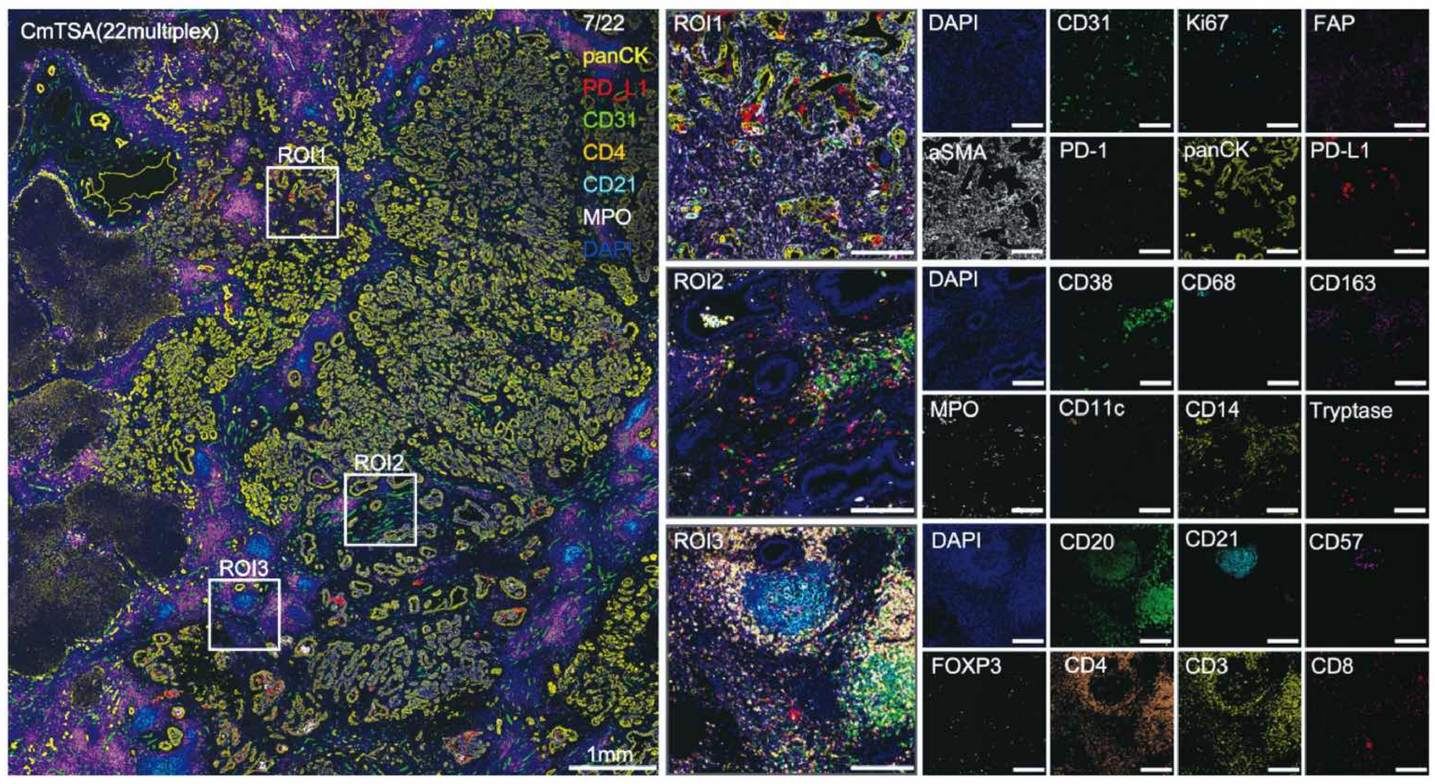
HUABIO

Enabling Reproducibility in Multiplex IHC: Validated Antibodies for Ultra-Multiplexed Staining

• Visualizing the Human Pan-Immune Microenvironment in 21 Colors

This panel comprehensively covers the major functional cell populations and states within the human immune microenvironment, enabling systematic analysis of immune composition, tumor features, and therapeutic responses.

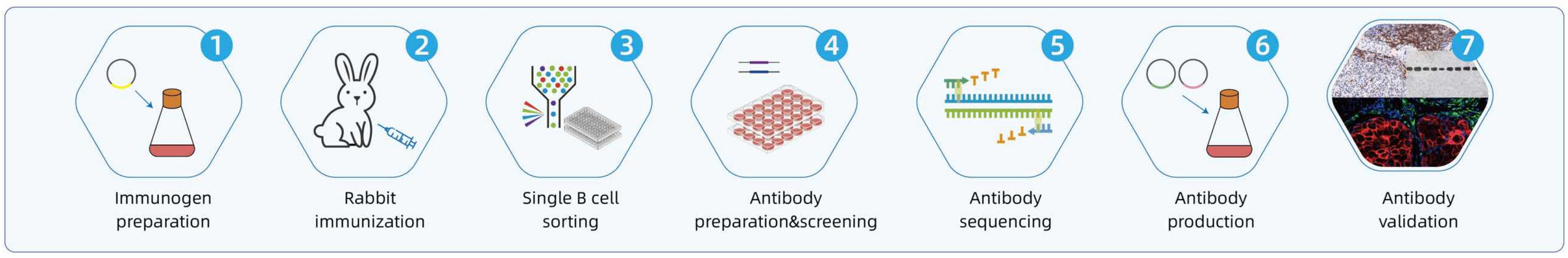
- **Lymphoid cells:** FOXP3, CD4, CD8, CD20, CD21, CD38, CD57 (profiling adaptive immune responses)
- **Myeloid cells:** MPO, CD14, CD11c, CD68, CD163, Tryptase (characterizing innate immunity and regulatory functions)
- **Mesenchymal cells:** CD31, FAP, aSMA (assessing vascular and stromal components)
- **Epithelial/Tumor:** panCK (identifying tumor and epithelial cells, aiding boundary and origin determination)
- **Proliferation:** Ki67 (evaluating cell activity and treatment response)
- **Immune Checkpoints:** PD-1, PD-L1 (analyzing immune suppression and predicting immunotherapy outcomes)



Built on multiplex immunofluorescence principles, the panel employs iterative HRP-tyramide signal amplification to achieve high-density, covalent labeling across multiple rounds. This species-independent approach **enables 21-color, multidimensional immune profiling on a single tissue section.**

• From HiMab® to MESA-IRS™: Antibodies for True Multiplexing

Such high-dimensional immune profiling is made possible through MESA-IRS™, a dedicated antibody series developed on HUABIO's HiMab® recombinant monoclonal antibody platform.



HUABIO antibodies are rigorously validated through multi-dimensional approaches to ensure high specificity and reliability in experimental workflows.

Knockout / Knockdown (KO/KD)
Employ CRISPR-Cas9 or RNAi models to confirm target-specific binding

Relative Expression
Test across variable expression models to ensure specificity

Cell Treatment Response
Monitor downstream signaling or phenotypic events after treatment

Independent Antibody Verification
Cross-verify using two distinct antibodies targeting the same protein

• Ensuring Specificity and Reliability

To ensure compatibility with TSA-based ultra-multiplex staining, MESA-IRS™ series antibodies undergo specialized validation focusing on clean stripping, epitope preservation, and multiplex endurance:

Affinity-Elutability Balance
Optimized binding strength that allows complete removal under mild stripping conditions without epitope damage.

Cycle Endurance
Tested over multiple staining-stripping cycles to confirm stable signal and minimal carryover ("ghosting").

Epitope Preservation
Verified re-staining after repeated stripping ensures consistent target detection.

Multiplex Compatibility
Confirmed absence of cross-reactivity or spectral interference in complex multi-target panels.

• TSA-Based Multiplex IHC Workflow