

differentiation state and enrich cellular stemness.² This would enhance TILs in vivo anti-tumor activity and prolong their survival. Elucidating TILs and their relations with tumor's PD-L1 expression would allow clinicians to appropriately recognize sarcoma's tumor immune environments and select the most desirable infiltrates for superior ACT.

Ethics Approval The study was approved by Mount Sinai Hospital's Ethics Board, approval number 01-0138-U.

REFERENCES

1. Wunder J, Lee M, Nam J, Lau B, Dickson B, Pinnaduwaage D, Bull S, Ferguson P, Seto A, Gokgoz N, Andrulis I. Osteosarcoma and soft-tissue sarcomas with an immune infiltrate express PD-L1: relation to clinical outcome and Th1 pathway activation. *Oncology* 2020;**9**:e1737385-1- e1737385-13.
2. Yang S, Ji Y, Gattinoni L, Zhang L, Yu Z, Restifo N, Rosenberg S, Morgan R. Modulating the differentiation status of ex vivo-cultured anti-tumor T cells using cytokine cocktails. *Cancer Immunol Immunother* 2012;**62**:727–736.

<http://dx.doi.org/10.1136/jitc-2020-SITC2020.0771>

772

A POTENT AND OFF-THE-SHELF ONK CELL THERAPY PRODUCT TARGETS HER2+ CANCER CELLS AND RESISTS SUPPRESSIVE TUMOR MICROENVIRONMENT

¹Hao-Kang Li*, ²Ching-Wen Hsiao, ²Sen-Han Yang, ¹Hsiu-Ping Yang, ¹Tai-Sheng Wu, ¹Zih-Fei Cheng, ¹Chia-Yun Lee, ¹Yan-Liang Lin, ¹Yan-Da Lai, ²Sai-Wen Tang, ¹Janet Pan, ¹Wei-Lun Lo, ¹Shih-Chia Hsiao. ¹Acepodia Biotechnologies Ltd., New Taipei City, Taiwan, Province of China; ²Acepodia Biotech Inc., Vallejo, CA, USA

Background Autologous or allogeneic natural killer (NK) cells possess efficient cytotoxicity against tumor cells without severe side effects such as CRS or graft-versus-host disease (GvHD). In addition to chimeric antigen receptor (CAR) strategy, antibody-cell conjugates (ACC) platform provides more efficient way to arm NK cells with binding specificity and enhanced potency against target cells. In this work, we develop a NK cell therapy product ACE1702, a novel NK cell line oNK conjugated with trastuzumab, and assess its potency against HER2+ solid tumors.

Methods oNK cells were covalently conjugated with monoclonal antibody Trastuzumab after sublethal irradiation by our patented antibody-cell conjugates (ACC) platform to become our cryopreserved final product ACE1702 compliant with current good manufacturing practice (cGMP). Function of ACE1702 was validated by real-time xCELLigence analyzer and MTT assay in vitro. Efficacy of intraperitoneally (ip.) delivered ACE1702 was evaluated in tumor-bearing female immune compromised NSG mice. Characterization of ACE1702 was analyzed by flow cytometry.

Results We demonstrated that the trastuzumab-armed oNK cells, ACE1702, exerted human epidermal growth factor 2 (HER2) binding specificity and enhanced cytotoxicity against various types of cancer cells with different grade of HER2 expressions compared to control oNK cells in vitro. In vivo results in human ovarian cancer cell line SK-OV-3-bearing xenograft mouse model further supported the in vitro observations. Of note, ACE1702 also displayed a better cytotoxicity against HER2+ cancer cells than trastuzumab and its derived antibody-drug conjugate. ACE1702 also remained cytotoxicity against cancer cells in the suppressive tumor microenvironment. Characterization revealed a preferential expression of NK activation receptors, and conjugation of trastuzumab with cell membrane proteins responsible for NK activity capacitated ACE1702 with enhanced cytotoxicity. These results underscore the potency of ACE1702 in eradication of cancer cells.

Conclusions Here we introduced a novel trastuzumab-modified oNK cell product with enhanced specificity against myriad types of HER2+ cancers. Selective conjugation of trastuzumab with membrane proteins contributing to NK activation conferred ACE1702 with enhanced cytotoxicity even in the suppressive tumor microenvironment.

Acknowledgements None

Trial Registration None

Ethics Approval The animal study was conducted according to protocols approved by the Institutional Animal Care and Use Committee of Muragenics.

Consent None

<http://dx.doi.org/10.1136/jitc-2020-SITC2020.0772>

773

ADOPTIVE CELL THERAPY RESPONSE IN MELANOMA IS MEDIATED BY STEM-LIKE CD8 T CELLS

Sri Krishna*, Frank Lowery, Amy Copeland, Stephanie Goff, Grégoire Altan-Bonnet, Paul Robbins, Steven Rosenberg. *National Cancer Institute, Bethesda, MD, United States*

Background Adoptive T cell therapy (ACT) utilizing ex vivo-expanded autologous tumor infiltrating lymphocytes (TILs) can result in complete regression of human cancers.¹ Successful immunotherapy is influenced by several tumor-intrinsic factors.²⁻³ Recently, T cell-intrinsic factors have been associated with immunotherapy response in murine and human studies.⁴⁻⁵ Analyses of tumor-reactive TILs have concluded that anti-tumor neoantigen-specific TILs are enriched in subsets defined by the expression of PD-1 or CD39.⁶⁻⁷ Thus, there is a lack of consensus regarding the tumor-reactive TIL subset that is directly responsible for successful immunotherapies such as ICB and ACT. In this study, we attempted to define the fitness landscape of TIL-enriched infusion products to specifically understand its phenotypic impact on human immunotherapy responses.

Methods We compared the phenotypic differences that could distinguish bulk ACT infusion products (I.P.) administered to patients who had complete response to therapy (complete responders, CRs, N = 24) from those whose disease progressed following ACT (non-responders, NRs, N = 30) by high dimensional single cell protein and RNA analysis of the I.P. We further analyzed the phenotypic states of anti-tumor neoantigen specific TILs from patient I.P (N = 26) by flow cytometry and single cell transcriptomics.

Results We identified two CD8+ TIL populations associated with clinical outcomes: a memory-progenitor CD39-negative stem-like TIL (CD39-CD69-) in the I.P. associated with complete cancer regression (overall survival, P < 0.0001, HR = 0.217, 95% CI 0.101 to 0.463) and TIL persistence, and a terminally differentiated CD39-positive TIL (CD39+CD69+) population associated with poor TIL persistence post-treatment. Although the majority (>65%) of neoantigen-reactive TILs in both responders and non-responders to ACT were found in the differentiated CD39+ state, CR infusion products also contained a pool of CD39- stem-like neoantigen-specific TILs (median = 8.8%) that was lacking in NR infusion products (median = 23.6%, P = 1.86 x 10⁻⁵). Tumor-reactive stem-like T cells were capable of self-renewal, expansion, and persistence, and mediated superior anti-tumor response in vivo.

Conclusions Our results support the hypothesis that responders to ACT received infusion products containing a pool of stem-like neoantigen-specific TILs that are able to undergo prolific

expansion, give rise to differentiated subsets, and mediate long-term tumor control and T cell persistence, in line with recent murine ICB studies mediated by TCF+ progenitor T cells.^{4 5} Our data also suggest that TIL subsets mediating ACT-response (stem-like CD39-) might be distinct from TIL subsets enriched for anti-tumor-reactivity (terminally differentiated CD39+) in human TIL.^{6 7}

Acknowledgements We thank Don White for curating the melanoma patient cohort, and J. Panopoulos (Flowjo) for helpful discussions on high-dimensional analysis, and NCI Surgery Branch members for helpful insights and suggestions. S. Krishna acknowledges funding support from NCI Director's Innovation Award from the National Cancer Institute.

Trial Registration NA

Ethics Approval The study was approved by NCI's IRB ethics board.

REFERENCES

- Goff SL, et al. Randomized, prospective evaluation comparing intensity of lymphodepletion before adoptive transfer of tumor-infiltrating lymphocytes for patients with metastatic melanoma. *J Clin Oncol* 2016;**34**:2389–2397.
- Snyder A, et al. Genetic basis for clinical response to CTLA-4 blockade in melanoma. *N Engl J Med* 2014;**371**:2189–2199.
- McGrath N, et al. Clonal neoantigens elicit T cell immunoreactivity and sensitivity to immune checkpoint blockade. *Science* 2016;**351**:1463–1469.
- Sade-Feldman M, et al. Defining T cell states associated with response to checkpoint immunotherapy in melanoma. *Cell* 2019;**176**:404.
- Miller BC, et al. Subsets of exhausted CD8 T cells differentially mediate tumor control and respond to checkpoint blockade. *Nat. Immunol* 2019;**20**:326–336.
- Simoni Y, et al. Bystander CD8 T cells are abundant and phenotypically distinct in human tumour infiltrates. *Nature* 2018;**557**:575–579.
- Gros A, et al. PD-1 identifies the patient-specific CD8+ tumor-reactive repertoire infiltrating human tumors. *J Clin Invest* 2014;**124**:2246–2259.

<http://dx.doi.org/10.1136/jitc-2020-SITC2020.0773>

Checkpoint blockade therapy

774

ANTIBIOTIC ADMINISTRATION PRIOR TO IMMUNOTHERAPY LEADS TO POOR OVERALL SURVIVAL ACROSS MULTIPLE MALIGNANCIES

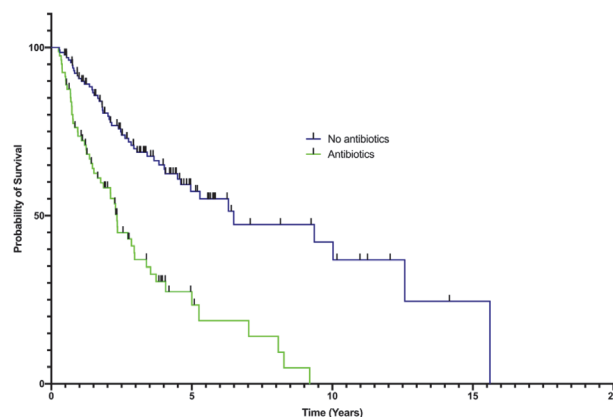
¹Eric Vick*, ¹Inas Abuali, ²Sarah Ludvigsen, ²Andrew Kelleher, ²Nathanael Moore, ³Nicholas Arias, ¹Shuchi Gulati, ¹Trisha Wise-Draper. ¹University of Cincinnati Cancer Center, Cincinnati, OH, USA; ²University of Cincinnati Medical Center, Cincinnati, OH, USA; ³University of Cincinnati, Cincinnati, OH, USA

Background The use of immune checkpoint inhibitors (ICI) has increased significantly in the past five years, along with the number of available drugs and regimens. ICIs have dramatically increased survival in cancer patients, however, there has been data to show that they have reduced efficacy in the presence of antibiotics.¹ Antibiotic use prior and during ICI therapy was associated with worsening clinical outcomes in patients with renal cell carcinoma,² melanoma,³ and non-small-cell-lung-cancer.⁴ Specifically, exposure within 60 days of initiation of ICIs in NSCLC seemed most detrimental, however, some studies have suggested that antibiotics disrupt intestinal microflora for up to six months.^{5 6} Therefore, we hypothesized that the duration of the antibiotic effect on ICI efficacy may be present for a longer duration.

Methods The electronic medical record was queried at the University of Cincinnati Medical Center for the administration of ICIs and antibiotics. Data was collected on the use, type, and duration of antibiotics before ICI use after administration with relevant demographic and clinicopathologic variables

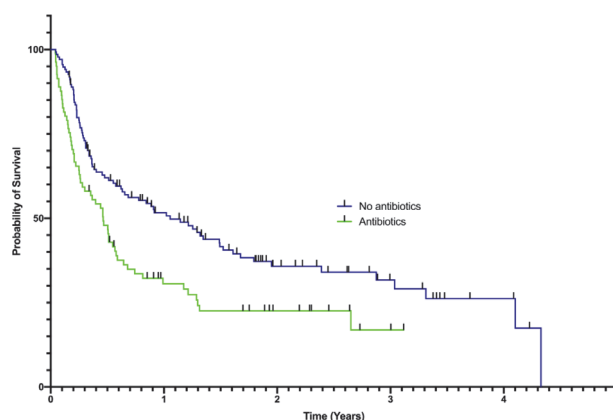
including treatment type, cancer type, staging information, and clinical course including subsequent antibiotic use. Univariate (Fischer's Exact) and multivariate analysis (multiple logistic regression) were conducted and survival analysis was determined according to log-rank testing.

Results 217 patients were examined. The median age was 64 (range 22-93), 38% were female, 73% had ECOG 0-1, and 77% were white. Cancer types included melanoma 24%, non-small cell lung cancer (NSCLC) 34%, small cell lung cancer 2%, renal cancer 11%, urothelial cancer 10%, head and neck cancers 11%, and 16% other primaries. 20% remained on ICI at the time of data entry. The most



Abstract 774 Figure 1 Antibiotics up to six months before ICI reduce OS

Figure 1: Antibiotics Prior to Checkpoint Inhibitor Therapy Lead to Inferior Overall Survival: Analysis of patients treated with any type of antibiotic lead to worsened overall survival compared to those who did not receive antibiotics or who received a one time dose of cefazolin. Statistical analysis showed by both Log Rank and Wilcoxon testing p-values were <0.0001 with median survival 6.5y vs. 2.3y for those who received antibiotics prior to ICI treatment (HR 3.4, 95% CI 2.2 to 5.3).



Abstract 774 Figure 2 Antibiotics up to six months before ICI reduce PFS

Figure 2: Antibiotics Prior to Checkpoint Inhibitor Therapy Lead to Inferior Progression-Free Survival: Analysis of patients treated with any type of antibiotic lead to worsened progression-free survival as well compared to those who did not receive antibiotics or who received a one time dose of cefazolin. Statistical analysis showed by both Log Rank and Wilcoxon testing p-values were 0.0027 and 0.0011 respectively. Median PFS from initiation of immunotherapy was 1.1y vs. 0.46y for those who received antibiotics prior to ICI treatment (HR 1.7, 95% CI 1.2 to 2.5).