History and Clinical Signs
Most colonic diseases cause overt signs of large bowel diarrhea, tenesmus, and/or dyschezia (e.g., painful defecation). Large bowel diarrhea is characterized by frequent (2–3 times normal) urges to defecate, with each bowel movement producing small volumes of feces that contain excessive mucus and sometimes fresh blood (e.g., hematochezia). Urgency may be seen with colonic or rectal diseases, while dyschezia occurs most often with rectal disorders. Since the colon principally functions to absorb water and electrolytes, systemic signs attributable to nutrient malabsorption (e.g., voluminous feces, significant weight loss) are uncommon. Animals are generally alert, active, and well-fleshed with normal appetites on presentation. Occasionally, dogs may exhibit abdominal pain or discomfort with colitis. Furthermore, some diseases (inflammatory bowel disease, alimentary lymphoma, mycotic enterocolitis) may cause concurrent small intestinal signs.

Physical Examination
The physical examination in most animals with colonic disease is normal. A carefully performed digital examination of the rectum should be performed to search for rectal masses, pain, diverticulum (perineal hernia), stricture (rare), increased mucosal granularity, and perianal disease. Additionally, rectal evaluation affords the opportunity to collect fresh feces for diagnostic evaluation (e.g., presence of hematochezia, fecal mucus) and provides valuable exfoliative specimens for cytologic review.

Diagnostic Tests
Diagnostic strategies for colonic disorders vary considerably depending on the severity, chronicity of signs, presence of systemic illness, and historical or likely responses to therapy. CBC, biochemical profile, and urinalysis should be obtained from all animals with colorectal disease on admission. This serves to rule out metabolic or systemic disease that may result in large-bowel diarrhea. An adequate fecal examination for intestinal parasites is required in all patients. Some parasites (e.g., Trichuris vulpis and Giardia spp.) are notoriously difficult to diagnose, necessitating performance of serial fecal flotations. In order to identify giardia cysts, a ZnSO4 flotation solution is recommended. Direct saline fecal smears are used to detect motile trophozoites of Giardia, Trichomonas, Balantidium, or Entamoeba.

Fecal cytologic examination involves evaluation of stained rectal/colonic mucosal scrapings under high power or oil immersion to identify etiologic agents and inflammatory cells. A flat conjunctival spatula (carefully advanced digitally) procures excellent quality specimens that are placed on a microscope slide, air-dried, and stained with Diff-Quick or Wright’s stain. Increased numbers of leukocytes indicate a possible inflammatory or infectious etiology. The presence of fungal (Histoplasma) organisms or neoplastic cells, or a predominance of spirochetes or Clostridial spores, also suggests a possible cause for large-bowel signs.

Fecal cultures are useful when fecal cytology shows evidence of an inflammatory diarrhea or when infectious diarrhea is suspected. The major bacterial pathogens in dogs and cats include Campylobacter jejuni, Salmonella spp, and Clostridia. Note that fecal specimens for culture must be fresh, of adequate quantity (e.g., small, pea-size amount of stool), and transported rapidly for inoculation into enrichment media.

Imaging is infrequently diagnostic in animals with colorectal disease. Colonoscopy with mucosal biopsy often helps provide a definitive diagnosis of colonic mucosal disease. Flexible endoscopy is generally preferred as it enables evaluation of the entire colon, cecum, and possibly the distal ileum via retrograde ileoscopy.

Clinical Approach to Patients with Colonic Disease
Acute large bowel diarrhea is common and generally self-limiting. Potential causes include diet, bacteria, and/or their toxins, viral agents, and parasites. Rarely is the underlying cause identified, necessitating nonspecific symptomatic treatment. Reduced oral intake of a low-fat, highly digestible diet fed at frequent intervals is recommended. Either nutritionally balanced home-made rations or ready-made commercial gastrointestinal diets can be used. Hypoallergenic diets may be used successfully in some patients. Fiber supplementation is often prescribed for large bowel diarrhea, since it effects large bowel function by normalizing motility, binding colonic irritants, and nourishing and protecting the colonic mucosa (e.g., via fermentation of soluble fiber into SCFA).
Acute colitis that is nonresponsive to dietary management may require antidiarrheal drugs. These drugs (e.g., motility modifiers such as diphenoxylate or loperamide) are generally reserved for short-term use of 3–5 days duration. Antibiotics should not be routinely given in cases of acute colitis of undetermined cause because of their adverse effects on normal intestinal flora and their tendency to promote resistant strains of bacteria.

**Parasitic Colitis**
Parasitic colitis is a common cause for colitis affecting dogs in Europe and parts of the United States. *Trichuris vulpis* (whipworms) may infest the proximal colon, causing intermittent diarrhea with blood and mucus at the end of the stool. Eosinophilia, anemia, and hypoalbuminemia are possible, although uncommon. Diagnosis is made by finding eggs in feces or parasites during colonoscopy. The treatment of choice is fenbendazole. Due to the prepatent period of *Trichuris*, therapy should be repeated at 3 months. *Trichomoniasis* infection may occur in both dogs and cats. However, diarrheic animals with large numbers of organisms may have other causes for diarrhea. Identification of motile trophozoites on direct fecal smears is diagnostic. Metronidazole typically eliminates the organism, although reinfection may occur. Therapeutic deworming is indicated in cases with minimal signs of large bowel diarrhea and when fecal parasite examinations are negative.

**Fungal/Algal Colitis**
*Histoplasmosis* is a dimorphic fungus affecting dogs and cats in the United States. Infection occurs after inhaling the spores from the environment. Some infections result in pulmonary disease but may disseminate to other sites, including the gastrointestinal tract. Colonic disease is common in dogs with disseminated disease where the mycotic infection causes extensive granulomatous tissue reaction. Signs vary in affected dogs from mild, chronic large bowel diarrhea to severe disease causing tenesmus, hematochezia, fecal mucus, fever, and weight loss. Diagnosis requires identification of the etiologic agent and mucosal biopsy specimens or colorectal cytologic samples. Special stains (e.g., PAS stain) may be required to confirm that the organism is present in histologic specimens. Therapy usually consists of itraconazole (10 mg/kg PO q 12–24 h) alone or in combination with amphotericin B (0.25–0.5 mg/kg IV q 48h up to a total cumulative dose of 5–10 mg/kg in dogs and 4–8 mg/kg in cats). Prognosis depends on disease dissemination but is generally good with long-term antifungal therapy.

Other mycoses affecting the bowel are relatively uncommon. Both *Pythium spp.* (*pythiosis*) and several genera of zygomycetes (*zygomycosis*) may deeply invade digestive tissues, causing severe granulomatous gastroenteritis. *Pythiosis* is most common in young, large-breed dogs that reside in the Southern United States. Signs include chronic intractable diarrhea and vomiting, anorexia, depression, and weight loss. Physical examination often reveals an abdominal mass or marked regional thickening of the bowel. Diagnosis depends on histologic identification of the organisms in mucosal biopsies. Treatment is radical surgical excision of the granulomatous mass, since these fungi are resistant to standard antifungal drugs. The prognosis is guarded.

*Protheca spp.* are ubiquitous unicellular algae that may rarely colonize the gastrointestinal tract of dogs and cats, causing severe ulcerating enterocolitis. Dissemination is common, with preferential sites including the eyes, visceral organs, and the central nervous system. Diagnosis requires organism identification in affected tissues. There is no effective treatment, and the prognosis is poor.

**Inflammatory Bowel Disease (Chronic Colitis)**
Inflammatory bowel disease (IBD) broadly refers to a group of idiopathic chronic gastrointestinal disorders characterized by infiltration of the gastrointestinal tract with inflammatory cells.

*Lymphocytic-plasmacytic colitis* (LPC) is the most common form of chronic colitis in the dog and cat. As in most cases of IBD, affected animals are middle-aged or older, and clinical signs are generally cyclical with tenesmus, mucoid feces, and hematochezia predominating. Abnormalities observed during endoscopy may include increased mucosal friability, increased mucosal granularity, loss of submucosal vascularity, and erosions. Absence of these observations does not eliminate LPC, so biopsy samples should be collected.

*Eosinophilic Colitis* (EC) may represent a variant of IBD or may occur as an allergic manifestation to dietary or parasitic antigens. The prevalence of EC is considerably less than that of LPC. As is the case with LPC, middle-aged animals are affected most frequently. Physical examination, including digital examination of rectal mucosa, may detect a roughened irregular mucosa in dogs and cats with EC. Mucosal biopsies are required for definitive diagnosis and yield a diffuse infiltration of eosinophils (with perhaps lesser numbers of cell types) within the colonic
mucosa. Endoscopically the mucosa will be more friable and may be ulcerated as compared with LPC.

**Chronic Histiocytic Ulcerative Colitis (CHUC)** is the most frequently diagnosed IBD variant. Affected dogs present with intractable large bowel diarrhea, hematochezia, or tenesmus of variable severity. Lethargy, anorexia, and weight loss are commonly observed. Boxers are predisposed to CHUC, and the disease is diagnosed most frequently in male dogs less than 1 year of age. Histologically, lesions are characterized by a mixed inflammatory infiltrate of PAS-positive histiocytes within the mucosa. Colonoscopy usually reveals increased mucosal granularity, friability, and diffuse signs erosions. The prognosis with this IBD variant is usually very poor. One recent report suggests that clinical signs may resolve with antibiotic therapy (rather than traditional immunosuppressive therapy), indicating a possible causal role for the resident microflora in mediating intestinal inflammation of CHUC.

**Therapy for Chronic Colitis**

**Dietary therapy**, while often not curative alone, is extremely important in the long-term management of most diseases of the colon. Dietary therapy may consist of: feeding a novel protein (hypoallergenic) diet, feeding a highly digestible diet, or feeding a high-fiber diet. Each of these approaches has merits, depending on the clinical situation, but there is no specific way to determine which dietary approach might be successful. A reasonable approach is to feed one of the diets for a period of 3–4 weeks, and if no positive response is observed, then try a diet from the other categories. The most frequently recommended group of diets for therapy of large bowel disease in dogs and cats are those containing increased amounts of dietary fiber. This strategy is reasonable because dietary fibers, depending on their fermentability, influence luminal SCFA production as well as colonic motility, both of which may have a positive influence on the health and function of the colon.

There is ample and increasing evidence that feeding dogs with colitis diets with increased amounts of dietary fiber is beneficial. The question remains as to which fiber type is most appropriate. Dietary trials with either a hypoallergenic diet (e.g., novel protein source) or a highly digestible diet are prudent due to the role of dietary sensitivity or intolerance in the development of intestinal inflammation. However, most dogs or cats with food hypersensitivity or intolerance have primarily small bowel signs (e.g., vomiting, anorexia, weight loss, and sometimes chronic diarrhea); thus, signs of large bowel diarrhea alone are less likely to be due to allergic disease. Feeding patients with colonic disease highly digestible diets would be expected to be beneficial because less ingesta reaches the colon, resulting in production of a smaller fecal mass. This can be especially important in colonic disorders where there is severe mucosal disease, in severe constipation/obstipation where motility is altered or absent, or in rectoanal diseases where minimal production of feces is desirable. Since long-term dietary management may be required in pets with colonic disease, use of a commercial diet (rather than a homemade diet or a diet supplemented with fiber) is often the best approach. However, adding one or two tablespoons/25 kg body weight of psyllium, pumpkin, or other mixed fibers to the animal’s regular diet is another way of increasing the dietary fiber content.

There are several drug treatment options for management of colitis in dogs and cats where reducing inflammation is the primary means of controlling the clinical disease. One approach in dogs is to use non-steroidal anti-inflammatory drugs (NSAIDs) such as sulfasalazine. The 5-aminosalicylic acid (5-ASA) is the active moiety, and its mechanism of action is its anti-leukotriene activity and free radical scavenging ability. Newer amino salicylic acid drug (e.g., mesalamine) preparations are available that allow delivery of 5-ASA without the sulfa moiety, which is believed to be responsible for the numerous adverse effects (including keratoconjunctivitis and vomiting) associated with sulfasalazine use.

Therapy for all cats (and many dogs) with colitis often requires use of anti-inflammatory or immunosuppressive doses of steroids. Long-term (months) or high-dose (>2 mg/kg/day) steroid therapy may be associated with side effects that limit its use or require alternative therapy choices. Generally, oral prednisone or methylprednisone is the preferred steroid for use in both dogs and cats rather than dexamethasone, betamethasone, or triamcinolone. In humans, efforts to reduce the steroid side effects include using rectal suppositories or enemas containing steroids, or use of other newer glucocorticosteroid preparations that cause fewer systemic side effects (e.g., budesonide). Budesonide has been used in limited numbers of dogs and cats with inflammatory bowel disease, and there are some limited reports of effectiveness. However, controlled trials using this drug have not been published. The addition of immunosuppressive drugs to the medical therapy protocol is required to manage severe or refractory cases of colitis. The drugs used most commonly are azathioprine or chlorambucil, but cyclosporine is also another therapeutic option. Therapy with these drugs can be associated with significant side effects. Thus, appropriate monitoring and
adjustment in the drug is recommended. In dogs or cats with severe colitis, combination therapy using steroids, immunosuppressive drugs, NSAIDs, or enemas may be required to achieve adequate control.

Antibiotics effective against anaerobic bacteria (tylosin or metronidazole) are often effective in reducing bacterial overgrowth and potential enterotoxin production. Resolution of clinical signs usually occurs following 3–5 days of antibiotic therapy in dogs or cats with acute disease. Alternatively, in animals with chronic colitis, long-term therapy with metronidazole is required to maintain clinical remission. Metronidazole’s actions may be attributable to its direct inhibition of cell-mediated immunity or its antimicrobial effect on phlogistic resident microflora. Recent studies have shown that some dogs diagnosed with CHUC are responsive to fluoroquinolone administration.

**Colonic Neoplasia**

Both malignant and benign tumors affect the colon in dogs and cats. In dogs, adenocarcinoma (AC) is diagnosed most frequently, followed by lymphosarcoma (LSA) and leiomyosarcoma. The majority of canine large bowel neoplasms are located in the descending colon and rectum, although leiomyosarcomas often occur in the cecum. Adenocarcinoma and LSA are the most common malignant tumors in cats, followed by mast cell tumors. Malignant feline tumors usually arise in the ileocolic and descending colonic regions. Regional metastasis of AC to the peritoneum and mesenteric lymph nodes occurs in 50% of cats.

Most malignant tumors occur in older dogs and cats. Clinical signs are often indistinguishable from other causes of chronic colitis. Physical examination in animals with malignant colonic tumors may reveal dyschezia, palpable abdominal mass, mesenteric lymphadenopathy, rectal mass, or excessive mucosal granularity on digital examination. Imaging (diagnostic radiology and ultrasonography) provides important staging information concerning disease burden. Colonoscopy with mucosal biopsy confirms a definitive diagnosis. Treatment of colonic neoplasia is variable depending on tumor type, location, and extent of metastasis. Surgical excision is recommended for focal AC and leiomyosarcoma. Diffuse colonic LSA is best treated with multiple drug chemotherapy, such as the Madison-Wisconsin or UW-25 protocols. The long-term prognosis for most malignant neoplasms is guarded. Surgical resection or endoscopic polypectomy is recommended in dogs having benign (adenomatous) polyps and carries an excellent prognosis.

**References**