

Engineering Smarter and Stronger T Cells for Cancer Immunotherapy

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T cells expressing chimeric antigen receptors (CARs) specific for the B-cell marker CD19 have shown impressive results in the treatment of B-cell malignancies. However, CD19 CAR-T cell therapy remains the only robustly effective T-cell immunotherapy to date. My laboratory is pursuing several strategies to engineer T cells with stronger anti-tumor functions and greater robustness against evasive mechanisms employed by cancer cells. I will discuss the development of multi-input CARs to prevent mutational escape by tumor cells, the design of synthetic receptors to counter immunosuppression in the tumor microenvironment, and the engineering of cytotoxic protein to interrogate intracellular tumor markers. These strategies combine to address critical limitations facing adoptive T-cell therapy, providing potential treatment options for diseases that are otherwise incurable with current technology.