1. Cutaneous Squamous Cell Carcinoma

Cutaneous Squamous Cell Carcinoma (cSCC) is the second most common non-melanoma skin cancer. Though prognoses are favorable in most cases, with a 5-year survival >90%, cSCC accounts for 75% of all deaths due to skin cancer excluding melanoma. Tumor development is a gradual process characterized by a high mutational burden and an immunosuppressive microenvironment.

Immunotherapy is a promising solution; however locally advanced and metastatic forms along with resistance to immune checkpoint inhibitors (ICI) presents an emerging health burden. Identifying the molecular mechanisms of tumor progression and the underlying cellular changes in the microenvironment will be valuable to advance our understanding of cSCC biology and develop therapeutic strategies for improved management of the disease.

2. PhenoCycler-Fusion 2.0 Technology

The PhenoCycler®-Fusion 2.0 (PCF) technology is the fastest whole-slide spatial biology platform that enables simultaneous detection of 100+ biomarkers by combining automated fluids and iterative imaging of oligo-conjugated antibodies. Leveraging the highplex resolution and throughput of PCF, our study sought to identify the spatio-temporal changes in the cSCC microenvironment over the course of immunotherapy. In this interim analysis, we have profiled 2 patients pre-immunotherapy (Cemiplimib) and at follow-up after 6-12 months.

3. Spatio-Temporal Immune and Metabolic Analyses of a cSCC Reveals a “Responder” Phenotype with Tumor Regression

4. Spatio-Temporal Immune and Metabolic Analyses of a cSCC Reveals a “Non-Responder” Phenotype with High Tumor Proliferation

5. Spatial Analyses Reveals Regional Heterogeneity and Differential Organization of Cellular Phenotypes

6. Value of Ultrahigh-Plex Spatial Phenotyping for Studying the Dynamics of cSCC Progression

Cancer development is a dynamic process, characterized by cellular and molecular changes in the tissue microenvironment that contribute to sustained proliferation, evasion of immune responses, metabolic deregulation, invasion and therapeutic resistance. Since cSCC biopsies can be collected relatively non-invasively, longitudinal studies tracking spatial and temporal changes can be carried out to follow the course of the tumor in the same patient. The PhenoCycler-Fusion 2.0 platform is ideally suited for such studies with its high throughput, high resolution, ultra-high-plex space and unparalleled speed.