A Novel Technique to Produce Large Quantities of Therapeutic T cells (Yeda)

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Summary

Culturing and expanding T cells ex-vivo, while retaining their functionality, is an essential factor for the development of cutting-edge immunotherapies. A major problem frequently faced by physicians is the low number of T cells available for adoptive immunotherapy, and the difficulty to retain their functionality following extended incubation ex vivo. Specifically, cultivation of T-cells commonly leads to short term cell proliferation, which is followed by gradual loss of functionality, growth arrest, and increased cell death. **Consequently, there is a strong need for the development of novel technologies that could increase T-cell proliferation, while maintaining, or even enhancing their functionality.** The groups of Prof. Benjamin Geiger and Prof. Nir Friedman have identified unique conditions for inducing T cell proliferation ex vivo. The technology is based on supplementing factors to the media and affixing factors to the surface of the cell culture device. The conditions developed by the joint Geiger-Friedman team greatly enhanced the expansion of CD4+, CD8+, and additional types of T cells. Moreover, functional testing of specific cytotoxic T-lymphocytes demonstrated a remarkably-enhanced capacity of killing relevant cancer cells, both ex vivo and in vivo.

Applications

Expanding large quantities of CD4+ and CD8+ T cells ex-vivo, for example tumor infiltrating T cells (TILs) from biopsies. Producing highly functional antigen-specific CD8+ T cells for tumor suppression. Capacity to stimulate functional CAR-Ts and TILs.

Advantages

Simple - coating vessels with the particular T cell stimulatory factors that are commercially available. **Specific** - Co-culturing with antigen loaded dendritic cells allows antigen-specific T cell expansion (e.g. cancer neo-antigen T cells). **Compatible** - stimulating CAR-T cells and possibly TILs.

Technology's Essence

The Geiger-Friedman team has discovered a novel set of conditions that induce the growth of T cells, using a specific combination of T cell stimulators attached firmly to the culture device along with soluble stimulatory cytokines. The team was able to effectively produce large numbers of T cells which retain full or even enhanced functionality, e.g. killing of specific cancer cells in culture and in vivo.

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