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

Sarah Au Yeung, Paula Giaretta, Richard Levenson, Maria Questa, Sina Marsilio
Department of Medicine and Epidemiology, UC Davis School of Veterinary Medicine, Davis, CA; Department of Pathology and Laboratory Medicine, Sacramento, CA; Departamento de Clínica e Cirurgia, Escola de Veterinária, Universidade Federal de Minas Gerais, São Luiz, Brazil

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 standard1
- 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

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:

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>FIBI Image cannot identify the structure without the H&amp;E</td>
</tr>
<tr>
<td>1</td>
<td>FIBI image can identify the structure without the need of H&amp;E</td>
</tr>
<tr>
<td>2</td>
<td>FIBI image can identify the structure with more certainty than H&amp;E</td>
</tr>
<tr>
<td>N/A</td>
<td>Not Applicable (structure not in field to evaluate)</td>
</tr>
</tbody>
</table>

Results

H&E histopathological 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 used to mimic special stains (e.g., Mason’s Trichrome, PAS)

Acknowledgements

Thank you to Dr. Sina Marsilio, Dr. Richard Levenson, and Dr. Paula Giaretta for making this project possible. Funding provided by UC Davis students training in advanced research (START) program.

References