Approach to Common Pediatric Gastrointestinal Disorders

Andy Skinn

Pediatric Gastroenterology
BC Children's Hospital

http://www.bcchildrens.ca/our-services/clinics/gastroenterology

Disclosures

- Nothing to disclose.

Objectives

- Diagnostic testing for Celiac disease
- Differentiating functional medical conditions from inflammatory bowel disease
- Management of constipation
- Utility of diagnostic testing and management of these conditions
- **Keep it practical!**

Pediatric Gastroenterology

- BC Children's Hospital
- Outreach Program
  - Victoria, Nanaimo, Kelowna, Prince George
- Telehealth / Zoom
- Endoscopy Procedures

http://www.bcchildrens.ca/our-services/clinics/gastroenterology

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Gastroenterology

We provide care for patients with diseases and conditions of the digestive tract including stomach and intestines.

About | Procedures | Resources

General resources

- Celiac Disease
- Constipation
- Eosinophilic Esophagitis
- Endoscopy
- Functional Abdominal Pain
- Inflammatory Bowel Disease
- Liver Disease
- Nutrition related Resources
- Reflux Disease
- Cow Milk Protein Intolerance

Referrals

You need a referral from a doctor to use this clinic.

Finding us

4480 Oak Street
Ambulatory Care Building, Room K4-200
Vancouver
BC V6H 3V4

Phone: 604-875-2332
Fax: 604-875-3244

Directions & Parking >
Your Visit >
Complex Feeding and Nutrition Service >

http://www.bcchildrens.ca/our-services/clinics/gastroenterology

Gastroenterology Referral

Our Gastroenterology clinic is accepting urgent referrals only at this time.

Patients with non-urgent issues, including constipation and/or abdominal pain without additional GI red flags (see below) are not eligible for referral. This allows us to prioritize specialist clinical resources for patients who have urgent GI concerns that require care.

Urgent Cases

GI Red Flags +

Urgent or Acute Referral Support +

Non-Urgent Supports +

Approach to Pediatric GI Cases

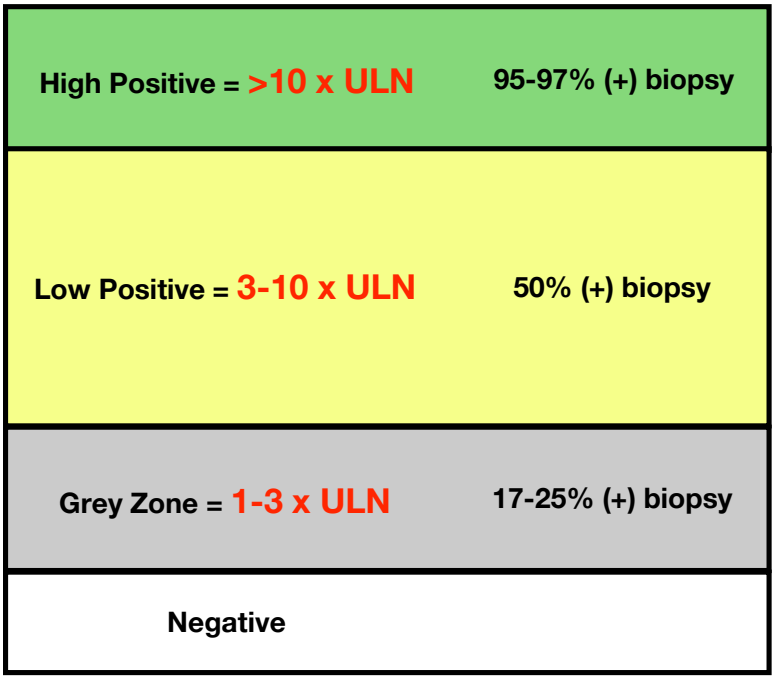
- History and Physical Exam
  - assess for red flags
- Growth parameters
- Puberty assessment
- Investigations
  - based on level of concern
  - screening bloodwork (may include CBC, TTG, TSH, electrolytes)
  - imaging and secondary tests rarely needed

Red Flags

- Weight loss, poor linear growth, delayed puberty
- Significant vomiting
- Prolonged severe diarrhea +/- blood
- Unexplained fever
- Family history of IBD, Celiac, other GI disease
- Localized pain (non-periumbilical pain)
- Extraintestinal manifestations of IBD

Case

- 7 yo male with peri-umbilical abdominal pain
- Occasionally has issues with constipation but recently seems to be under control
- Vague symptoms otherwise
- Maternal aunt has “gluten issues”
- Otherwise healthy
- TTG 58 (normal < 12), otherwise normal bloodwork



General Rule for Diagnosis = Scope Everybody

1 exception:

- symptomatic patients
- TTG > 10 X ULN = unmeasurably high
- confirmatory test
- positive for HLA-DQ2 or DQ8
- resolution of symptoms on gluten-free diet

BCCH Celiac Referrals

- TTG > 10 x ULN
  - 2 readings, at least 1 month apart
  - non-biopsy diagnosis, > 95% accuracy
  - reviewed by dieticians, gluten-free diet teaching
- TTG 2-10 x ULN
  - recommended to have upper endoscopy for diagnosis
  - need to stay on gluten until diagnosis is made
- TTG < 2 x ULN
  - followed with serial TTGs, remain on gluten-containing diet
  - TTG of this value is non-specific so referral may not be accepted

Waiting for endoscopy: 1-2 gluten equivalents / day

Breads/Buns/Crackers	Amount	Cake/Cookies	Amount
Bread	1 slice	Cake	1 slice
Dinner Roll	1	Cupcake	1
Croissant	1	Doughnut	1
Hamburger/Hot Dog Bun	½	Graham Wafers	3
Soda Crackers	8	Cookies – Chocolate Chip/Oreo	
Triscuit Crackers	5		
Wheat/Vegetable Thins	11	**Miscellaneous**	**Amount**
Ritz Crackers	7	Macaroni	½ cup
Breton Crackers	5	Spaghetti	½ cup
Muffin (made with wheat flour)	1	Pancake	1 med
Rye crisps	2	Waffle	1 med
		Wheat Flour	3 Tbsp
Breakfast Cereals	**Amount**	Barley	½ cup
Cream of Wheat	½ cup		
Bran Flakes	½ cup		
Puffed Wheat	1 cup		
Shredded Wheat	½ cup		
Special K	¾ cup		
* Any other wheat-containing cereal	½ to ¾ cup		

After Diagnosis

- Gluten-free diet, dietician
- It can take up to 18-24 months (or longer!) for TTG to normalize after starting gluten-free diet
- Repeat TTG in 9-12 months
  - may not be normal, but looking for trend down
- Follow up 1-2 times with Pediatric GI
- Continued follow-up with family doctor / pediatrician
  - TTG annually to assess compliance with diet

Screening Relatives

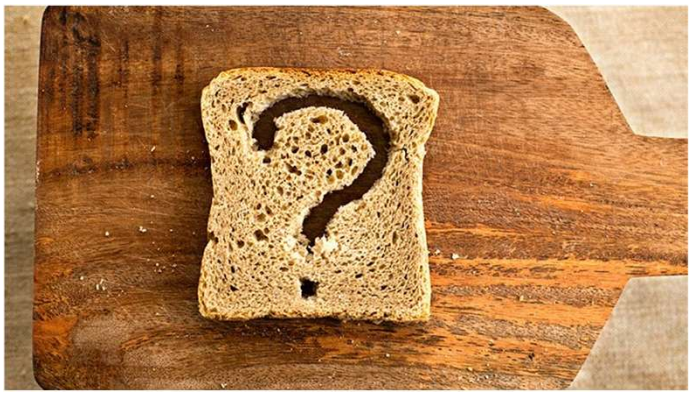
- All 1st degree relatives should be screened with a TTG after a diagnosis of Celiac disease has been made
- +/- HLA DQ2/DQ8
- Even if asymptomatic, first degree relatives should be screened every 2-3 years (if still eating gluten!)

Type 1 Diabetes

- At higher risk of developing Celiac disease
- Higher rate of false positive TTG, especially if close to time of diagnosis / DKA
- Since TTG not as reliable in patients with type 1 diabetes, general recommendation is for scope in all cases to confirm

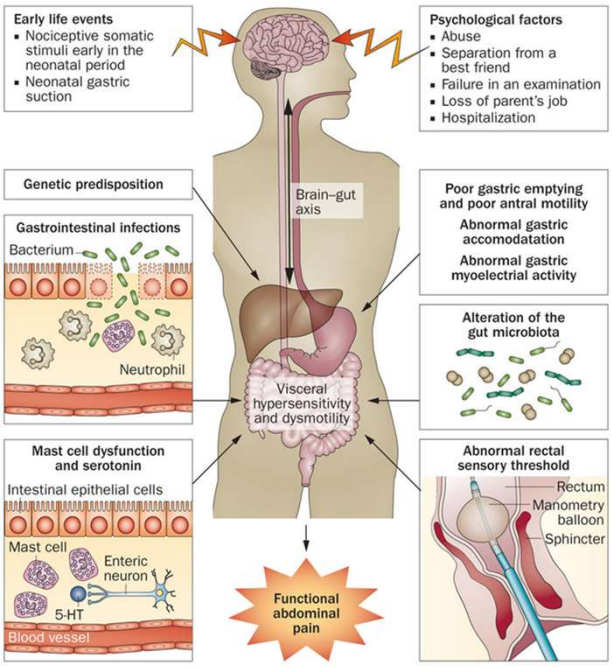
Pediatric Considerations

- Wide range of symptoms - not always classic!
- Growth and Puberty
- Gluten challenge - not as reliable in children, need to remain on gluten until endoscopy (1-2 equivalents/day)
  - may need to be back on gluten up to 3-4 months
- Compliance as teenagers
  - better if biopsy-confirmed diagnosis
- Children with Celiac disease on a gluten-free diet can still get abdominal pain (even with normal TTG)



Case

- 7 yo male with peri-umbilical abdominal pain
- Passing 1-2 soft formed stools each day
- Often occurs in the mornings and is missing school on a regular basis
- Also complains of occasional headaches
- Screening bloodwork and all other investigations normal to date
- Mother is frustrated, “there must be more to do!”



Nature Reviews | Gastroenterology & Hepatology, 12, 159–171 (2015)

Practical Explanations

- Butterflies in your stomach
- Fire in the building / malfunctioning alarm
- Walking across hot coals
- Similar to headaches: we don’t always know why

- Structural vs messenger system

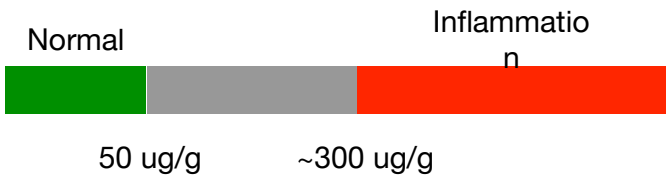
How sure?

Fecal Calprotectin

- indicator of neutrophils in the intestinal mucosa including the small bowel
- more GI specific version of CRP / ESR
- does not distinguish infection vs. IBD
  - order infectious stool studies if not already done
- False positives:
  - NSAIDs, young age

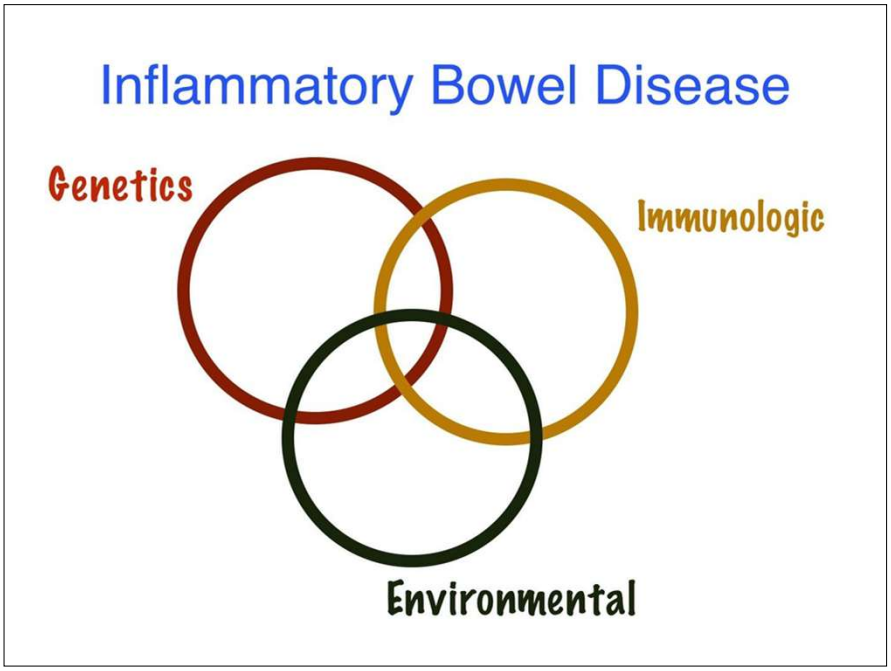
Fecal Calprotectin

- Interpretation:
  - Most labs report < 50 ug/g as normal
  - Most IBD patients > 300 ug/g
  - **Grey zone** - think of pre-test probability



Fecal Calprotectin

- Practical uses:
  - IBS vs IBD
  - following the trend in known IBD patients
- When it is not as helpful:
  - infection (eg. C. difficile)
  - history and physical very suggestive of IBD



Key differences and considerations in pediatric IBD:

Growth
Delayed Puberty
Missed school and social interactions

General anesthesia
Fewer approved treatment options

Transition to adult GI care

Pediatric IBD Phenotypes

- **Location**
  - CD: higher rate of colonic involvement in pediatrics
  - UC: higher rate of pancolitis in pediatrics
- **Clinical Features**
  - moderate to severe activity at presentation is not uncommon
  - more aggressive disease progression
  - less time to complications

Treatment

- **Exclusive enteral nutrition**
- Try to limit steroid exposure
- 5-ASA's
- Immunomodulators - azathioprine, methotrexate
- Biologics - infliximab, adalimumab, and others

Follow-up / Flares

- On-call team always willing to discuss IBD patients, especially when they are having a flare
- PCDAI and PUCAI
    - helpful way to determine how stable the patient is in follow-up or how severe the flare is

ITEM	POINTS
1. Abdominal pain:	
No pain	0
Pain can be ignored	5
Pain cannot be ignored	10
2. Rectal bleeding	
None	0
Small amount only, in less than 50% of stools	10
Small amount with most stools	20
Large amount (>50% of the stool content)	30
3. Stool consistency of most stools	
Formed	0
Partially formed	5
Completely unformed	10
4. Number of stools per 24 hours	
0-2	0
3-5	5
6-8	10
>8	15
5. Nocturnal bowel movement (any diarrhea episode causing wakening)	
No	0
Yes	10
6. Activity level	
No limitation of activity	0
Occasional limitation of activity	5
Severe restricted activity	10
SUM OF PUCAI (0-85)	

- **Remission**: total score less than 10 points
- **Mild disease activity:** total score between 10 and 30 points inclusive
- **Moderate disease activity:** total score between 35 and 60 points inclusive
- **Severe disease activity:** total score of 65 points or greater

Other Considerations

- Vaccinations
  - Live vaccines
    - Cannot be given while on immunosuppression
    - Prior to initiating medication, best to catch-up
  - Influenza / COVID vaccine
- Iron Infusions

Case

- 7 yo male with peri-umbilical abdominal pain
- Occurs most days, on several occasions, he has been “doubled over” in pain
- Has a bowel motion every 2-3 days, usually soft but occasionally will “plug the toilet”
- Recently started having episodes of encopresis and lacking sensation to have a bowel motion
- Screening bloodwork is all normal

Functional Constipation

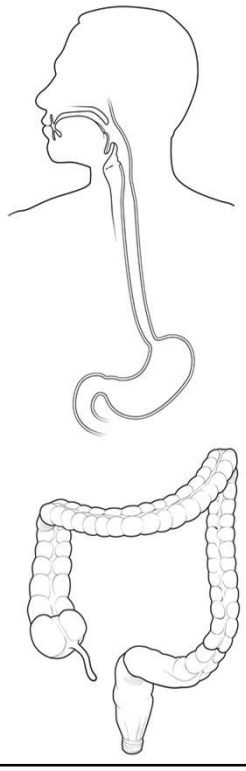
- The vast majority of constipated children do not have underlying pathology
- If not responding to treatment, important to rule out other conditions
- Consider screening bloodwork:
  - TTG, extended electrolytes, TSH
- Imaging is rarely helpful for diagnosis
- It is OK to need PEG-3350 long-term

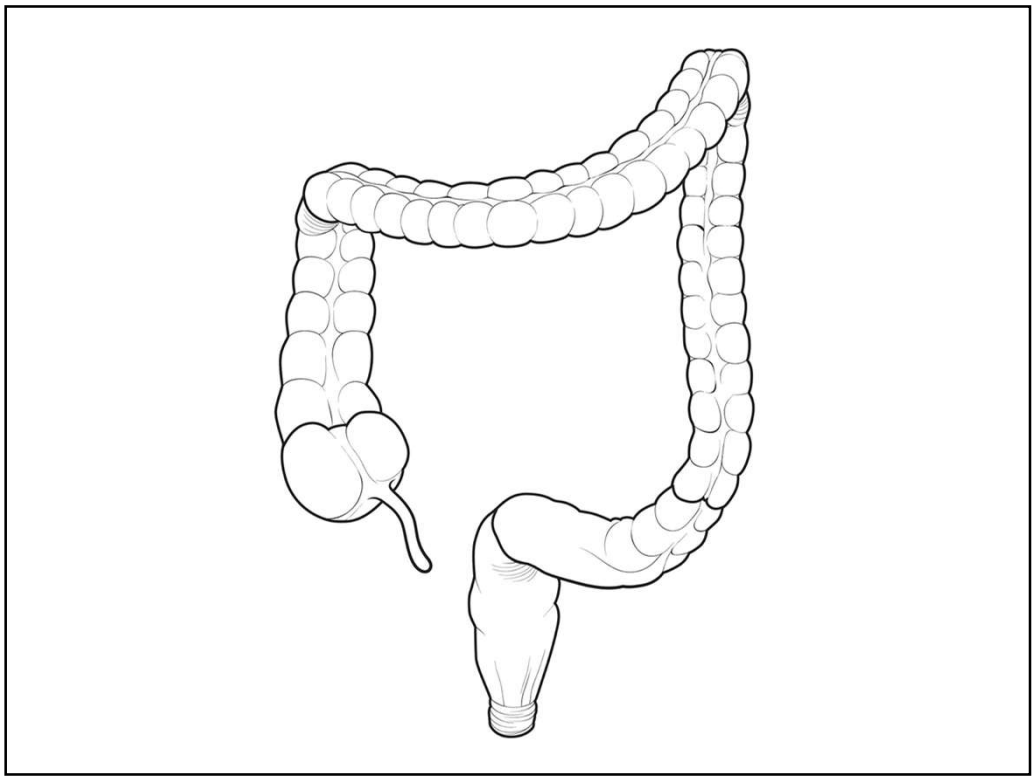
Functional Constipation

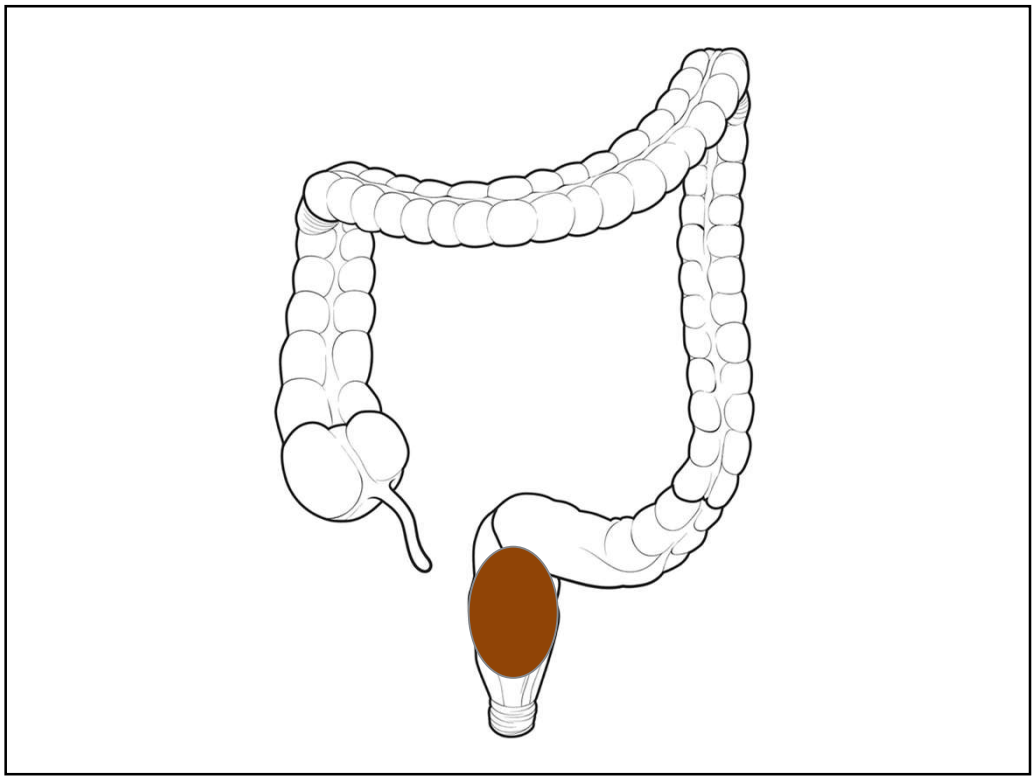
- Red Flags:
  - Starts < 1 month of age / delayed meconium
  - Bilious emesis
  - Bloody stools without anal fissures
  - Anal stenosis / abnormal position of the anus
  - Perianal lesions (abscess, fistula)
  - Lumbrosacral abnormalities

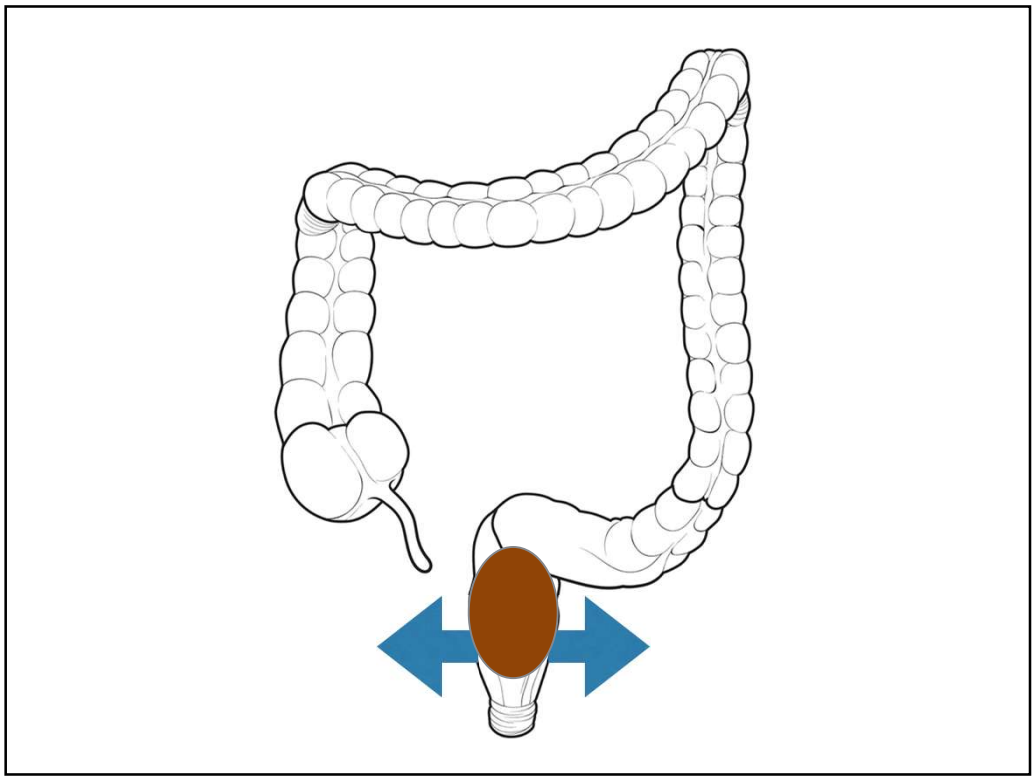
Bristol Stool Chart

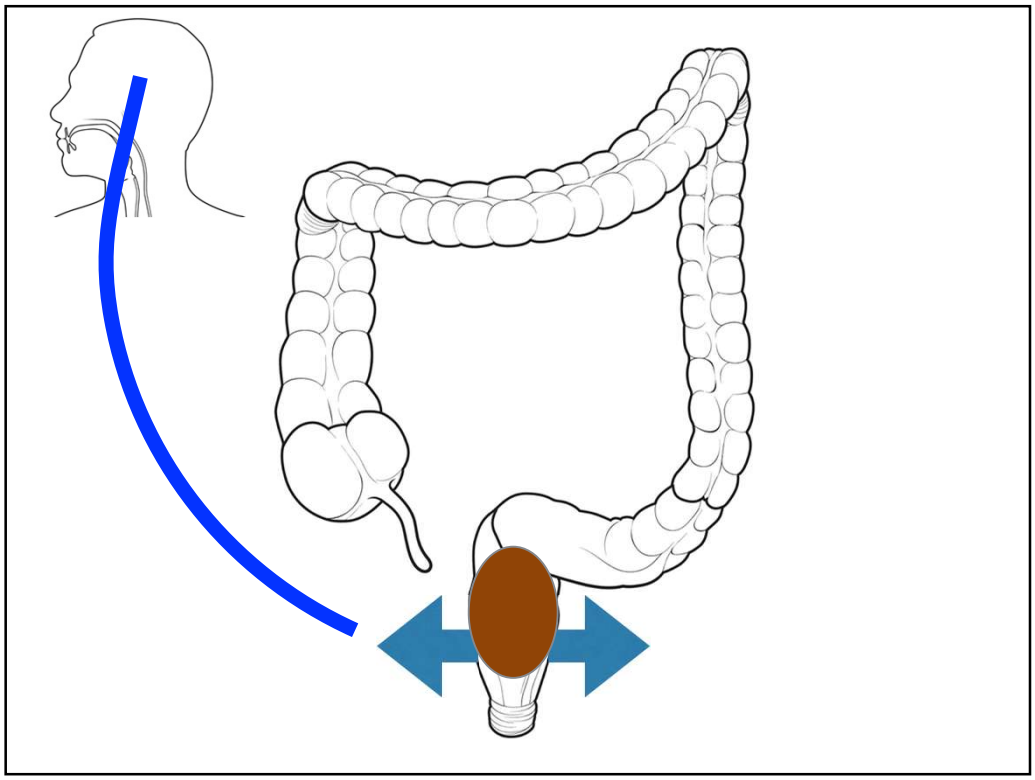
Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid

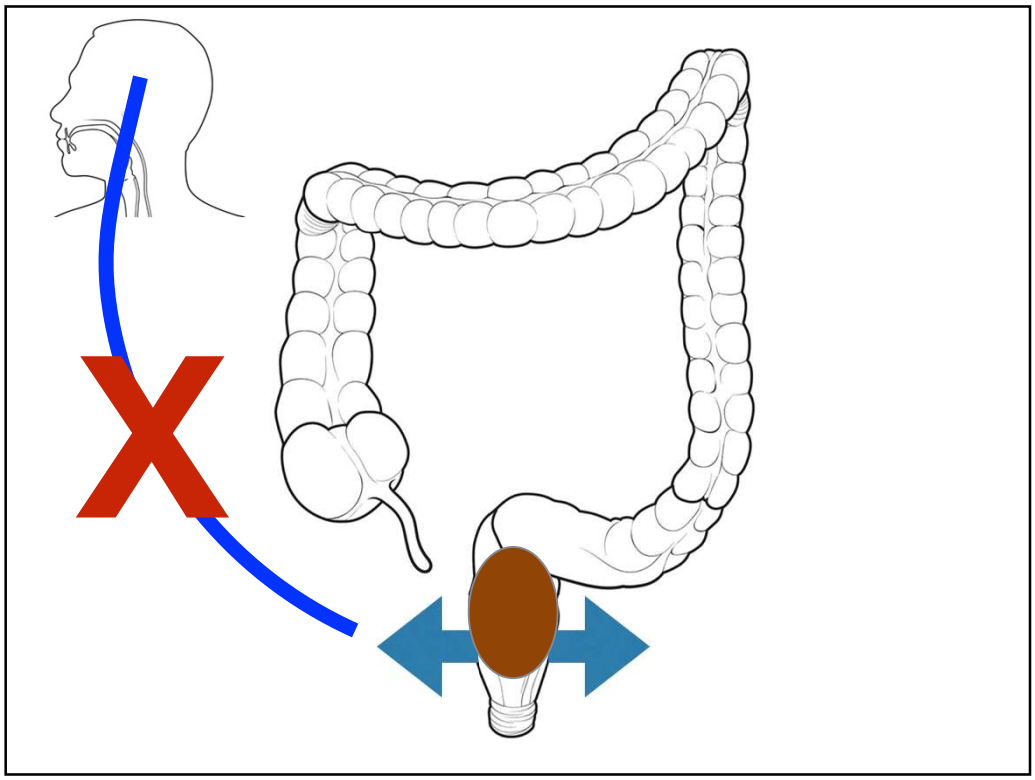


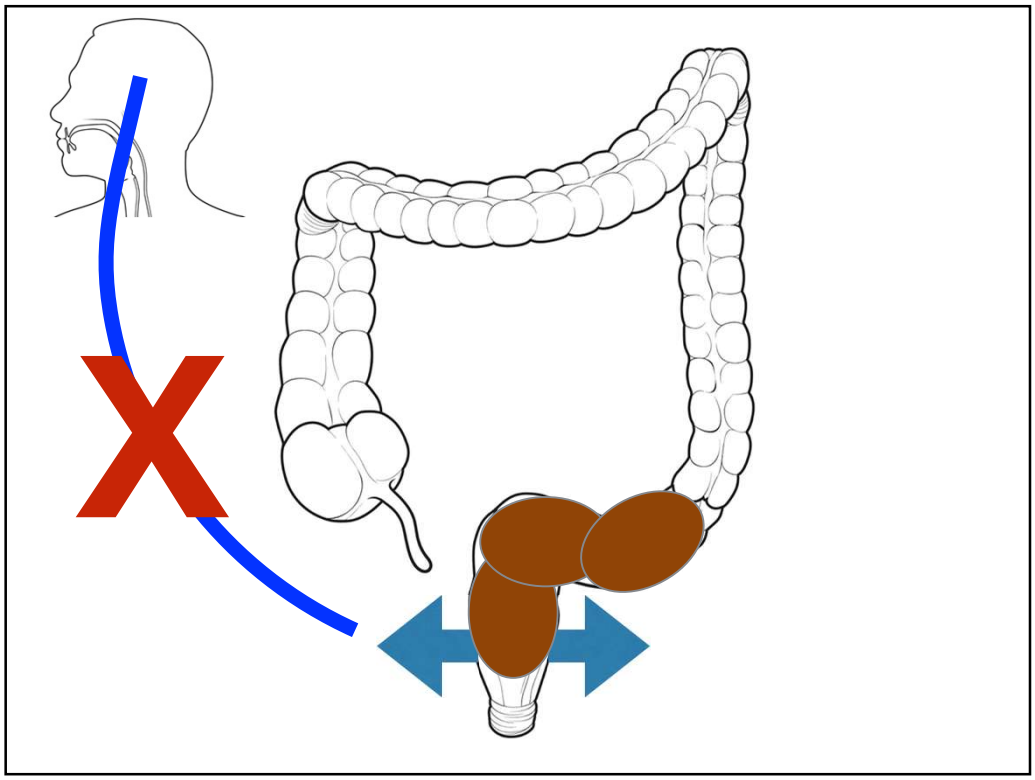


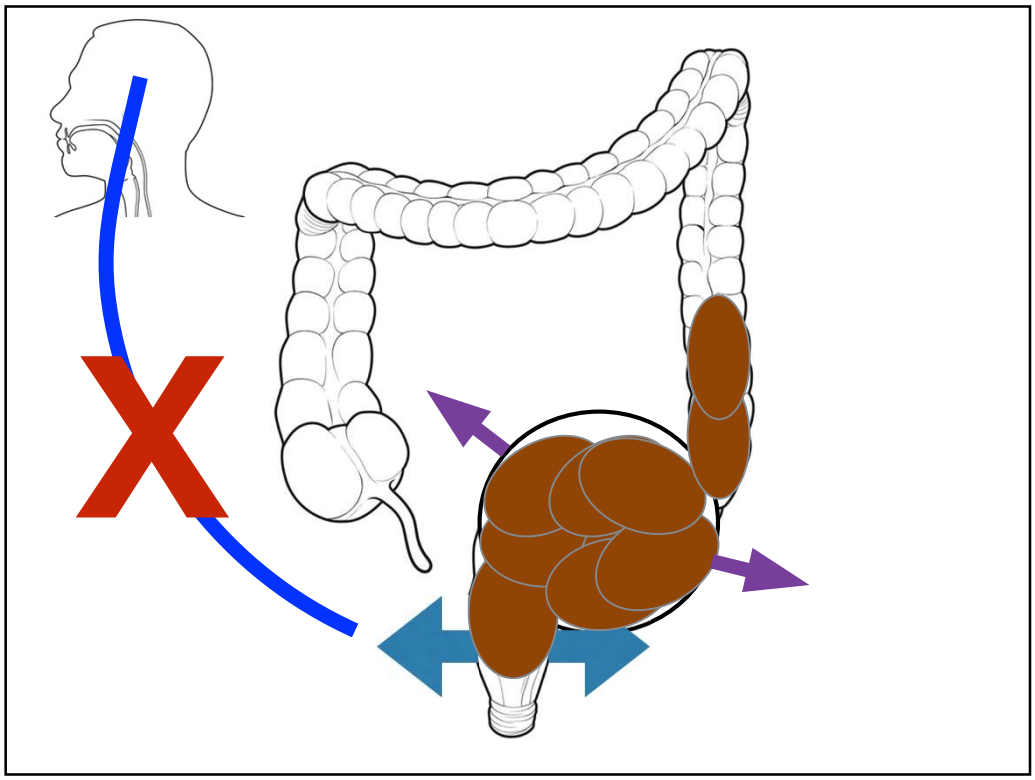


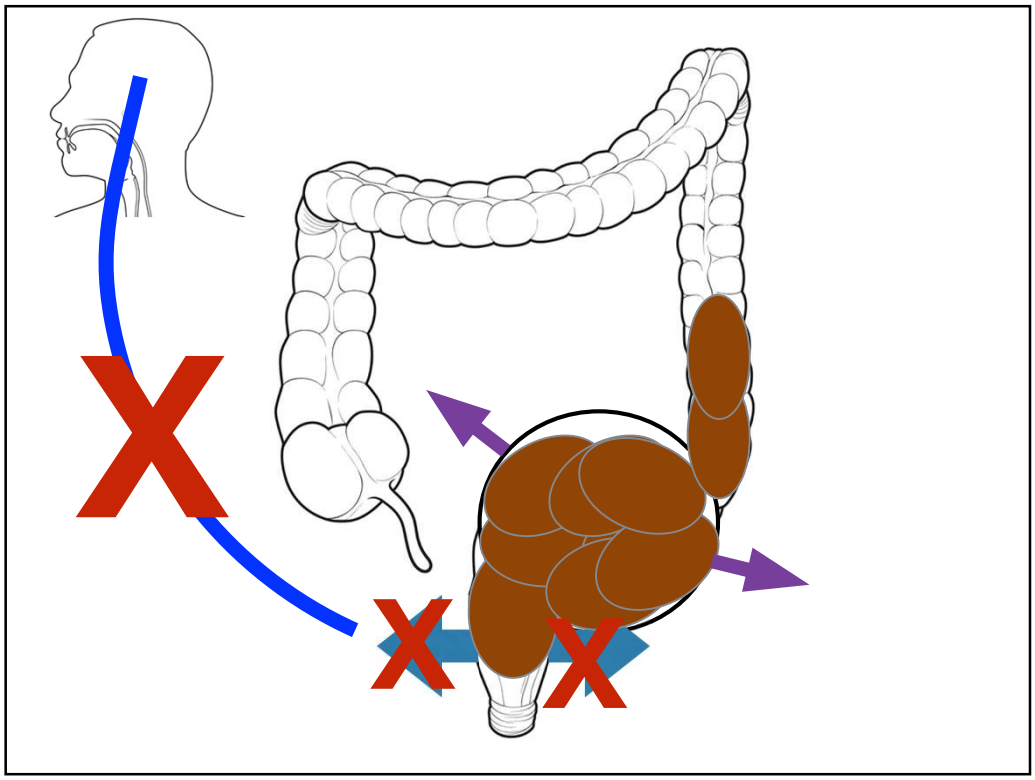


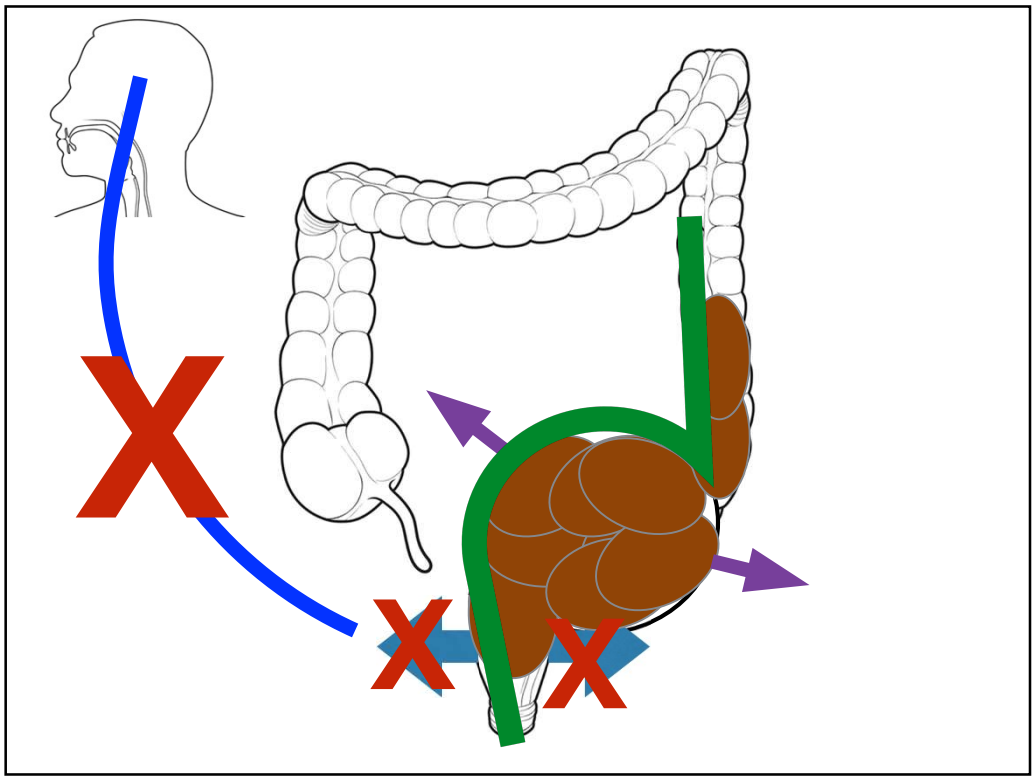


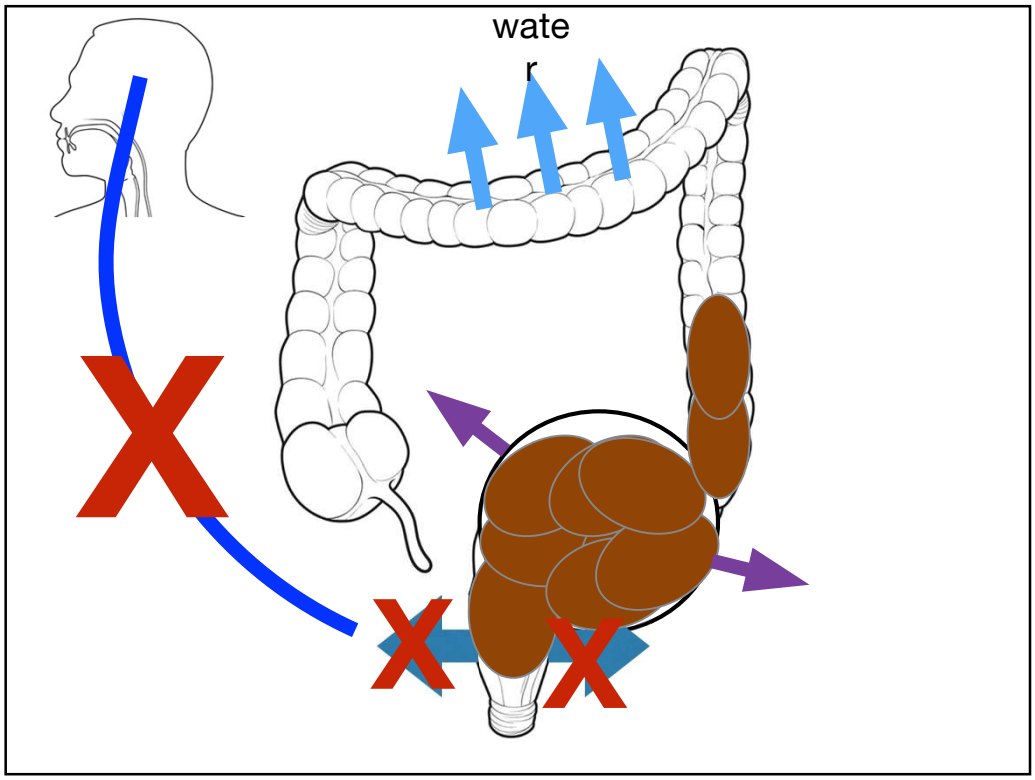








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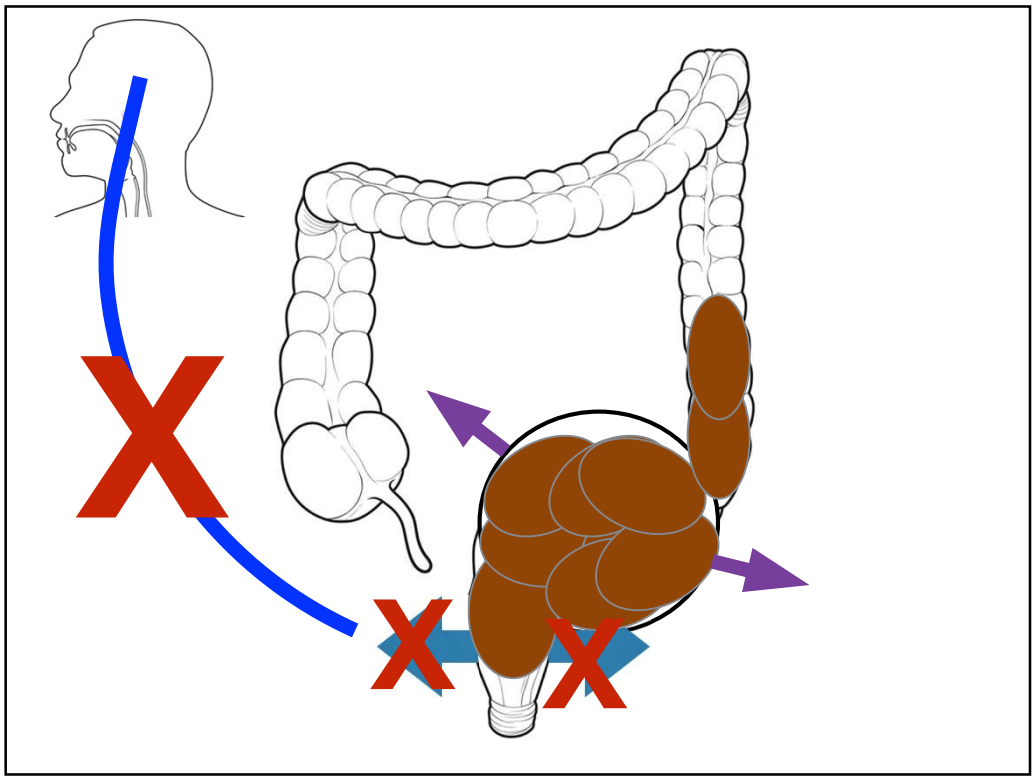

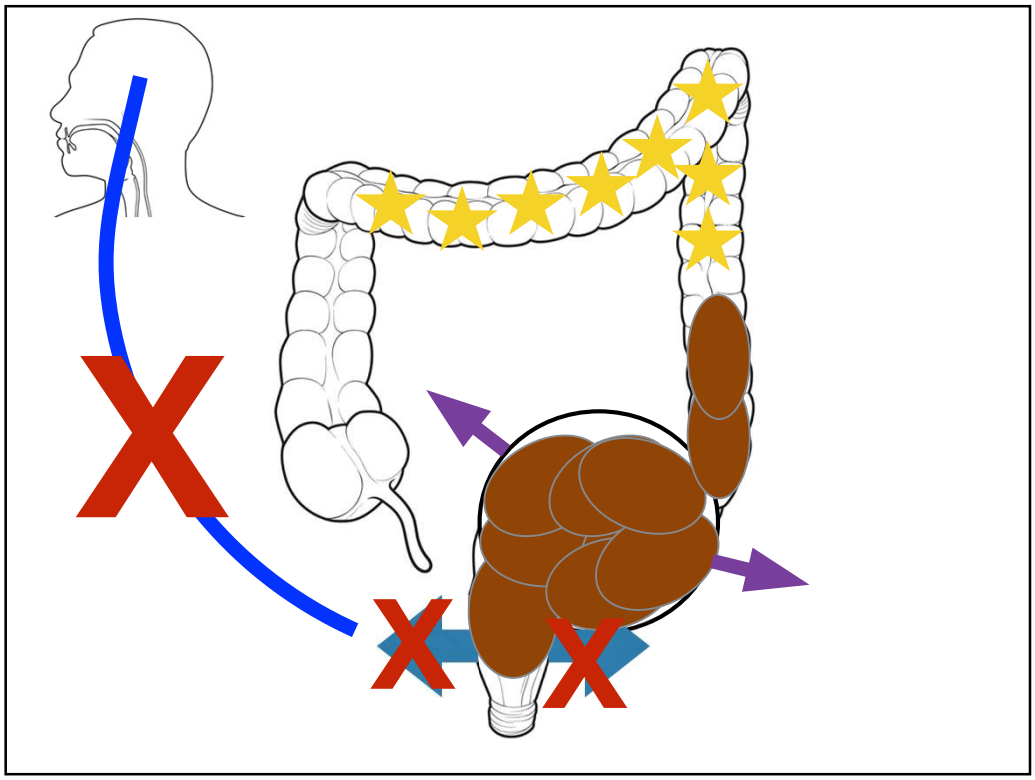

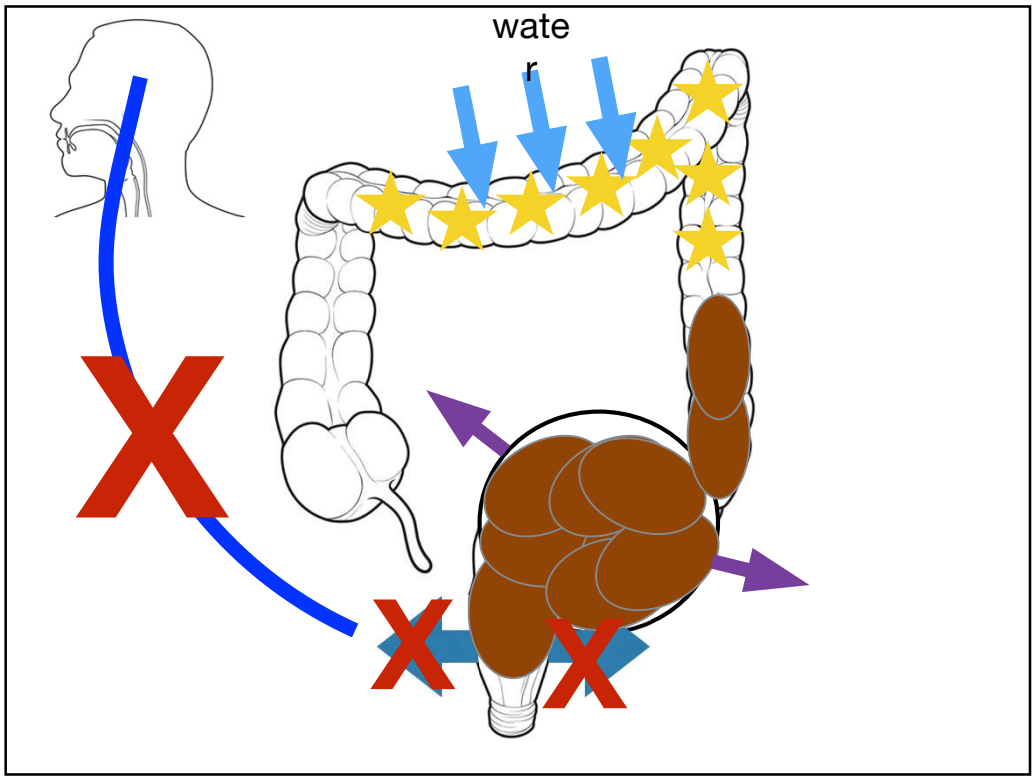
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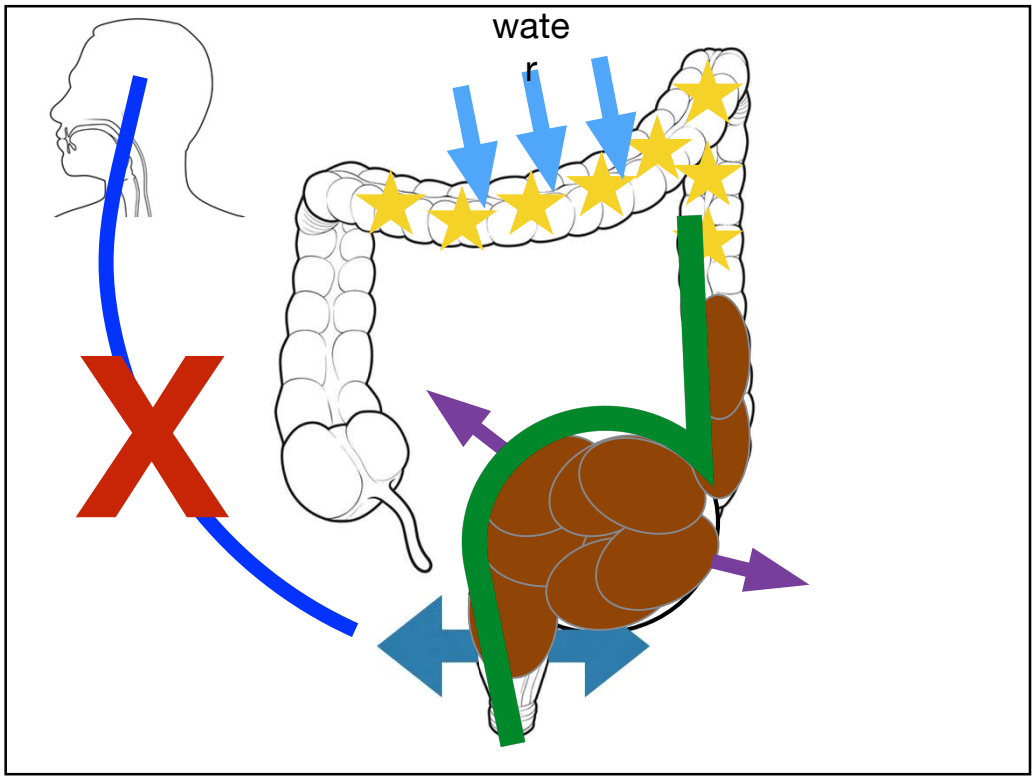
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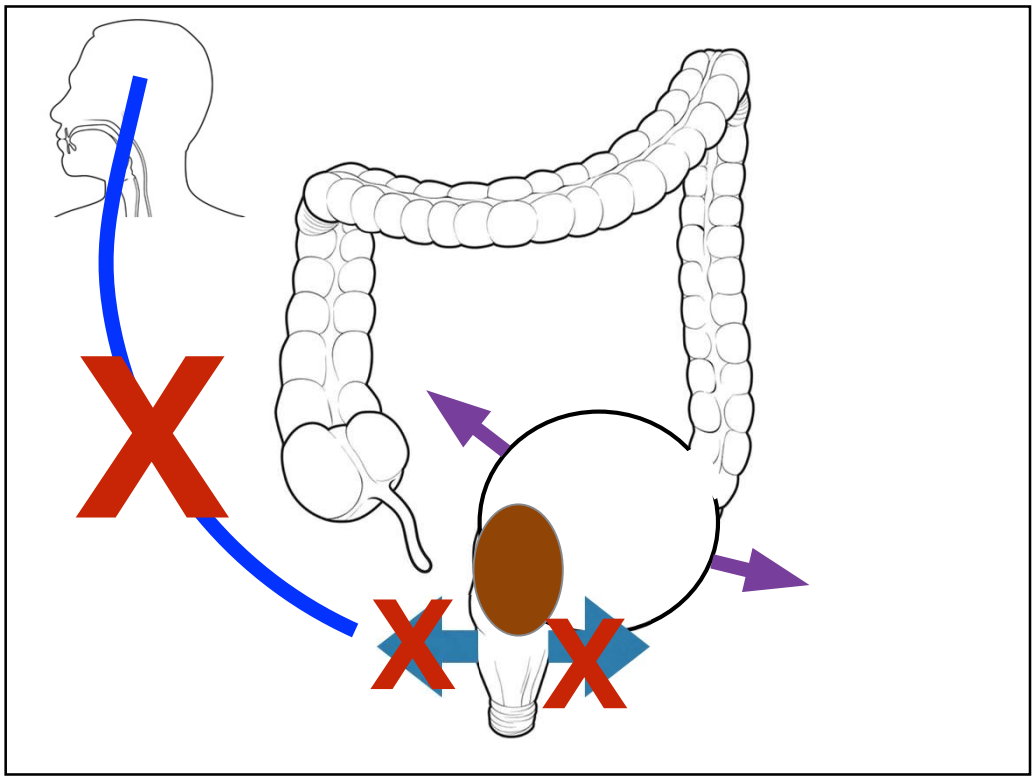

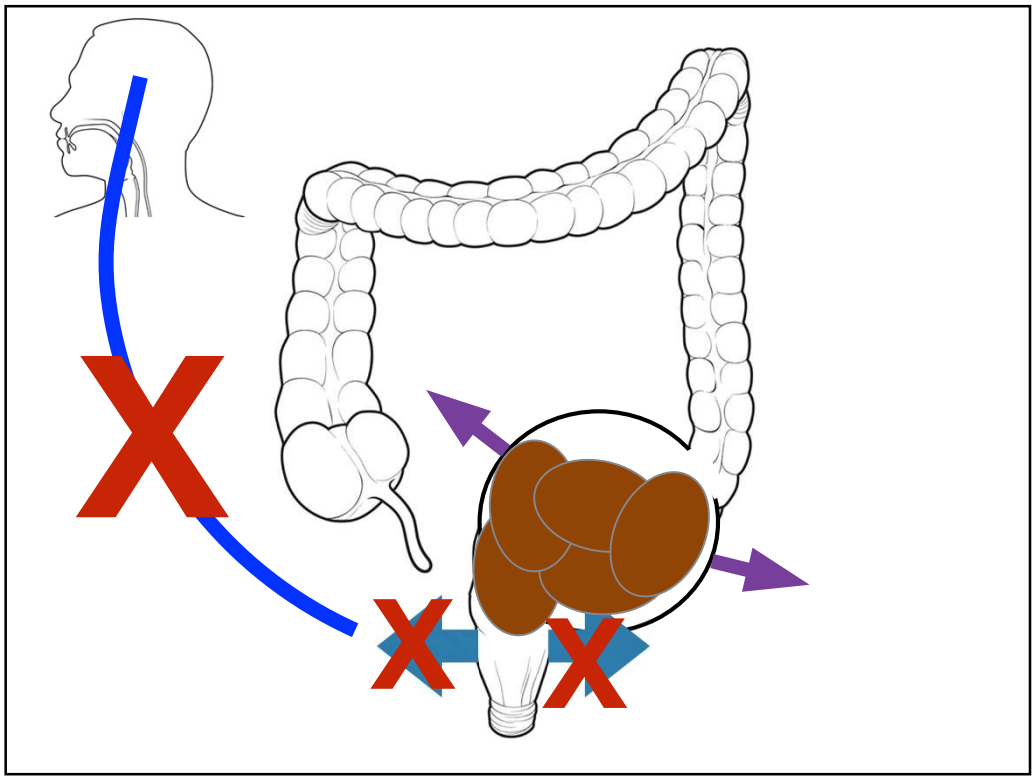

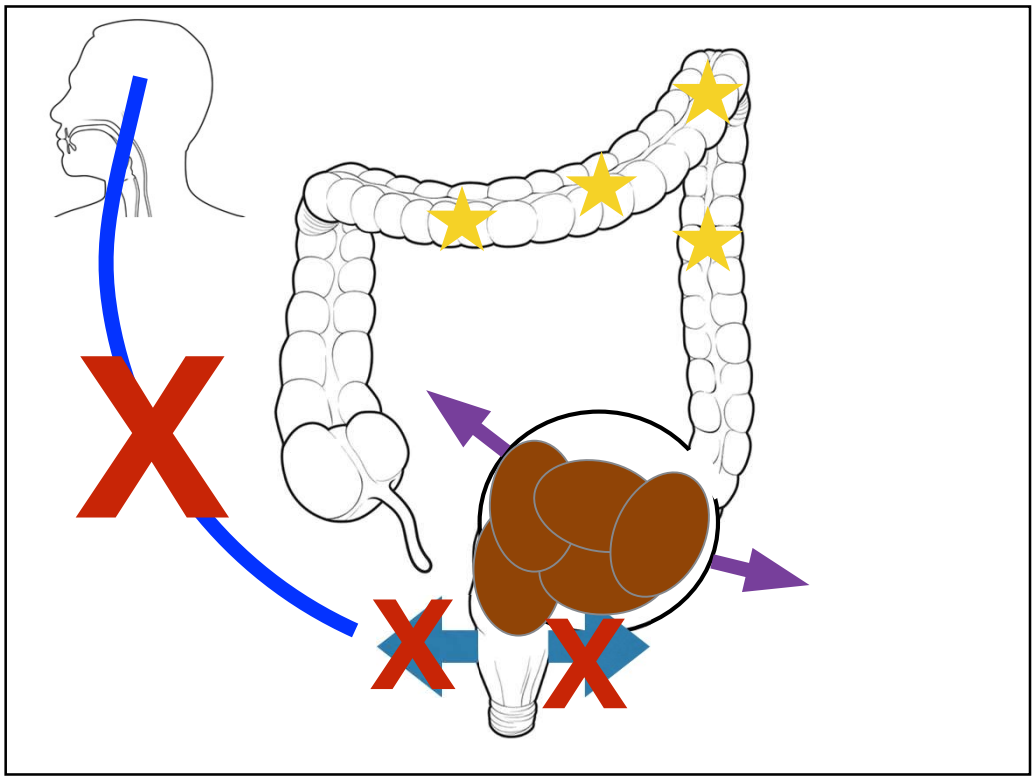

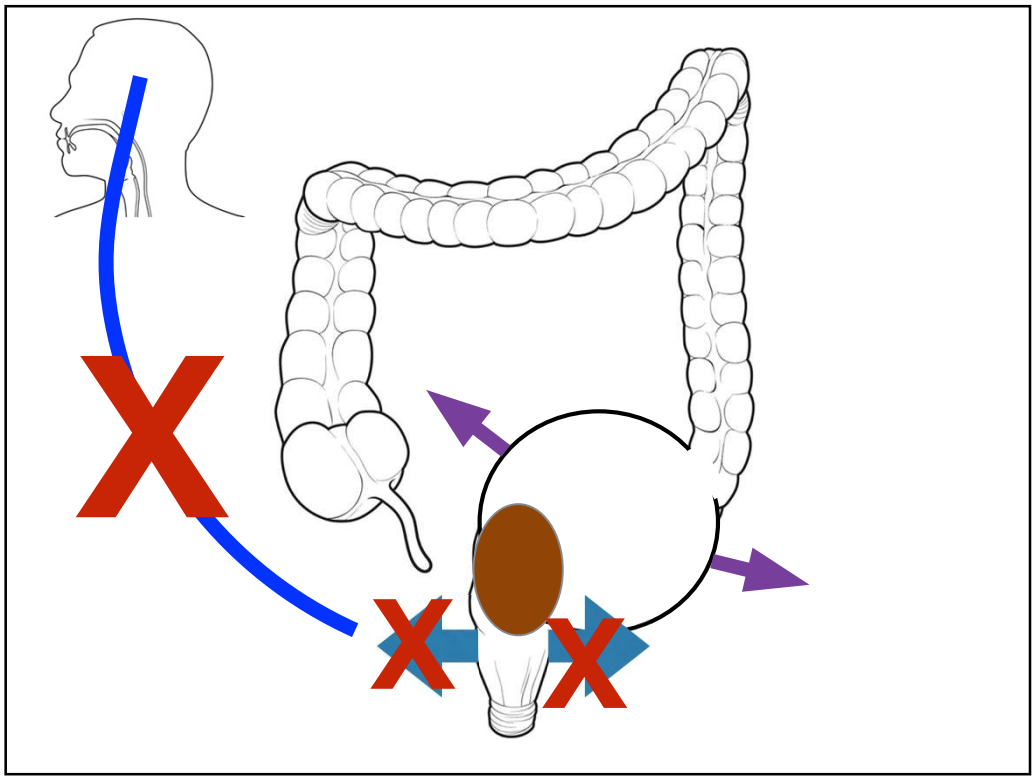

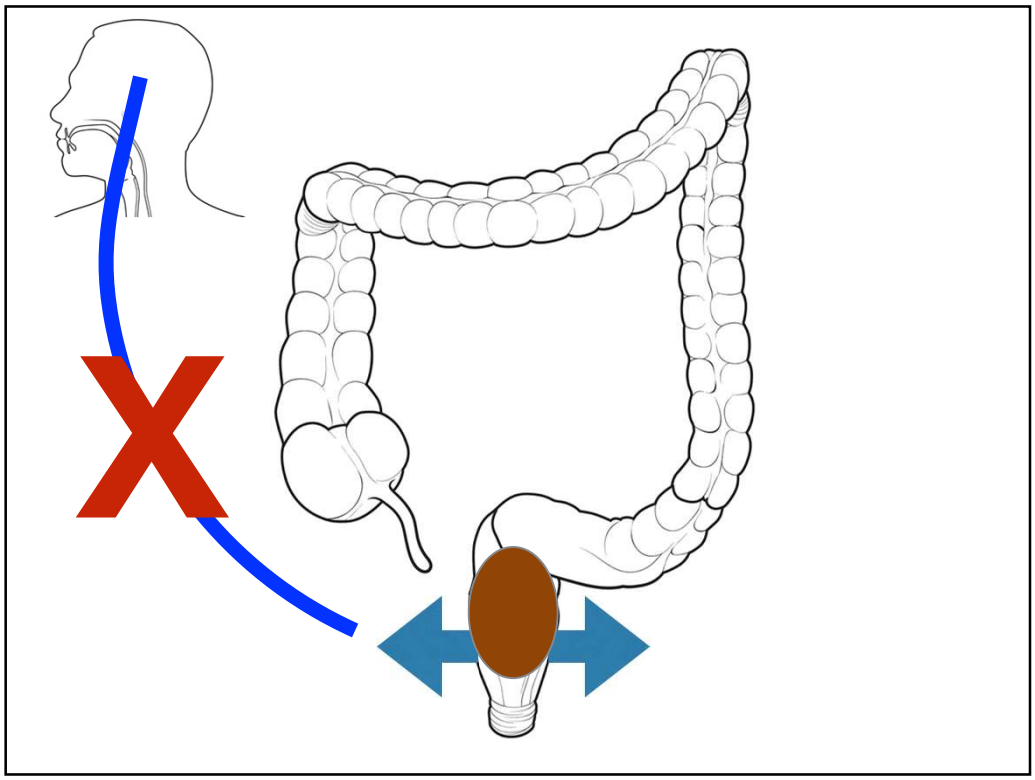

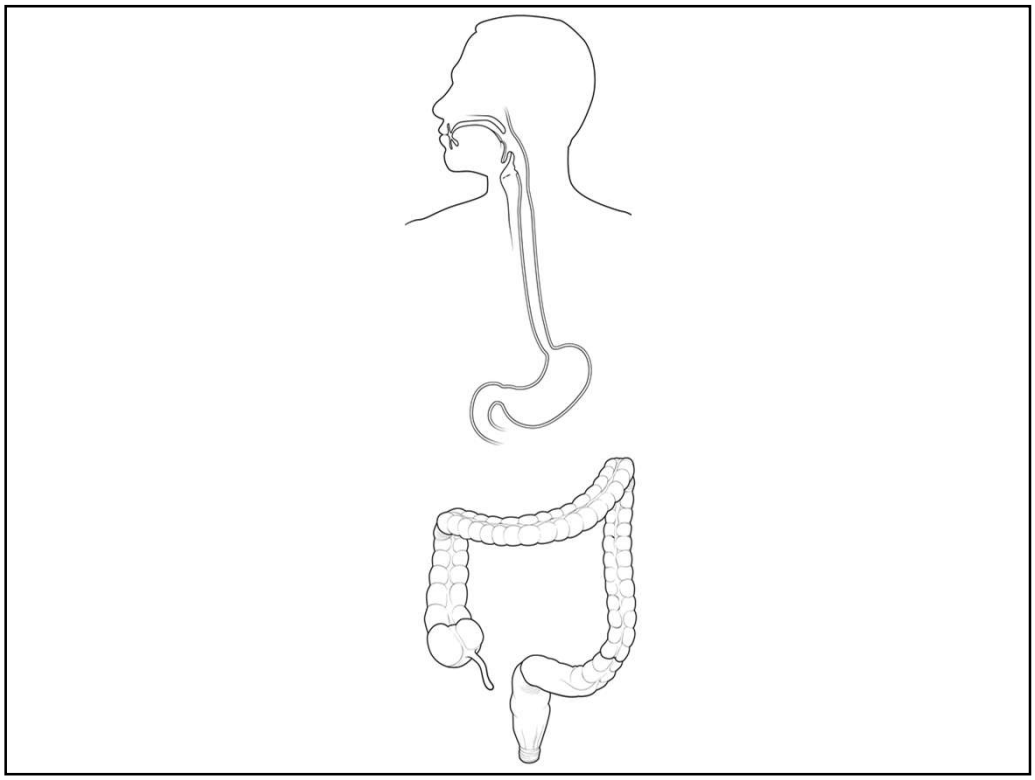

Gastro
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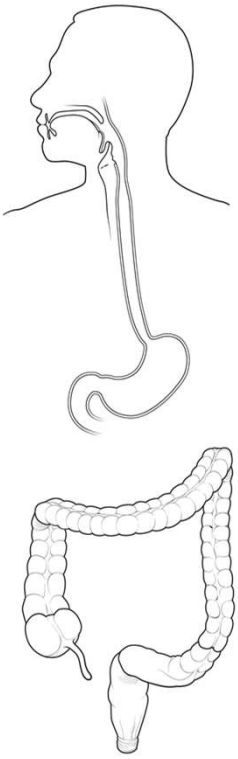
Reflex



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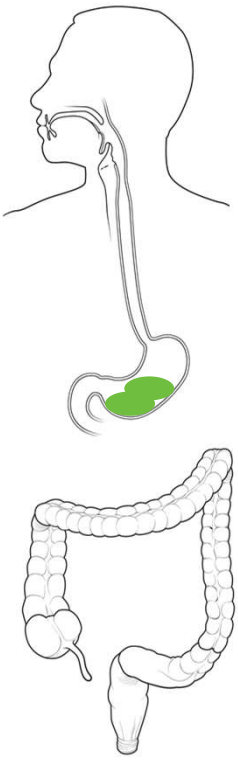

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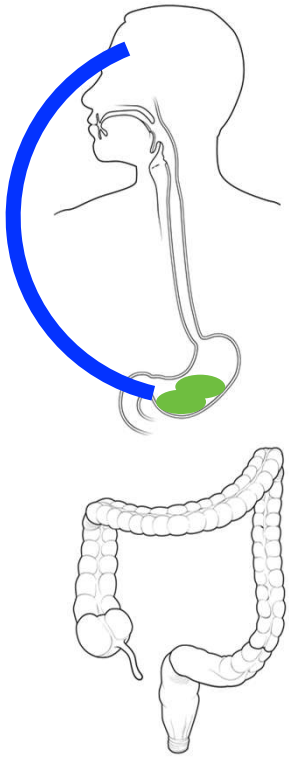

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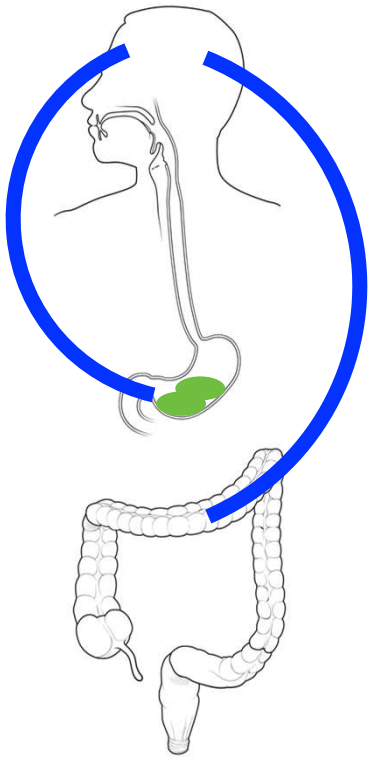

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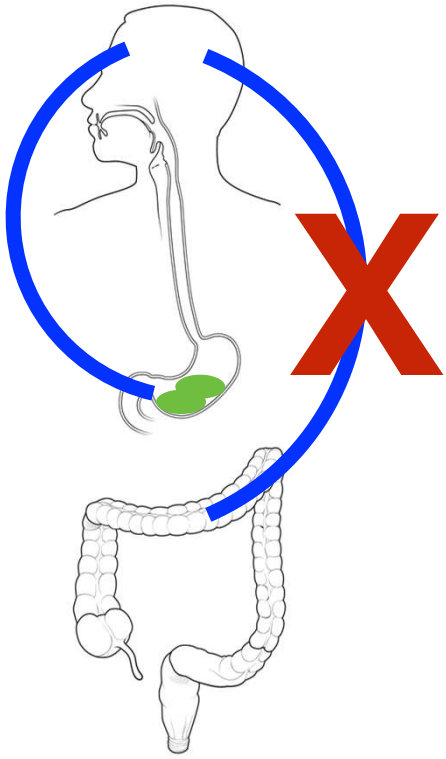

Goals of Treatment

- 2-3 soft pudding-like stools per day
  - Aim high!
- Expect to be on PEG-3350 for a long time
  - expect at least as long as the child has had constipation

PEG-3350 Dosing

- Initial maintenance dose 1 g / kg
  - usually don’t start higher than 17 g for maintenance but many end up needing more
- Titrating the dose - dosing is individual!
  - don’t change the dose more often than every 3-4 days
  - go up by 1/4 dose until achieving goal
  - then stay there!

Initial Clean Out

- if child is going multiple days without a stool
- long-standing constipation
- very hard stools

Initial Clean Out

- PEG-3350
  - double dose for 3-6 days
- Fleet enemas
  - if significant encopresis, hard stools, multiple days without a stool

Relapse

- Stools becoming harder
- Not having a stool for 2-3 days

- Repeat the clean-out with PEG-3350 +/- enema
- Increase the maintenance dose by at least 1/4

Practical Tips for Families

- Children are growing
  - Parents should not get discouraged if the dose needs to go up!
- Water! Water! Water!
  - PEG-3350 does not work without fluid
  - Need extra fluid - the human body is smart!
- Many children need to be on PEG-3350 for a long time - they are not alone!

Weaning PEG-3350

- Only after having consistent stools for many months
- Go Slow!
  - Decrease by 1/4 dose every 3-4 weeks
  - If stools becoming firmer again, go back up to previous effective dose then try again in 1-2 months
- Fluid and fibre intake will help with the weaning stages

Not working?

- Too low of a dose
- Too little water
- Too short of time on treatment
- Too many days without stooling
- Too many other behavioural challenges

Not working?

- Stimulants
  - can be tried in addition to stool softener to help with frequency
  - may assist in regaining sensation to defecate when there has been longstanding colonic distension

Not working?

- Biofeedback
  - Offered by physiotherapists
  - Can be helpful if an element of dyssynergic defecation (contracting rectal muscles instead of relaxing)
- Pediatric Psychology
  - behavioural component, withholding

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http://gikids.org

GI Kids
Help & Hope for Children with Digestive Disorders

- Digestive Topics A-Z
- Celiac Disease
- Eosinophilic Esophagitis
- Inflammatory Bowel Disease
- Nutrition & Obesity
- Reflux & GERD

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Welcome to GIKids

Children's Digestive Health Information for Kids and Parents

Millions of children are living with pediatric digestive and nutritional disorders. GIKids provides easy to understand information about the treatment and management of these pediatric digestive conditions for children and parents.

We welcome you to explore GIKids to learn more about pediatric digestive disorders, how they are diagnosed, the treatment and management of conditions, and our patient and parent resources.

Join Our Growing Community:

Facebook | Twitter | Instagram

FEATURED RESOURCES

Constipation Care Package

The NASPGHAN Foundation announces a new one stop

FEATURED RESOURCES

Patient/Family Survey on IBD Transition

We want to make it easier for your child to transition to an IBD doctor who treats adults. Please tell us what your child and you need and want to help prepare for IBD transition care.

- Follow this link for patients
- Follow this link for parents

Have you ALREADY identified an adult GI Provider for your IBD care? Help us and other patients like you by answering this quick survey!

- Follow this link for patients and parents

GI Kids.org
Patient & Family
RESOURCES

Managing Constipation

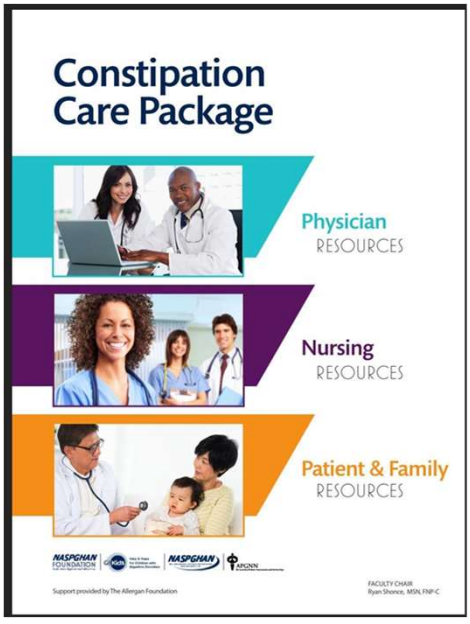
- **Poo in You:** A wonderful video if your child is having problems with soiling accidents. This is one of the most common problems seen by both pediatric GI and primary care providers. This interactive animated video explains what causes the accidents, why they happen so often, and how we can treat the problem.

PAGE 2

Download Video
- English
- Spanish

- **Constipation Fact Sheet:**
Constipation is defined as either a decrease in the frequency of bowel movements, or the painful passage of bowel movements.
  - English
  - Spanish
  - French

Visit GIKids.org for more information on Constipation



Constipation
Care Package

Physician
RESOURCES

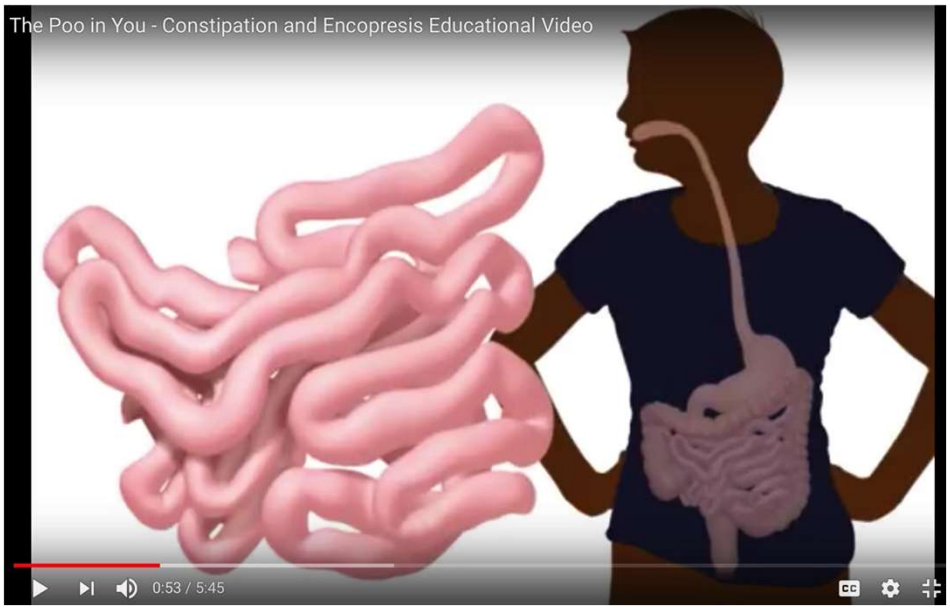
Nursing
RESOURCES

Patient & Family
RESOURCES

Support provided by The Allergan Foundation

FACULTY CHAIR
Ryan Shonce, MSN, FNP-C

YouTube: The Poo in You




Thank you!

Gastroesophageal Reflux

Journal of Pediatric Gastroenterology and Nutrition
49:498–547

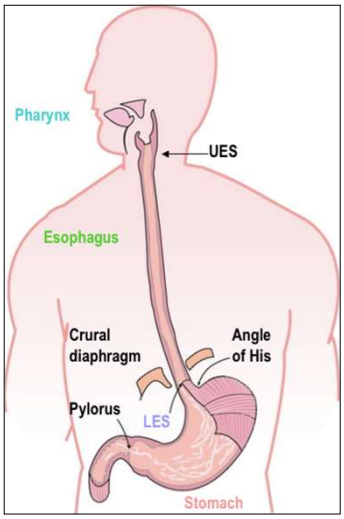
Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN)

Co-Chairs: *Yvan Vandenplas and †Colin D. Rudolph
Committee Members: ‡Carlo Di Lorenzo, §Eric Hassall, ||Gregory Liptak, ¶Lynnette Mazur, #Judith Sondheimer, **Annamaria Staiano, ††Michael Thomson, ‡‡Gigi Veereman-Wauters, and §§Tobias G. Wenzl

Definitions

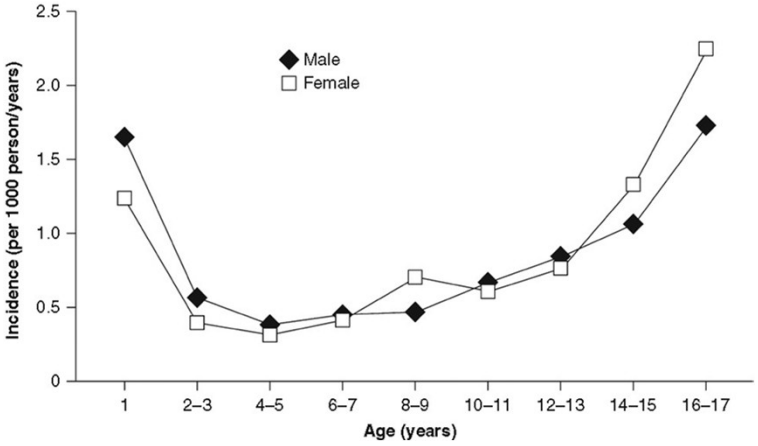
- Gastroesophageal reflux (GER)
  - passage of gastric contents into the esophagus with or without regurgitation or vomiting
  - normal physiologic process
  - occurs several times per day in healthy infants
  - the frequency decreases in children and adults
- Gastroesophageal reflux disease (GERD)
  - troublesome symptoms and/or complications of persistent GER

Pathogenic Factors



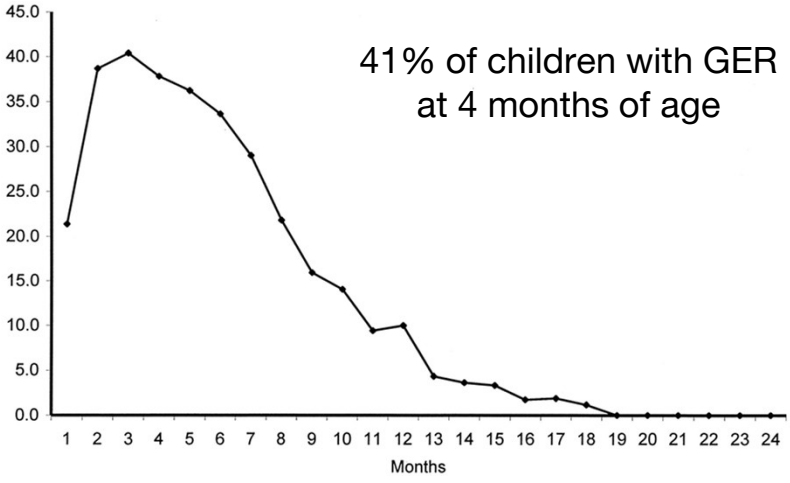
- **Primary Mechanisms of GERD**
  - transient LES relaxation
  - impaired esophageal clearance
- **Secondary Mechanisms of GERD**
  - intra-abdominal pressure
  - decreased gastric compliance
  - delayed gastric emptying
  - reduced esophageal capacitance
- **Mechanisms of Esophageal complications**
  - defective tissue resistance
  - noxious composition of refluxate
- **Mechanisms of Airway Complications**
  - vagal reflexes
  - impaired airway protection

GERD Incidence Rates



Ruigómez et al. Scand J Gastroenterology 2010; 45(2):139-46

Natural History



41% of children with GER at 4 months of age

Martin et al. Pediatrics 2002;109:1061-1067

Diagnosis

- History and Physical Exam
- Diagnostic Tests
  - pH monitoring +/- impedance monitoring
  - endoscopy and biopsies
  - other tests

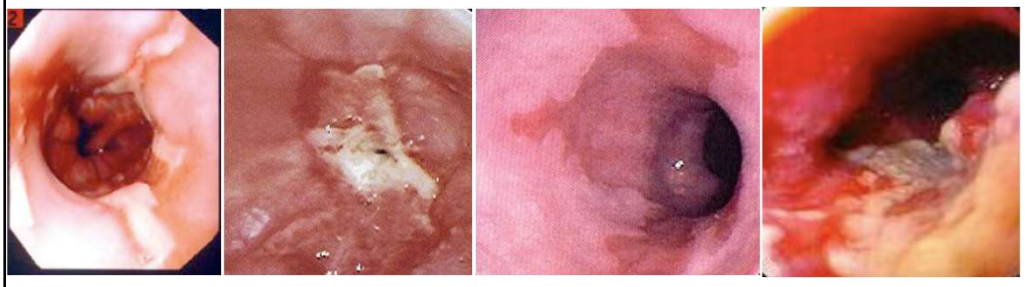
Clinical Manifestations of GERD

- Recurrent regurgitation +/- vomiting
- Weight loss or poor weight gain
- Irritability in infants
- Ruminative behaviour
- Heartburn or chest pain
- Hematemesis
- Dysphagia / odynophagia
- Wheezing / stridor / cough
- Hoarseness

Groups at High Risk for GERD

- Neurologic impairment
- Repaired esophageal atresia or other congenital esophageal disease
- Cystic fibrosis
- Hiatal hernia
- Repaired achalasia
- Obesity
- Family history of GERD, Barrett's esophagus or esophageal adenocarcinoma

GERD Related Complications



Erosive esophagitis | Stricture | Barrett's Esophagus | Adenocarcinoma

Warning Signs

- Suggestive of disorders or conditions other than GERD
  - bilious vomiting / persistent forceful vomiting
  - new onset vomiting after 6 months
  - GI bleeding - hematemesis / hematochezia
  - failure to thrive
  - diarrhea / constipation
  - fever / lethargy / bulging fontanelle
  - macro / microcephaly
  - seizures
  - abdominal findings - tenderness, distension, hepatosplenomegaly
  - documented or suspected genetic or metabolic syndrome

History and Physical Exam

- Infants and toddlers
  - no single symptom or group of symptoms can reliably diagnose GERD or predict response to treatment
- Older children and adolescents
  - history and physical exam can often reliably diagnose GERD and can be used to initiate management
- A small percentage ever require further investigations

Other Investigations

- Esophageal pH monitoring and/or impedance
  - useful for correlating other symptoms with reflux episodes
- Endoscopy and biopsies
  - to identify mucosal changes but is not very sensitive or specific for reflux
- Upper GI series
  - to identify anatomic abnormalities (strictures, malrotation, etc.) but not reflux or GERD

Empiric Trial of Acid Suppression

- Infants and young children
  - no evidence that an empiric trial of acid suppression is diagnostic for GERD
  - acceptable to do 2-4 week trial to see response
- Older children and adolescents
  - PPI trial is justified for up to 4 weeks
  - improvement does not confirm diagnosis of GERD - symptoms may improve spontaneously or by placebo effect

Treatment

- Diet
- Positioning
- Acid suppression
- ? Prokinetics
  - insufficient evidence to support their use
- Surgery

Diet

- Extensively hydrolyzed protein formula
  - 2-4 week trial in infants with suggestive GERD
  - (if breastfed, consider maternal withdrawal of cow's milk from diet)
- Thickening of formula
  - decreased visible reflux / regurgitation
- Late night eating
  - associated with GERD in adults and adolescents

Specific Foods

- Expert opinion only (not well-studied)
  - caffeine
  - chocolate
  - alcohol
  - spicy foods
  - high fat meals
- Can avoid these foods if they provoke symptoms

Positioning

- Prone sleeping position
  - shown to reduce reflux symptoms
  - BUT, up to 12 months of age, increased risk of sudden infant death syndrome (SIDS)
  - therefore, still recommend supine sleeping up to 12 months of age
- Adolescents
  - left side sleeping position and elevation of the head of the bed may reduce reflux symptoms

Acid Suppression

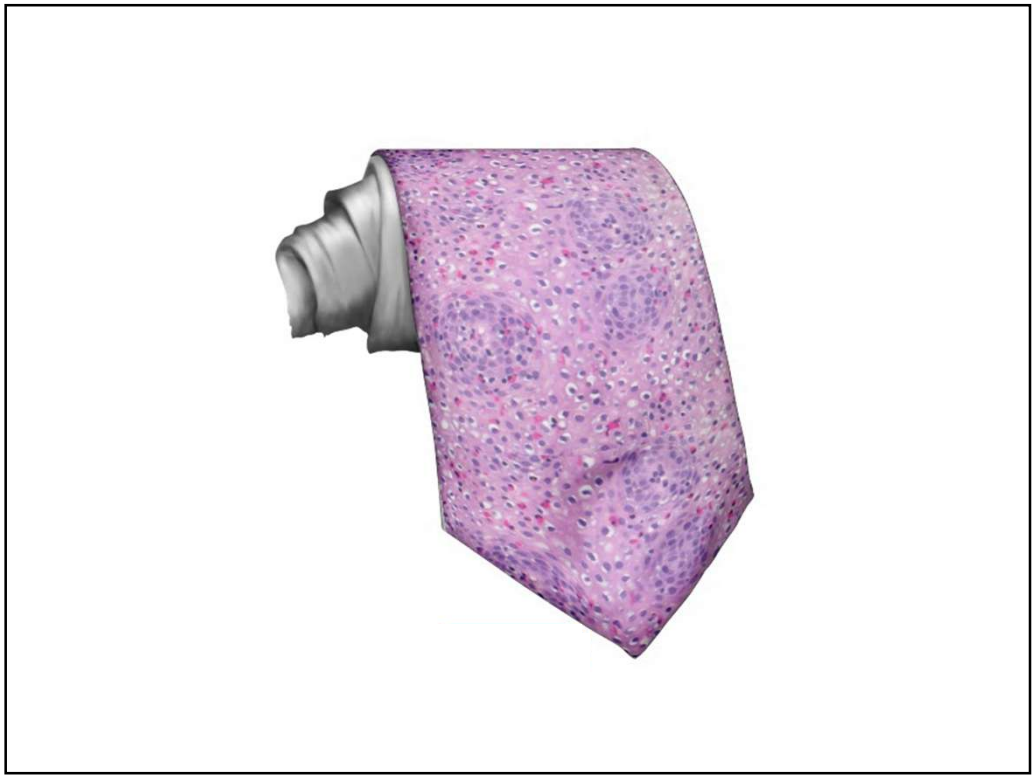
- Histamine2-receptor antagonists
  - relief of symptoms and mucosal healing
  - tachyphylaxis
- Proton pump inhibitors (PPI)
  - superior to H2RAs in symptom relief and mucosal healing
  - Most patients only require once daily dosing
  - Give 30 mins before meals
  - Use the smallest effective dose
  - 3-4 month trial, then wean

When to refer to GI?

- Persistent need for medications
- Complications
  - Dysphagia
  - Regurgitation or Vomiting
  - Failure to Thrive
  - Respiratory Complications
- No improvement with significant distress

Eosinophilic Esophagitis


I CAN SAY
EOSINOPHIL...
CAN YOU?
Buck
Eosinophilic Disorders
EE SUCKS



Prevalence / Incidence

- Systematic Review
  - 25 studies
  - incidence 0.7-10/100,000
  - prevalence 0.2-43/100,000
  - varies across geographic regions
  - prevalence highest in children with food impaction or dysphagia (63-88%)

Journal of Pediatric Gastroenterology and Nutrition 2013, 57 (1): 72-80

Risk Factors for Eosinophilic Esophagitis

Males
Asthma
Food allergies
Allergic rhinitis
Eczema

Clinical Features

- Infants/Toddlers
  - non-specific symptoms
  - feeding difficulties
  - vomiting
  - regurgitation
  - feeding refusal
  - failure to thrive

Clinical Features

- Childhood
  - vomiting
  - abdominal pain
  - retrosternal pain
- Adolescence
  - GERD symptoms
  - dysphagia
  - food impaction

EoE vs GERD

- GERD
  - mucosal breaks may increase risk of food sensitization
- Food allergy / EoE
  - may predispose to GERD due to issues with esophageal dysmotility, gastric dysrhythmia, increased number of LES relaxations
- i.e. they may exacerbate each other

When do we start thinking about EoE?

- Risk Factors Present
  - asthma, allergies, eczema
- Not responsive to PPI therapy
- Difficulty weaning PPI therapy
- Food sticking / swallowing difficulties
  - slow eater, washing down food with water