### 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

### Acute Diarrhea

**INFECTIOUS (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

### Normal Bowel Frequency

- 3 times/day → 3 times/week

---

**Acute Diarrhea**

Akeek S. Bhatt, MD
Assistant Professor of Clinical Medicine
Division of Gastroenterology, Hepatology, & Nutrition
Director of Endoscopy University Hospital East
The Ohio State University’s Wexner Medical Center
**Initial Evaluation**

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

**Social History**

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

**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

**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

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

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

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 (≥38.5°C or 101.3°F)
- ≥6 unformed stools/24h or >48h 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

- One time is sufficient
  - Continuous excretion of pathogens

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

<table>
<thead>
<tr>
<th>Non-typhoidal salmonella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading foodborne disease in the U.S.</td>
</tr>
<tr>
<td>Transmission: poultry, eggs, milk products, produce, raw meats, pets/animals</td>
</tr>
<tr>
<td>Incubation: 8-72 hrs</td>
</tr>
</tbody>
</table>

### 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

<p>| Bacteremia (5%) |
| Endovascular infections (arteritis, aortitis, mycotic aneurysms, stent/graft infections) |
| Orthopedic prostheses |
| Prosthetic heart valves |
| Osteomyelitis in sickle cell patients |</p>
<table>
<thead>
<tr>
<th>Campylobacter</th>
<th>Shigellosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• C. jejuni or C. coli</td>
<td>• S. sonnei or S. flexneri</td>
</tr>
<tr>
<td>• 2nd leading cause foodborne disease U.S.</td>
<td>• Transmission: person to person; contaminated water or food (raw vegetables, salads, sandwiches)</td>
</tr>
<tr>
<td>• Transmission: poultry/cross-contamination, unpasteurized milk, animals</td>
<td>• Increased risk: children (toddlers); daycares and institutional settings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Campylobacter</th>
<th>Shigellosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Incubation: 2-5 days</td>
<td>• Incubation: 3 days (1-7)</td>
</tr>
<tr>
<td>• Symptoms: Watery or hemorrhagic, fever, cramps, vomiting</td>
<td>• Symptoms: watery progressing to dysentery (bloody/mucoid), fever, tenesmus, N/V</td>
</tr>
<tr>
<td>• Duration: 2-7 days</td>
<td>• Duration: 2-7 days</td>
</tr>
<tr>
<td>• Complications: reactive arthritis and Guillain-Barré syndrome</td>
<td>• Complications: HUS and TTP (children)</td>
</tr>
</tbody>
</table>
**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

**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)

**EHEC**

- Symptoms:
  - Watery diarrhea → hemorrhagic
  - Abdominal pain
  - Absent/low grade fever
- Few or no fecal leukocytes
- Rx: NO ANTIBIOTICS OR ANTI-PERISTALTIC AGENTS

**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**

- Fever and bloody stools
- Fever and hemoccult, fecal leukocyte or lactoferrin positive stools
- >8 stools/d
- Volume depletion
- >1 week duration
- Hospitalization being considered
- Immunocompromised

**Anti-Diarrheal Agents**

**Empiric Antibiotic Treatment**

- *Fluoroquinolone x 3-5 days*
  - Cipro 500mg BID
  - Norfloxacin 400mg BID
  - Levofloxacin 500mg qd
* Avoid in EHEC

- If suspect campylobacter:
  - Azithromycin 500mg qd x 3d
  - Erythromycin 500mg po qd x 5d

**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

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

Bismuth Subsalicylate (Pepto-Bismol)

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

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 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 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 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

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 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

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

**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

**Viral Gastroenteritis**

**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**

- 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**

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

---

**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*
<table>
<thead>
<tr>
<th>Cryptosporidiosis</th>
<th>Cyclosporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• C. parvum</td>
<td>• C. cayetanensis</td>
</tr>
<tr>
<td>• Transmission</td>
<td>• Transmission: contaminated food and water; outbreaks (raspberries and basil) and sporadic</td>
</tr>
<tr>
<td>– contaminated drinking or swimming water or food</td>
<td>• Nepal, Peru, Haiti, Guatemala</td>
</tr>
<tr>
<td>– person to person (households, sexual partners, daycares, healthcare workers)</td>
<td>• Incubation: 7 days (2-14)</td>
</tr>
<tr>
<td>• Incubation: 1 week (up to 4 weeks)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cryptosporidiosis</th>
<th>Cyclosporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Self-limited (1-2 weeks)</td>
<td>• Sx:</td>
</tr>
<tr>
<td>– severely dehydrating watery diarrhea</td>
<td>– Watery diarrhea</td>
</tr>
<tr>
<td>• Dx: Stool Ag (EIA), acid fast staining of stools</td>
<td>– Intense fatigue and malaise</td>
</tr>
<tr>
<td>• Rx: usually symptomatic</td>
<td>– Loss of appetite</td>
</tr>
<tr>
<td>– Nitazoxanide 500mg po BID x 3 days</td>
<td>– Wt loss</td>
</tr>
<tr>
<td></td>
<td>– Abdominal cramping</td>
</tr>
<tr>
<td></td>
<td>– Nausea</td>
</tr>
<tr>
<td></td>
<td>– Gas/flatulence</td>
</tr>
<tr>
<td></td>
<td>• Duration: can last more than 3 weeks</td>
</tr>
<tr>
<td></td>
<td>• Relapses</td>
</tr>
<tr>
<td></td>
<td>• Dx: Acid fast O&amp;P (specific request)</td>
</tr>
<tr>
<td></td>
<td>• DOC: TMP/SMX 160/800 bid x 7-10 days</td>
</tr>
</tbody>
</table>
### 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

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

### 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

### Indications for Stool O&P

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

### 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

### 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

### 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

- Colonoscopy:
  - Distinguish IBD from infectious diarrhea
  - Unclear colitis, evaluate ischemia
  - Aid in diagnosis of C. diff (not as common)
  - Colitis in immunocompromised (CMV, HSV)
  - Suspicion of amebiasis with negative stool
  - GVHD in bone marrow transplant patients

- EGD/flex sig:
  - Immunocompromised to evaluate for opportunistic infections (- stool cx, - o&p)
  - Persistent diarrhea not responsive to empiric rx or negative stool pathogens

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

Sheetal Sharma, MD
Assistant Professor of Clinical Medicine
Division of Gastroenterology, Hepatology, & Nutrition
The Ohio State University’s Wexner Medical Center

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

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

Bloody Diarrhea

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

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**

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

**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**

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

- **Pancreatic Insufficiency:**
  - Indirect testing:
    - Serum Trypsin
    - Fecal Chymotrypsin
    - Fecal Elastase
    - All have poor sensitivity and specificity

---

**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**
- 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.

Malabsorption

- Parasites: Uncommon
  - Giardia
- Gastric surgery/Reflux surgery
- Chronic mesenteric ischemia
- Radiation
- Significant illetis/ileal resection
- Medications:
  - HAART

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

Malabsorption

- Malabsorption:
  - Small bowel diseases (uncommon)
    - Collagenous sprue
    - Whipple's disease
    - Eosinophillic enteritis
    - Lymphoma
    - Amyloid
Chronic Diarrhea: Medications

- Osmotic:
  - Citrates
  - Magnesium containing
  - Sugars; sorbitol, xylitol, mannitol
- Secretory:
  - Antibiotics
  - NSAIDs
  - Allopurinol/Colchicine
  - Antineoplastics
  - Metformin
  - Prostaglandins
  - Laxatives: Senna and Docusate
- Motility
  - Macrolides
  - Reglan
  - Laxatives; Bisacodyl

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

- Dietary:
  - Alcohol
  - Dairy
  - Supplements
  - OTC medications
  - Herbals
  - Fructose/Sorbitol
- Medications:
  - 7% of all medication side effects

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

### 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

### Watery Diarrhea and Diabetes

- Visceral autonomic neuropathy
- Bacterial overgrowth
- Celiac sprue
- Pancreatic insufficiency
- Unabsorbed carbohydrates:
  - Sugarfree products

### Microscopic Colitis

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

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

**Secretory Diarrhea**

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

**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

**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

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.