



Histology Cores at Stephenson Cancer Center

<https://www.ouhsc.edu/pathologyJTY/download/SCC-Histology-Core.PDF>

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Tissue Pathology Shared Resource (TPSR)- CCSG/Histology, Immunohistochemistry, & Microscopy Core (HIMC)-COBRE

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Services

Consultation:

- Advice on design of experiment
- Assistance in targeting small targets in complicated structures such as mouse head and zebra fish
- Assistance in interpretation of histopathology slides

Image Analysis & Photographic Services:

- Assistance in targeting pathologic changes in single frame photomicrography
- Whole slide image (WSI) scanning with Leica-Aperio CS bright-field scanner *
- Zeiss AxioScan.Z1 bright-field & fluorescence scanner (7 channels) [§]
- WSI based image analysis with Leica-Aperio software* or Indica HALO Plus 10 [¶]
- Conventional photomicrography services including bright-field, fluorescence, and polarized light
- Publication grade figure assembly (Adobe Photoshop)

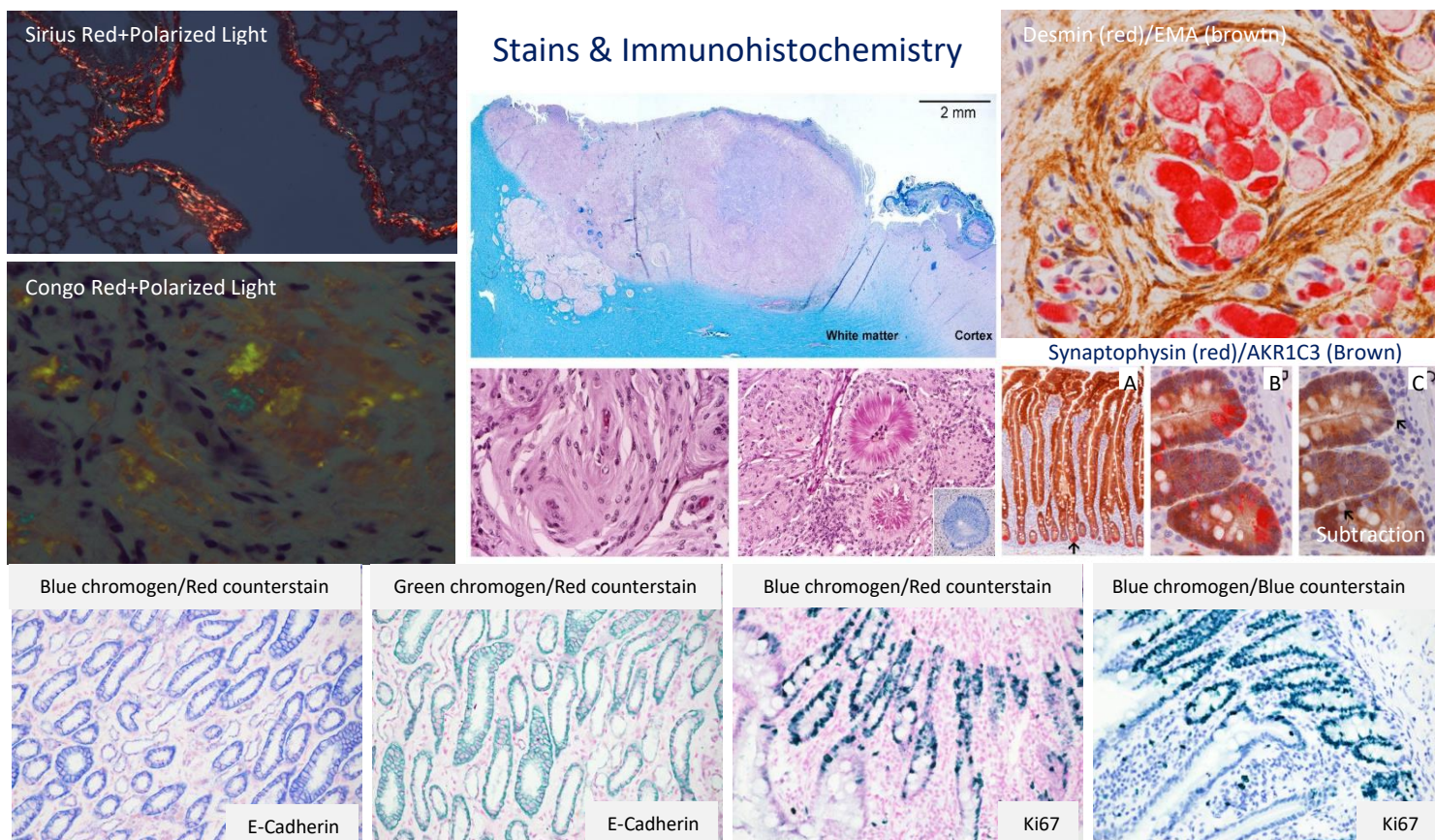
Histology Services:

- Fixation, decalcification, processing, embedding, sectioning- paraffin block or frozen
- Sectioning tissue- paraffin & frozen
- Tissue microarray (TMA) and cultured cell microarray (CCMA)

Staining Services:

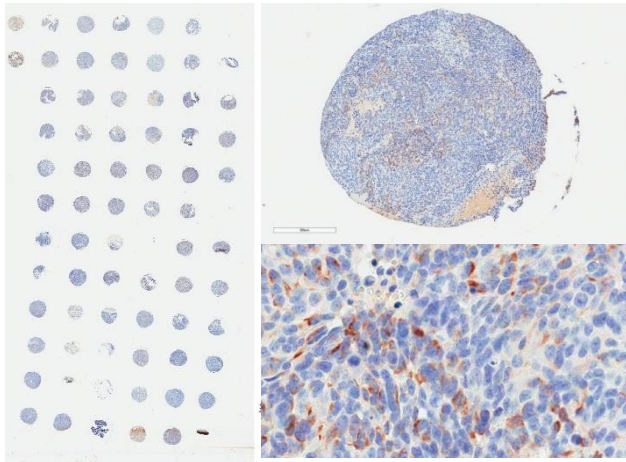
- Traditional stain including HE, trichrome, Sirius red, PAS, Kossa, Giemsa, Alcian blue, Elastic-Van Gieson, & *et cetera*
- Automated immunofluorescence (IF) & immuno-histochemistry (IHC), single & double antibodies, antibody optimization
- Automated *In situ* hybridization (ISH) using chromogen or fluorescence based RNAscope® (**Chromogenic & Fluorescence**), BaseScope®, & miRNAscope® technology from Advanced Cell Diagnostics (ACD™) using Leica BOND RX automated staining machine.
- Automated TUNEL
- OUMC clinical antibodies
- OUMC muscle enzyme histochemistry

* This whole slide scanning and image analysis are provided by the Department of Pathology since 2008. Image analysis software are jointly provide by the Department of Pathology and SCC since 2010.[§] Fluorescence scanning at 40x using multiple channels typically will take hours. Overnight scanning can be arranged. [¶]Three site licenses are available with all of them installed in 3 laptops that can be checked.

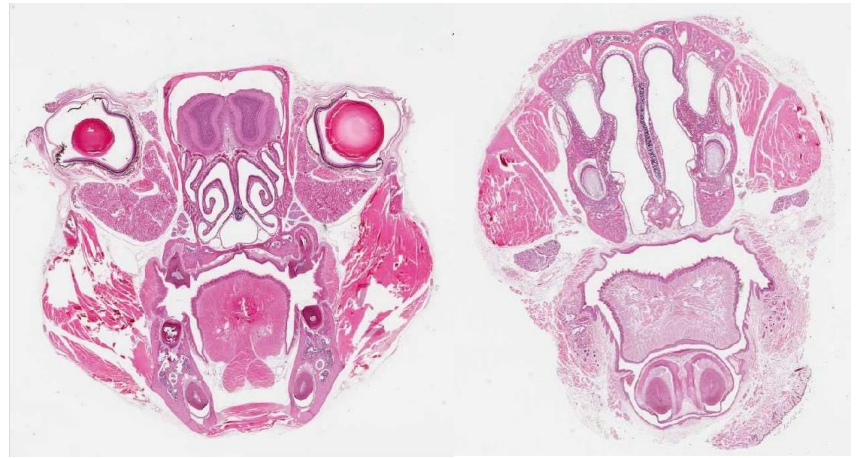


In addition to brown chromogen (DAB) and red chromogen with blue (hematoxylin) counter stain, we offer 4 other combinations.

Tissue Microarray (TMA)



Whole Slide Scanning

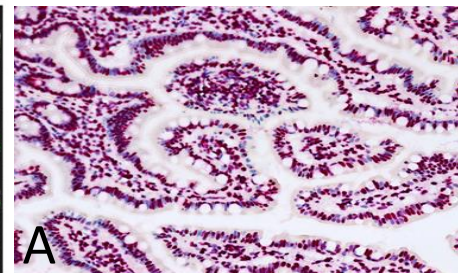
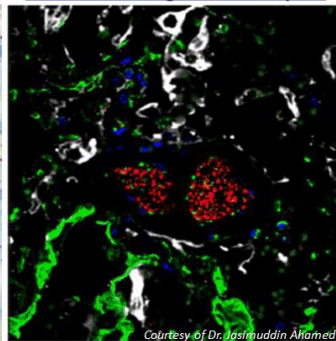
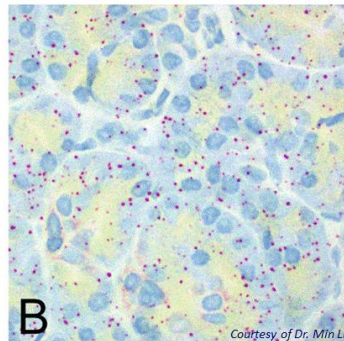
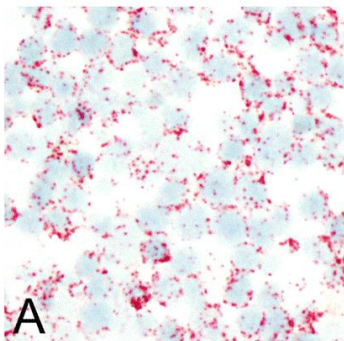


In situ hybridization with or without Immunohistochemistry.

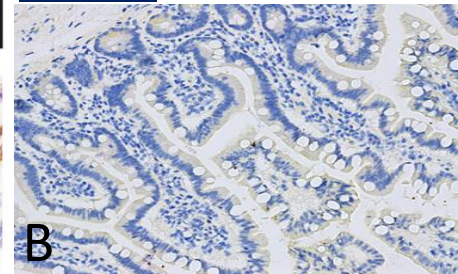
miR-224 using BaseScope[®]

mRNA using RNAscope[®]

miRNA using miRNAscope[®]



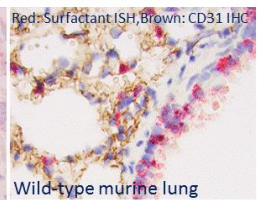
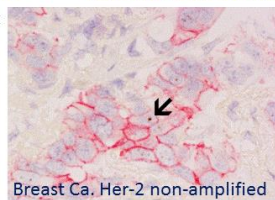
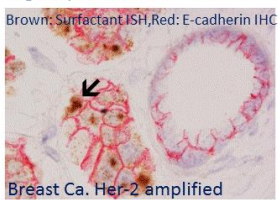
Control Positive



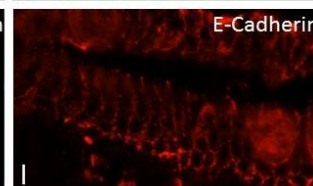
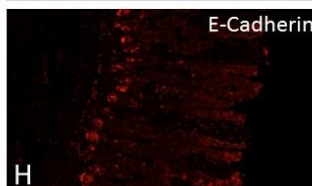
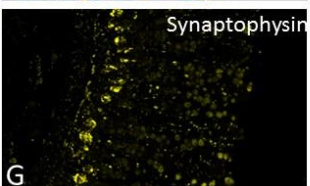
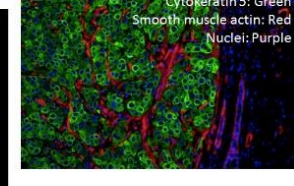
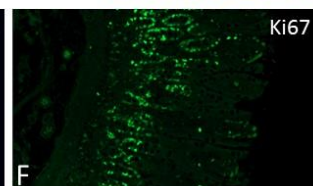
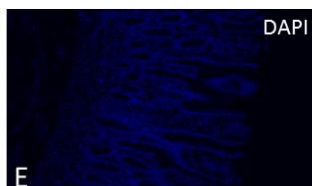
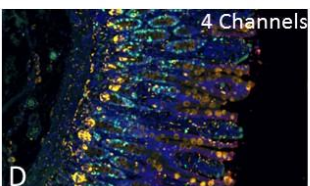
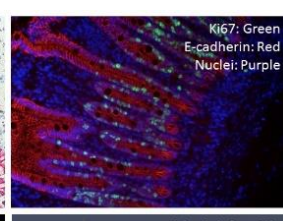
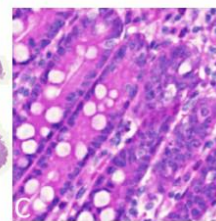
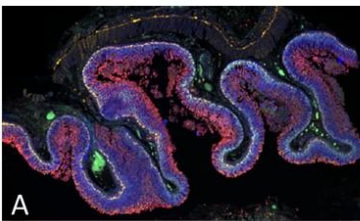
Control Negative

High expression control: HeLa Cells
Brown: Surfactant ISH, Red: E-cadherin IHC

Low expression control: Human Pancreas



Immunofluorescence with or without Whole Slide Scanning (Zeiss AxioScan.Z1)



Re-staining double scanning (RDSD): Fluorescence stain have an inherent weakness that the morphology cannot be seen for correlation. In RDSD, fluorescence-stained slides are scanned, and the cover slip is then removed. The slide is re-stained with hematoxylin & eosin (H&E) stain (or other stains) and scanned. The two images (fluorescent & bright-field) therefore come from the same slide. Interpretation of fluorescent results with reference to histopathologic features can then be performed at single cell level. This technique is possible with our ISH as our automated ISH is performed at 40 °C with excellent tissue preservation.

Services and Equipment:

Services	Equipment ¹	Operation
Conventional Histology	ST5020 stainer, TP 2010 processing machine, EG1150H embedding center, CM1950 cryostat, R2255 microtome, Brady BSP31 cassette labeler, BBP11 label marker, Zeiss microscope.	Equipment for histologic processing, embedding, sectioning (frozen & paraffin blocks) are staff operated except for the cryostat which allows trained researchers to operate.
Tissue/Cell Microarray	Veridiam 110c TMA manual arrayer.	This machine is used for the construction of tissue/cell microarray (TMA/CMA) and is staff operated.
Cell/Tissue Isolation	Thermofisher Cytospin 4, Leica LMD7 laser capture microscope, and Rarecell ISET to isolate circulating tumor cells.	The cytopsin and laser capturing microscope are self-operated after training. ISET is staff operated.
Automated IHC, IF, ISH, TUNEL	Leica BOND III BOND RX ² automated strainers with multiple antigen retrieval protocols & flexible IHC/IF programs.	Both are staff operated. Each machine has a capacity of 30 slides per run. ISH using kits from ACD can only be run on the BOND RX.
Whole Slide Scanning ³	Zeiss AxioScan.Z1 ⁴ whole slide scanner (100 slots) & Zeiss physical server (.czi file format), Leica-Aperio CS whole slide scanner ⁵ (5 slots) & Aperio virtual server (.svs file format) with file management software.	The Zeiss does both bright-field & fluorescence scanning (up to 7 channels), the Leica-Aperio is bright-field scanning only. Both can scan up to 40x with numerical aperture at 0.95 (Zeiss) and 0.75 (Leica-Aperio) respectively. Both are self-operated after training but staff assisted scanning is available.
Image Analysis ²	Indica HALO Plus 10 ² and Leica-Aperio image analysis software ^{5,6} .	Self-operated. Leica-Aperio software is available online. HALO is loaded on laptops.
Laptops for Image analysis ²	Three laptops each loaded with a site license of HALO Plus 10.	Self-operated laptops for loaning out. Leica-Aperio ImageScope is also loaded in these laptops.
Photomicrography	Nikon Eclipse Ni-E microscope & camera, Adobe Photoshop.	Bright-field and fluorescence (3 channels) digital photomicrography. Both are self-operated after training. Staff assisted figure construction is available.

Image analysis and connection: Scanned images are available online. The 3 site licenses of Indica HALO Plus 10 are loaded on 3 laptops for loan.

Indica HALO Plus 10 (.czi, .svs, & other file format) [†]		Leica-Aperio (.svs format only)	
Area quantitation ^B	Membrane IHC quantitation ^B	Cytoplasmic count ^{B*}	Color deconvolution ^{B*}
Tissue microarray ^{B+F}	Cytonuclear IHC quantitation ^B	Membrane count ^{B*}	Rare event count ^{B*}
Tissue classifier ^{B+F}	Cytonuclear quantitation FL ^F	Nuclear count ^{B*}	TMA segregation ^{B†}
Spatial analysis ^{B+F}	Membrane quantitation FL ^F	Vessel count ^{B*}	ISH quantitation ^{B†}
Immune cell ^B	High-plex FL ^F	Pixel count ^{B*}	
ISH-IHC ^B			

Image analysis algorithms. ^B: Bright field; ^F: Fluorescence. [†]: Provided by SCC; ^{*}: Provided by Pathology.

Image analysis: Image Recognition with Blood Vessel Count Courtesy of Dr. Rheel Towner

Using Leica-Aperio whole slide scanner and image analysis software.

