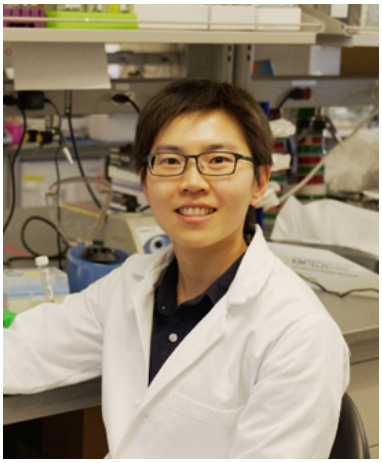
# CARNEGIE MELLON UNIVERSITY
# BME 2025 SPRING SEMINAR SERIES

## In Vivo Engineering of Disease-Specific T Cells for CAR T Cell Therapy and Autoimmune Disease Prevention



### PRESENTED BY

**Fang-Yi "Ida" Su, Ph.D.**
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Wallace H. Coulter Department of Biomedical Engineering
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### SCHEDULE

**Doherty Hall (DH) 2315**

**Tuesday,**
**March 11, 2025**
(11:00-12:00 PM)

In vivo cell engineering is revolutionizing immunotherapy by offering direct control over cell function within the body to augment T cell immunity. This approach bypasses the complicated and expansive ex vivo manufacturing processes that are currently required for engineered cell therapies, such as T cells modified with anti-cancer chimeric antigen receptors (CARs). However, current approaches to engineer T cells in vivo rely on pan T cell markers (e.g., CD3, CD8) to target T cells, which can lead to adverse effects associated with unselective activation or suppression of T cell immunity. In this talk, I will first introduce a gene delivery system, termed antigen-presenting nanoparticles (APNs), which can selectively engineer disease antigen-specific T cells within the body by mRNA delivery. I will then showcase how APNs can be engineered to selectively deplete autoreactive T cells to prevent the onset of type 1 diabetes in a mouse model. Moreover, I will demonstrate the use of APNs for reprogramming influenza-specific T cells into anti-cancer CAR T cells that achieved comparable therapeutic outcome as virally transduced ex vivo CAR in a xenograft mouse model of human multiple myeloma. I will conclude this seminar by outlining the research directions that my future lab will pursue to engineer cells in vivo for antigen-specific immunotherapy, disease detection, and tumor reprogramming.

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