# Maximize spatial transcriptomics discoveries with Signios Bio

Spatial transcriptomics is a transformative technology that allows visualization and quantitation of mRNA molecules while preserving their spatial context within a tissue sample. Unlike traditional transcriptomics, spatial transcriptomics enables visualization of gene expression patterns within their anatomical locations. Here, we provide an overview of spatial transcriptomics and its diverse applications across various fields including developmental biology, neuroscience, cancer research, and regenerative medicine. By enabling high-resolution mapping of gene expression pattern within tissues, spatial transcriptomics revolutionizes our understanding of complex biological systems, paving the way for novel discoveries in biology and medicine.

## The value of spatial transcriptomics

Different RNA sequencing assays provide varying insights into gene expression, each measuring slightly different aspects of biological samples.

Bulk RNA sequencing measures the average gene expression of a large population of cells, providing a comprehensive overview of gene expression levels in a tissue or sample. This assay is useful more measuring differentially expressed genes between different conditions or sample types.

Single-cell RNA sequencing analyzes gene expression at the individual cell level, enabling identification of cellular heterogeneity and rare cell populations within a sample. This assay is useful for gaining a detailed understanding of the transcriptional diversity among cells and identifying cell sub-populations.

Spatial transcriptomics combines gene expression analysis with spatial information within the tissue context. This retained spatial location of gene expression data offers the ability to study tissue architecture and cellular microenvironments. This assay is useful for looking at spatially variable gene expression, tissue organization, and cell-to-cell communication.

## The spatial transcriptomics workflow

Spatial transcriptomics involves several steps, including tissue sectioning, capturing mRNA using spatially barcoded capture probes, sequencing, and computational analysis.
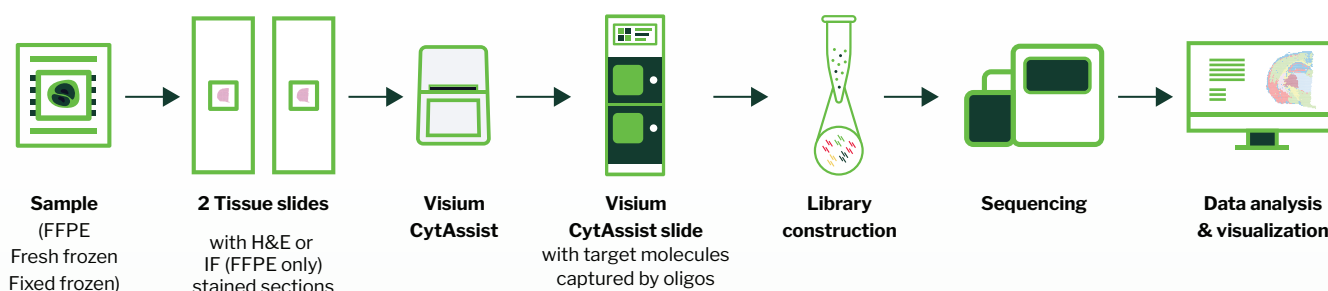


**Sample**
(FFPE
Fresh frozen
Fixed frozen)

**2 Tissue slides**
with H&E or
IF (FFPE only)
stained sections

**Visium CytAssist**

**Visium CytAssist slide**
with target molecules
captured by oligos

**Library construction**

**Sequencing**

**Data analysis & visualization**

**Figure 1.** Visium CytAssist enabled spatial transcriptomics workflow for tissue sections from FFPE, fresh frozen or fixed frozen samples (Source: 10x Genomics).

# Applications of spatial transcriptomics

Spatial transcriptomics has diverse applications across various fields of biology and medicine:

Characterize tissue architecture to guide tissue engineering approaches.

Unveil tumor heterogeneity and explore tumor microenvironments to guide the development of targeted therapies.

Visualize patterns during embryonic development to study tissue patterning and organogenesis.

Explore brain gene expression mapping to identify cell types and neuronal

# Signios Bio's spatial transcriptomics services

Signios Bio offers spatial transcriptomics solutions for tissue sections from FFPE, fresh frozen, and fixed frozen samples. Our comprehensive package includes spatial data from 10x Genomics Visium with CytAssist, expert bioinformatics analysis, and publication-ready reports with intuitive data vizualization.

# Bioinformatics analysis

| Standard analysis | Advanced analysis | Specialized analysis |
|---|---|---|
| • Advanced filtering for low-quality spots, rRNA, mitoRNA, and hemoglobin contamination<br>• PCA and optimized clustering of high-quality spots<br>• Spatial dimensional plots with filtered spots and heatmap of gene expression across clusters<br>• Spatial localization of individual clusters<br>• CLOUPE file for use in the Loupe Browser | • Raw spatial data FASTQ file<br>• Space Ranger generated key sequencing and gene expression metrics<br>• Space Ranger generated tissue plot colored by clusters<br>• Space Ranger generated t-SNE projected spot clusters<br>• CLOUPE file for use in the Loupe Browser | • All Advanced Analysis Deliverables<br>• Cell type annotation from public databases and associated spatial plots by cell type<br>• Cell type annotation with custom markers and associated spatial plots by cell type<br>• Interactome spatial visualization including number and strengths of interactions |

# Conclusions

Spatial transcriptomics is an innovative method for understanding biological system with both expression and the spatial location of that expression. This data type is rich in information and requires expertise in sample preparation, data generation, and bioinformatics. Signios Bio has the lab and bioinformatics expertise and infrastructure to ensure you get the publication-ready biological insights you are seeking.

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