

RNAsky® Design: Custom RNA panels for same-section spatial multiomics

Unlock spatial gene detection with RNAsky Detection Probes

RNAsky Technology enhances the capabilities of the MACSima™ Platform by enabling high-plex, *in situ* RNA detection alongside protein analysis on the same tissue sections. This multiomic approach preserves spatial context while providing unprecedented resolution for in-depth biological analysis. With RNAsky Technology, you can cross-validate results from upstream methods such as RNA-seq or spatial transcriptomics, detect secreted factors such as chemokines and cytokines, analyze RNA–protein co-expression, and overcome limitations caused by poorly performing or unavailable antibodies.

Applications of RNAsky Technology in multiomic research

- Cell phenotyping**
 RNAsky Technology enables precise identification of cell types through spatial RNA profiling, helping to map cellular diversity and uncover rare or novel populations.
- Cellular neighborhoods**
 Combining RNA and protein detection, RNAsky Technology reveals how cells are organized and interact within tissues, providing valuable insights into cellular relationships and tissue function.
- Cell-cell interactions**
 To explore cell signaling and immune responses, RNAsky Technology detects RNA for ligands, receptors, and signaling molecules, including cytokines and chemokines, alongside protein markers.
- Functional states**
 By tracking gene expression at single-cell resolution and identifying transcription factor activation and transitions in cellular states, RNAsky Technology sheds light on cellular adaptations.

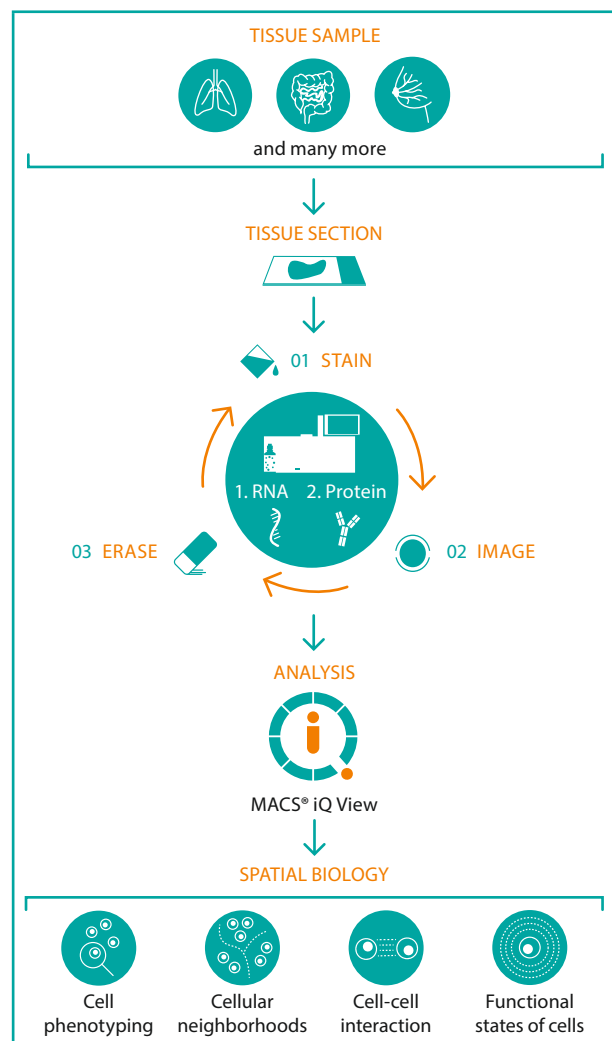


Figure 1: Multiomics workflow with MACSima Imaging Cyclic Staining (MICS) technology on the MACSima Platform. MICS technology utilizes cycles of staining, imaging, and signal erasure to enable high-plex detection of both RNA and proteins within the same sample.

Multiomics analysis with MACS® iQ View Software

MACS iQ View Spatial Biology Software supports RNAsky assays, enabling seamless RNA expression analysis in multiomic experiments. This functionality allows researchers to extract, quantify, and analyze spatially resolved transcript counts with precision (figs. 2 and 5). Additionally, the software enhances spatial biology RNA and protein workflows by supporting distance and density studies, providing deeper insights into tissue organization.

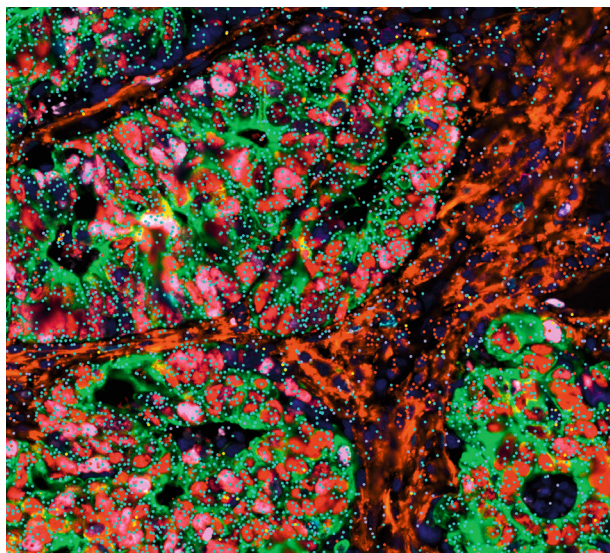


Figure 2: Microscopic view of colorectal cancer (CRC) tissue, imaged using the MACSima Platform. MICS technology was used for the simultaneous detection of 39 proteins and 24 RNAs, the latter using a custom RNAsky Design Panel.

RNAsky Design: Custom RNAsky Panels tailored to your needs

Our RNAsky Design service allows you to create user-defined panels to target virtually any gene of interest for your research. Our expert probe design process ensures high sensitivity and specificity, providing reliable and reproducible results while maximizing detection efficiency for your chosen targets.

RNAsky Panel Formats

Choose the flexible panel formats that will fit your specific research needs. Each is designed for optimal performance and high-plex analysis:

- 12-plex panel: Includes 9 custom RNA targets plus 3 essential controls for quality assessment.
- 24-plex panel: Includes 21 custom RNA targets plus 3 essential controls for quality assessment.

Custom RNAsky Design services

Depending on the complexity and scope of your requested gene panel, two levels of design service are available to meet the specific needs of your project.

- Standard service: Designed for targeting transcripts within well-annotated transcriptomes of human, mouse, and rat. This service also supports isoform-specific transcripts and includes off-target analysis within the selected species transcriptome.
- Advanced service: Designed for targeting transcripts outside of standard reference organisms or for incorporating custom sequences allowing off-target analysis within and across species transcriptomes. This service supports:
 - Advanced sequence-based target input, such as transcript fusions, protein tag transcripts, and synthetic sequences.
 - Transcripts other than human, mouse, or rat, including viral and bacterial sequences as well as multi-species samples.

This service enables researchers to explore novel targets and investigate diverse biological systems with high specificity and sensitivity.

How it works

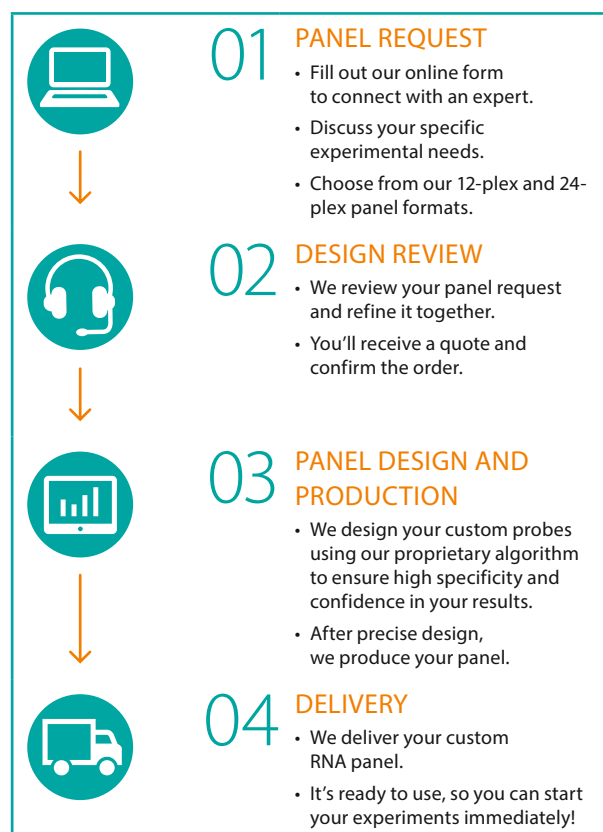


Figure 3: Process of how to request and design a custom RNAsky Panel.

Why RNAsky Technology is right for your research

Epitope preservation

RNAsky Technology preserves protein epitopes using a mild, protease-free buffer protocol. Unlike standard methods that can compromise protein integrity, it enables high-quality, high-plex protein detection alongside RNA (fig. 4).

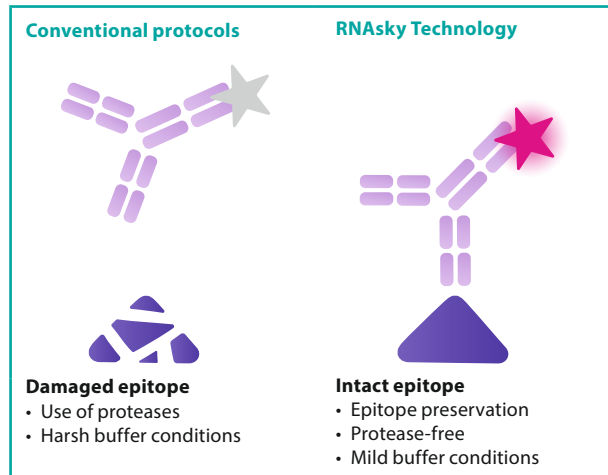


Figure 4: Epitope preservation with RNAsky Technology compared to conventional spatial biology protocols.

Specificity

With its proprietary design algorithm, RNAsky Technology delivers highly specific detection by evaluating sequence homology and thermodynamic profiles to avoid nonspecific binding, ensuring accurate results, even in complex or multi-species samples.

Robustness

RNAsky Technology improves gene coverage and detection sensitivity with multiple probes that target different regions of the same RNA molecule. This approach enhances the detection of low-abundance or degraded RNA. As a single workflow provider, Miltenyi Biotec ensures scalable and reproducible multiomics analysis with the MACSima Platform.

Non-keratinizing squamous cell carcinoma

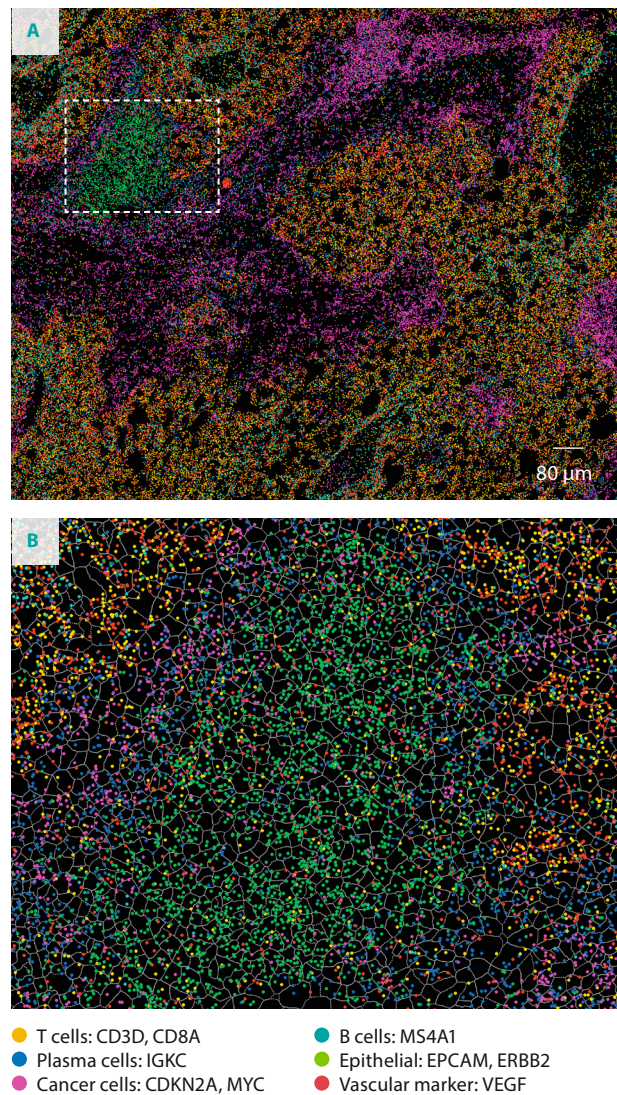


Figure 5: Example of gene expression signatures in non-keratinizing squamous cell carcinoma using RNAsky Technology on the MACSima Platform (A). Close up of gene expression and integrated cell segmentation in MACS IQ View Analysis Software for easy analysis of RNA data at single-cell resolution (B).

Product name	Product description	Quantity	Order no.
RNAsky IO Explore Panel, human	Predefined RNAsky Panel profiling 24 immunoncology RNA targets.	2 experiments	130-134-683
RNAsky Design 12-plex	Custom RNAsky Panel profiling 9 RNA custom targets + 3 controls.	5 experiments	Custom order
RNAsky Design 24-plex	Custom RNAsky Panel profiling 21 RNA custom targets + 3 controls.	5 experiments	Custom order
RNAsky Sample Preparation Kit	For the molecular preparation of samples before using RNAsky Technology.	Up to 8 reactions	130-134-682
RNAsky Support Kit	Support reagents for the RNAsky experiment in the MACSima System.	2 experiments	130-134-684

Transform your spatial multiomics research today – reach out to discuss your custom RNAsky Panel Design!

LEARN MORE



Enhance your spatial multiomic research with a custom RNAsky Panel. Contact us to discuss your project and start designing your tailored solution.

► miltenyibiotec.com/rnaskydesignpanel



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