer Treatment

Immunotherapy has revolutionized cancer treatment, yet its efficacy remains limited to a subset of patients due to tumor-intrinsic resistance, variable immune responses, and a suppressive tumor microenvironment (TME). To address this challenge, we are developing a patient-centric reporting system that initially integrates comprehensive genomic and transcriptomic profiling to inform clinical decisionmaking. The report includes classical molecular features (biomarkers) associated with immune activity and treatment response—such as tumor mutational burden (TMB), microsatellite stability status, and the IFN-γ signature—as well as tumor antigen burden and tumor neoantigens. By combining these data, we generate a multidimensional view of each patient's TME profile. To streamline interpretation, a large language model (LLM) synthesizes the multi-omic data into concise, clinically actionable summaries to support more informed treatment planning.

Research type

Translational research

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