

## Regular and Young Investigator Award Abstracts

### Biomarkers, Immune Monitoring and Novel Technologies

#### 1 NILOGEN ONCOSYSTEM'S 3D-EXPRESS PLATFORM ALLOWS RAPID ASSESSMENT OF MONO AND COMBO TARGETED AND IMMUNE THERAPIES USING A BIOREPOSITORY OF FRESH PATIENT TUMOROIDS WITH INTACT TUMOR MICROENVIRONMENT

Michelle Ataya\*, Seth Curlin, Angie Rivera, Jasmin D'Andrea, Alliyah Humphrey, Jared Ehrhart, Rikhia Chakraborty, Soner Altoik. *Nilogen Oncosystems, Tampa, FL, USA*

**Background** It has been a significant challenge to select, combine and sequence the multiple FDA-approved IO therapies and pharmaceutical agents, highlighting the need to develop a precision oncology platform to explore novel combination treatments. 3D-EXpress is a unique *ex vivo* therapeutics testing platform using a biorepository of fresh patient tumoroids that were never dissociated, propagated, or reassembled in order to retain an intact microenvironment. Therefore, these specimens provide an excellent *ex vivo* platform to investigate the efficacy of therapeutics targeting the tumor microenvironment. Here we employed the 3D-EXpress platform to compare the efficacy of different therapeutic modalities targeting tumor antigens and immune checkpoint *ex vivo*.

**Methods** Tumoroids measuring 150  $\mu\text{m}$  in size retaining tumor cell heterogeneity, tumor-resident immune cells, stromal components and extracellular matrix interaction were prepared from human endometrial and colorectal tumors. Tumoroid were cryopreserved and were selected based upon tumor antigen status. Samples were treated for 72 hours *ex vivo* with antibody-drug conjugates, chimeric antigen receptor (CAR)T cells, or bispecific antibodies alone and in combinations. Treatment-mediated changes in tumor cell killing and tumor immune microenvironment were investigated.

**Results** Treatment-induced tumor cell killing activity in tumoroids was detected by D high throughput confocal imaging and analyzed using Nilogen Oncosystem's proprietary algorithm. The impact of *ex vivo* treatment by different modalities in combination with chemo therapeutic agents upon tumor resident immune cell populations was monitored by deep immune phenotyping and multiplex cytokine release assay. Based on the *ex vivo* responses tumors were assigned to treatment sensitive and resistant groups. Correlative analysis were performed and compared with detailed clinicopathologic data that is readily available for Biorepository tumors.

**Conclusions** The 3D-EXpress platform using cryopreserved 3D tumoroids with intact tumor microenvironment is an effective tool for the pre-clinical assessment of rational drug combinations for treatment of solid tumors. Furthermore, the 3D-EXpress platform provides unique insight into the microenvironment of both treatment responsive and non-responsive tumors and can aid in the development of patient-centered therapeutic regimens.

**Ethics Approval** This study was approved by Vanderbilt University Ethics Board; approval number 031078 and Ohio State University Ethics Board: 2014J0130.

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