GASTROENTERIC DISEASES: FEEDING FOR SUCCESS

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Approximately 4% of small animal patients are brought to veterinarians because of gastrointestinal (GI) disease [1]. Dietary therapy is always part of the treatment plan for GI disease, regardless of whether the signs are acute or chronic. In acute diarrheal disease, management in many cases will be symptomatic and supportive, with minimal diagnostic evaluation aimed at ruling out a limited number of specific conditions, such as parasitic and acute viral enteropathies, especially in immature animals. In chronic (or unresponsive acute) diarrheal disease, diagnostic evaluation will assume a more important role, but dietary therapy will still be part of the management plan. Diet can be part of the diagnostic process as well, such as using an elimination diet in a dietary trial.

Performing a nutritional assessment

The American College of Nutrition “Circle of Nutrition” describes the 3 factors needed in making a nutritional assessment and recommendation: animal factors, dietary factors and feeding management factors. The circle represents the relationship among all three components as well as the need for continual reassessment as health and nutritional status are not static. An accurate diet history is invaluable when making an assessment of the health of the patient and vital to formulating an individualized diet plan. Strive to make a nutritional assessment on every patient at every visit [2]. This should include a diet history and physical examination and an estimate of energy and protein requirements.

**Animal Factors** - consider the patient’s signalment, lifestage, current body weight and body condition score (BCS) (as well as any recent changes in weight and BCS) physical exam findings, health, appetite, activity level and the environment. A detailed description of the GI signs and laboratory results will help to localize the region of GI tract affected. In cases with diarrhea, an activity index can be a useful for more objectively tracking therapeutic response[3,4].

**Dietary Factors** - Determine whether the current diet is home prepared or commercial product(s) including
the form (moist semi moist or dry). If home prepared, obtain the recipe and amounts eaten. If the patient is fed a commercial food, the food should be made by a reputable manufacturer, have a nutritional adequacy statement that it has undergone animal feeding trials for adult maintenance, have a nutrient profile matching the needs of this specific pet, and provide adequate dietary protein (~2 gms/lb ideal body weight for cats and ~ 1 gm/lb ideal BW for dogs). Ask not only what diet(s) is fed, but how much and how often it is fed. Ask how long the pet has eaten its current diet. With GI disease, owners often attempt several diet changes on their own, or on the advice of lay friends or the internet. Asking only about the current diet can be misleading and not reflective of usual intake. If the patient has undergone recent or frequent changes in foods, ask specifically about each diet fed, as well as the response to each diet, and reason for change. Be sure to ask about treats and supplements.

Feeding Management Factors - Ask how the food is offered and how often. Is it measured and how? Is intake observed? Availability becomes especially important in multi-pet households.

Diet Categories Used in GI Disease

There are 4 major diet categories used in the management of gastrointestinal diseases.

1) Highly digestible, Low residue- This represents the therapeutic “enteric” diets with high quality, highly digestible protein, low fiber, and moderate to lower fat levels. (Examples: Hill’s i/d®, PVD EN, Eukanuba Low residue, Royal Canin Sensitive formula)

2) Novel Protein- These diets are meant to offer a single, novel source of dietary protein often with a single source of carbohydrate. Use of these requires a thorough, lifelong diet history in order to determine suitability. (Examples: IVD limited antigen, Hill’s d/d, PVD LA, Eukanuba KO)

3) Hydrolyzed Protein - These diets contain proteins as short peptides, which are more easily absorbed than intact proteins and are theoretically “hypoallergenic” as their small size means they go undetected by the immune system. These diets are also formulated with purified starches as the carbohydrate source. They have the added benefit of also being highly digestible (low residue). (Examples: Hill’s z/d, PVD HA and Royal Canine Hypoallergenic HP).

4) Fiber enhanced- These diets have increased levels of fiber(s) (either high insoluble fiber a mix of soluble and insoluble fiber). Not all fibers, and not all high fiber diets are alike, and it is important to have an understanding of these differences for successful management of colonic diseases (see below).

Formulating the nutritional plan

Select the diet from the category that best suits the needs of the individual patient. Dividing feedings into two to three meals per day will help maximize absorption of the diet, which is important in small intestinal diseases. In order to avoid causing food aversions, care should be taken not to make sudden changes in diet or to make changes when the pet is feeling ill. Food aversion can be quite strong, so introduce new foods gradually and consider how to optimize the timing. Patients can be expected to show a positive response within 2 weeks of starting a diet trial. Much to the relief of owners, there is no evidence that a protracted food trial is needed.
even in cases of GI signs from suspected dietary sensitivity. A dietary trial need not be fed for the 12+ weeks standardly advocated to assess success in pets with allergic dermatitis. In pets with GI signs, 1-2 weeks is usually long enough to see whether dietary therapy will improve the clinical signs. Longer-term improvement may be due to nutrient repletion as well as reduction in mucosal and systemic inflammatory responses. It is important to emphasize to owners that, during the dietary trial, the pet must not be fed any foods besides the elimination diet.

When the disease process localizes to the small bowel, it is more likely that a highly digestible, novel protein or hydrolyzed diet will be successful [5, 6]. Be sure to review the diet history to determine if any of these categories have been utilized? Select from the diet category and feed the selected food diet exclusively, if possible, to avoid confounding variables in treatment. Acute diarrhea may respond to a brief period of fasting to reduces the osmotic load in the gut lumen and to reduce pancreatic and intestinal stimulation. However, prolonged fasting is associated with villus atrophy, increased bacterial translocation, and increased morbidity. Early refeeding with small amounts of a highly digestible food may help reduce gut atrophy and facilitate recovery and has been shown to hasten recovery even in parvoviral enteritis.

Some commercial diets for inflammatory bowel disease (IBD) include enhanced levels of omega-3 fatty acids. The theory is that diets enriched in n-3 fatty acids will result in more n-3 fatty acids incorporated into biological membranes, resulting in decreased concentrations on pro-inflammatory n-6 fatty acid metabolites. There are no reports of therapeutic trials assessing the success of this approach.

If food hypersensitivity is suspected, an elimination trial is in order. Currently the gold standard is to have the owner home cook a diet made of a novel protein source. This is becoming increasingly challenging. To select the novel protein, you must have a history of all diets to which the pet has been exposed. Many pets have been exposed to multiple brands, and many treats and human foods. Many commercial products are made of multiple protein sources, and formulation may change over time. In the absence of an accurate diet history, a hydrolyzed diet would be preferable for the elimination diet trial. Alternatively, a hydrolyzed diet can be used as a first choice for the trial period, followed by careful selection of a novel protein diet if the trial was successful.

If the large bowel is the suspected site of disease, either a fiber enhanced or a low residue diet would be an appropriate first choice. Colitis is variable in its causes and responsiveness to dietary fiber. It may be worthwhile trying alternate sources and types of fiber. Dietary fibers are usually classified by water solubility or their fermentability by microorganisms. The more soluble fibers tend to be more fermentable. Soluble fibers tend to form viscous gels, which can slow gastric emptying and GI transit. Insoluble fibers tend to adsorb water and increase fecal bulk, which can help normalize GI motility. Many fibrous ingredients in foods and pet foods contain differing degrees of both soluble and insoluble fiber.

Specific Nutrient Considerations

**Dietary Fat** - Most dietary fat present is in the form of long-chain triglycerides. Of the three major nutrients, fat is the most complex to digest and absorb. The intestinal cells most specialized for absorption of fat are those located at the tips of the microvilli. These are the cells most susceptible to mucosal injury. Severe fat malabsorption is evident as steatorrhea, but fat malabsorption may occur in the absence of obvious steatorrhea.
Malabsorbed fats can be fermented by colonic bacteria to produce hydroxy fatty acids, which can stimulate a secretory diarrhea. Less commonly, fats may contribute to an exudative diarrhea. This may occur with lymphangiectasia when there is dilation or obstruction of lymphatic lacteals. The increased mucosal hydrostatic pressure secondary to congestion of lymphatic lacteals with chylomicrons causes a protein-rich exudation and interferes with nutrient and fluid absorption. An ultra low-fat diet (such as Royal Canin Gastrontestinal Low Fat LF) will help limit the diarrhea associated with fat malabsorption (lymphangiectasia). Sufficient improvement in the disease process can often be achieved that the fear of further weight loss on such a low caloric density diet is not realized. A few dogs may benefit from provision of medium chain triglycerides. Cats with chronic diarrhea may not benefit from a low fat diet. In one study, cats were fed either high fat (47% of energy) or low fat (24% of energy), highly digestible diets [9]. Over 75% of the cats showed a positive response both diets, and there were no differences based on dietary fat.

**Dietary Protein** - Adequate protein and amino acid intake is critical to promote intestinal healing, and protein does not appear to contribute to diarrhea. Enterocytes use between 10% and 20% of total energy expenditure and approximately 50% of ingested protein, with more than 90% of the aspartate, glutamate and glutamine used by the intestinal tissues. Thus, the GI tract is highly sensitive to protein or amino acid deficiency.

**Dietary Carbohydrates** - Normal, healthy cats and dogs are able to digest properly processed carbohydrates with greater than 90% efficiency. With intestinal disease, however, carbohydrate digestion may decrease as the activity of intestinal brush border disaccharidases may be damaged. When carbohydrate malabsorption does occur, it can contribute to osmotic diarrhea. Increased carbohydrate fermentation, indicative of carbohydrate malabsorption, has been confirmed in cats with inflammatory bowel disease (IBD)[10]. Carbohydrate malabsorption may occur in IBD if inflammation inhibits production of digestive enzymes or if inflammatory infiltrates inhibit nutrient absorption.

**Vitamins** - A deficiency in B12 can lead to atrophy of the rapidly dividing cells of the intestinal mucosa. Ironically, the cause of B12 deficiency is most often GI disease. Inflammatory bowel disease, lymphoma, cholangiohepatitis or cholangitis, and pancreatic inflammation have been associated with B12 deficiency in cats [11]. Older cats with GI disease seem to be more predisposed to B12 deficiency compared to younger cats [12]. Cats with diarrhea and low B12 are less likely to respond to dietary therapy alone, whereas diarrhea improved with diet change alone in more than 75% of cats with normal B12 concentrations. In dogs, dysbiosis (intestinal bacterial overgrowth) also may contribute to B12 deficiency. Correcting a B12 deficiency via parenteral supplementation (250μg subcutaneously, once weekly for 4 weeks) resulted in clinical improvement in one study of cats with GI disease and low B12 [13]. Note that the half life of cobalamin in cats is short (< 3 weeks).

In conditions where fat digestion or absorption is compromised, fat-soluble vitamins may be deficient. While such deficiencies have only rarely been reported in cats, supplementation might be worth considering if diarrhea is prolonged. Vitamin K deficiency has been reported in cats with inflammatory bowel disease (IBD), while symptomatic hypocalcemia, responsive to vitamin D supplementation has been reported in Yorkshire terriers with lymphangiectasia.
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<thead>
<tr>
<th>DISEASE LOCALIZATION OR CONDITION</th>
<th>DIET TYPE AND NUTRIENT CONSIDERATIONS</th>
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<tbody>
<tr>
<td>Acute gastritis</td>
<td>Highly digestible, low fat; novel protein</td>
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<tr>
<td>Acute diarrhea</td>
<td>+/- NPO, then highly digestible, low fat. Consider probiotics.</td>
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<tr>
<td>Chronic small bowel diarrhea</td>
<td>Highly digestible, low fat in dogs. In cats, consider low carbohydrate.</td>
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<tr>
<td>Food hypersensitivity diarrhea</td>
<td>Hydrolyzed protein; novel protein.</td>
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<tr>
<td>Inflammatory bowel disease</td>
<td>Hydrolyzed protein; novel protein. Consider omega-3 fatty acids.</td>
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<tr>
<td>Lymphangiectasia</td>
<td>Ultra low fat; Highly digestible, low fat; hypoallergenic, low fat. Consider parenteral vitamin supplementation.</td>
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<tr>
<td>Chronic large bowel diarrhea</td>
<td>Moderate to high fiber--soluble &amp; insoluble; hydrolyzed protein or novel protein.</td>
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References

Electronic Resource
http://vet.osu.edu/nssvet Click on “Diet search” to access an excellent resource that provides comparative nutrient information on many commercial (therapeutic and non-therapeutic) canine and feline diets.