Flexibly Induced Backlit Imaging as a Novel Microscopy Method for the Diagnosis of Feline Chronic Enteropathy

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Introduction

- Chronic enteropathy CE is the most common gastrointestinal disease in elderly cats
- CE mostly comprises lympho-plasmacytic enteropathy (LPE) and small cell lymphoma (SCL)
- Collection and histopathological examination of intestinal biopsy specimens is considered gold standard[1,2]
- Processing of tissue is both time and resource consuming
- Flexibly Induced Backlit Imaging (FIBI) is a slide-free novel microscopy method that can image fresh and fixed tissue[3]

Advantages of FIBI:
1. Non-destructive to tissue → fresh tissue remains available for further downstream analysis
2. Real-time imaging: Scan takes approximately 5 minutes and creates high quality images for real-time diagnostic evaluation

Hypothesis

FIBI images will be of equal or improved diagnostic value compared to conventional hematoxylin and eosin (H&E) stained slides for the diagnosis of feline chronic enteropathy while saving time, resources, and opening options to preserve tissue for downstream analysis.

Methods

1. Fifty formalin-fixed paraffin-embedded (FFPE) small intestinal specimens from cats with chronic enteropathy were enrolled
2. The H&E slides were evaluated by a pathologist according to WSAVA guidelines
3. FFPE blocks underwent superficial deparaffinization and FIBI imaging
4. FIBI images will undergo the same histopathological examination
5. FIBI image quality of pre-determined mucosal structures will be scores for comparability:

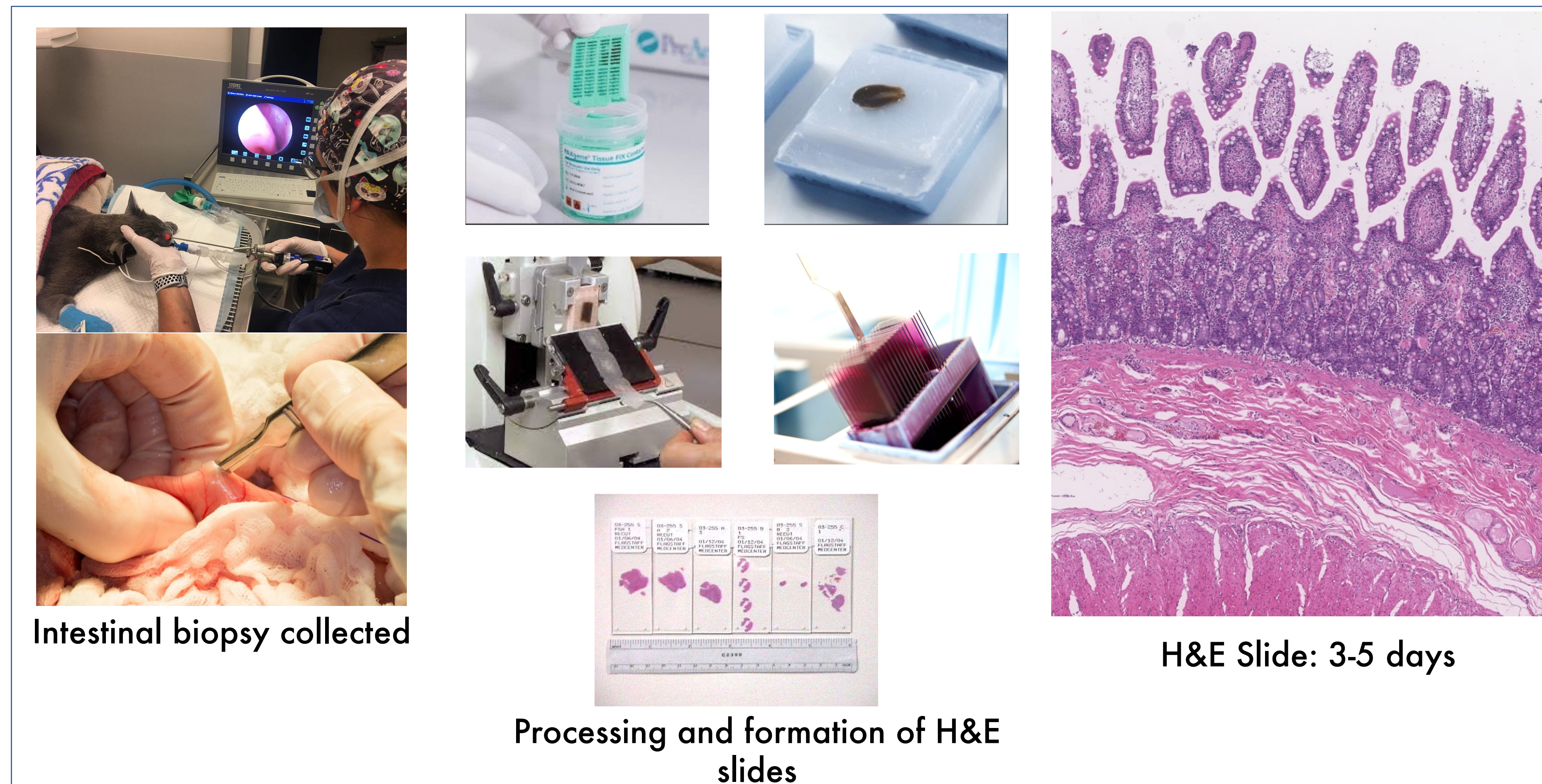| Score	Definition
0	FIBI Image cannot identify the structure without the H&E
1	FIBI image can identify the structure without the need of H&E
2	FIBI image can identify the structure with more certainty than H&E
N/A	Not Applicable (structure not in field to evaluate)

Traditional H&E Formation

Intestinal biopsy collected

Processing and formation of H&E slides

H&E Slide: 3-5 days

Figure 1: standard histology processing

FIBI Image Formation

Fresh or Fixed tissue → Deparaffinize surface of block and stain with H&E → Scan with FIBI → FIBI image scanned in 5 minutes
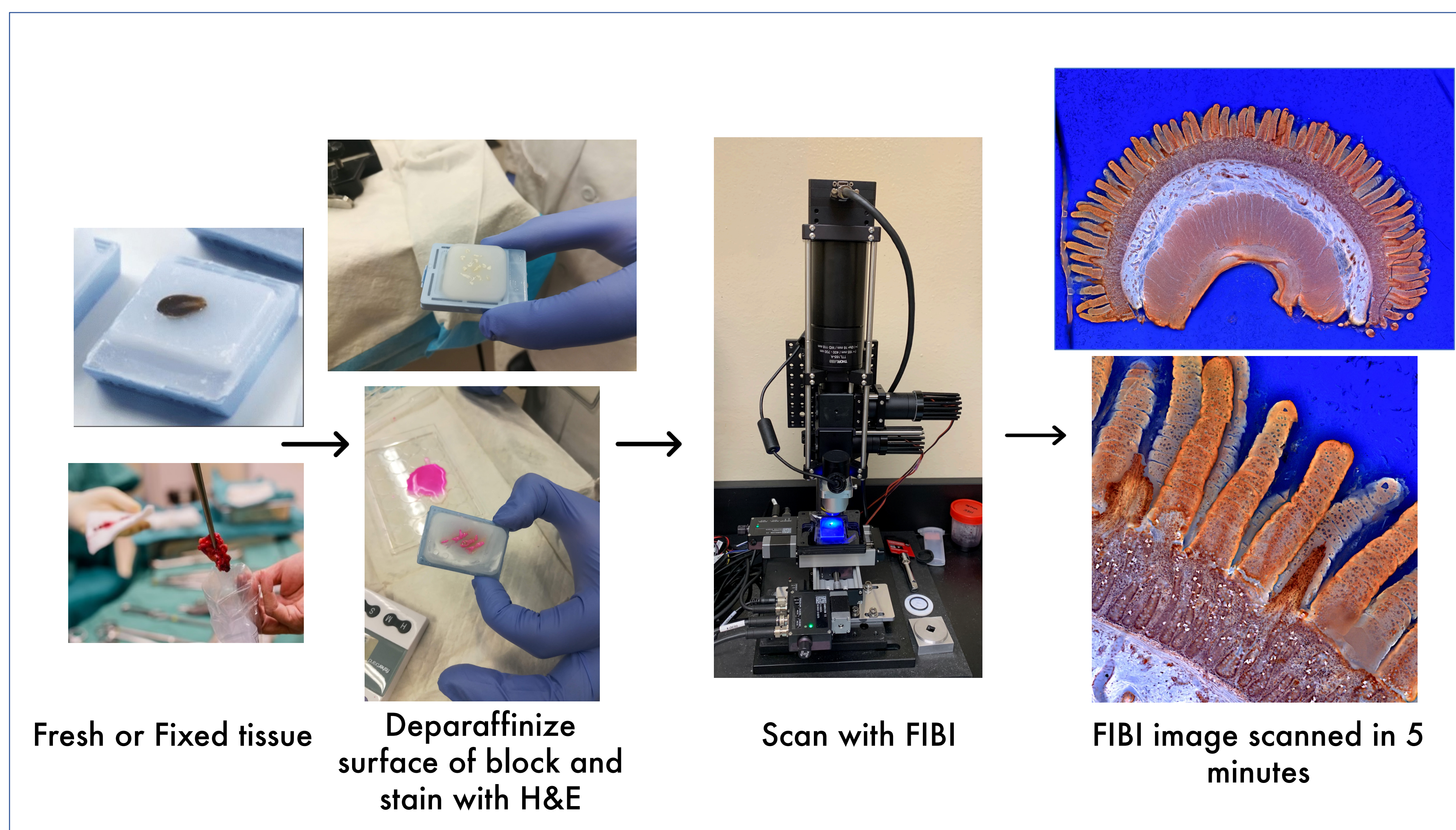
Figure 2: FIBI Image processing of formalin-fixed paraffin-embedded blocks

Results

H&E histopathologic evaluation from a board-certified veterinary pathologist:
- 24/50 cases diagnosed with inflammatory bowel disease
- 15/50 cases with small cell lymphoma
- 5/50 cases ambiguous - SCL or LPE
- 3/50 no inflammation or neoplasia noted
- 2/50 fibrosis in the lamina propria only
- 1/50 small intestinal large cell lymphoma

FIBI images undergoing WSAVA scores and diagnostic concordance. Results from FIBI images will be

Future Aims and Conclusion

- FIBI imaging is a novel microscopy method that may provide real time diagnostic information for fresh and fixed tissues
- Results from this study may prove that FIBI images are comparable or superior to conventional H&E stained slides
- FIBI technology can be use to mimic special stains (e.g., Mason's Trichrome, PAS)

Mason's Trichrome

FIBI Converted Mason's

Fluorescence Scan
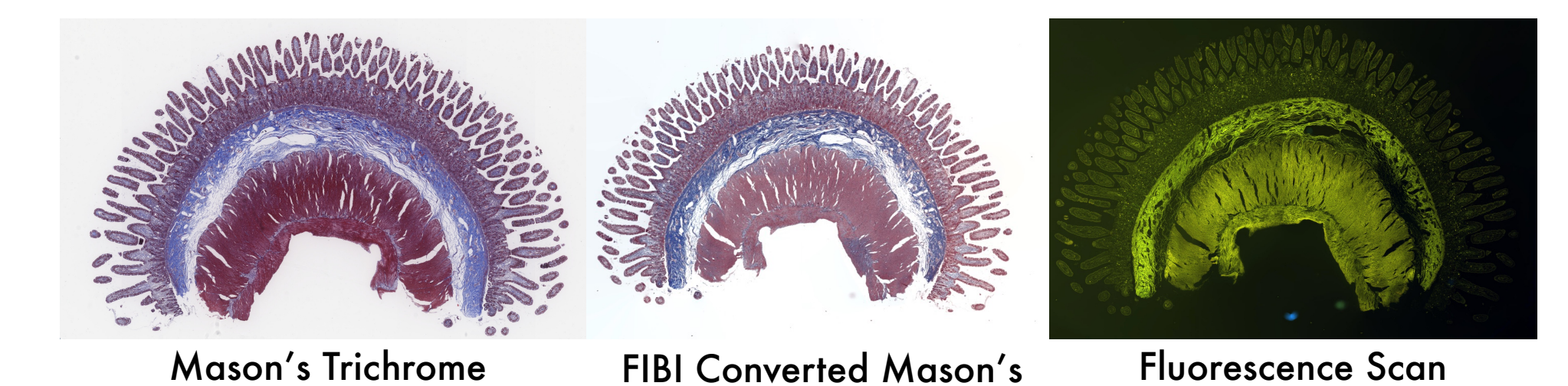
References

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3. Fereidouni, F. et al. Microscopy with ultraviolet surface excitation for rapid slide-free histology. Nat. Biomed. Eng. 1, 957 (2017).

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