Prospect T1 System Publication Highlight

Allogeneic Expanded Human Peripheral NK Cells Control Prostate Cancer Growth in a Preclinical Mouse Model of Castration-Resistant Prostate Cancer

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Summary

Using natural killer (NK) cell therapy, researchers recently showed therapeutic efficacy against castration-resistant prostate cancer (CRPC)[1]. CRPC is an advanced form of prostate cancer with a poor prognosis, an impaired quality of life, and no current known cure[2,3]. Prostate cancer typically needs testosterone to grow, but CRPC continues growing even when testosterone levels are low, which limits treatments. Using the **Prospect T1 high-frequency ultrasound system**, this group showed that treatment with NK cells significantly reduced both the overall subcutaneous tumor size as well as the blood supply within that tumor – overall showing that NK cell treatment could be a potential therapeutic avenue for CRPC.

This group estimated tumor size with both calipers and 2D ultrasound imaging, with the ultrasound imaging highlighted in **Figure 1A** showing the NK treatment group had reduced tumor growth curves in their xenograft mouse model. Using calipers, although common, comes with its' known biases – mainly, differences in tumor compressibility, surrounding fat, and irregular tumor shapes as well as higher interoperator variability, all of which will affect the accuracy of this measurement[4]; measurements from ultrasound offer a more reliable method for obtaining accurate tumor sizes and growths[5].

Tumor Imaging and Size Determination

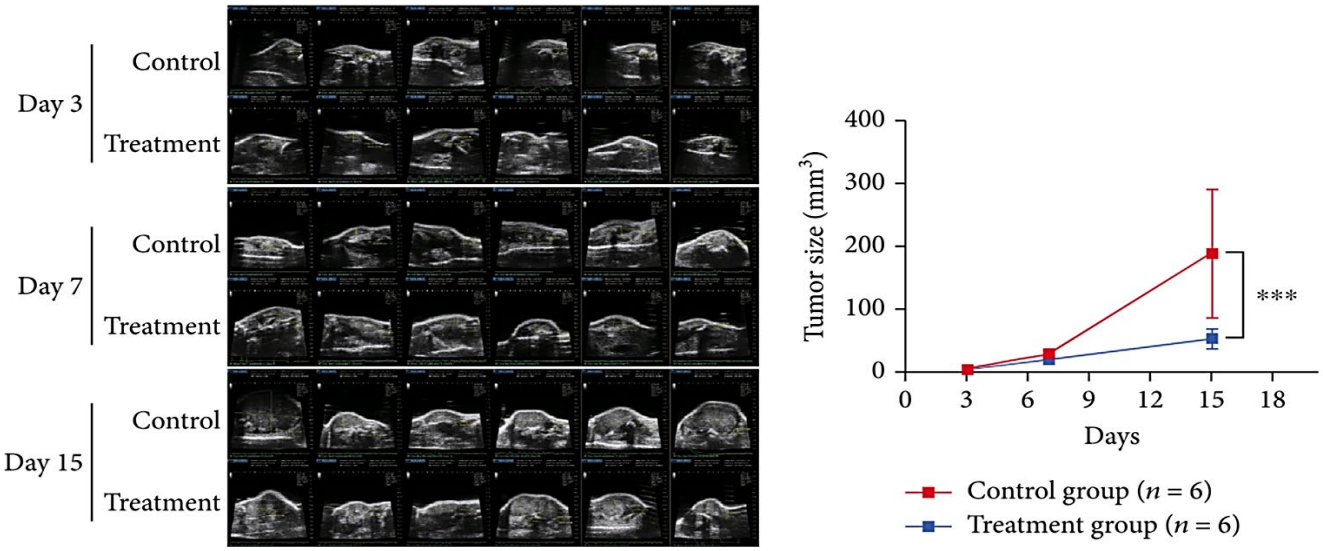

Figure 1A. The measurement data of implanted tumors and IL-6 levels in the NK cell treatment and control groups in vivo. Tumor size measured by ultrasonography examination in the treatment and control groups before treatment (day 3), after the first (day 7) and the second cycles (day 15) of treatment (for each group). *Figure adapted from Wang, F. et al. J Immunol Res (2022).

This group also analyzed maximal blood flow within the tumors using ultrasound imaging, as highlighted in **Figure 1B** showing the NK treatment group has less vascularized tumors than the controls. Blood flow within a tumor can be a crucial measure since blood vessels are essential for maintaining tumor growth, drug responsiveness, as well as playing a role in future metastasis[6].

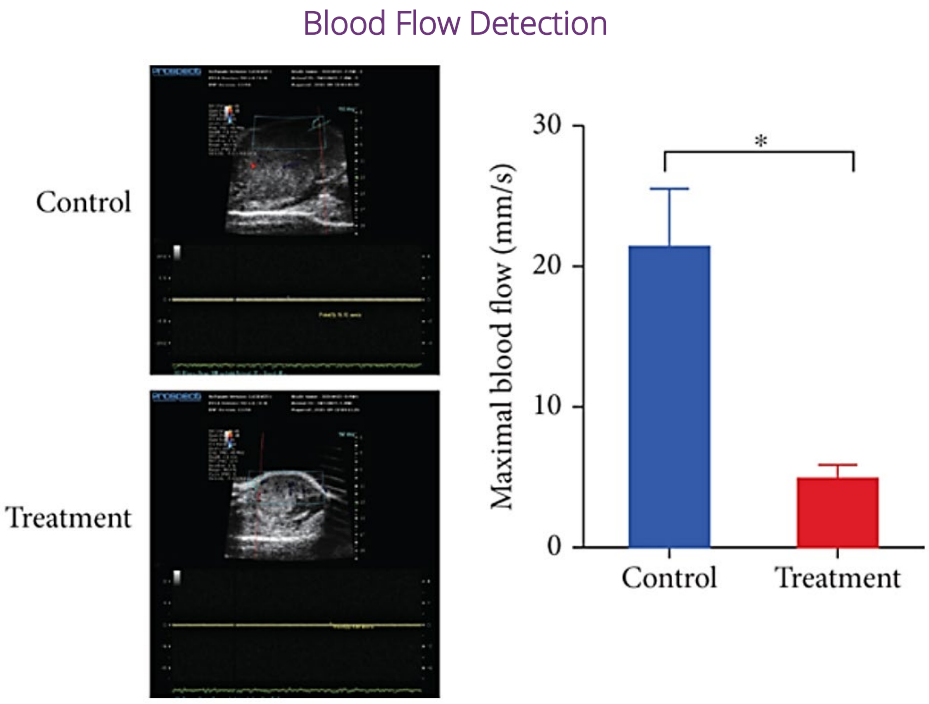

Figure 1B. The measurement data of implanted tumors in the NK cell treatment and control groups in vivo. The maximal blood flow measured by colored doppler-flow mode of ultrasonography in the treatment and control groups on day 15.

The Prospect T1 is a high-frequency (20-50MHz) and high-resolution (~30µm) ultrasound imaging system. Although subcutaneous tumors were imaged in this work, the system can image various tumor types, such as cell or patient-derived xenografts, transgenic, orthotopic, or other types of models. Tumors are reliably and accurately detectable as small as ~1mm and can be measured with 2D linear and 3D volumetric measurements. Color, power, and pulse-wave Doppler are included with the Prospect T1 and are common ways to measure blood flow within tumors. If microvascularity within tumors is of interest, contrast imaging with microbubbles can also be imaged. Check out the Prospect T1 High-Frequency Ultrasound System website page below - if you would like to discuss your research needs or to request a demonstration of the system with your specific models.

Prospect T1 Webpage | Request More Information | Request Demo

References

1. Wang, F. *et al.* Allogeneic Expanded Human Peripheral NK Cells Control Prostate Cancer Growth in a Preclinical Mouse Model of Castration-Resistant Prostate Cancer. *J Immunol Res* **2022**, (2022).
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