**A Novel Technique to Produce Large Quantities of Therapeutic T cells**

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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*.