Presentation Aims
(1) To review the clinical indications for performing upper and lower GI endoscopic procedures
(2) To illustrate the current perspectives for maximizing the diagnostic accuracy of endoscopic biopsy using clinical case examples and evidenced-based studies

Introduction
In recent years, the availability and extended use of flexible endoscopy has led to a marked increase in diagnostic procedures involving visualization and biopsy of the upper and lower gastrointestinal (GI) tract in domestic animals. Endoscopy provides rapid, minimally invasive examination of mucosal surfaces and permits procurement of tissues for histologic and cytologic examination or of fluid specimens for laboratory evaluation. Key to the success of GI endoscopy in detecting mucosal disease is proper biopsy technique, which allows submission of adequate specimens for analysis. Pertinent considerations include:

• Which organ is being sampled: stomach versus duodenum versus colon versus ileum?
• Are there species differences that must be accounted for?
• What is the nature of the suspected lesion, and how do we maximize diagnostic interpretation?
• Are clinically relevant GI histopathologic grading criteria presently available?
• What constitutes a diagnostically accurate sample?
• How do we minimize inter-observer variability between pathologists?

Endoscopic Biopsy of the Esophagus
Indications: Clinical signs of dysphagia, regurgitation, excessive salivation, vomiting, hematemesis, suspicion of stricture, diverticulum, or foreign body.
Patient preparation: Withhold food for 12–18 hours. Animals having esophageal retention of ingesta or barium contrast may require additional time.
Instrumentation: Flexible endoscopy is preferred. Biopsy accessories should include serrated jaw pinch forceps (most useful), foreign body graspers, and a balloon catheter for dilatation of strictures. Mucosal biopsy of the esophagus is uncommonly required except for intraluminal mass lesions.
Abnormal findings: Mass lesions (neoplastic most commonly), esophagitis (mucosal erythema, hemorrhage, erosions), stricture, foreign body, focal or generalized dilatation, and perforation.
Biopsy recommendations: It is difficult to obtain esophageal biopsy specimens since the mucosa is tough and the biopsy instrument cannot be easily positioned perpendicular to the mucosal surface. Biopsy of mass lesions with pinch forceps often yields only superficial epithelia. Mass lesions should be biopsied deeply to avoid necrotic surface debris and superficial cells, which may obscure a correct diagnosis. Always obtain specimens from the border delineating grossly normal mucosa from the abnormal mass. Exfoliative cytology of mass lesions is as or more useful than histopathology given the above limitations.

Endoscopic Biopsy of the Stomach
Indications: Clinical signs referable to gastric diseases, including anorexia, weight loss, chronic vomiting, hematemesis, and melena. Specific diseases diagnosed via gastroscopy include chronic gastritis, gastric ulcer/erosions, foreign bodies, gastric nematodes, and pyloric mucosal hypertrophy.
Patient preparation: Withhold food for 12–18 hours. Animals having gastric retention of ingesta or barium contrast will require that food be withheld for 24–36 hours.
Instrumentation: Flexible endoscopy to visualize the cardia, fundus, body, antrum, and pyloric regions of the stomach. Instrumentation should include serrated jaw pinch forceps for mucosal biopsy and retrieval forceps (three-pronged and basket types) for removal of foreign bodies.
Abnormal findings: Mucosal granularity (e.g., increased mucosal texture seen with inflammatory or neoplastic infiltrative diseases), increased tissue friability (denoted by excessive mucosal hemorrhage following contact with the endoscope or biopsy instrument), excessive erythema (quite subjective), mass lesions, rugal distortion, ulcer/erosions, incomplete gastric distention, retained gastric contents, foreign body, and intraluminal parasites.
Biopsy recommendations: Gastric biopsies are always obtained regardless of mucosal appearance. Serrated jaw pinch forceps produce the greatest tissue purchases. Six to eight good-quality biopsy specimens should be procured.
Focal lesions such as masses, erosions, and ulcers should be biopsied directly. Masses are repeatedly biopsied deeply, and at the junction of normal from abnormal appearing mucosa. Ulcers are biopsied by obtaining specimens from the ulcer rim as it interfaces with adjacent tissue. Brush cytology may allow for rapid tentative diagnosis of mucosal disease. In the absence of gross mucosal abnormalities, obtain multiple random biopsies from the rugal folds of the gastric body. The antrum is not routinely sampled unless gross lesions are present.

**Endoscopic Biopsy of the Small Intestines**

*Indications:* Patients having clinical signs of small intestinal disease, including chronic small bowel diarrhea, weight loss, alterations in appetite (most commonly anorexia), vomiting, and melena. Specific small intestinal diseases diagnosed via enteroscopy include inflammatory bowel disease (IBD), intestinal neoplasia, duodenal ulcer/erosions, and gastrointestinal Histoplasmosis. Enteroscopy is particularly useful in obtaining small bowel biopsies in protein-losing enteropathy patients where poor wound healing subsequent to surgery may be of concern.

*Patient preparation:* Withhold food for 12–18 hours for upper small bowel examination. Retrograde ileoscopy will require more extensive patient preparation (see colonoscopy).

*Instrumentation:* Flexible endoscopy is required to traverse the pylorus and to visualize the descending duodenum. The jejunum is often accessible to endoscopic evaluation in small dogs and most cats. Serrated jaw pinch forceps (without bayonet) are most useful for small bowel biopsy procedures.

*Abnormal findings:* Alterations in mucosal texture (increased granularity), friability, and hyperemia are commonly observed. Increased granularity, friability, and erosions are often associated with mucosal inflammation seen with IBD and intestinal neoplasia. Ulcers (uncommon) and erosions (more common) are characteristic of inflammatory and neoplastic lesions. A milky-white mucosal appearance or milky exudate within the intestinal lumen may be seen in dogs with lymphangiectasia.

*Biopsy recommendations:* Duodenal/jejunal biopsies are always obtained regardless of mucosal appearance. Duodenal tissue is normally quite friable and good technique is essential! Serrated jaw pinch biopsy forceps should be used to obtain 10–15 good-quality specimens. Focal lesions are biopsied directly. The best biopsies are obtained by directing the instrument perpendicular to the mucosal surface. Alternatively, “blind” biopsies may be procured by passing the biopsy forceps as far as possible down the lumen until resistance is met. Due to their friability, special care is advised when removing small intestinal specimens from biopsy forceps.

**Endoscopic Biopsy of the Large Intestines**

*Indications:* Clinical signs of chronic colonic disease including large bowel diarrhea (exhibited by tenesmus, dyschezia, hematochezia, or the passage of mucoid feces). Colonoscopy is particularly useful in the diagnosis of IBD (lymphocytic-plasmacytic colitis) or rectal masses in both dogs and cats.

*Patient preparation:* Withhold food for 18–24 hours. In dogs, I prefer to administer two doses of a colonic electrolyte lavage solution (GoLYTELY, 20 ml/kg/dose given 4–6 hours apart orally) the afternoon before an A.M. endoscopy. The morning of the procedure, I give a warm-water enema to both dogs and cats.

*Instrumentation:* Flexible endoscopy allows for visualization of all colonic regions as well as retrograde ileoscopy. Biopsy instrumentation should include serrated jaw pinch biopsy instruments.

*Abnormal findings:* Similar as for enteroscopy, including increased mucosal granularity, increased friability, and the presence of ulcer/erosions. Loss of submucosal vascularity is a significant finding and may be caused by mucosal edema, the accumulation of exudate (blood, mucous, necrotic debris), or infiltration of inflammatory or neoplastic cells. Masses and colonic nematodes (*Trichuris vulpis*) are less common endoscopic observations.

*Biopsy recommendations:* Colonic biopsies are always obtained regardless of mucosal appearance. Flexible endoscopy is preferable, since examination and biopsy of the transverse and ascending colons may also be performed. Focal lesions are biopsied directly. In the absence of gross mucosal abnormalities, obtain 3–4 biopsy specimens from each colonic region using serrated jaw pinch biopsy forceps.

**Maximizing Diagnostic Yield from GI Endoscopic Procedures**

While the many advantages of GI endoscopy are evident, these procedures are far from state-of-the-art with regard to diagnostic interpretation. This is directly attributable to their small size, artifacts induced by procurement via avulsion, and handling/processing procedures performed at diagnostic laboratories. Furthermore, the lack of standardization for biopsy interpretation has significantly hindered pathologists and has made comparisons between studies exceedingly difficult for clinicians to interpret, even for common diseases like inflammatory bowel disease.

Our current perspective on GI biopsy interpretation is based on only a few published studies:
Fact 1 Biopsy interpretation between pathologists suffers from significant inter-observer variability. A recent study compared the consistency of histopathologic diagnosis between pathologists at separate diagnostic laboratories. 14 histologic slides were evaluated independently by 5 pathologists at 4 different institutions and defined as normal versus abnormal versus specific diagnosis. 5/14 tissues from healthy animals were interpreted as abnormal and even neoplastic in some instances. Substantial inter-observer variation was detected. Standardization of pathologic descriptions of intestinal tissue is necessary for meaningful comparisons with published articles. Clinicians must be cautious about correlating clinical signs and histopathologic descriptions of intestinal biopsy specimens.

Fact 2 The quality of endoscopically obtained biopsies from the duodenum can vary among endoscopists and may relate to their level of endoscopy experience. Slides from approximately 100 consecutive endoscopies obtained from experienced (group 1) and newly trained endoscopists (group 2) were independently evaluated for their diagnostic suitability (inadequate, questionable, clearly adequate) by 3 investigators independently. Results showed that group 1 tissues were more likely to be scored as adequate and were most likely to contain a greater number of suitable specimens for microscopic analysis as compared to those tissues obtained by beginner endoscopists. Results suggest that at least 8 individual tissue pieces should be submitted when performing endoscopic biopsy of the duodenum in dogs and cats.

Fact 3 The quality of endoscopic biopsies influences the likelihood of detecting gastric and duodenal lesions in dogs and cats. Tissues from approximately 150 dogs and cats were characterized by diagnostic quality (i.e., inadequate, marginal, adequate), type of lesions (i.e., lymphangiectasia, crypt lesion, villous blunting, cellular infiltrate), and severity of lesions (normal, mild, moderate, severe). The sensitivity of different quality tissue samples for finding different lesions was determined. Fewer samples were required from dogs for diagnosis, as the quality of the sample improved from inadequate to marginal to adequate. Duodenal lesions in cats displayed the same trend except for moderate duodenal infiltrates, for which quality of tissue sample made no difference. The quality of endoscopically obtained tissue samples has a profound effect on their sensitivity for identifying certain lesions, and there are differences between biopsies of canine and feline tissues.

References


