Acute Diarrhea

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Diarrhea Definition

• Formal definition: Stool weight >200g/day  
• Practical definition:  
  – ≥ 3 loose/watery stools/day  
  – Decrease in consistency AND increase in frequency from the patient’s norm  
    • Acute: 2 weeks or less  
    • Persistent: 2-4 weeks  
    • Chronic: > 4 weeks
Normal Bowel Frequency

3 times/day $\rightarrow$ 3 times/week

Acute Diarrhea

INFECTIONOUS (GASTROENTERITIS)
- Self-limited
  1. Viruses
  2. Bacteria
  3. Protozoa

Non-Infectious (5%)
- Persistent/chronic
  1. Drugs
  2. Food allergy/intolerance
  3. Other disease states
  4. Primary GI disease
## Initial Evaluation

- Duration of symptoms
- Frequency
- Stool characteristics
- Signs/symptoms of volume depletion
- Fever
- Peritoneal signs
- Extraintestinal symptoms

## Food History

- Exposure to particular type of food associated with foodborne disease (in the week preceding illness)
- Time interval between exposure and onset of symptoms
Social History

- Quit smoking (UC flare, OTC nicotine)
- Alcohol
- Illicit drugs
- Sexual history: MSM, anal intercourse
- Occupation (exposures)
- Travel
- Pets
- Recreational activities

Important Clues in Acute Diarrhea
Small bowel vs Large Bowel

- Small Bowel
  - Large volume
  - Watery
  - Abdominal cramping, bloating, gas
  - Weight loss
  - Rarely fever
  - Negative occult blood and stool WBC

- Large Bowel
  - Small volume
  - Frequent
  - Painful bowel movements
  - Bloody/mucoid
  - Fever
  - Positive occult blood and stool WBC

Differential Diagnosis of Bloody Diarrhea

1. Shiga toxin producing E.coli (O157:H7)
2. Shigella
3. Salmonella
4. Campylobacter
5. Clostridium difficile
6. Ischemic colitis
7. Inflammatory Bowel Disease
8. Entamoeba Histolytica
Acute Diarrhea with Fever

Indicates intestinal inflammation

1. Invasive Bacteria
   -Salmonella, Campylobacter, Shigella
2. Enteric viruses
   -Norovirus, Rotavirus, Adenovirus
3. Cytotoxic organism
   -C. diff, E. histolytica
   *Enterohemorrhagic E. coli fever is absent or low grade (EHEC/STEC)
4. Inflammatory bowel disease
5. Severe ischemic colitis

Indications for Medical Evaluation of Diarrhea: Severe Illness

- Profuse watery diarrhea with dehydration
- Passage of many small volume stools with visible blood and mucus (dysentery)
- Fever ($\geq 38.5^\circ$C or 101.3°F)
- $\geq 6$ unformed stools/24h or $>48$h duration
- Severe abdominal pain
### Indications for Medical Evaluation of Diarrhea

- Elderly (≥ 70yo)
- Immunocompromised
- Signs/symptoms of systemic illness along with diarrhea (esp. pregnant women—suspect listeriosis)
- Hospitalized patients or recent use of antibiotics

### When to Obtain Stool Cultures

- Severe Illness
- Patients with comorbidities that increase the risk for complications
- Underlying IBD
- Occupation (daycare workers or food handlers) requires negative cultures to return to work
- Untreated persistent diarrhea
- (+) stool WBC, lactoferrin, or occult blood
Ordering Stool Cultures

• Routine
  – Salmonella
  – Shigella
  – Campylobacter
  – Yersinia (most strains) *
  - E.coli O157:H7**
  - Aeromonas and Plesiomonas *

  *Grow on routine culture but notify lab as frequently overlooked
  **Specific order for other Shiga toxin producing E.coli

Ordering Stool Cultures

• One time is sufficient
  – Continuous excretion of pathogens

• Require specific orders:
  – Shiga toxin producing E.coli
  – Vibrio
  – Listeria
Bacterial Gastroenteritis (Foodborne Illness)

Salmonellosis

- Non-typhoidal salmonella
- Leading foodborne disease in the U.S.
- Transmission: poultry, eggs, milk products, produce, raw meats, pets/animals
- Incubation: 8-72 hrs
### Salmonellosis

- **Symptoms:** watery diarrhea, fever, cramps, vomiting (colitis less common)
- **Duration:** 4-10 days
- **Treatment in healthy persons with mild symptoms** may prolong excretion

### Salmonellosis Complications

- **Bacteremia (5%)**
  - Endovascular infections (arteritis, aortitis, mycotic aneurysms, stent/graft infections)
  - Orthopedic prostheses
  - Prosthetic heart valves
  - Osteomyelitis in sickle cell patients
**Campylobacter**

- *C. jejuni* or *C. coli*
- 2nd leading cause foodborne disease U.S.
- Transmission: poultry/cross-contamination, unpasteurized milk, animals

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**Campylobacter**

- Incubation: 2-5 days
- Symptoms: Watery or hemorrhagic, fever, cramps, vomiting
- Duration: 2-7 days
- Complications: reactive arthritis and Guillain-Barré syndrome
**Shigellosis**

- S. sonnei or S. flexneri
- Transmission: person to person; contaminated water or food (raw vegetables, salads, sandwiches)
- Increased risk: children (toddlers); daycares and institutional settings

**Shigellosis**

- Incubation: 3 days (1-7)
- Symptoms: watery progressing to dysentery (bloody/mucoid), fever, tenesmus, N/V
- Duration: 2-7 days
- Complications: HUS and TTP (children)
**Enterohemorrhagic E.coli (Shiga-toxin producing E.coli)**

- **(EHEC/STEC)**
  - O157:H7 most common serotype

- Transmission: undercooked ground beef, unpasteurized, cattle, petting zoos/exhibits

- Two-thirds cases June-September

- Incubation: 1-7 days

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**EHEC**

- Symptoms:
  - Watery diarrhea → hemorrhagic
  - Abdominal pain
  - Absent/low grade fever

- Few or no fecal leukocytes

- Rx: NO ANTIBIOTCS OR ANTI-PERISTALTIC AGENTS
**HUS and TTP**

- **Life threatening complication of STEC**
  - 5-10%
  - Children, elderly (40% mortality)
- **Clinical diagnosis**
  - Bloody diarrhea
  - Microangiopathic Hemolytic Anemia
  - Purpura/thrombocytopenia
  - Anuria/Acute renal failure
  - Neurologic symptoms

Rx: supportive care, dialysis/plasmapheresis (<10% mortality)

**Yersinia**

- **Y. enterocolitica (U.S), Y. pseudotuberculosis (Europe)**
- Uncommon; undercooked pork, unpasteurized milk, contaminated water
- **Self-limiting enterocolitis**
  - Watery or bloody diarrhea
  - Fever
- **Self-limiting terminal ileitis (pseudoappendicitis)**
- Increased risk of infection in hereditary hemochromatosis (siderophilic bacteria)
### Empiric Antibiotic Treatment for Acute Diarrhea

<table>
<thead>
<tr>
<th>• Fever and bloody stools</th>
<th>• &gt;1 week duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fever and hemoccult, fecal leukocyte or lactoferrin positive stools</td>
<td>• Hospitalization being considered</td>
</tr>
<tr>
<td>• &gt;8 stools/d</td>
<td>• Immunocompromised</td>
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<tr>
<td>• Volume depletion</td>
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### Empiric Antibiotic Treatment

<table>
<thead>
<tr>
<th>• <em>Fluoroquinolone</em> x 3-5 days</th>
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<tbody>
<tr>
<td>– Cipro 500mg BID</td>
</tr>
<tr>
<td>– Norfloxacin 400mg BID</td>
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<tr>
<td>– Levofloxacin 500mg qd</td>
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* Avoid in EHEC

<table>
<thead>
<tr>
<th>• If suspect campylobacter:</th>
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<tbody>
<tr>
<td>– Azithromycin 500mg qd x 3d</td>
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<tr>
<td>– Erythromycin 500mg po qd x 5d</td>
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</tbody>
</table>
Anti-Diarrheal Agents

Loperamide

- Drug of Choice when stools are nonbloody and fever is low grade or absent and low suspicion of C. diff
  - Significant reduction in stools when combined with cipro
  - Dose: 2 tabs initially (4mg), then 2mg after each unformed stool (max 16mg/d) for <= 2 days

*Could facilitate HUS in EHEC
**Aggressively hydrate as fluid loss may be masked by pooling in the intestine
### Lomotil (Diphenoxylate and Atropine)

- 2 tabs (4mg) qid <= 2 days
- Central opiate effects
- Cholinergic side effects

*Could facilitate HUS in EHEC*

**Aggressively hydrate as fluid loss may be masked by pooling in the intestine**

### Bismuth Subsalicylate (Pepto-Bismol)

- Consider in patients with febrile bloody diarrhea
- Improves vomiting
- 30mL or 2 tabs q 30 min x 8 doses
Clostridium difficile

- Antibiotic associated colitis
- Most common nosocomial infection
  - > 3 million hospital infections U.S/yr
  - 10% patients hospital admission >48hrs
- Rising incidence
- Occurring outside hospitals (20,000/yr)
- IBD patients without antibiotics

Risk Factors for C.diff

- Antibiotics
- Advanced age
- Hospitalization
- Severe illness
- Cancer chemotherapy
- Gastric acid suppression
# Severe CDAD

- Systemic toxicity
  - Fever
  - Abdominal tenderness
  - Acute mental status changes
- WBC >15k
- Albumin <2.5
- Elevated Cr
- Age >60

## C.Diff Testing

- One time testing is sufficient
- C. diff toxin PCR:
  - Highly sensitive and specific
  - Rapid
- EIA C.diff toxin A/B
  - Less sensitive
  - Variation: GDH +, cytotoxicity on + samples only
  - Only repeat if neg and clinical suspicion remains high
C. Diff Treatment

- Stop inciting abx ASAP
- Mild/Moderate: Flagyl 500mg PO TID x 10-14d
  - IV only when not able to tolerate po
- If severe: Vancomycin 125mg po qid x 10-14d
  (enemas if ileus) +/- IV Flagyl
  - Consult ID
- If underlying infection requiring abx
  - Continue for additional week after completion
- Repeat initial antibiotic for initial recurrence if of same severity
- Tapered or pulse regimen vancomycin for 2nd or later recurrences

C. Diff and PPI Use

- FDA warning Feb. 2012
  - Evaluate the clinical necessity
  - Use lowest dose and shortest duration
  - H2B being reviewed
# Traveler’s Diarrhea (TD)

- **Low risk:** US, Canada, Australia, Northern and Western Europe
- **Intermediate risk:** Eastern Europe, Caribbean, S. Africa, China, Russia
- **High risk:** Africa, Asia, Middle East, Central and South America

# TD Preventive Measures

- Eat freshly cooked foods that are steaming hot (avoid buffets and street vendors)
- Avoid salads (washed in water)
- Avoid unpeeled fruits and veggies
- Avoid tap water, ice/beverages diluted with water
- Safe beverages: bottled and sealed, carbonated
- Carry alcohol-based (60%) hand cleaner
Traveler’s Diarrhea

- 80-90% bacterial
- Enterotoxigenic E. coli
- 80% watery diarrhea
- 5-10% dysentery (Shigellosis, Campy)
- Course: 1-2-7 days
- Important cause of post-infectious IBS

TD Prophylaxis

- High risk hosts
- Critical trips
- High risk areas

1) Bismuth 2 tabs qid (<3 weeks)
2) Antibiotic prophylaxis
   - Ciprofloxacin 500mg once daily
   - Rifaximin ?
3) Insufficient evidence for probiotics
TD Empiric Treatment

- Loperamide +
  - Ciprofloxacin 500mg bid 3-5 days
  - Norfloxacin 400mg bid 3-5 days
  - Azithromycin 1000mg x 1 or 500mg day 1, 250mg day 2-4
  - Rifaximin 200mg TID x 3d*

*Approved for noninvasive E.coli

VIRAL GASTROENTERITIS
Norovirus (Norwalk-like)

- Most common cause of GE in U.S. (stomach flu)
  - Familial and community outbreaks
- Acute explosive vomiting (children) and watery diarrhea (adults)
- Transmission: person to person, prepared foods, produce, shellfish
- Incubation: 12-48hrs
- Duration: 2-3 days

Parasites
Giardiasis

- Giardia lamblia
- Most common parasitic cause of diarrhea in the U.S.
- Risk factors:
  - campers/hikers/travelers
  - Institutional exposure (nursing homes, day cares)
  - Food/waterborne
  - Unprotected anal sex, MSM
  - HIV/AIDS

Giardiasis

- Symptoms:
  - Abdominal pain
  - Profuse watery diarrhea
  - Excess flatulence
  - Sulfur tasting burps
  - Distended abdomen/bloating
  - Loss of appetite
  - Nausea
  - Vomiting
  - Low grade fever
  - Headache
Giardiasis

- Incubation: 7-14 days
- Duration: One to several weeks
- Long term complications: malabsorption (steatorrhea) and weight loss
- Dx: stool antigen (EIA), O&P (cysts)
- Rx: metronidazole 250mg TID x 5 days

Giardiasis: Persistent Diarrhea

- Consider empiric treatment for Giardiasis in immunocompetent hosts
  - *Flagyl may also be effective against small bowel bacterial overgrowth syndrome—seen after enteric infections and also a cause of persistent diarrhea
## Cryptosporidiosis

- **C. parvum**
- **Transmission**
  - contaminated drinking or swimming water or food
  - person to person (households, sexual partners, daycares, healthcare workers)
- **Incubation:** 1 week (up to 4 weeks)

### Cryptosporidiosis

- **Self-limited (1-2 weeks)**
  - severely dehydrating watery diarrhea
- **Dx:** Stool Ag (EIA), acid fast staining of stools
- **Rx:** usually symptomatic
  - Nitazoxanide 500mg po BID x 3 days
Cyclosporosis

• C. cayetanensis
• Transmission: contaminated food and water; outbreaks (raspberries and basil) and sporadic
• Nepal, Peru, Haiti, Guatemala
• Incubation: 7 days (2-14)

Cyclosporosis

• Sx:
  – Watery diarrhea
  – Intense fatigue and malaise
  – Loss of appetite
  – Wt loss
  – Abdominal cramping
  – Nausea
  – Gas/flatulence
• Duration: can last more than 3 weeks
• Relapses
• Dx: Acid fast O&P (specific request)
• DOC: TMP/SMX 160/800 bid x 7-10 days
Amebiasis

- Entamoeba histolytica
- Risk factors:
  - Migrants and travelers
    - Crowded tropical areas (Africa, Mexico, India, parts S. America)
  - Institutionalized patients
  - MSM
- Incubation: 7-10 days
- Duration: 2 weeks, relapses if untreated

Amebiasis

- Mild diarrhea
  - 3-8 semiformed stools
  - Occasional passage of blood and mucus
  - Fatigue
  - Gas
  - Tenesmus
- Severe dysentery (alcoholics, corticosteroids, pregnancy, young/elderly, cancer, malnourished)
  - 10-20 bloody liquid stools/day
  - Abdominal tenderness
  - Fever
  - Vomiting
- Hematologic spread:
  - Liver
  - Lungs
  - Brain
Amebiasis

- Dysentery with few leukocytes
- Dx: stool antigen EIA, trophozoites stool
- Rx: Metronidazole

### Indications for Stool O&P

<table>
<thead>
<tr>
<th></th>
<th>Giardia lamblia</th>
<th>Cryptosporidium</th>
<th>Entamoeba</th>
<th>Cyclospora</th>
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<tbody>
<tr>
<td>Persistent diarrhea</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Travel to Russia, Nepal, or mountainous regions</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Exposure to infants in daycare</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>MSM</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>Waterborne outbreak</td>
<td>X</td>
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<tr>
<td>Bloody diarrhea, few or no fecal leukocytes</td>
<td></td>
<td></td>
<td>X</td>
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</tbody>
</table>
Ordering Ova & Parasite

- Screen: EIA stool antigens
  - Giardia
  - Cryptosporidium
  - E. histolytica

- Comprehensive: Travel hx or Immunocompromised
  - Smears
  - Wet preps
  - Stains

- Three specimens separated by 24 hrs (intermittent excretion)

Food Handlers

All known causes of infectious diarrhea require rx or additional testing after cessation of diarrhea:

1) Salmonella, Shigella, STEC, Yersinia : 2 neg. stool samples
2) Campylobacter: 2 neg. samples or 48h rx
3) Giardia: 72hrs of Rx or 3 neg. stool samples
4) Cryptosporidium: 3 neg. samples
5) Amebiasis: 3 negative stool samples
6) Cyclospora: Rx begun
Other High Risk Occupations

- Daycare (child/adult)
- Health Care
- Same rules as food handlers except no Rx or stool testing required:
  - Salmonella
  - Campylobacter
  - Yersinia
  - Cryptosporidium

Ohio Reportable Diseases

- Notify your local health department
  - By the end of the next business day:
    - Salmonella
    - Shigella
    - Shiga toxin producing E.coli
    - Hemolytic uremic syndrome
    - Cyclosporiasis
  - By the end of the work week
    - Campylobacter
    - Cryptosporidiosis
    - Giardiasis
    - Non-cholera vibrio
### Indications for Endoscopy in Acute Diarrhea

<table>
<thead>
<tr>
<th>Colonoscopy:</th>
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<tbody>
<tr>
<td>- Distinguish IBD from infectious diarrhea</td>
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<tr>
<td>- Unclear colitis, evaluate ischemia</td>
</tr>
<tr>
<td>- Aid in diagnosis of C. diff (not as common)</td>
</tr>
<tr>
<td>- Colitis in immunocompromised (CMV, HSV)</td>
</tr>
<tr>
<td>- Suspicion of amebiasis with negative stool</td>
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<tr>
<td>- GVHD in bone marrow transplant patients</td>
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</tbody>
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<thead>
<tr>
<th>EGD/flex sig:</th>
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<tbody>
<tr>
<td>- Immunocompromised to evaluate for opportunistic infections (- stool cx, - o&amp;p)</td>
</tr>
<tr>
<td>- Persistent diarrhea not responsive to empiric rx or negative stool pathogens</td>
</tr>
</tbody>
</table>
CAREFUL HANDWASHING WITH SOAP AND WATER FOR 20 SECONDS ESPECIALLY AFTER USING BATHROOM FACILITIES

References

5. Clinical Practice Guidelines for Clostridium difficile Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). Infection Control and Hospital Epidemiology May 2010, Vol. 31, No. 5
Chronic Diarrhea

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Chronic Diarrhea

- Chronic diarrhea is a clinical challenge, and can be frustrating to evaluate, and the differential diagnosis can be vast.
- Definition: Presence of decreased stool consistency for more than 4 weeks duration.
  - Greater than 200 grams of stool daily.
  - Greater than 3 stools/daily that are of a loose consistency.

Fine KD, Gastroenterology 1999
Sleisenger and Fortran 9th Edition 2010
Chronic Diarrhea

• Epidemiology:
  – There is a lack of robust data demonstrating the relative incidence and cost of chronic diarrhea in the Developed World.
  • Estimates suggest that 3-5% of the population have chronic diarrhea.
  • Estimates of work related loss of revenue are $350,000,000 annually, not including the medical evaluation and work-up/treatment.

Fine KD, Gastroenterology 1999

Chronic Diarrhea

• The effects of chronic diarrhea also significantly impacts on a patient’s quality of life.
  – Leading to: Depression, anxiety, and loss/ Quitting work.

Chronic Diarrhea

- Approach to Chronic Diarrhea.
- Is it:
  - Bloody?
  - Fatty?
  - Watery/Liquid?
    - Osmotic vs Secretory vs Functional

Bloody Diarrhea

- Differential Diagnosis:
  - Infection
  - Inflammatory Bowel Disease (IBD)
  - Ischemia
  - Medications
  - SCAD: Segmental Colitis
    Associated Diverticulosis
  - Radiation
  - Post-operative
Bloody Diarrhea

- Infection is an uncommon cause of chronic diarrhea:
  - Stool culture:
    - Salmonella, Campylobacter, Yersinia, Aeromonas, Plesiomonas, and C.Difficile
    - Ova & Parasites

Bloody Diarrhea

- Work-up of Bloody Diarrhea:
  - Colonoscopy is the primary mode of diagnosis.
  - Referral to a Gastroenterologist should be made when bloody diarrhea occurs, to differentiate IBD from ischemic and infectious etiologies.
Bloody Diarrhea

- Ulcerative Colitis
- Crohn’s Colitis

Fatty Diarrhea

- Fatty Diarrhea: Clues in the clinical setting
  - Steatorrhea
  - Weight loss
  - Stools:
    - Not always diarrhea
    - Hard to flush/float within toilet
    - Oily droplets
### Fatty Diarrhea

- **Steatorrhea:**
  - Vitamin malabsorption
    - Vitamins A, D, E, and K
    - Vitamin A: Night blindness
    - Vitamin D: Osteomalacia
    - Vitamin K: Easy Bruising/Bleeding

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### Fatty Diarrhea

- **Fecal Fat Analysis**
- **Qualitative:**
  - Subjective:

- **Quantitative:**
  - 24-hour collection while on a 100gram diet
  - Stool Weight; <200-300 grams
  - Fat; <7 grams/24 hour period

*Sleisenger and Fortran 9th Edition 2010*
Fatty Diarrhea

• Caveats
  – High carbohydrate diet; increases stool volume to 300-400 grams
  – Voluminous stools will raise fat excretion; up to 14g/24hrs
  – Correct for fat intake; ie low fat diets
  – False positives; Olestra and tree nuts
  – Pancreatic/Biliary sources; >9.5 grams/100gm stool

Fatty Diarrhea

• Steatorrhea:
  – Luminal causes:
    • Pancreatic insufficiency
    • Bile Salt deficiency
    • Bacterial Overgrowth
  – Mucosal:
    • Celiac sprue
    • Crohn’s Disease; especially small bowel disease
### Fatty Diarrhea

- **Pancreatic Insufficiency:**
  - Indirect testing:
    - Serum Trypsin
    - Fecal Chymotrypsin
    - Fecal Elastase

  - All have poor sensitivity and specificity


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### Fatty Diarrhea

- Pancreatic Insufficiency
- Evaluate and rule out mucosal disease first
  - Then consider trial of pancreatic enzyme replacement therapy
    - Monitor weight gain and fecal fat
Celiac Disease

• Diarrhea caused by gluten sensitivity.

• Epidemiology:
  – Prevalence is 1: 133 in the USA, increased to 1:22 if first degree relative with celiac disease.

  (Fasano A et.al, Arch Intern Med 2003)

  – May also have associated features

  • Weight Loss, Abdominal Distension, Abnormal LFTs, Iron Deficiency, Infertility/Recurrent fetal loss, Microscopic Colitis, DM I, and Thyroid diseases.

Celiac Disease

• Celiac Disease: Test while on Gluten diet
  – Antibody Tests: IgA tTG or EMA and Serum IgA
    • 2-3% of Celiac patient are deficient in IgA
    • Preferable to have tTG testing
    • Use of Anti-gliaden Antibody is not recommended
  – Small bowel biopsies:
    • Consult GI for biopsies; still gold standard.
  – Genotype
    • HLADQ2, DQ8
    • If negative, rules our celiac disease
    • Not recommended for screening purposes
<table>
<thead>
<tr>
<th>Malabsorption</th>
</tr>
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<tbody>
<tr>
<td>• Parasites: Uncommon</td>
</tr>
<tr>
<td>– Giardia</td>
</tr>
<tr>
<td>• Gastric surgery/Reflux surgery</td>
</tr>
<tr>
<td>• Chronic mesenteric ischemia</td>
</tr>
<tr>
<td>• Radiation</td>
</tr>
<tr>
<td>• Significant Ilietis/ileal resection</td>
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<tr>
<td>• Medications:</td>
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<td>– HAART</td>
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<thead>
<tr>
<th>Malabsorption</th>
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<tbody>
<tr>
<td>• Malabsorption:</td>
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<tr>
<td>– Small bowel diseases (uncommon)</td>
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<tr>
<td>• Collagenous sprue</td>
</tr>
<tr>
<td>• Whipple’s disease</td>
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<tr>
<td>• Eosinophillic enteritis</td>
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<tr>
<td>• Lymphoma</td>
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<tr>
<td>• Amyloid</td>
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Chronic Diarrhea: Medications

<table>
<thead>
<tr>
<th>Osmotic:</th>
<th>Secretory:</th>
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<tbody>
<tr>
<td>• Citrates</td>
<td>• Antibiotics</td>
</tr>
<tr>
<td>• Magnesium containing</td>
<td>• NSAIDs</td>
</tr>
<tr>
<td>• Sugars; sorbitol, xylitol, mannitol</td>
<td>• Allopurinol/Colchicine</td>
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<tr>
<td>• Motility</td>
<td>• Antineoplastics</td>
</tr>
<tr>
<td>• Macrolides</td>
<td>• Metformin</td>
</tr>
<tr>
<td>• Reglan</td>
<td>• Prostaglandins</td>
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<tr>
<td>• Laxatives; Bisacodyl</td>
<td>• Laxatives: Senna and Docusate</td>
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Watery Diarrhea

<table>
<thead>
<tr>
<th>Dietary:</th>
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<tbody>
<tr>
<td>• Alcohol</td>
</tr>
<tr>
<td>• Dairy</td>
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<tr>
<td>• Supplements</td>
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<tr>
<td>• OTC medications</td>
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<tr>
<td>• Herbals</td>
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<tr>
<td>• Fructose/Sorbitol</td>
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<thead>
<tr>
<th>Medications:</th>
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<tbody>
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<td>• 7% of all medication side effects</td>
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Watery Diarrhea

• Diseases:
  – Diabetes
  – Surgical:
    • Cholecystectomy
    • Gastric
    • Small intestinal
  – Family History:
    • Celiac
    • IBD
  – Sexual history:
    • HIV
    • Infections
  – Travel History:
    • High risk areas/activities

Watery Diarrhea

• Evaluation of Watery Diarrhea:
  – H&P
  – Labs:
    • CBC, CMP, Thyroid tests, Celiac serology, ESR/CRP, and Stool FOBT
    • Stool culture is low yield
    • Only several months of symptoms; consider:
      – Ameba, Giardia,
      Cryptosporidium/cyclospora, and Candida
        (Elderly)
**Watery Diarrhea**

- **Evaluation: Send to Gastroenterology?**
  - Secretory Diarrhea
  - Colonoscopy with biopsy; Evaluation
    - Crohn’s Disease
    - Microscopic colitis
    - Colon cancer
  - EGD with Duodenal biopsy

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**Watery Diarrhea and Diabetes**

- Visceral autonomic neuropathy
- Bacterial overgrowth
- Celiac sprue
- Pancreatic insufficiency
- Unabsorbed carbohydrates:
  - Sugarfree products
Watery Diarrhea after Cholecystectomy

- Cholecystectomy
  - Post-Cholecystectomy related diarrhea
    - Incidence 20%
    - Can be delayed
    - Rarely severe
  - Mechanism: Low bile acid absorption at terminal ileum; especially nocturnal.
    - Bile acids induce colonic salt and water secretion
  - Treatment: Bile acid binders

Microscopic Colitis

- Microscopic colitis:
  - Intermittent secretory type diarrhea.
  - Types:
    - Lymphocytic Colitis
    - Collagenous Colitis
## Watery Diarrhea

- Watery Diarrhea:
  - Fecal fat testing
  - Laxative screen
  - Osmotic Gap

## Stool Osmotic Gap

- Osmotic Gap
  - Normal: $290 - 2(Na + K)$
  - Secretory Diarrhea: $<50$
  - Osmotic Diarrhea: $>100-125$
  - Contamination: $>375$

- FYI: Labs do not test stool that is solid; used to indirectly confirm that patient is having diarrhea

Sleisenger and Fortran 9th Edition 2010
Secretory Diarrhea

- Continues despite fasting.
- Hormonally Induced:
  - Zollinger-Ellisison Syndrome: Elevated Gastrin (off PPI therapy)
  - VIPoma: Elevated VIP
  - Carcinoid: 5-HIAA (24hr urine collection)
  - Medullary Thyroid Carcinoma: Calcitonin
  - Idiopathic Secretory Diarrhea

Osmotic Diarrhea

- Related to ingested foods/medications:
  - Close examination of ingested materials assists in diagnosis.
  - Resolves with fasting.
  - Most common cause: Lactase Deficiency
    - Wanes over time, and increased symptoms with advancing age.

Fine KD, Gastroenterology 1999
Sleisenger and Fortran 9th Edition 2010
Chronic Diarrhea

- **Functional:**
  - Irritable Bowel Syndrome (IBS) is the most common cause of functional diarrhea in adults in the developed world.
    - 3-20% of the USA population has IBS
    - Women affected more than Men
    - Ages 15-35 most commonly
  - **Diagnosis of exclusion:**
    - Do they respond to dietary changes, fiber, and exercise?
  - **Watch for RED FLAGS:**
    - Bleeding, substantial weight loss, abnormal imaging and/or nocturnal symptoms

Fine KD, Gastroenterology 1999
Sleisenger and Fortran 9th Edition 2010
Lembo AL Practical Gastroenterology 2007

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**When to send to GI?**

- **In General,** any diarrhea that is suspected to be Fatty, Inflammatory, or Secretory should be sent to Gastroenterology for endoscopic biopsy or specific radiographic testing sooner than later.

- **Any diarrhea with “warning features”**; ie progressive pain, significant weight loss, bleeding/iron deficiency anemia, and severe metabolic abnormalities.