

# Constipation/ Obstipation/Megacolon

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*“Austerity causes constipation; excess, diarrhea.”  
Mason Cooley, City Aphorisms, Twelfth Selection, New York, 1993*

## CLINICAL IMPORTANCE

The term constipation is applied to those patients that pass stools infrequently or exhibit tenesmus in association with defecation. Constipation is a clinical sign, not a disease, and may result from several disorders, separately or in combination. Constipation is not easily assessed in dogs and cats because it is often difficult to obtain accurate information about their defecation habits. However, constipation appears to be far less common in veterinary medicine than in human medicine. In people, it is the number one gastrointestinal (GI) complaint, accounting for more than 2 million physician visits each year in the United States (Sweeney, 1997; Lembo and Camilleri, 2003).

Obstipation is severe constipation that requires medical therapy in addition to dietary management for relief. The term megacolon refers to anatomic dilatation of the colon. Feline idiopathic megacolon is a frustrating, chronic, recurring problem that often results in euthanasia of affected patients. A similar condition occurs in dogs although it is relatively rare. Megacolon in dogs is usually seen as a consequence of severe chronic constipation resulting from obstruction (e.g., perineal

hernias, stenosis of the pelvic canal or pelvic fracture malunion) and/or an underlying innervation defect. In cats, the pathogenesis of idiopathic megacolon remains unclear but appears to result from a generalized abnormality of colonic smooth muscle function (Washabau and Sammarco, 1996; Washabau et al, 2002; Byers et al, 2006).

## PATIENT ASSESSMENT

### History and Physical Examination

Dogs and cats with constipation typically exhibit tenesmus, dyschezia and abdominal pain. Chronically affected animals may present with systemic signs of illness including weight loss, inappetence, vomiting and depression.

Constipated cats are usually presented for reduced, absent or painful defecation for a period ranging from days to weeks or months. Some cats are observed making multiple, unproductive attempts to defecate in the litter box, whereas other cats may sit in the litter box for prolonged periods without assuming a defecation posture. Dry, hardened feces are seen inside and outside of the litter box. Occasionally, chronically constipated cats have

**Table 64-1.** Drugs associated with constipation.\*

Antacids	Bismuth subsalicylate
Anticholinergics	Diuretics
Anticonvulsants (phenytoin)	Hematinics
Antidepressants	Opiates
Barium sulfate	Sucralfate

\*Dimski DS. Constipation: Pathophysiology, diagnostic approach and treatment. Seminars in Veterinary Medicine and Surgery: Small Animal 1989; 4: 247-254.

intermittent episodes of hematochezia or diarrhea due to colonic mucosal irritation, which may give the owner the erroneous impression that diarrhea is the primary problem.

Cats with megacolon are usually presented for repeated episodes of constipation or obstipation. Although it is common for obese cats to present for constipation, chronically obstipated animals often exhibit weight loss and poor body condition. Prolonged inability to defecate may result in other systemic signs, including anorexia, lethargy, vomiting and poor coat quality (Washabau, 2001, 2005; Washabau and Holt, 1999; Bertoy, 2002). Owners of constipated pets should be questioned about medications their pet is receiving because a number of commonly used drugs are associated with constipation (Table 64-1). In addition, consumption of bones and raw foods has been associated with constipation and obstipation in dogs. Lastly, owners should be questioned regarding potential exposure to lead because lead poisoning can result in constipation. Consumption of lead-based paint chips and glazed ceramic food bowls are potential sources.

Depression and dehydration may be noted at physical examination of constipated animals. Abdominal palpation often reveals colonic distention and the presence of dry hard feces. Digital rectal examination may also confirm dry hard feces. Rectal examination may also reveal foreign bodies, rectal neoplasia or a reduction in the pelvic inlet due to a previous pelvic fracture. Anal sac disease, perianal fistulas and perineal hernias may be visualized upon examination of the perineum. In dysautonomia, constipation will be accompanied by other autonomic signs including mydriasis, distended urinary bladder, dysphagia, prolapsed nictitans and dry mucous membranes (Lyons, 1998).

### Laboratory and Other Clinical Findings

Most constipated pets do not require diagnostic evaluation beyond a careful history and physical examination and the appropriate exclusion of systemic and GI causes. However, all obstipated and chronically constipated pets should have a workup that includes a complete blood count, biochemistry profile, urinalysis, thyroxine analysis and abdominal radiography. Further diagnostic evaluation may require abdominal ultrasound, GI contrast studies and/or colonoscopy.

### Risk Factors

In cats, constipation occurs most commonly in middle-aged (mean = 5.8 years), male cats (70%) of domestic shorthair (46%), domestic longhair (15%) or Siamese (12%) breeding. A

review of obstipation in cats (Washabau, 2001) revealed 62% of cases were due to idiopathic megacolon, 23% to pelvic canal stenosis and 6% to nerve injury with most related to Manx sacral spinal cord deformity. The remaining cases (4%) were due to complications of colopexy (1%), colonic neoplasia (1%) and suspected colonic hypo- or aganglionosis (2%). Inflammatory, pharmacologic and environmental/behavioral causes were not cited as predisposing factors in any of the original case reports in this review (Washabau, 2001). Endocrine factors including obesity were noted in several cases, but were not acknowledged as the etiology of megacolon. Although it is important to consider an extensive list of differential diagnoses in individual cats, it should be kept in mind that most cases are idiopathic, orthopedic or neurologic in origin.

The use of opioid narcotics for pain or control of GI transit time has long been recognized to cause constipation. The constipating effect of narcotic analgesics is well known but its mechanisms are poorly understood. Postulated mechanisms include decreased intestinal water, increased rhythmic segmentation and delayed colonic transit. Several other commonly used medications, including barium sulfate, bismuth subsalicylate and anticonvulsants, also have constipating effects.

Dietary indiscretion is frequently associated with constipation in dogs. Consumption of bones, rocks and clay may trigger an episode. Constipation and obstipation have been reported to occur in dogs consuming bones and raw food diets due to the large contribution bones make to such foods. Although not generally prone to dietary indiscretion, cats may develop constipation as a consequence of trichobezoar formation.

Perineal and perianal disorders (e.g., perineal hernias, perianal fistulas and anal sacculitis) often predispose pets to constipation because of the pain associated with defecation (Box 64-1). Suppression of defecation results in increased fecal retention time, increased water absorption and inspissated feces. Orthopedic disorders may have a similar effect if the animal experiences pain when it assumes the defecation stance. Improperly healed pelvic fractures may reduce the size of the pelvic inlet and impinge on the rectal lumen.

Lastly, lead exposure may lead to constipation in affected animals presumably due to autonomic nervous system damage.

### Etiopathogenesis

It is important to consider an extensive list of differential diagnoses (e.g., neuromuscular, mechanical, inflammatory, metabolic/endocrine, pharmacologic, environmental and behavioral causes) for the obstipated patient (Byers et al, 2006; Bertoy, 2002; Washabu and Holt, 1999). The parasympathetic nervous system and intrinsic myenteric and submucosal plexuses innervate the colon. Destruction or damage to either pathway results in reduced colonic motility and potentiates constipation. Normal colonic motility involves both propulsive and non-propulsive patterns. Ingesta, digesta and associated somatic activity stimulate propulsive contractions, which serve to move colonic contents distally. Non-propulsive motility, also termed rhythmic segmentation, mixes colonic contents and promotes absorption of water and electrolytes.

### Box 64-1. Dietary Management of Perianal Fistulas in Dogs.

The perianal fistula syndrome (anal furunculosis) is a frustrating problem for pet owners and veterinarians. Although uncommon in the general canine population, it is commonly seen in the German shepherd dog. This condition is often recurrent or refractory to treatment and may lead to elective euthanasia. The etiology of perianal fistulas is unknown, although it is suspected to be immune-mediated. Immunohistochemical studies of tissues from affected dogs support this concept. These tissues had T-helper cell cytokine mRNA profiles and increased expression of matrix metalloproteinases 9 and 13, which are primarily produced in macrophages. Reports of the successful use of immunosuppressive drugs, including prednisone and cyclosporine, and elimination foods in affected dogs lend credence to the idea that the condition is immune mediated. Concurrent lymphoplasmacytic colitis is found in the majority of dogs with perianal fistulas, although it is unknown if these conditions are causally linked.

Dietary treatments for perianal fistula patients are highly case specific and dependent on the degree of diarrhea, constipation, tenesmus and rectal stricture that may be present. Success with dietary therapy can be unpredictable, and it is often trial and error to discover which dietary maneuver will succeed in a particular patient. The feeding plan is used in conjunction with immunosuppressive agents and stool softeners, depending on the degree of rectal stricture. The preferred therapy for perianal fistula is immunosuppressive therapy, with the greatest success occurring with cyclosporine therapy. This is the preferred therapy in severe disease and when rectal stricture is present. Other options include systemic prednisone and azathioprine or topical tacrolimus administration. The reader is referred to medical texts for more information. When medical management is not successful or there are residual fistulas, surgical resection of necrotic, inflamed tracts is necessary. The most successful surgical procedures involve cryotherapy or the use of the Nd:YAG laser; other surgical techniques have high complication and recurrence rates. Interested readers are referred to surgical texts for more information.

The signs of large bowel diarrhea associated with perianal fistula are sometimes managed successfully by increasing the insoluble fiber content of the food. If the current food contains less than 5% dry matter (DM) crude fiber, insoluble fiber is the first treatment of choice because it increases fecal bulk and improves transit

time. However, it is prudent to increase the DM fiber concentration in increments of 5% per week until clinical signs resolve; increasing fiber intake too rapidly may result in pain and obstipation. This can be done by mixing the patient's current food with a high-fiber food, in a manner recommended for a gradual transition from one food to another. Another successful approach, especially when rectal stricture is present, is to use a lower residue food containing a mixed-fiber source. Low-residue foods may contain either little or no (<2% DM) crude fiber or use predominately soluble or fermentable fiber (<5% DM total dietary fiber).

Novel antigen diets have been suggested for managing dogs with perianal fistulas. This approach was used successfully in 18 of 27 (67%) dogs also receiving immunosuppressive doses of corticosteroids. Chapter 31 discusses elimination foods.

Some investigators have speculated that omega-3 (n-3) fatty acids derived from fish oil or other sources may have a beneficial effect in controlling inflammation associated with perianal fistulas. Chapter 57 provides more information about omega-3 fatty acids.

Some dogs with perianal fistulas may benefit from small, frequent meals in conjunction with exercise to encourage more frequent defecation.

Body weight and condition determinations and stool evaluations are useful for assessing patients with perianal fistulas. Patients should be evaluated immediately if a change or decline in body weight or condition is noted. Regaining or maintaining optimal body weight and condition, normal activity level, normal behavior and absence of clinical signs are measures of successful management. Feeding method and amount fed, as tolerated by the patient, can be adjusted as needed to maintain body weight and condition. If dietary therapy alone is insufficient to improve stool quality and maintain body weight, additional medical or surgical therapy should be considered. Unfortunately, recurrence is common and prolonged medical therapy and multiple surgeries may be necessary. Many affected dogs are eventually euthanized because of client frustration with repeated bouts of the disease or the cost of continuous medical therapy.

The Bibliography for **Box 64-1** can be found at [www.markmorris.org](http://www.markmorris.org).

The pathogenesis of feline idiopathic megacolon has been variably attributed to primary neurogenic or degenerative neuromuscular disorders. Although a small number of cases (11%) result from neurologic disease, the vast majority (>60%) of cases have no evidence of neurologic disease (Washabau, 2001; Washabau and Holt, 1999). These cases may involve disturbances of colonic smooth muscle; *in vitro* studies suggest that colonic smooth muscle function is impaired in cats affected with idiopathic megacolon (Washabau and Sammarco, 1996; Washabau et al, 2002).

Isometric stress measurements (*in vitro*) were performed on colonic smooth muscle segments obtained from cats suffering from idiopathic dilated megacolon. Megacolonic smooth muscle developed less isometric stress in response to neurotransmit-

ters (acetylcholine, substance P, cholecystokinin), membrane depolarization (potassium chloride) and electrical field stimulation, when compared to muscle from healthy controls. These differences were observed in longitudinal and circular smooth muscle from both the ascending and descending colon. No significant abnormalities of smooth muscle cells or of myenteric neurons were observed histologically. These studies suggested that feline idiopathic megacolon is a generalized dysfunction of colonic smooth muscle, and that treatments aimed at stimulating colonic smooth muscle contraction might improve colonic motility (Washabau and Sammarco, 1996).

Dehydration and electrolyte imbalances may induce constipation. Dehydration enhances colonic water absorption and leaves a dry, hard fecal mass. For example, cats with chronic

**Table 64-2.** Key nutritional factors and their recommended levels for foods for patients with chronic constipation or obstipation.\*

Factors	Recommended levels
Water	>75% for cats and dogs with constipation or obstipation (moist foods)
Fiber	≥7% crude fiber (insoluble or mixed is best) for cats and dogs with chronic constipation and intermittent obstipation ≤5% for cats with chronic obstipation (megacolon)
Digestibility	Highly digestibility for cats with chronic obstipation (megacolon) (fat and digestible carbohydrate ≥90% and protein ≥87%)
Energy density	≥4 kcal/g for cats with chronic obstipation (megacolon)

\*All values are on a dry matter basis except water; to convert kcal to kJ, multiply kcal by 4.184.

kidney disease may have intermittent constipation associated with dehydration. Electrolyte disturbances (e.g., hyponatremia, hypokalemia, hypocalcemia and hypercalcemia) may alter colonic muscular activity resulting in constipation.

Mechanical obstruction may result in constipation due to intraluminal or extraluminal masses, rectal strictures and narrow pelvic outlets (e.g., improperly healed pelvic fractures). Additionally, a number of neurologic disorders may result in reduced colonic motility. These include cauda equina syndrome, dysautonomia (Key-Gaskell syndrome) and diabetic or hypothyroid polyneuropathy.

### Key Nutritional Factors

Key nutritional factors for chronic constipation differ from key nutritional factors for obstipation. **Table 64-2** summarizes key nutritional factors for constipation and obstipation.

#### Water

Maintaining normal hydration status is important for managing patients with chronic constipation or obstipation. Water is a key nutrient and its intake is often overlooked. A variety of methods should be used to encourage water intake. These include providing multiple bowls of potable water in prominent locations in the pet's environment, feeding moist (>75% water) rather than dry forms of foods, adding small amounts of flavoring substances such as bouillon or broth to water sources and offering ice cubes as treats or snacks. Addition of canned pumpkin and/or sweet potato to the current food has been successfully used in some cases of constipation.<sup>a</sup> These canned vegetables consist primarily of water (90%), which adds a significant quantity of water to the digesta. Beneficial effects resulting from canned pumpkin or sweet potato are likely the result of an increase in total daily water consumption, although fiber intake is also increased.

#### Fiber

Many patients with constipation improve clinically when the fiber content of their food is increased. Dietary fibers are poorly digestible polysaccharides, derived from a variety of sources.

Fiber sources typically used in commercial pet foods include sugar beet pulp, cereal grains, cellulose, soy hulls, peanut hulls and pea fiber. Increasing fiber intake usually increases fecal water content, colonic motility and intestinal transit rate, all of which may benefit patients with constipation. Both fermentable and non-fermentable fiber sources have been advocated for the management of constipation (Dimski, 1989; Zor-an, 1999). Fiber acts as a bulk-forming laxative. Insoluble (poorly fermentable) fibers (e.g., purified cellulose, peanut hulls) normalize colonic motility by distending the colonic lumen, increasing colonic water content, diluting luminal toxins (e.g., bile acids, ammonia and ingested toxins) and increasing the rate of passage of digesta. This change in colonic transit time reduces colonocyte exposure to toxins while softening the stool and increasing the frequency of defecation. Several gel-forming fibers have been recommended as an aid in managing constipation in people (Wald, 1998) and animals (Dimski, 1989). Soluble (fermentable) fibers (fruit pectins, guar gum, psyllium) are readily fermented by bacteria, producing short-chain fatty acids, which benefit colonic health. These fibers, whether added to or incorporated into food, are reported to swell to form emollient gels and facilitate passage of fecal matter (Dimski, 1989; Lembo and Camilleri, 2003). However, fermentable fibers may not be as laxative as insoluble or mixed fibers because they have little ability to increase fecal bulk or dilute luminal toxins (Washabau, 2005a). Flatulence, diarrhea and abdominal cramping are potential side effects to fermentable, gel-forming fibers. These side effects can be reduced by a gradual transition to fiber supplementation, slowly increasing the level of added fermentable fiber until efficacy is achieved with minimal side effects. Such fibers should be added at no more than 5% of the total food because soluble fibers can significantly reduce the availability of minerals, including zinc, calcium, iron and phosphorus (Wedekind et al, 1995, 1996, 1996a) (Chapter 5).

Ingredients such as beet pulp, brans (rice, wheat or oat), pea fiber, soy fibers, soy hulls or mixtures of soluble and insoluble fiber sources are intermediate in their fermentability and have moderate attributes of both fermentable and poorly fermentable fibers (Figure 5-13). They are referred to as mixed fibers.

For patients with chronic constipation that still have some level of colonic motility, the crude fiber content of a food should be at least 7% dry matter (DM) initially and the fiber source should be insoluble or mixed.

Fiber sources can be added to a patient's current food (**Box 64-2**), but it is generally better to switch to a fiber-enhanced food. Feeding additional dietary fiber is preferable to the use of laxative medications alone. Dietary fiber is more physiologic, better tolerated and often more effective than non-fiber laxatives.

The motility patterns of patients with obstipation are completely abolished (e.g., severe endstage megacolon in cats). In these patients, fiber-enhanced foods and fiber supplements are no longer effective stimulants of colonic motility and, worse, can contribute to obstipation. Foods for patients with megacolon should have no more than 5% DM crude fiber.

### Box 64-2. A Safe and Practical Method for Providing Supplemental Fiber to a Patient's Current Food and Limitations of Using Canned Pumpkin as a Supplemental Fiber Source.

Adding fiber supplements is the least desirable approach for increasing fiber intake in patients with chronic constipation. In most constipation cases, dietary fiber intake can be increased by switching to a balanced food with the desired fiber content (**Tables 64-3** and **64-4**) or a mixture of two balanced foods can be fed using the Pearson square method to determine the amounts of constituent foods in the mixture (Chapter 1). If fiber supplements are used, they should be added to moist foods to ensure the fiber is mixed with the food and doesn't settle out in the bowl.

For this method, a practical source of fiber is Fiber One Bran Cereal<sup>a</sup> breakfast cereal. Although it is a human breakfast cereal and is not nutritionally balanced for dogs and cats, it does contain carbohydrate, protein, minerals and vitamins. Thus, relative to other readily available fiber supplements such as psyllium, wheat bran or canned pumpkin, Fiber One breakfast cereal is a more balanced source of fiber. It is somewhat palatable (depending on the individual patient's preferences and amount used) and contains a good amount of insoluble fiber (almost 50% dry matter [DM] crude fiber). **Table 1** provides a dose schedule for moist food.

Use the Pearson square method for determining how much Fiber One to add to a dry pet food to achieve a specific crude fiber level. Variability in the weight density per 8-oz. measuring cup makes it difficult to create a similar reliable table for dry pet foods.

Besides not being a balanced food, canned pumpkin as a fiber source has an important volume limitation. Canned pumpkin con-

tains 90% water and on an as fed basis has only a fraction of the crude fiber of Fiber One cereal. As noted below, to obtain a fiber level of 10 to 11%, 2 tsp of Fiber One breakfast cereal are added to an 8-oz. cup of moist food. To achieve the same amount of fiber, more than 8 oz. of canned pumpkin would have to be added to the 8 oz. of moist food, more than doubling the amount of food the patient would have to eat to ingest the same amount of crude fiber.

#### ENDNOTE

a. Fiber One Bran Cereal. General Mills Cereals, LLC, Minneapolis, MN, USA.

**Table 1.** Dose schedule for Fiber One Bran Cereal to add to a typical moist food\* and resultant crude fiber level.

Added Fiber One	Total crude fiber in mixture (DM)
1 tsp	7 to 8%
2 tsp	10 to 11%
3 tsp	13 to 14%
4 tsp	16 to 17%
5 tsp	18 to 19%

Key: tsp = rounded teaspoon (~5 g).

\*8 volume oz. measuring cup of a typical moist food; assumed crude fiber content of approximately 3% DM, before Fiber One cereal is added. To improve acceptance by the patient and allow the colon and colonic microflora to adapt to the increase in fiber intake, gradually increase the amount of fiber added.

### Digestibility and Caloric Density

For patients suffering from obstipation (including feline mega-colon), in which colonic motility patterns are completely abolished, feeding a highly digestible food (fat and digestible [soluble] carbohydrate  $\geq 90\%$  and protein  $\geq 87\%$ ) with an increased energy density ( $\geq 4.0$  kcal/g [ $\geq 16.7$  kJ/g] DM) will provide adequate nutrition and markedly reduce the fecal mass. A food's energy density and digestibility are inversely related to its fiber content. Reducing fiber results in increased caloric density, which helps meet the patient's requirements in a small volume of food. Calorically dense foods can markedly reduce the burden of home management (i.e., administering stool softeners and enemas) for pet owners. In such cases, fecal production is reduced to such an extent that owners can generally remove feces by cleansing enemas once or twice weekly. In many cases, this food transition is made as the owner considers the surgical option of subtotal colectomy.

The energy density and digestibility of a food are less important in constipated patients.

### FEEDING PLAN

Initial management of chronic constipation includes owner education, encouraging increased water intake, appropriate dietary changes and judicious use of laxatives and enemas. If the affected animal is overweight, a weight-reduction program

should be considered. Obstipation often requires multiple cleansing enemas with or without mechanical removal of impacted feces before dietary changes are instituted.

### Assess and Select the Food

The key nutritional factor content of the food currently being fed should be evaluated in patients with constipation. Information from this aspect of assessment is essential for making any changes to foods currently provided. Changing to a more appropriate food is indicated if levels of key nutritional factors of the current food do not closely match recommended levels. **Tables 64-3** and **64-4** list selected commercial veterinary therapeutic foods for dogs and cats, respectively, affected with chronic constipation and compare the key nutritional content of these foods to recommended levels.

Many constipated cats respond favorably when fed a fiber-enhanced food, particularly if it is a moist food. Cats should be well hydrated before increasing fiber intake to maximize the therapeutic effect of fiber and to minimize the potential for fiber impaction in the constipated colon (Scherk, 2003; Washabau and Sammarco, 1996). Also, it is prudent to increase the fiber concentration gradually (e.g., 5%, 10%, 15%, 20%) over several weeks until clinical signs improve or resolve.

While less convenient, the fiber intake can also be increased by adding a higher fiber food to the current food. Most commercial grocery and specialty brand pet foods contain less than 5% DM crude fiber. Fiber-enhanced foods contain between 8

**Table 64-3.** Key nutritional factors in selected veterinary therapeutic foods for dogs with constipation and intermittent obstipation compared to recommended levels.\*

<b>Moist foods</b>	<b>Crude fiber (%)</b>	<b>Primary sources of fiber**</b>
<b>Recommended levels</b>	<b>≥7</b>	<b>–</b>
Hill's Prescription Diet w/d Canine	12.4	Cellulose
Iams Veterinary Formula Intestinal Low-Residue	3.9	Beet pulp
Medi-Cal Fibre Formula	15.0	Tomato pomace, guar gum, flax meal, carrageenan
Purina Veterinary Diets OM Overweight Management Formula	19.2	Pea fiber, beet pulp, carrageenan
Royal Canin Veterinary Diet Calorie Control CC High Fiber	8.8	Tomato pomace, guar gum, flax meal, carrageenan
<b>Dry foods</b>	<b>Crude fiber (%)</b>	<b>Primary sources of fiber**</b>
<b>Recommended levels</b>	<b>≥7</b>	<b>–</b>
Hill's Prescription Diet w/d Canine	16.4	Cellulose, soybean mill run, beet pulp
Iams Veterinary Formula Intestinal Low-Residue	2.1	Beet pulp
Medi-Cal Fibre Formula	14.3	Tomato pomace, rice hulls, oat hulls, flax meal, apple pomace
Purina Veterinary Diets DCO Dual Fiber Control	7.6	Beet pulp, pea fiber
Purina Veterinary Diets OM Overweight Management	10.3	Soybean hulls, pea fiber, cellulose
Royal Canin Veterinary Diet Calorie Control CC 26 High Fiber	17.6	Cellulose, pea fiber, rice hulls, beet pulp, psyllium husk
Royal Canin Veterinary Diet Diabetic HF 18	12.1	Cellulose, rice hulls, guar gum

\*Moist foods are best. Manufacturers' published values. Values expressed on a dry matter basis.  
\*\*Fiber sources should be insoluble or mixed. Increased levels of soluble fiber are not recommended (see text).

**Table 64-4.** Key nutritional factors in selected veterinary therapeutic foods for cats with constipation and intermittent obstipation compared to recommended levels.\*

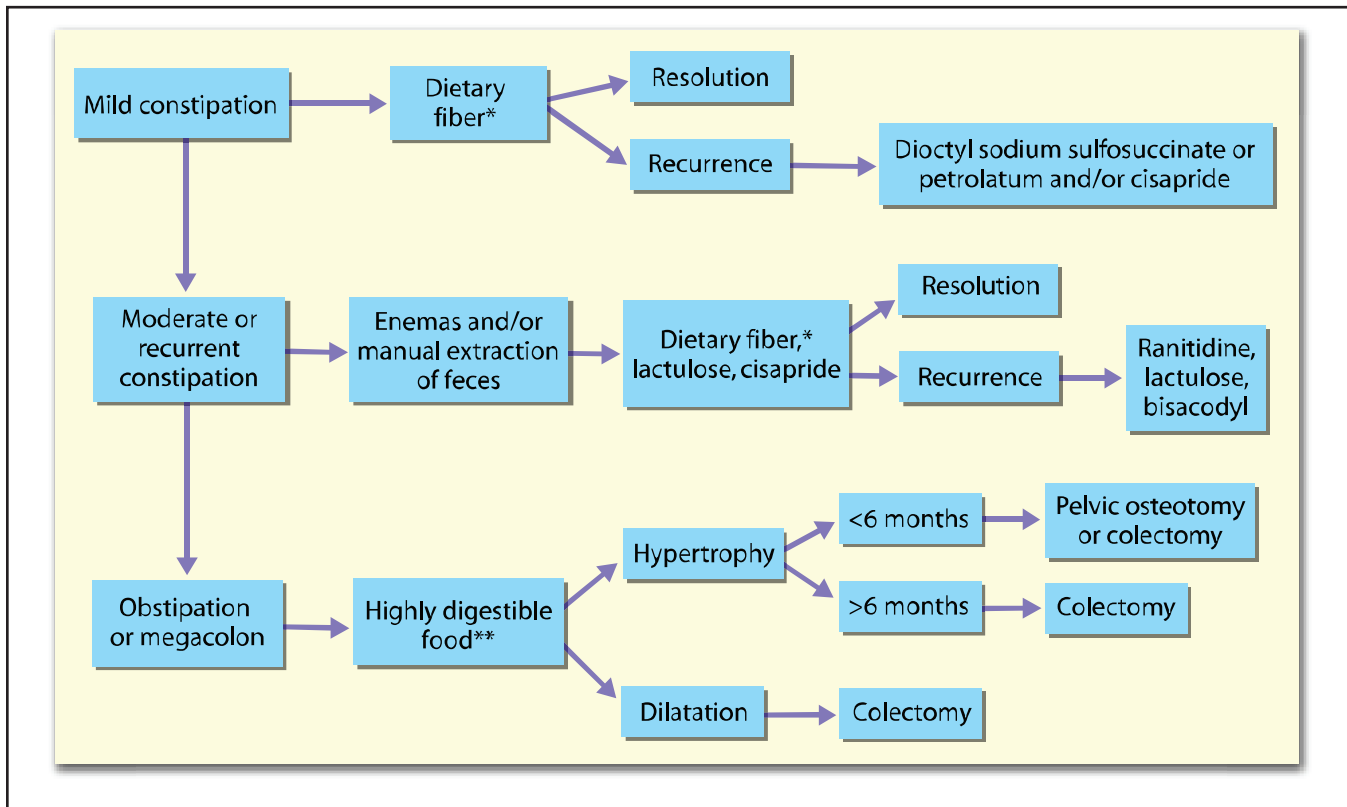
<b>Moist foods</b>	<b>Crude fiber (%)</b>	<b>Primary sources of fiber**</b>
<b>Recommended levels</b>	<b>≥7</b>	<b>–</b>
Hill's Prescription Diet w/d with Chicken Feline	10.6	Cellulose, oat fiber, guar gum, locust bean gum, carrageenan
Iams Veterinary Formula Intestinal Low-Residue	3.7	Beet pulp
Medi-Cal Fibre Formula	16.7	Pea fiber, flax meal, guar gum
Purina Veterinary Diets OM Overweight Management	10.2	Pea fiber, oat fiber, guar gum
Royal Canin Veterinary Diet Calorie Control CC High Fiber	7.7	Cellulose, guar gum, flaxseed
<b>Dry foods</b>	<b>Crude fiber (%)</b>	<b>Primary sources of fiber**</b>
<b>Recommended levels</b>	<b>≥7</b>	<b>–</b>
Hill's Prescription Diet w/d Feline	7.6	Cellulose
Hill's Prescription Diet w/d Feline with Chicken	7.6	Cellulose
Iams Veterinary Formula Intestinal Low-Residue	1.8	Beet pulp
Medi-Cal Fibre Formula	14.9	Pea fiber, beet pulp, flax meal
Purina Veterinary Diets OM Overweight Management	5.6	Oat fiber, cellulose
Royal Canin Veterinary Diet Calorie Control CC High Fiber	14.0	Cellulose, pea fiber, rice hulls, beet pulp, psyllium

\*Moist foods are best. Manufacturers' published values. Values expressed on a dry matter basis.  
\*\*Fiber sources should be insoluble or mixed. Increased levels of soluble fiber are not recommended (see text).

**Table 64-5.** Key nutritional factors in selected veterinary therapeutic foods for cats with chronic obstipation (megacolon) compared to recommended levels.\*

<b>Moist foods</b>	<b>Crude fiber (%)</b>	<b>Protein digestibility (%)</b>	<b>Fat digestibility (%)</b>	<b>Carbohydrate digestibility (%)</b>	<b>Energy density (kcal/g)**</b>
<b>Recommended levels</b>	<b>≤5</b>	<b>≥87</b>	<b>≥90</b>	<b>≥90</b>	<b>≥4</b>
Hill's Prescription Diet a/d Canine/Feline	1.3	90	89	96	4.8
Hill's Prescription Diet i/d Feline	2.4	91	89	91	4.2
Iams Veterinary Formula Intestinal Low-Residue	3.7	na	na	na	4
Iams Veterinary Formula Stress/Weight Gain Formula Maximum-Calorie	2.7	na	na	na	5.8
Medi-Cal Hypoallergenic/Gastro	1.2	na	na	na	na
Medi-Cal Recovery Formula	3.4	na	na	na	na
Medi-Cal Sensitivity CR	2.5	na	na	na	na
Royal Canin Veterinary Diet Recovery RS	3.4	na	na	na	4.4
<b>Dry foods</b>	<b>Crude fiber (%)</b>	<b>Protein digestibility (%)</b>	<b>Fat digestibility (%)</b>	<b>Carbohydrate digestibility (%)</b>	<b>Energy density (kcal/g)**</b>
<b>Recommended levels</b>	<b>≤5</b>	<b>≥87</b>	<b>≥90</b>	<b>≥90</b>	<b>≥4</b>
Hill's Prescription Diet i/d Feline	2.8	88	92	90	4.3
Iams Veterinary Formula Intestinal Low-Residue	1.8	na	na	na	3.9
Medi-Cal Hypoallergenic/Gastro	3.1	na	na	na	na
Purina Veterinary Diets EN GastroENteric Formula	1.3	94.0	93.1	79.7	4.4
Royal Canin Veterinary Diet Intestinal HE 30	5.8	na	na	na	4.4

Key: na = information not available from manufacturer.  
\*Moist foods are best. Manufacturers' published values. All values expressed on a dry matter basis.  
\*\*To convert to kJ, multiply kcal by 4.184.



**Figure 64-1.** An algorithm for combined dietary and medical management for constipation and obstipation.

\*Tables 64-3 and 64-4.

\*\*Table 64-5.

(Adapted from Washabau RJ, Sammarco J. Alterations in colonic smooth muscle function in cats with idiopathic megacolon. *American Journal of Veterinary Research* 1996; 57: 580-587. Scherk MA. Feline megacolon. In: *Proceedings. 21st Annual American College of Veterinary Internal Medicine Forum* 2003, Charlotte, NC: 911-913.)

and 25% DM crude fiber. The source of fiber may be determined by reviewing the ingredient list (Chapter 9). Almost any intermediate fiber concentration can be achieved by combining foods (dry or moist) that have different levels of fiber. The amounts of the constituent foods for the mixture can be determined using the Pearson square (Chapter 1). When making this calculation, be sure to use the same method of expressing the foods' fiber content (i.e., as fed or DM basis).

Adding fiber supplements such as psyllium, coarse wheat bran, bran cereals and canned pumpkin to the pet's regular food is another method of increasing the fiber intake of constipated patients. However, this is a less desirable approach. Fiber supplements can be awkward to use, may make the food unpalatable and in some instances can significantly reduce mineral bioavailability and create an unbalanced food. Fiber supplements work best when added to moist foods. **Box 64-2** provides a safe method for increasing the fiber content of a moist pet food by using a high-fiber human breakfast cereal as the fiber source.

Obstipated patients that have lost colonic motility should be fed foods that are highly digestible and have increased energy density. **Table 64-5** lists the key nutritional factor contents for foods for feline patients with chronic obstipation (megacolon)

and compares them to recommended levels. Patients with severe megacolon may need veterinary therapeutic foods for stress/recovery (Tables 25-8 and 25-9) or homemade foods.

### Assess and Determine the Feeding Method

Because the feeding method may be altered in patients with constipation, a thorough assessment should include verification of the feeding method currently being used, including feeding frequency, amount fed and access to other food.

In some cases, smaller more frequent meals may aid colonic motility patterns. Dogs should be walked immediately after feeding; both mild exercise and the gastrocolic reflex will often result in defecation during the immediate postprandial period. Feeding three to four meals per day also minimizes the amount of ingesta entering the large bowel at one time. As discussed above, water intake should be encouraged and drinking water should be readily available (i.e., multiple locations in the pet's environment) at all times.

### ADJUNCTIVE MEDICAL THERAPY

The specific therapeutic plan will depend upon the severity of constipation and the underlying cause (**Figure 64-1**). First epi-

**Table 64-6.** Non-dietary medical therapies.**Emollient/lubricant laxatives/stool softeners**

Dioctyl sodium succinate (Colace, Regulax SS, Surfak)

Dioctyl calcium sulfosuccinate (Sufax)

Mineral oil (Fleet mineral oil)

**Hyperosmolar laxatives**

Glycerin

Lactulose (Cephulac, Chronulac, Duphalac)

Polyethylene glycol (Miralax) (toxic to cats)

Polyethylene glycol with electrolytes (Colyte, GoLYTELY, NuLYTELY)

Sugar alcohols

Sorbitol (potentially toxic to small dogs and cats)

Mannitol

**Saline laxatives**

Magnesium citrate (Evac-Q-Mag)

Magnesium hydroxide (Phillip's Milk of Magnesia)

Magnesium sulfate

Sodium phosphate (Fleet enema, Fleet Phospho-Soda, Visicol)

**Stimulant laxatives**

Aloe

Anthraquinones

*Cascara sagrada* (Colamin, Sagrada-lax)

Senna (Senokot, Ex-Lax)

Castor oil (Purge, Neoloid, Emulsoil)

Diphenylmethanes

Phenolphthalein

Bisacodyl (Dulcolax, Correctol)

Sodium picosulfate (Lubrilax, Sur-Lax)

**GI prokinetic therapy**

Cisapride

Prucalopride (Resolor) (not approved in the U.S.)

**New applications of existing drug classifications**

Acetylcholinesterase inhibitors (ranitidine, nizatidine, neostigmine)

Erythromycin

Metoclopramide

Prostaglandin E<sub>1</sub> analogues (misoprostol)

sodes are often transient and resolve without medical therapy. Mild to moderate or recurrent episodes of constipation usually require medical intervention. In addition to dietary management, these cases may be managed, often on an outpatient basis, with water enemas, oral or suppository laxatives, and/or colonic prokinetic agents. Obstipation usually requires hospital admittance to correct metabolic abnormalities and to evacuate impacted feces using water enemas, manual extraction of retained feces, or both. Followup therapy in such cases is directed at correcting predisposing factors and preventing recurrence (Washabau and Sammarco, 1996). Medical therapies for mild to moderate constipation include enemas, stool softeners, laxatives (Table 64-6) and colonic motility modifiers (e.g., cisapride<sup>b</sup>, 0.25 mg/kg body weight, t.i.d. to q.i.d.). A number of poorly absorbed carbohydrates may prove useful as laxatives. These sugars, including polyethylene glycol, sorbitol, lactulose and lactitol are hydrolyzed to fatty acids by the colonic microflora. The metabolites of these sugars exert osmotic pres-

sure and draw fluid into the colon lumen. Additionally, laxative therapy may occasionally be needed to promote fecal hydration and lubrication.

Cats suffering from bouts of obstipation or idiopathic dilated megacolon are, by definition, unresponsive to medical therapy. Surgery (subtotal colectomy) may become necessary to remove the affected portion of the bowel in cases of idiopathic megacolon. In most cases, subtotal colectomy with ileorectal or cecocolic-rectal anastomosis is the treatment of choice.

## REASSESSMENT

Body weight and condition assessments and stool evaluations are useful for monitoring patients with constipation. Well-compensated patients should be evaluated immediately if a change or decline in condition is noted. Regaining or maintaining optimal body weight and condition, normal activity level, normal behavior and absence of clinical signs are measures of successful dietary management. The feeding method and amount fed can be adjusted as needed to maintain body weight and condition. Additional medical therapies should be considered if dietary management alone is insufficient to improve stool quality and maintain body weight. Although treatment is highly case specific, many cases can eventually be managed with diet alone after initial medical therapies are gradually discontinued.

Occasionally, a patient may develop constipation, obstipation or flatulence while being fed moderate- (8 to 15% DM fiber) or high-fiber (>15% DM fiber) foods. The prudent recommendation in such cases is to decrease the fiber content by one-half, reevaluate the patient in one week and decrease the fiber content again if necessary. This situation occurs more commonly in older overweight and obese cats consuming dry, high-fiber, low-calorie foods for weight control than in cats being treated for constipation with fiber.

## ENDNOTES

- Maureen Carroll, Angell Animal Medical Center, Boston, MA. Personal observation.
- Available from compounding pharmacies.

## REFERENCES

The references for Chapter 64 can be found at [www.markmorris.org](http://www.markmorris.org).



**CASE 64-1****Constipation in a Domestic Shorthair Cat**

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**Patient Assessment**

A six-year-old, neutered male exclusively indoor domestic shorthair cat was examined for tenesmus and apparent constipation. The owners had noticed the cat making multiple unproductive attempts to defecate in the litter box. The cat was also seen sitting in the litter box for prolonged periods without making attempts to urinate or defecate. Two other cats in the household were normal. The owners cleaned the litter box daily and noticed both normal and dry, hardened feces. Because the cat had been constipated in the past, the owners were giving a flavored petrolatum product (Laxatone<sup>a</sup>) each day by mouth.

Physical examination revealed a normal-appearing, overweight, 5.5-kg cat. The cat's body condition score (BCS) was 4/5. Abdominal palpation elicited a painful response and the entire colon was distended with firm feces.

Warm tap water and mineral oil enemas were given to the cat; some of the fecal material was subsequently passed. The cat was anesthetized and warm tap water was infused into the colon while the remaining fecal material was manually expressed by abdominal palpation. The cat was discharged the same day with instructions for the owners to increase the amount of flavored petrolatum given each day.

Ten days later, the cat was reexamined for similar problems. Abdominal radiographs revealed a markedly distended colon impacted with feces. No foreign material, mass lesions, healed pelvic fractures or spinal abnormalities were noted radiographically. The fecal material was removed by enemas and manual extraction. A tentative diagnosis of chronic constipation and possible megacolon was made.

**Assess the Food and Feeding Method**

All of the cats in the house were fed a commercial dry specialty brand adult cat food free choice. Canned tuna or a variety of commercial moist grocery brand foods were offered once or twice weekly as a treat. Water was available free choice although all three cats liked to drink from faucets and toilet bowls.

**Questions**

1. What are the key nutritional factors to consider for this patient?
2. Outline an appropriate feeding plan (foods and feeding method) for this cat.
3. What other therapy can be used in conjunction with the feeding plan?

**Answers and Discussion**

1. The key nutritional factors for this patient are water and fiber intake. Fiber is classified as a bulk-forming laxative although it has many other properties. Fiber's beneficial effects in treating animals with constipation include increasing fecal water content, increasing intestinal motility, altering intestinal transit rate and increasing frequency of defecation. Feeding more moist food and less dry food would also increase water intake.
2. Fiber supplements such as psyllium husk fiber, wheat bran or pumpkin can be added to the moist foods. Alternatively, commercial, fiber-enhanced moist foods can make up part or all of a patient's diet. This cat will need to be fed separately from other cats in the household. Several smaller meals during the day rather than one large meal may be beneficial and will be similar to the free-choice feeding method used previously.
3. Therapy for chronic constipation includes: 1) removing impacted feces, 2) administering laxatives, 3) assessing the diet and 4) administering prokinetic agents. Laxatives are classified as emollient (dioctyl sodium sulfosuccinate), lubricant (mineral oil, petrolatum), hyperosmotic (lactulose, magnesium salts, polyethylene glycols) and stimulant (bisacodyl). All these may be used in cats with mild to moderate constipation, but they should be avoided in cases with functional or mechanical bowel obstruction (obstipation). Studies suggest that stimulating colonic smooth muscle contraction may improve colonic motility in cats with idiopathic dilated megacolon. In vitro studies have shown that cisapride<sup>b</sup> stimulates propulsive motility in the colon, and anecdotal experience suggests that cisapride also effectively stimulates colonic propulsive motility in cats with mild to moderate idiopathic constipation. Cats with longstanding obstipation and megacolon are not likely to improve with dietary, laxative and prokinetic therapy alone. Subtotal colectomy should be considered in these cases.

## Progress Notes

Metamucil<sup>c</sup> (0.5 tsp) was added to the moist food (1-1/4 5.5-oz. cans) and offered to the cat daily in addition to the regular commercial dry food fed free choice. The moist food plus fiber supplement made up approximately half of the daily food intake. Little improvement was noted after one month. The cat was then exclusively fed a commercial moist veterinary therapeutic food (Prescription Diet w/d Feline<sup>d</sup>) with moderate fiber levels (9.3% dry matter crude fiber). One 5.5-oz. can was divided into three meals per day for slow weight loss. There was some improvement after one month (i.e., increased frequency of defecation and moister feces). However, constipation remained an intermittent problem. Cisapride, 2.5 mg, two to three times daily per os, was added to the therapeutic protocol and, subsequently, the cat had only occasional problems with constipation.

## Endnotes

- a. EVSCO Pharmaceuticals, Buena, NJ, USA.
- b. Available from compounding pharmacies.
- c. Procter & Gamble, Cincinnati, OH, USA.
- d. Hill's Pet Nutrition, Inc., Topeka, KS, USA.

## Bibliography

- DeNovo RC, Bright RM. Chronic feline constipation/obstipation. In: Kirk RW, Bonagura JD, eds. *Current Veterinary Therapy XI*. Philadelphia, PA: WB Saunders Co, 1992; 619-626.
- Washabu RJ, Hasler AH. Constipation, obstipation and megacolon. In: August JR, ed. *Consultations in Feline Internal Medicine 3*. Philadelphia, PA: WB Saunders Co, 1997; 104-112.