Feasibility of spatial transcriptomic analysis on pituitary adenomas for understanding tumor microenvironment

Post-operative pituitary adenoma recurrence is on the order of ~20%; spatial transcriptomic analysis is feasible on resected tissue and may reflect tumor micro-environment to help predict recurrence and determine which patients may benefit from adjuvant therapy

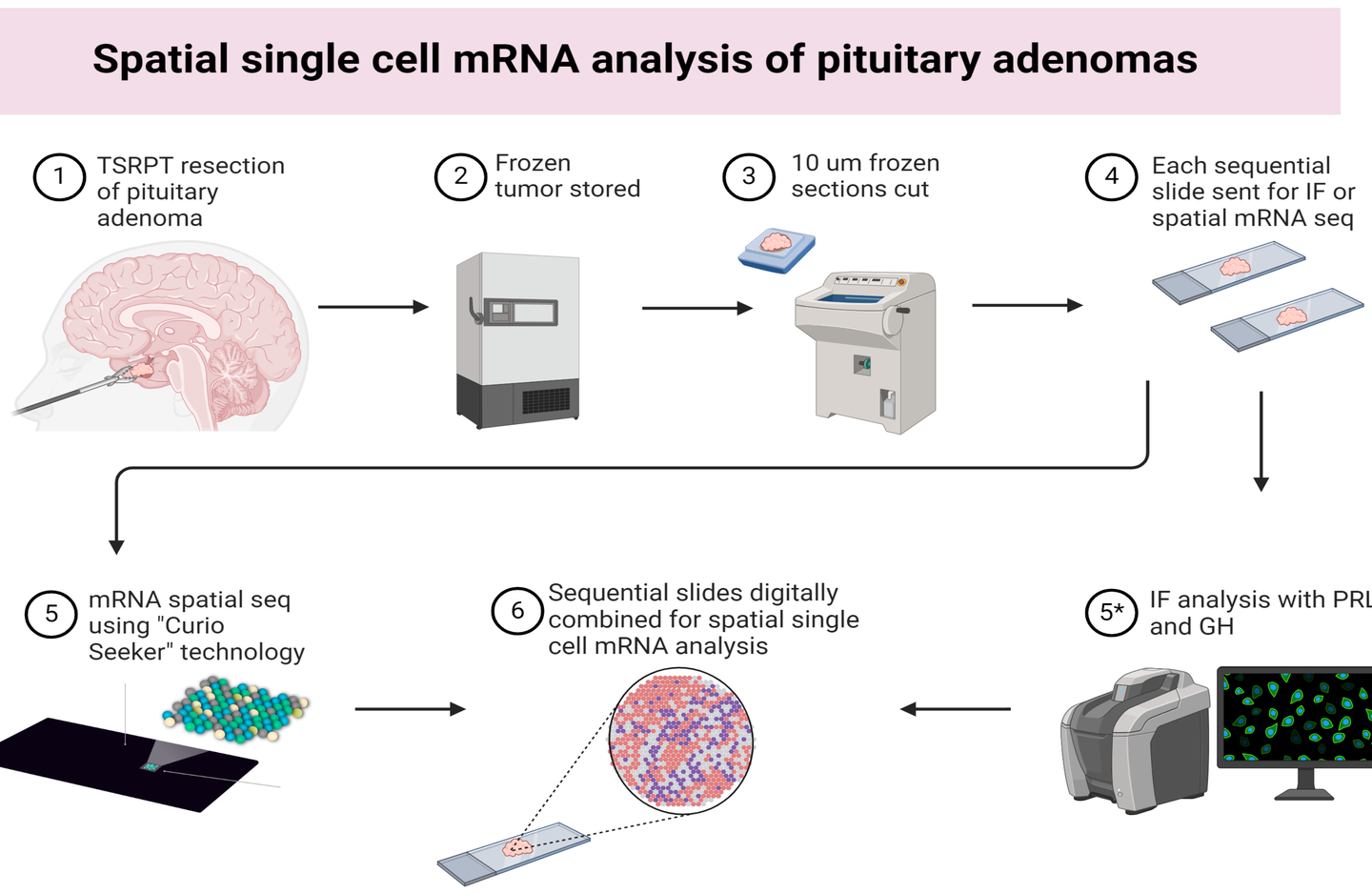


Figure 1: Diagram of workflow for sample procurement, sequential slide creation, and histology + RNA methods.

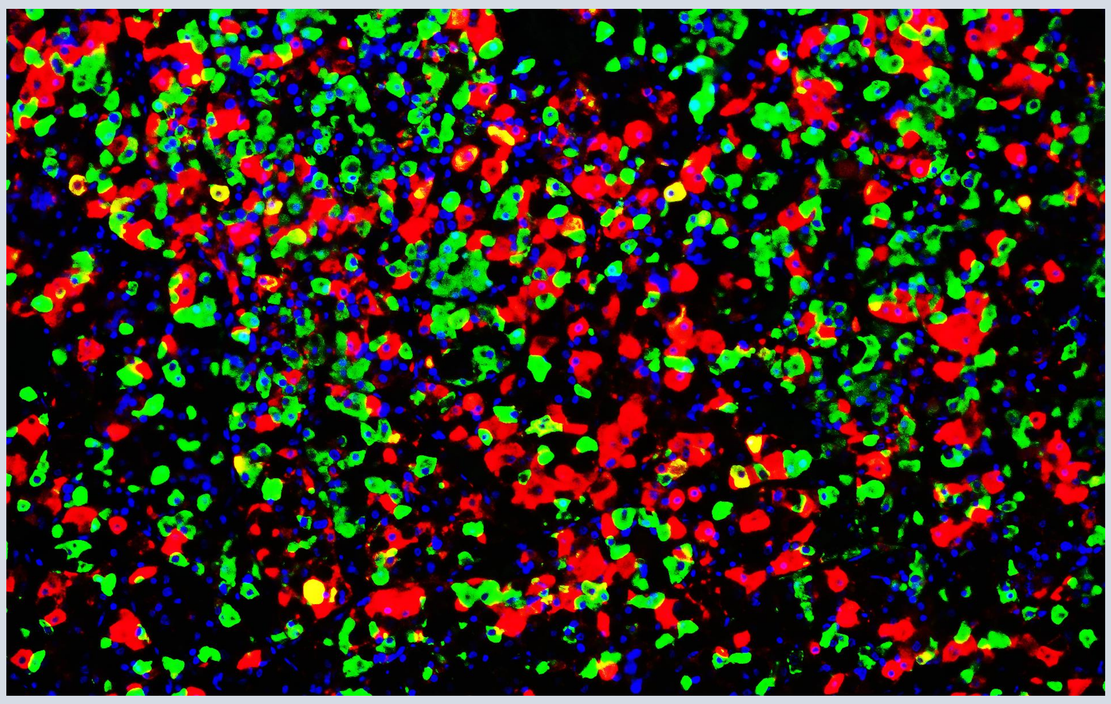


Figure 3: Representative immunofluorescence image of pituitary adenoma co-labeled with antibodies for GH (green) and Prolactin (red) with nuclear DAPI staining

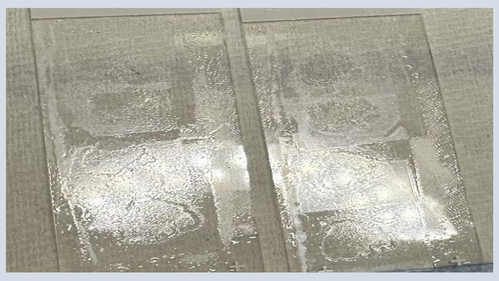
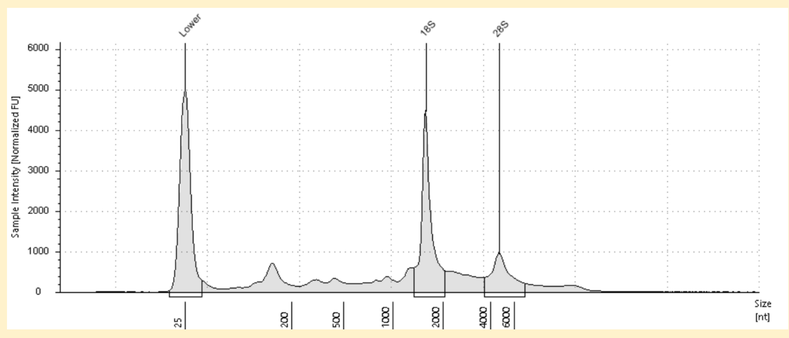


Figure 2: Example of thin cut frozen sequential sections for RNA and histology.

METHODS: Tumor bank of 133 pituitary tumors available at UF, a subset will be sectioned for histology with PRL + GH antibodies and single-cell transcriptomics using "Curio-Seeker" technology to measure heterogeneity between individual secreting cell types.



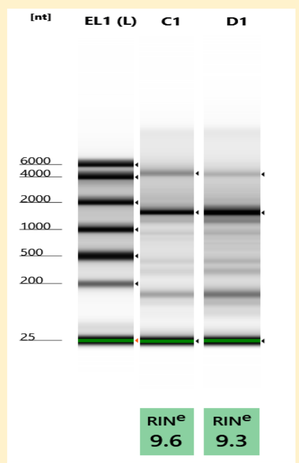


Figure 4: Gel electrophoresis (left) demonstrating capture of RNA bands from two tumor samples and purity of RNA (top) measured by intensity of ribosomal RNA subunits.

Preliminary Results:

- Have established a pipeline of tumor procurement, storage, frozen sectioning and proof-of-concept immunofluorescence labeling + RNA extraction of samples for single cell spatial transcriptomics.
- Robust labeling of individual cell types in two tumor samples thus far and high purity RNA with concentrations of ~50-60 ng/uL which is sufficient for spatial transcriptions.
- Moving forward, will overlay transcriptomic and histology sequential slides for single cell heterogeneity and tumor micro-environment analysis.

SUMMARY: Single cell transcriptomics and overlay on typical histologic analysis has been utilized in tumor biology for study of tumor micro-environment to better predict features such as progression and we are applying this technique to a large database of pituitary tumors with future plans to retrospectively correlate with recurrence and atypical features

All studies IRB approved through UF IRB202400681

Zachary Sorrentino, MD, PhD[1]; Jie Zhou, PhD[1] ;Brandon-Lucke-Wold, MD,PhD[1]; Christopher Vulpe, MD,PhD[1] ;Steven Roper, MD[1,]

[1]Department of Neurosurgery, College of Medicine, University of Florida

Contact: Zachary.Sorrentino@neuorsurgery.ufl.edu