Getting to the guts of gastrointestinal disease in small animals
Erinne Branter, BVSc, DACVIM
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Objectives
- Review common chronic enteropathies
- Diagnostics
- Nutritional management
  - Various diets
  - Other dietary factors
- Medical management
- Case studies
- May not love them but…

Defining chronic enteropathy
- ≥ 2-week history of vomiting and/or diarrhea
- Must exclude other causes of vomiting/diarrhea
  - Endocrine
  - Pancreatic
  - Hepatic
  - Neoplasia
  - Neurologic

Characterizing diarrhea

Small intestinal
- Large volume
- Melena
- Weight loss
- +/- Vomiting

Large intestinal
- Small volume
- Hematochezia
- Mucus
- Tenesmus
- Increased frequency & urgency
- No weight loss

Patient assessment
- Body composition
  - Body weight, body condition score, muscle condition
- Diet history
- Response to previous treatment
Diagnostic plan

- Minimum database
  - CBC, chemistry profile, urinalysis +/- T4
- Fecal examination

Diagnostic plan

- Abdominal imaging
  - Radiographs, ultrasound
- Additional tests
  - GI panel
    - Cobalamin, folate, trypsin-like immunoreactivity (TLI)
    - EPI?
  - Resting cortisol +/- ACTH stimulation test
  - Biopsies
  - Thoracic radiographs

Common chronic enteropathies

- Inflammatory bowel disease (IBD)
- Lymphangiectasia
- Food intolerance vs. food allergy

Inflammatory bowel disease

- Umbrella-term
  - Food-responsive
  - Antibiotic-responsive
  - Immunomodulatory-responsive
- Often multi-modal therapy required

Diagnosis

- Diagnosis of IBD is one of exclusion
- Minimum database may be normal
- Some diagnostics may yield indirect support
  - ↓ cobalamin, ↓ folate
  - Abdominal ultrasound
  - Panhypoproteinemia

Cobalamin & folate

- Folate absorbed in proximal small intestine
- Cobalamin absorbed in distal small intestine
Diagnosis

- Biopsies may support clinical diagnosis
  - Lymphoplasmacytic inflammation most common
- Histopathology does not necessarily dictate how an individual animal will respond to therapy
- Or severity of the disease
- Missed lesions...... What if they don’t respond?

Management

- Step-wise approach
  - Diet trial (s)
  - Antibiotic trial (eg. metronidazole)
  - Fiber supplementation
  - Immunomodulatory medications
  - Ensure full parasitic control
- May require some trial and error

Lymphangiectasia

- Form of protein-losing enteropathy (PLE)
  - Primary or secondary
- Definitive diagnosis requires intestinal biopsy
  - Many animals are presumptively diagnosed
    - Signalment
    - Clinicopathologic findings
    - Abdominal ultrasound
    - Bi-Tri cavitary effusion

Food allergy vs. intolerance

Diagnosis of food intolerance

1. Feed elimination diet for several weeks
2. See resolution of clinical signs
3. Challenge animal with original diet to see relapse
4. What if anorexic/hyporexic

Diagnosis of food allergy

1. Feed elimination diet for several weeks
2. See resolution of clinical signs
3. Challenge animal with one ingredient at a time to document the food(s) to which animal reacts
Most common food allergens

- Dog
  - Beef, dairy, chicken, wheat

- Cat
  - Beef, fish, chicken

If no response

- Consider these factors
  - Animal has atopic dermatitis
  - Lack of compliance
  - Diet was not truly novel

- Don’t spend forever looking for “the right” protein!

Nutritional management

- No single best approach for every case

- May require some trial & error

- Concurrent medical therapy is often needed

Diet trial

- Why change the diet?
  - Reduce antigen delivery to intestine
  - Increase digestibility
  - Modify intestinal flora

- Nutrients affect intestinal disease
  - Not just specific ingredients!

Diet trial options

- Novel ingredient diet

- Hydrolyzed diet

- Highly digestible diet
  - Aka “bland diet”

- Low-fat diet

- Home-cooked diet

- RAW- Yes I said it....
RAW diet: RMBDs
- Who recommends these?
- Results?
- Complications?
- Raw is more than meat
- Immunocompromised?
- Benefits
- Careful handling

RAW diet
- Toxoplasma - 6%
- E. coli - 80% resistant E. coli
- Listeria 54%
- Salmonella 20%
- Sarcocystis 23%
- Home vs. frozen supermarket - same issues
- Zoonotic potential

Novel ingredient diet
- Novel protein AND novel carbohydrate sources
  “Limited ingredient” diet
- May not be able to identify commercially-available novel ingredient diet for all animals
- Typically highly digestible
- Variable nutrient profiles

Novel ingredient diets
- Veterinary products

Novel ingredient diets
- OTC diets

Hydrolyzed diet
- Reduced protein size → reduced allergenicity
- Some diets use intact carbohydrate sources
- Typically highly digestible
Hydrolyzed diets

Highly digestible diet
- Formulated to be highly digestible (~90%)
- Typically low-to-moderate in fat (canine)
- NOT novel ingredient or hydrolyzed

Highly digestible diets

Low-fat diets
- Highly digestible
- Fat concentration
  - Canine diets: 1.8-2.3 g/100 kcal
  - AAFCO minimum – 1.4 g/100 kcal
- Useful in dogs with fat intolerance
  - Certain protein-losing enteropathies

Low-fat diets

Home-cooked diet
Home-cooked diet
- No inherent benefit (aside from palatability)
- Most recipes online or in books do not provide complete & balanced nutrition
- Can formulate novel ingredient diet
- Typically excellent digestibility
- Consult with veterinary nutritionist
- NO preservatives

Getting help
- www.acvn.org/directory
- Balance IT
  - www.BalanceIT.com

Million dollar question

Which diet is best???

You tell me what works....
- What diets are your first line?
- Second line?
- How many respond long-term?
- How many respond short-term?
- How many need additional medications.

There is no “best” diet
- Consider client & pet preferences
- Compare nutrient profiles
- Concurrent medical therapy is often necessary
- Good client communication is imperative
- I have made a cheat sheet for diet trial compliance.

Additional factors to consider
- Fiber
- Cobalamin
- Probiotics
- Prebiotics
Fiber
- Component of dietary carbohydrate
  - Resists enzymatic digestion in small intestine
- Characteristics
  - Solubility
  - Fermentability

Soluble fiber
- Usef ul in management of diarrhea
- Binds excess water in intestine
  - Reduces water content in stool
  - Increases viscosity
- Short-chain fatty acids
  - Benefit colonocytes

Fiber supplementation
- Psyllium
- Wheat dextrin
- Methylcellulose

Fiber supplementation
- 1 teaspoon Metamucil = 3 g fiber

Fiber supplementation
- ½ cup canned pumpkin = 3.6 g fiber

Fiber-modified diets
- Metamucil = psyllium
  - Unflavored, sugar-less
- Dose
  - Start with 1-2 tsp per meal
  - Titrate to effect
    - Up to 1-4 tbsp per day (big dog)
Cobalamin (vitamin B₁₂)

- May be decreased with chronic enteropathies
  - Affecting the ileum
- Cobalamin deficiency itself can contribute to intestinal disease
  - Villous atrophy
  - Mucosal inflammation

Cobalamin supplementation

- Must supplement parenterally*
  - Recommended when cobalamin < 300 ng/L
- Dose once per week x 6 weeks
  - Then one dose after 30 days
  - Recheck cobalamin 1 month later
  - Adjust as needed

<table>
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<tr>
<th>Dog weight</th>
<th>Below 10 lbs</th>
<th>10 lbs-20 lbs</th>
<th>20 lbs-40 lbs</th>
<th>40 lbs-60 lbs</th>
<th>60 lbs-80 lbs</th>
<th>80 lbs-100 lbs</th>
<th>Above 100 lbs</th>
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<tr>
<td>Dose of Cobalamin</td>
<td>250 µg</td>
<td>400 µg</td>
<td>600 µg</td>
<td>800 µg</td>
<td>1000 µg</td>
<td>1200 µg</td>
<td>1500 µg</td>
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Cobalamin supplementation

<table>
<thead>
<tr>
<th>Cobalamin product</th>
<th>Directions For Use</th>
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<tr>
<td>COBALQUIN</td>
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What do you do with the B12?

- INJECTIONS?
- ORALS?
- PERCEIVED RESPONSE?
Probiotics

- Criteria for efficacy
  - Live microorganisms*
  - Adequate amounts

- Purported benefits
  - Establish healthy intestinal microflora
  - Compete with pathogenic bacteria to colonize intestinal mucosa
  - Support immune system

Commercial probiotics

- 25 products evaluated
  - 4 products met label claim of viable organisms
  - 2 products considered acceptable

Assessment of commercial probiotic bacterial contents and label accuracy
J. Scott Howieson, Hughy Martin

- An additional hurdle viability test to assess the ability of probiotic bacteria to survive transit through the gut

Prebiotics

- Non-digestible dietary fermentable substance that enhances “good” intestinal flora

- Examples
  - Inulin
  - Fructooligosaccharides (FOS)

Meet Gabby

- 6.5-yo SF Collie

- 3 week history of loose stool & decreased appetite
Additional history
- No vomiting
- Normal drinking/urination
- Diet – Purina Pro Plan Sensitive Skin & Stomach
  - No treats; no dietary indiscretion
- Current on vaccines & flea/tick/heartworm prevention

Physical examination
- QAR: normal hydration, normal TPR
- BW ~ 50 pounds (23 kg)
  - BCS – 5/9; normal muscle condition
  - Normal cardiopulmonary auscultation
  - Abdominal palpation unremarkable
  - Soft yellow stool on rectal examination
  - Some ventral subcutaneous edema

Diagnostic plan
- Minimum database
  - CBC, chemistry profile, urinalysis
- Fecal examination
- Gastrointestinal panel
  - Cobalamin, folate, TLI, cPLI
- Abdominal ultrasound
- +/- Endoscopy & biopsies
- Is less more? Fewer full thickness or More mucosal?

Results
- CBC – stress leukogram
- Chemistry profile
  - Severe panhypoproteinemia
    - TP – 2.6 g/dl (5.2-7.1 g/dl)
    - Albumin < 1.0 g/dl (2.7-4.0 g/dl)
  - Hypocalcemia
  - Hypocholesterolemia
  - Urinalysis
  - Negative for protein

Results
- Fecal flotation – Many Isospora oocysts present
- GI panel
  - ↓ cobalamin, ↓ folate

Results
- Abdominal ultrasound
  - Normal GI wall thickness & layering
  - Mild volume of free peritoneal fluid

Diagnosis
- Protein-losing enteropathy
- Hypocobalaminemia
- Coccidiosis
- Rule out…..
Now what?

- Biopsies?
  - Not a good candidate for full thickness biopsies
- Treat empirically?
- Endoscopy?
- Esophageal vs. PEG tube?

Treatment plan

- Diet trial
- Cobalamin supplementation
- Sulfadimethoxine (eg, Albon)

Diet comparison

<table>
<thead>
<tr>
<th>Diet (dry)</th>
<th>Calories (kcal/cup)</th>
<th>Protein (g/100 kcal)</th>
<th>Fat (g/100 kcal)</th>
<th>Ingredients</th>
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<tbody>
<tr>
<td>Pro Plan Sensitive Skin &amp; Stomach</td>
<td>447</td>
<td>6.9</td>
<td>4.7</td>
<td>Salmon, rice, barley, oat meal, fish meal, egg</td>
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<tr>
<td>Hill's d/d Potato &amp; Venison</td>
<td>371</td>
<td>4.5</td>
<td>4.0</td>
<td>Potato, venison</td>
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<tr>
<td>Royal Canin PV</td>
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<td>5.7</td>
<td>3.2</td>
<td>Potato, venison</td>
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<tr>
<td>Royal Canin KO</td>
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<td>4.0</td>
<td>Kangaroo, oats</td>
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<tr>
<td>Royal Canin HP</td>
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<td>5.3</td>
<td>4.9</td>
<td>Hydrolyzed soy, rice</td>
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<tr>
<td>Hill's z/d Ultra</td>
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<td>4.9</td>
<td>3.7</td>
<td>Hydrolyzed chicken, starch</td>
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<tr>
<td>Purina HA</td>
<td>311</td>
<td>5.3</td>
<td>2.6</td>
<td>Hydrolyzed soy, starch</td>
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<tr>
<td>NAFCO minimum</td>
<td>4.5</td>
<td>1.4</td>
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Follow-up – 1 week later

- Doing well at home
  - Good appetite, good energy
- No diarrhea, no vomiting

Follow-up – 1 week later

- Panhypoproteinemia improving
  - TP – 4.3 g/dl (5.2-7.1 g/dl)
  - Albumin – 1.7 g/dl (2.7-4.0 g/dl)
- Continue with current therapy
  - Monitor and adjust as needed

Tiggra 8 yo FS DSH

- Presented for vomiting over 4 days with anorexia
- Severe acute weight loss
- Lethargy
- CBC, chemistry normal
- fPLI 12, normal cobalamin/folate
- Unremarkable thoracic radiographs
- AUS: thickened muscularis in SI normal lymph nodes, mild pancreatitis
Tiggra
- Endoscopy upper with feeding tube placement
- No gross abnormalities on endoscopy
- BX: LP chronic gastroenteritis
- Started on prednisolone and feedings
- Prednisolone 5mg/day via tube
- Tapered to 0.5mg EOD.
- Z/D diet
- E-tube site infection

Jura
- 4 yo MN Bernese
- Severe weight loss
- Watery diarrhea
- Good appetite
- Low cobalamin - 50,
- Normal folate
- Declining albumin/TS: ALB 19mg/dl, TS 3.1

Jura - Treatment/response
- Upper and lower endoscopy with ileal sampling
- LP enterocolitis
- Lymphangectasia
- HA diet
- Budesonide 3mg per day
- Tapered to 1mg EOD.
- Normal stool and weight gain of 8kg.

Emmy- 8 yo FS Golden
- 8 yo FS Golden
- 2 months diarrhea
- Severe Weight loss
- Panhypoproteinemia
- Ultrasound unremarkable
- Normal CXR
- Normal cobalamin (434) and folate.
- Normal TLI.

Emmy outcome
- Poor response to prednisone (partial stool response for 1 week).
- Repeat ultrasound as bw not improved- albumin 21mg/dl.
- Large mesenteric nodes (< 5cm)
- Lymphoma

Emmy- M+M
- *Missed lesions on upper/lower endoscopy*
- So...surgery better?
- Things change...repeat testing warranted
Frank - 6 yo FS French BD
- Weight loss, anorexia (NO diarrhea)
- Panhypoproteinemia: ALB - 16mg/dl, TS 2.8
- Hypocholesterolemic
- Hypocalcemic
- Mild anemia
- Poor appetite

Frank - diagnostics
- Cobalamin 100 and Folate 6
- Cortisol - resting 49
- Post ACTH - 211
- Abdominal ultrasound - mucosal speckling
- Thoracic radiographs - mild pleural effusion
- Upper and lower endoscopy with ileal sampling
- Moderate gastritis, severe enteritis with crypt ectasia

Frank - treatments
- Prednisolone 1.5mg/kg/day
- Diet: start on HA after eating home cooked - will not eat it.
- Continued weight loss
- Improved Albumin for 1 month - ALB - 18mg/dl, then 20mg/dl.
- NO longer eating
- Cachexia

Frank
- Repeat ultrasound - gastric thickening on greater curvature
- FNA of gastric wall acellular
- Move to injectable medications
- Albumin now 22mg/dl despite severe cachexia
- Add Chlorambucil 2mg three times weekly po
- NO change....
- What to do now……

Frank
- Repeat endoscopy - no change
- Full thickness biopsies
- Thoracic radiographs
- Feeding tube (esophageal or PEG)
- ONLY On HA now
- Improved over 3 weeks to stable weight, no diarrhea and eating on own

In summary
- Diet are useful tools in management of chronic enteropathies
  - Feeding tube aid to allow dietary therapy
- Consider each animal as an individual
- Some trial and error may be required to achieve best results
Questions?

- Contact information:
  - Email: im@wavesvet.com
  - Phone: (778) 432-4322