



Team Progress Updates

SU2C Single-Cell Multi-omics Convergence Research Team:

“Single-Cell Functional Multi-omics to Characterize and Monitor CAR T Therapy”



Immunotoxicity and autoimmune-like response are significant problems hindering widespread use of cancer therapies that harness the body's own immune system. A major player in the immune response are cytokines, substances secreted by some immune cells to trigger other cells in response to a signal, such as recognition of a foreign body.

To understand this response, the SU2C Single-Cell Multi-omics Convergence Research Team is assessing the full spectrum of cytokine functions in patients prior to treatment and matching these with patient responses to chimeric antigen receptor (CAR) T therapy. The team is then evaluating the function of the infused CAR T cells to determine the mechanisms of efficacy and/or immune toxicity. Researchers are also identifying molecular characteristics underlying the efficacy and toxicity of CAR T therapy and looking for biomarkers by examining their data using computational models and machine learning.

The team's aim is to create a tool that clinicians can use to mitigate patient risk associated with CAR T therapies while improving the chances of therapeutic success.

The team reported the following progress:

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- The team has developed assays to measure the dynamics of CAR T cell activation upon antigen-specific simulation; this will be the first such study undertaken at the single-cell level. Team members have also conducted single-cell-pair mRNA sequencing (scpRNA-seq) to examine the interaction between CAR T cells and target tumor cells in a pairwise fashion.
- The team has developed special antigen-presenting cells to facilitate sequencing studies investigating the biological mechanism of CAR T activation. Members have also engineered antigen-presenting cells with controlled mRNA delivery in order to modulate the expression level of CARs and co-activators.

