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**강연제목:** Chimeric T Cells and Macrophages: Cell Engineering to Expand Their Therapeutic Potentials

### **Abstract:**

CAR-T cell immunotherapy has achieved notable results for blood cancers but faces challenges for solid tumors due to complex manufacturing and limited efficacy. The issues include poor CAR-T cell infiltration and inactivation by the tumor microenvironment. This study introduces a simpler method to program macrophages in vivo into CAR-M1 macrophages, which can effectively penetrate solid tumors and enhance cancer phagocytosis and antitumor activity. Nanocomplexes of macrophage-targeting nanocarriers and CAR-interferon- $\gamma$ -encoding plasmid DNA induce these CAR-M1 macrophages, which then mediate cancer phagocytosis, immunomodulation, and inhibit tumor growth. This approach offers an off-the-shelf, cost-effective alternative to traditional CAR-T therapy.

Severe infections like COVID-19 can cause hypercytokinemia and organ failure. Current peptide treatments are limited by short half-lives and rapid enzymatic degradation. To address this, a method for continuously expressing therapeutic peptides on immune cells is developed. Chimeric T cells, engineered with lentiviral systems to display peptides with MMP- and TACE-responsive cleavage sites, release functional peptides upon enzymatic cleavage. These peptides activate endothelial protein C receptor (EPCR) and protease-activated receptor-1 (PAR-1), reducing vascular damage and hypercytokinemia. This approach shows promise for treating sepsis and other infectious diseases by preventing tissue damage and managing severe symptoms.

### **Brief Biosketch**

- 2021. 09 ~ Current: Assistant & Associate Professor / Hanyang University, Seoul, Korea
- 2018. 03 ~ 2021. 08: Assistant Professor / Kangwon National University, Chuncheon, Korea
- 2016. 05 ~ 2018. 02: Postdoc / BCH-Harvard Medical School, Boston, MA, USA
- 2014. 09 ~ 2016. 04: Postdoc / Seoul National University, Seoul, Korea