a framework of the needs of family caregivers from which to create targeted dissemination plans.

4473

## Immune control of plasma cell disorders – in-depth analysis of Sox2 immunity in MGUS

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OBJECTIVES/GOALS: We aim to identify and characterize anti-Sox2-specific CD8+ T cell responses in stable MUGS patients expressing HLA class I alleles-A*02:01 and /or -B*07:02. METHODS/STUDY POPULATION: Cross sectional study of patients with stable MGUS defined as stable serum paraprotein for ≥ 12 months from the MM Research Clinic at the Abramson Cancer Institute. Sox2 T cell reactivity will be assessed by IFN-γ ELISPOT assays. Rested PBMC will be pulsed with candidate Sox2-derived peptides predicted to display high affinity to HLA class I alleles and known to be processed and presented as determined by "targeted MS/MS" (mass spectrometry). The presence of anti-Sox2-specific CD8+ T cells will be confirmed in peptide/HLA multimer assays using flow cytometry. Anti-Sox2-specific CD8+ T cells will be characterized for HLA restriction and TCR αβ composition. RESULTS/ANTICIPATED RESULTS: Our work is still in progress. From Aug to Dec 2019, 22 MGUS subjects have been analyzed, 11 of which were found to have the HLA of interest. Positive Sox-2 reactivity by ELISpot was found in 3 subjects. DISCUSSION/SIGNIFICANCE OF IMPACT: Anti-Sox2 immune responses may maintain MGUS in a clinical indolent state by eliminating Sox2-expressing clonogenic MM cells. A detailed characterization of anti-Sox2 T cells followed by in-vivo assessment of their anti-myeloma activity could provide the foundation for a Sox2 based immunotherapy approach in MM.

4304

## Immune markers in tumor immune microenvironment of neuroblastoma correlate with risk groups

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OBJECTIVES/GOALS: Neuroblastoma (NB) is the most common extra-cranial solid tumor with outcomes varying from spontaneous regression to metastatic with high mortality rates. The tumor immune microenvironment (TIME) may play a significant role in this disease. In this study we analyze the TIME comparing high-risk (HR) and low-risk (LR) NBs using multiplex platforms. METHODS/STUDY POPULATION: Two tissue microarrays (TMAs) with 2mm cores were created from 41 patients treated at Columbia University Irving Medical Center. Five micron TMA slides were stained for Digital Spatial Profiling (DSP, nanoString) and multiplex immunofluorescence (mIF). For DSP, a 24-patient subset including 11 HR, 8 LR and 4 intermediate risk patients was analyzed for 34 proteins. Protein expression among risk groups was compared using Mann-Whitney t-test. For mIF, TMA FFPE slides were stained for DAPI, CD3, CD8, CD68, HLA-DR, PDL1 and Chromogranin A. Whole TMA cores were captured as 9 -20X multispectral images (MSIs) stitched into a 3x3 MSI using Vectra (Akoya). MSIs were processed with inForm and qualitative analysis performed comparing HR and LR tumors. RESULTS/ANTICIPATED RESULTS: With DSP, we find significantly more HLA-DR in HR compared to LR tumors ($p = 0.016$). When controlling for immune cells with CD45 we find HLA-DR/CD45 to be higher in HR than LR tumors ($p = 0.026$). We found increased PD1 and PDL1 expression in all groups without significant difference between LR and HR ($p = 0.778$ and $p = 0.310$, respectively). Preliminary analysis of mIF on 9 patients (4 HR and 5 LR) finds HR tumors appear to have more immune cells than LR tumors, specifically more CD3+CD8- T cells while total CD8+ cells may be similar. There may be less macrophages in the HR compared to LR tumors. Completion of image processing and quantitative analysis of mIF data is underway. DISCUSSION/SIGNIFICANCE OF IMPACT: Increased expression of immune markers in NB TIME correlates with higher risk, which is unlike many other tumors. We compared TIME in HR and LR NB using multiplex platforms, DSP and mIF. We find that HLA-DR is more expressed in HR NB while PD1 and PDL1 expression is consistently high and not different between risk groups. Further analysis is underway. CONFLICT OF INTEREST DESCRIPTION: Robyn D. Gartrell-Corrado received grant support from nanoString for Digital Spatial Profiling and received honoraria and travel support from Northwest Biotherapeutics and PerkinElmer, respectively.

4396

## Immunoglobulin administration and hypogammaglobulinemia during pediatric acute leukemia therapy

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OBJECTIVES/GOALS: Intravenous immunoglobulin (IVIG) is used for infection prevention in pediatric B-cell acute lymphoblastic leukemia (B-ALL), but evidence for this is lacking. We describe the prevalence of hypogammaglobulinemia in pediatric B-ALL, predictors of IVIG use and its efficacy for infection prevention. METHODS/STUDY POPULATION: We will conduct a retrospective review of children age 1-21 years with B-ALL treated at Aflac Cancer and Blood Disorders Center from 2010 to 2017. The cohort was identified through the cancer registry. Demographics, disease factors, laboratory values, medications and infection outcomes were linked between the electronic medical record and an institutional database. Outcomes of interest include emergency department (ED) visits, hospitalization days, and episodes of infection. Descriptive statistics will be performed. Outcomes will be compared between IVIG recipients and non-recipients. Univariate and multivariate logistic regression models will assess predictors of IVIG administration. RESULTS/ANTICIPATED RESULTS: We identified 443 patients with B-ALL during the study period who met inclusion criteria. Exclusion criteria included receipt of IVIG or hematopoietic stem cell transplant prior to diagnosis. The average age at diagnosis is 6.5 years (standard deviation 4.8 years); 52.6% are male; 61.6% are white; 61.0% are standard risk per National Cancer Institute criteria. Among eligible patients, 137 (31.1%) received IVIG. We hypothesize that IVIG initiation is associated with hypogammaglobulinemia and history of severe infection. We also anticipate that frequency of emergency department visits, hospitalization days, and episodes of infection will decrease after IVIG

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