United in science.

Boosting cell therapy: Natural killer cells against solid tumors

Immunotherapy has revolutionized cancer treatment, in particular utilizing genetically modified T-cells, CAR-T and T-cell receptors (TCR) have achieved considerable advances in the treatment of malignant tumors. Although these approaches allow targeting of tumor cells by T cells, new research is emerging including using engineered Natural Killer (NK) cells to express a T cell receptor. NK cells are a type of white blood cell that plays a crucial role in the body's innate immune system. They can identify and destroy abnormal cells, such as cancer cells, without needing prior exposure to them. NK cell therapy is a type of cellular immunotherapy, just like (chimeric antigen receptor) CAR T-cell therapy and is an emerging form of immunotherapy used in cancer treatment.

Genetically engineering Natural Killer (NK) cells to express a T cell receptor (TRC) allows them to target cancer cells by recognizing certain antigens expressed on the tumor cell surface. This approach 'boosts' NK cells ability to identify and kill cancer cells based on unique molecular markers. As NK cells can kill target cells through their innate cytotoxic mechanisms, engineering them with TCRs allows them to target tumors that might otherwise evade immune detection. This method is considered to be a promising strategy in cancer cell therapy given the potent cytotoxicity capabilities of NK cells combined with antigen-specific targeting of TCRs, potentially leading to improved efficacy against diverse cancers.

Featured scientist:

Sara Little
Associate Director of Oncology,
NeoSome Life Sciences

Zach Houston
Field Application Scientist,
In Vivo Imaging, Revvity

"Optical imaging on the IVIS™ system was a crucial part of our investigation of NK cell dose efficacy. IVIS bioluminescence imaging (BLI) and Living Image™ software made the investigation of this cell therapy easier, faster and more streamlined than other imaging techniques."

NK-cell dose efficacy in NCI-H1703 Luc cell line derived xenograft

Objective:

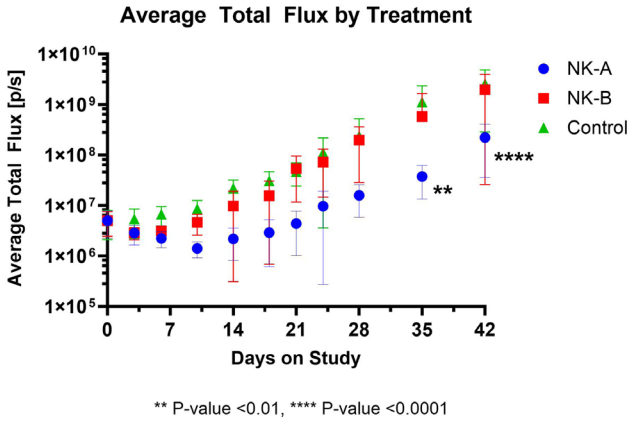
To evaluate the efficacy of T cell receptor modified human NK cells in NSG mice (JAX) injected intravenously with human Non-Small Cell Lung Carcinoma (NSCLC) luc cells.

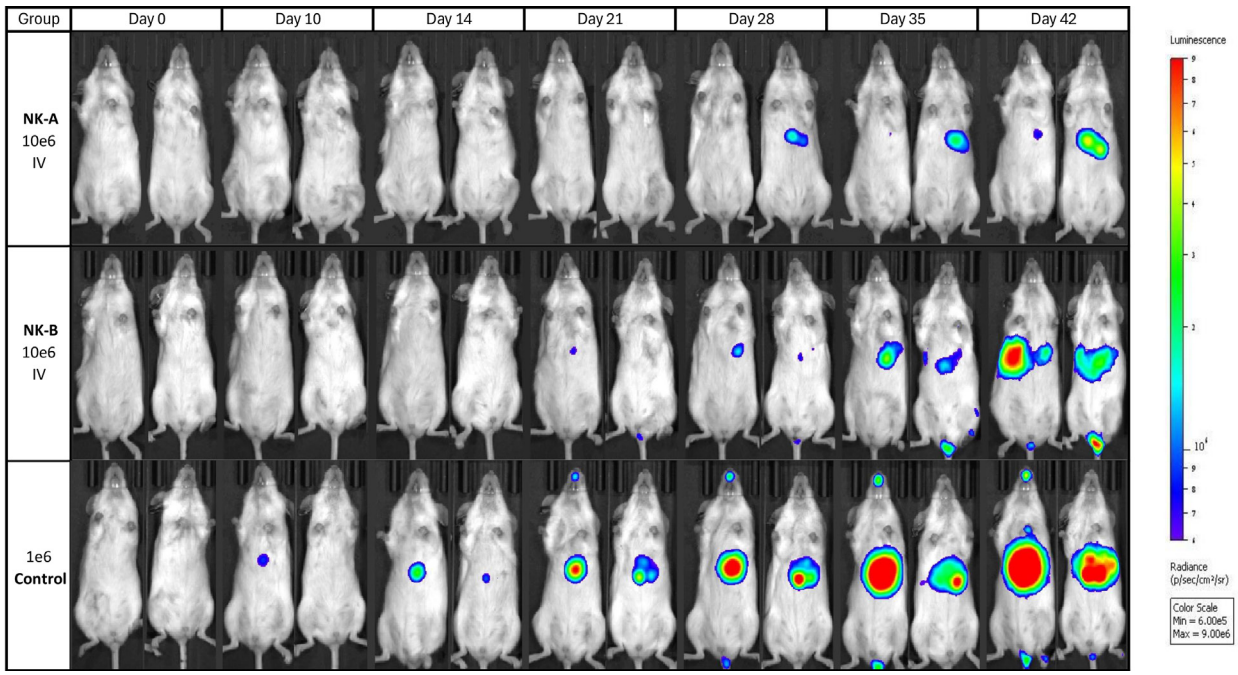
Method:

1e6 NCI-H1703-luc cells injected IV per mouse on day -14, mice randomized by Total Flux on day 0 into groups of n=5 mice. 10e6 NK Treatment A and B injected IV on days 0, 3, 6. Mice received IL-2 at 1e5 U/mouse IP every 3 days to support NK-cell. Bioluminescence imaging (BLI) using the IVIS™ optical imaging system: All mice imaged on day -9 (baseline), day -6, day -4, day -2, day 0-sort, day 3, day 6, day 10, day 14, day 18, day 21, day 28, day 35, and day 42. Disease progression was monitored using the IVIS system by reporting BLI Average Radiance [photons/sec/cm3/sr] and Total Flux [photons/sec]. Prior to imaging the mice were dosed with 150 mg/kg D-luciferin substrate via IP injection.

Data:

BLI images, ROI values Total Flux per client request. P-values calculated by Two-Way ANOVA compared to Control.





Conclusion

In the study, researchers at NeoSome Life Sciences demostrated how *in vivo* optical imaging using the IVIS system was used to rapidly evaluate the efficacy of modified human NK cells in an immunodeficient mouse model injected with human non-small cell lung carcinoma cells. This work further highlights the promise of NK cell therapy, especially for cancers resistant to other forms of cell therapy or immunotherapy treatments.