Synergism of Adoptive Cell Transfer Therapy and Existing Techniques in Interventional Oncology

Emily Hashem[1], Fady Bassem Fayek[1], Laxman Singanamala[1], Mina S. Makary, M.D.[2]
[1]Sidney Kimmel Medical College, [2]The Ohio State University

Introduction

Adoptive Cell Transfer (ACT) Therapy, such as CAR-T cell therapy, consists of extracting and reinfusing a patient's own immune cells with immunologic activity against tumor antigens. While this therapy is primarily used in hematologic malignancies, interventional oncology (IO) techniques stand to revolutionize the use of ACT in solid tumors. **Table 1** illustrates the main hurdles to the use of ACT in solid tumors and how IO delivery techniques can overcome them. However, the question remains of whether ablative therapies will demonstrate this synergism. In particular, Percutaneous Thermal Ablation (PTA) and Radiofrequency Ablation (RFA) are cornerstone IO techniques which may potentiate anti-tumor effects of adoptive immune cells. This poster aims to synthesize two important murine model experiments which address this prospect.

Methods

A keyword search was conducted to identify full-text, peer-reviewed journal articles on the concurrent use of IO and ACT therapies between 2019 and 2024. Studies were selected which provided specific examples of enhancement of traditional IO therapy by ACT methods. A review article by Kimura et al. was also identified describing the current state of the use of IO in ACT therapy.

Table 1. IO Techniques Address Multiple Challenges in Achieving Efficacy of ACT in Treating Solid Tumors.

Challenge	Interventional Oncology Approach
Limited ACT penetrance at the tumor site, systemic toxicity	Locoregional Delivery
Tumor Immune Evasion	Delivery of tumor immune checkpoint inhibitors
Monitoring of tumor microenvironment throughout treatment	Selective Sampling

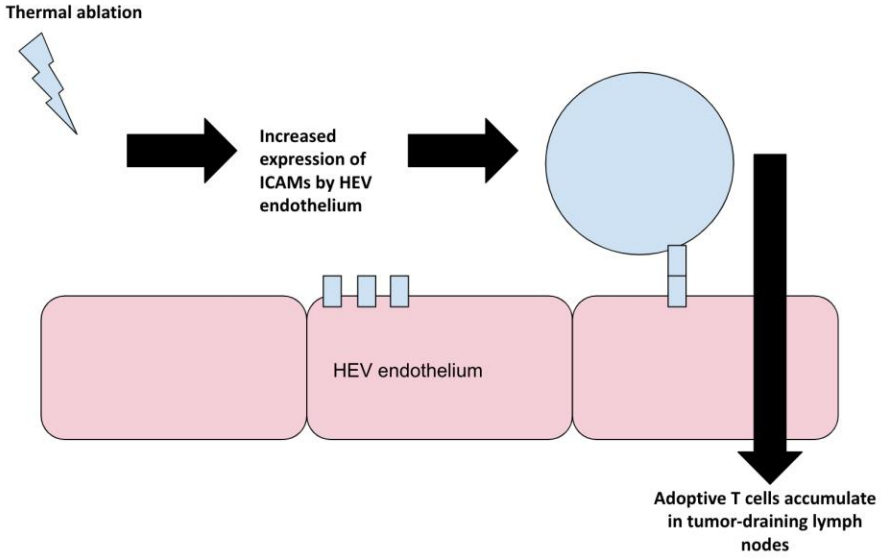

Figure 1. T cell migration Across the HEV is facilitated by ICAMs.

Conclusions

Murine models of combination ablative therapies and adoptive T cell transfer therapy demonstrate enhanced efficacy of treatment. The following two studies exemplify this principle:

A key finding in Ito et al. 2019 is the enhanced expression of intercellular adhesion molecules (ICAMs) in high endothelial venules (HEVs) of tumor-draining lymph nodes following thermal ablation. Interactions between ICAMs and T lymphocyte interactions facilitate the migration of T cells from the bloodstream to target tissues. This relationship is illustrated in Figure 1.

A key finding in Pan et al. 2024 is the enhancement of IL-1β and TNF-α in the serum of a non-small cell lung cancer mouse model following PTA. These cytokines are essential in the anti-tumor T cell response.

References

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