CAPTURING THE SPATIAL LANDSCAPE OF TUMOR AND IMMUNE CELL LINEAGES IN THE MICROENVIRONMENT OF HUMAN CANCER TISSUES

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Background Immune system response to cancer therapies can indicate whether a patient will have positive outcomes following therapy. Understanding how the tumor microenvironment (TME) evolves during tumorigenesis and therapeutic response is crucial to developing personalized treatments with the goal of improving cancer therapy. With robust and comprehensive multiplexed imaging technologies, immune biomarkers can be used to interrogate myeloid and lymphoid cell lineages and structures, and when combined with specific oncology biomarkers, can capture the immune response within the TME in a variety of neoplasms. The availability of cell type specific biomarkers, combined with the ability to interrogate using multiplexed tissue imaging, provides unprecedented and novel insights into immune cell populations and spatial cell interactions with many cell types in the TME.

Cell DIVETM Multiplex Imaging Solution allows probing and imaging of dozens of biomarkers on a whole single tissue section with an iterative staining and dye inactivation workflow. At its core, Cell DIVE is a precise and adaptable open multiplexing solution that enables flexibility in antibody selection of biomarker panels used in a multiplexed imaging study. Cell Signaling Technology (CST) has a broad portfolio of IHC-validated antibodies to detect key proteins in the TME, enabling immune cell detection and phenotyping in tissue. CST offers off the shelf (OTS), ready-to-ship antibody conjugates that have been verified to work on Cell DIVE and offers custom conjugation of IHC-validated antibodies to fluorophores and other detection reagents. CST employs a rigorous approach to IHC validation, followed by verification on the Cell DIVE platform to ensure successful detection of proteins. Here, we demonstrate multiplexed Cell DIVE imaging using a novel panel of dozens of CST biomarkers across multiple tissue types.

Methods Sections were stained using conjugated antibodies (Cell Signaling Technology) to various biomarkers in 4 channels plus DAPI and imaged using Cell DIVE. Multiple rounds of staining and imaging were accomplished using the Cell DIVE workflow (Leica Microsystems).

Results Development of the multiplexed panel required minimal optimization, enabled the identification of complex cell types and revealed their cell-to-cell interactions within the tumor microenvironment.

Conclusions Multiplexed whole slide imaging allows deep analysis of immune cell lineages and provided new insights into immune and tumor cell-to-cell interactions within the tumor microenvironment.