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Introduction:

- Diarrhea is an increase in fluidity, volume and frequency of stools relative to the usual habits of an individual.
- ≥ 3 /day loose, watery stool.

Introduction:

- The great majority of diarrhea episodes last less than one week;
- When diarrhea persists for more than 14 days, it is called persistent, intractable, or chronic diarrhea.

Introduction:

- In the developing world, persistent diarrhea usually follows an acute episode and typically is associated with serial enteric infections without time to recover between episodes.
- Children are at risk of malnutrition and often have other intercurrent illnesses, such as respiratory infections.

Introduction:

- In developed countries, children are less likely to be exposed to serial enteric infections and malnutrition.
- In these populations, chronic diarrhea is more likely to be caused by underlying disease, such as celiac disease or other food allergy.

Introduction:

- Sequelae:
 - Dehydration.
 - Marked weight loss and malnutrition.
 - FTT.

There are four basic pathophysiological categories of diarrhea

- (1) Osmotic Diarrhea: when an ingested solute is not absorbed properly, the higher concentration gradient within the gut lumen acts to draw water into intestinal lumen and greatly increases the water content of the stool. The classic example of this is the diarrhea caused by lactose intolerance. Enteric infections may also cause malabsorption via damage to intestinal epithelial cells (ex. Rotavirus or Shigella).



(2) Secretory Diarrhea: this diarrhea is caused by the intestine actively secreting water into the gut lumen. Infections such as *Cholera*, *Clostridia Perfringens*, *Clostridia Difficile*, *E. Coli*, *Staph. Aureus*, and *Shigella* all cause secretory diarrhea mainly via preformed enterotoxins.

(3) Inflammatory Diarrhea: Intestinal inflammation can lead to blood, mucus, and protein exudate losses, accompanied by fluid and electrolytes. The most common cause of this type of diarrhea is infection but can also be due to chronic diseases such as IBD or Celiac Disease.

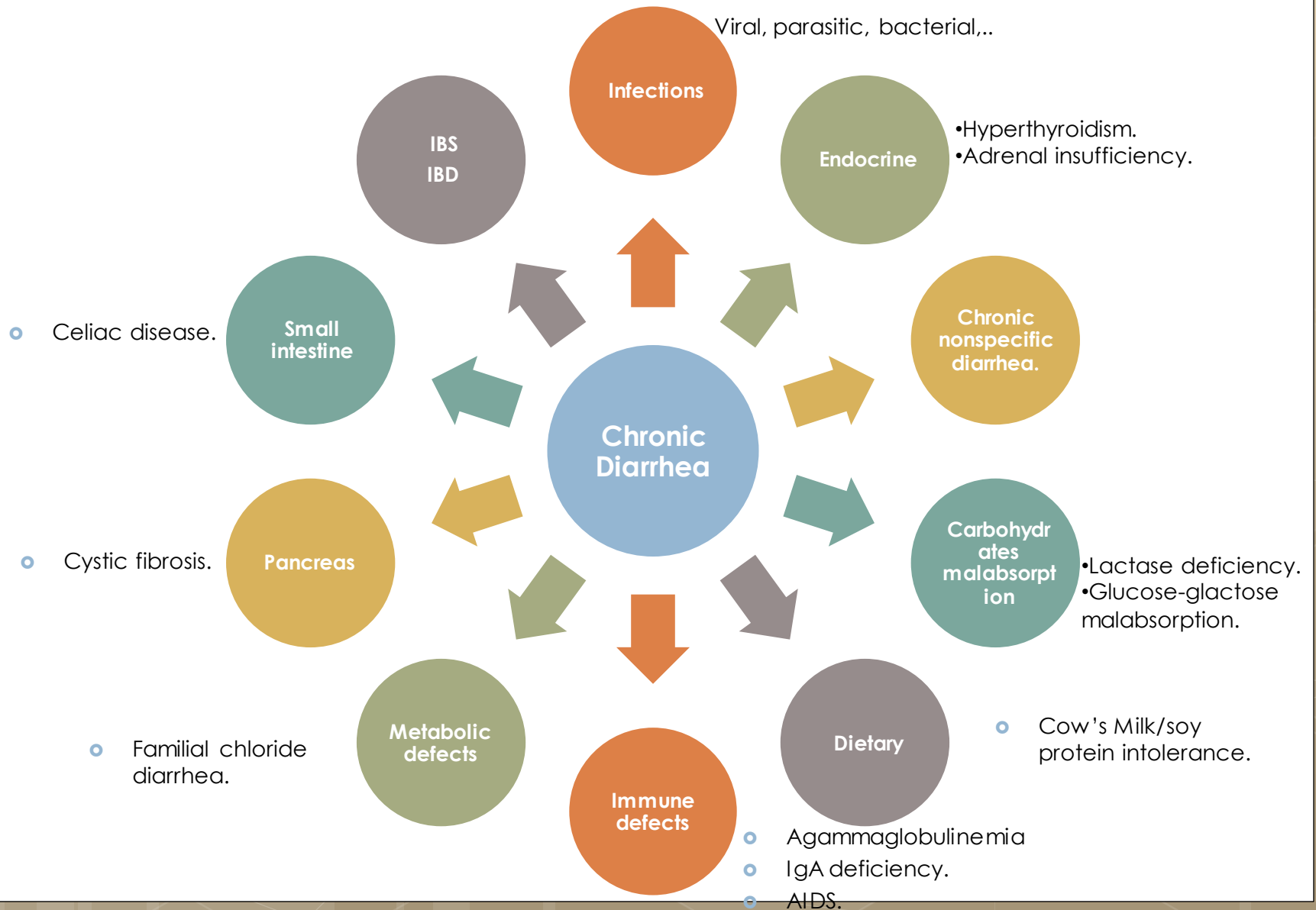
(4) Diarrhea due to Motility Disorders: although uncommon, both an increase and a decrease in gut motility can be a cause of diarrhea.

Note: diarrhea can be caused by one or any combination of these categories



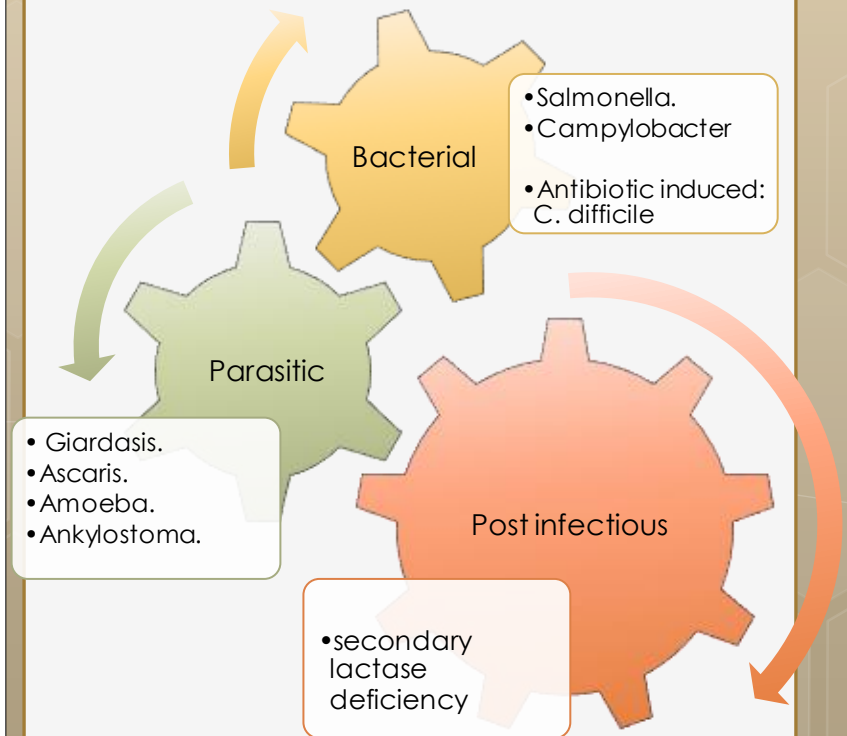
Causes

CAUSES:





Infections



Typhoid:

- Caused by *S. typhi* and *S. paratyphi*.
- Transmitted through contact with infected animals e.g., chicken, or through contaminated food e.g., eggs, dairy products.



Typhoid:

- C/P:
 - Bactremia and high grade fever that usually precede the enteric phase.
 - Diarrhea (usually after 1 week)
 - Abdominal pain.
 - Nausea.
 - Loss of appetite.
 - CNS signs (severe) : coma, meningism, fits..
 - If untreated, the disease persists 2-3 weeks with marked weight loss, hematochezia, melena.

Typhoid:

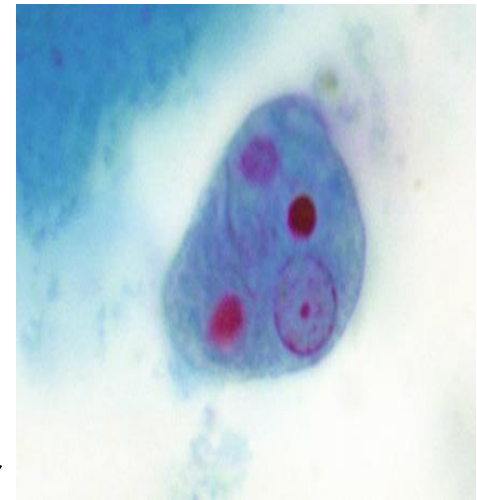
- Treatment:
 - Ciprofloxacin (best)
 - Alternative for ciprofloxacin resistance
 - Ceftriaxone or
 - azithromycin
 - Co-trimoxazole (TMP-SMZ)
 - Dexamethazone

Parasitic:

- Giardia Lamblia.
- Entamoeba histolytica.
- Cryptosporidium parvum.

Amebiasis:

- C/P:
- Intestinal:
 - Acute onset of mild diarrhea. or
 - Amebic dysentery: profuse diarrhea with blood, tenesmus, severe abd. pain
- Extra intestinal:
 - amebic liver abscess (fever, sweats, RUQ pain, high WBCs..)
 - may invade lung or brain also..

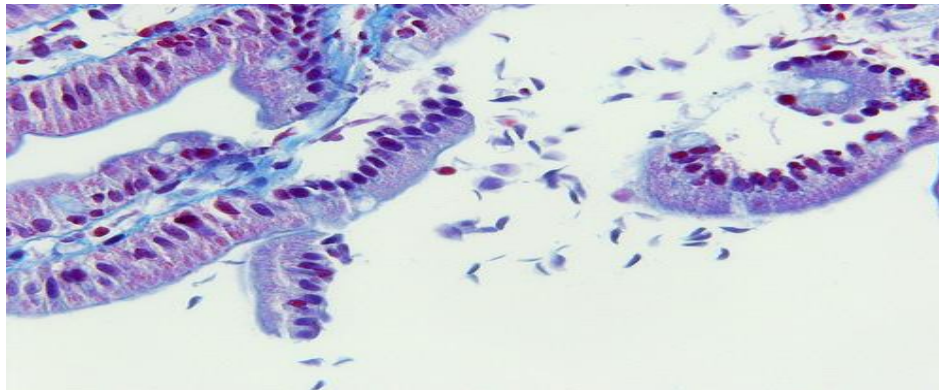


Amebiasis:

- Diagnosis:
 - Stool microscopy
 - Fecal antigen detection
 - Serology
 - US/CT .. Aspiration
- Treatment:
 - metronidazole:
 - With diloxanide furoate (cyst)
 - Tinidazole (severe)

Giardia lamblia:

- is transmitted through ingestion of cysts from contaminated food or drinks.
- Adheres to microvilli of duodenal or jejunal epithelium.



Giardia lamblia:

- C/P :
 - diarrhea
 - Bloating , flatulence
 - Abdominal pain
 - Explosive diarrhea
 - Malabsorption
 - Weight loss



- Diagnosis:
 - Direct fluorescent antibody (DFA) >> gold standard
 - Stool microscopy>> may be (--)
- Treatment:
 - Tinidazole
 - paromomycin



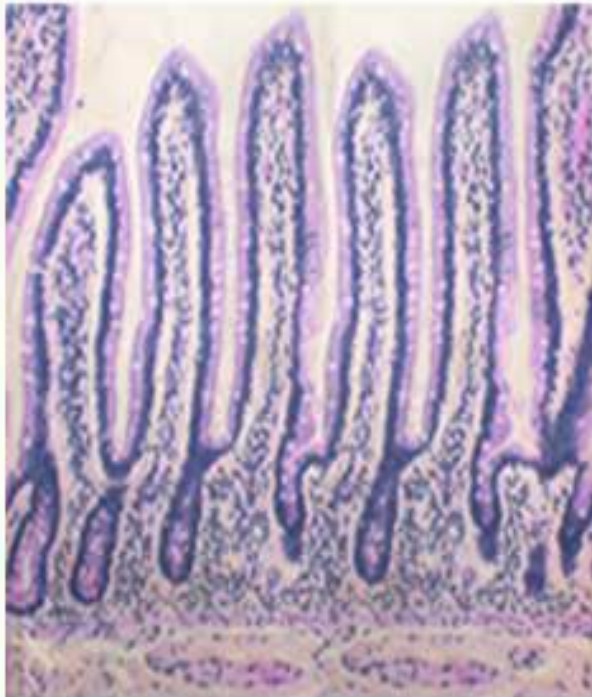
Celiac Disease



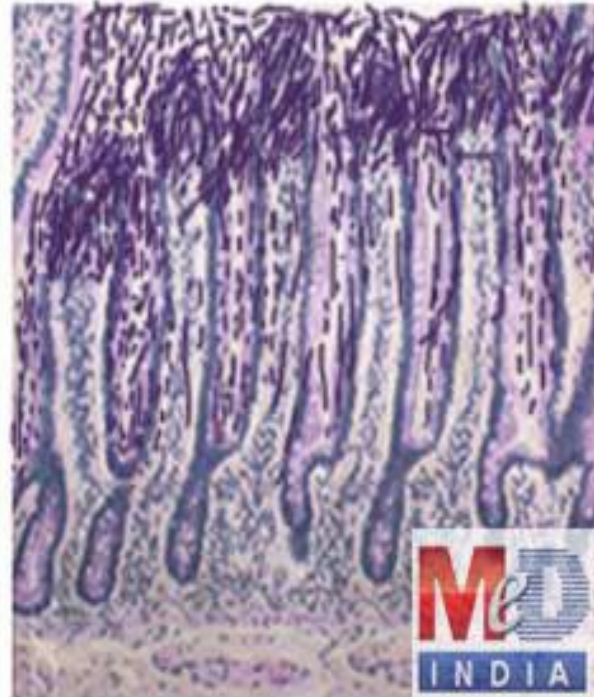
Celiac Disease:

- abnormal small intestine mucosa due to intestinal reaction to gliadin, a component of gluten.
- **Etiology**
 - Only autoimmune disease in which androgen (alpha-gliadin) is recognized.
 - Associated with other autoimmune diseases, especially thyroid disease.
 - Gluten, a protein in cereal grains, is toxic factor.
 - Associated with HLA-DQ2 and with HLA-DQ8

Healthy normal villi of the
small intestine(as seen under
the microscope)



Damaged villi of the
small intestine



Celiac Disease:

- **Clinical Features**

- classically: diarrhea, weight loss, anemia, symptoms of vitamin/ mineral deficiency, failure to thrive; now more commonly bloating, gas, iron deficiency.
- improves with gluten-free diet, deteriorates when gluten reintroduced.
- disease is usually most severe in proximal bowel; therefore iron, calcium, and folic acid deficiency common

Celiac Disease:

- Investigations:
 - small bowel mucosal **biopsy** (usually duodenum) :
 - villous atrophy and crypt hyperplasia
 - increased number of plasma cells and lymphocytes in lamina propria.

Celiac Disease:

- Investigations:

- **Evidence of Malabsorption:**

- Steatorrhea

- Low levels of ferritin/iron saturation, Ca, Fe, albumin, cholesterol, carotene, B12 absorption

Celiac Disease:

- Investigations:

- **Serology:**

- anti-transglutaminase antibodies, TTG

- **Fecal fat >7% over 72 hrs**

Celiac Disease:

- Treatment:
 - **Dietary counselling:**
 - Gluten free diet: avoid barley, rye, wheat, maybe oats (if not contaminated by other grains).
 - Starchy foods e.g., rice are safe.
 - Iron, folate supplementation (with supplementation of other vitamins as needed)



Celiac Disease:

- **Prognosis:**

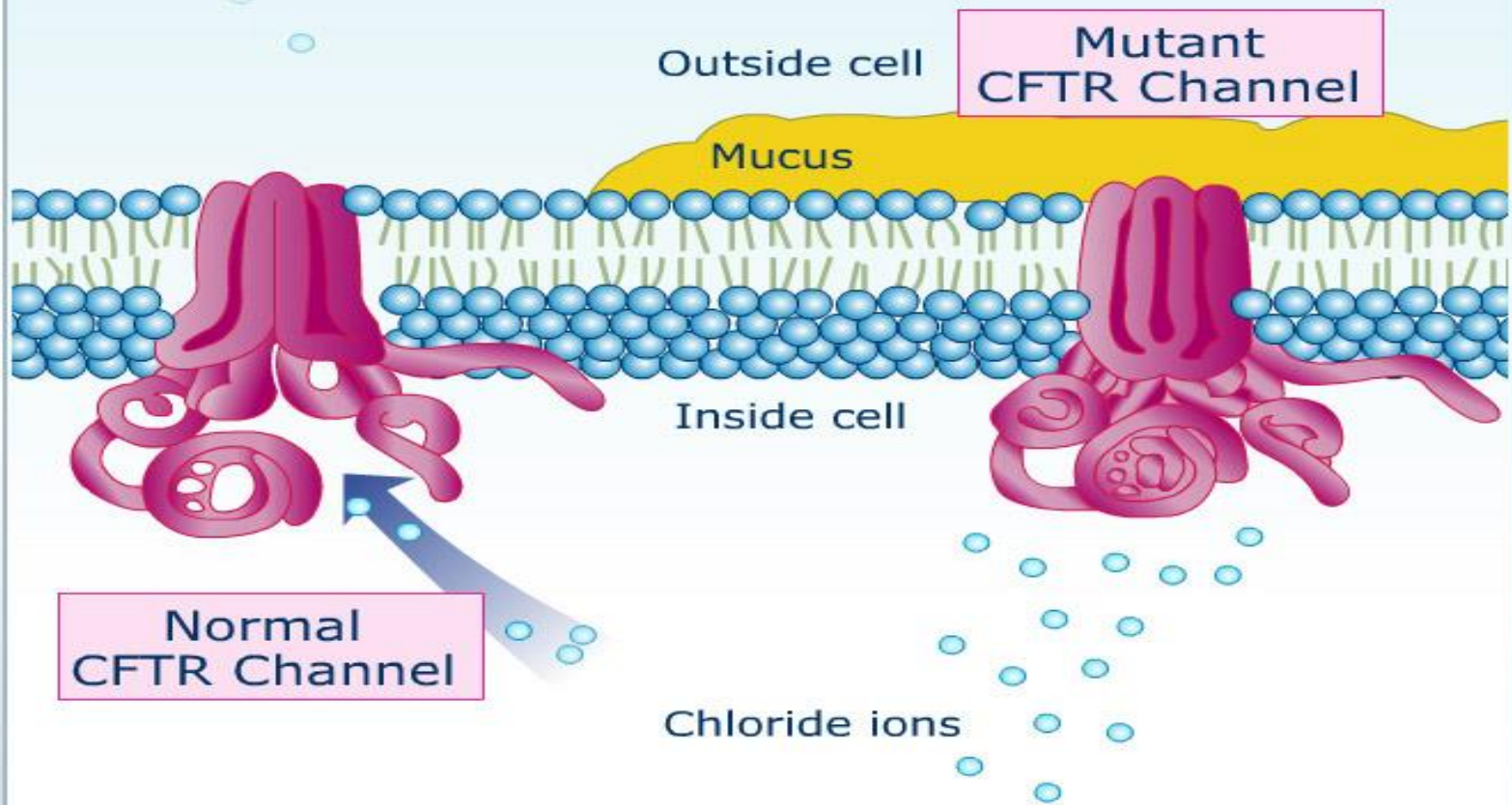
- associated with increased risk of lymphoma, carcinoma including small bowel and colon.
- These can be avoided if adherent to diet.



Cystic Fibrosis

Cystic Fibrosis:

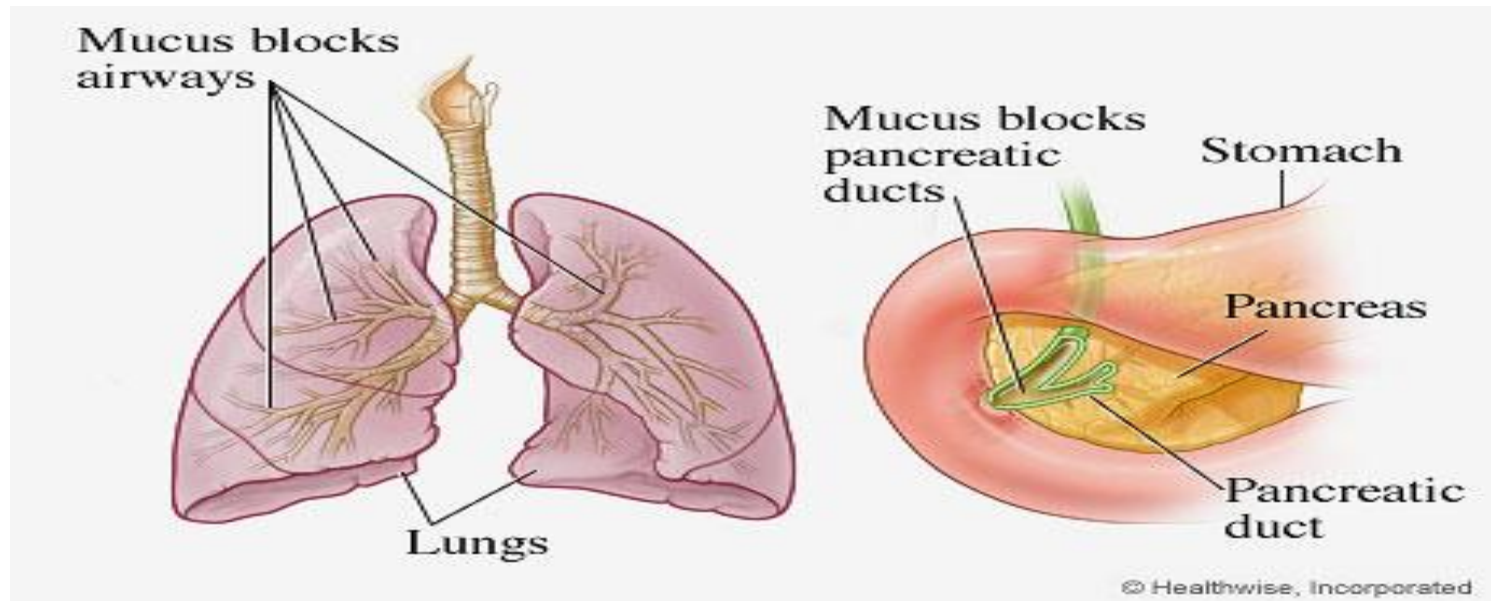
- Autosomal Recessive.
- Gene on long arm of chromosome 7 encoding for CFTR (Cystic Fibrosis Transmembrane Regulator).
- CFTR is a Chloride channel regulating Chloride transport and possibly sodium.
- This is responsible for elevated sweat chloride in 99% of patients.



A normal-functioning CFTR channel moves chloride ions to the outside of the cell while a mutant CFTR channel does not, causing sticky mucus to build up on the outside of the cell.

Cystic Fibrosis:

- CF is characterized by widespread exocrine dysfunction.



Cystic Fibrosis:

- GI Manifestation:
 - More prominent in infants.
 - Meconium ileus.
 - Greasy stools and fl atulence.
 - Pancreatitis.
 - Biliary cirrhosis.
 - Jaundice.

Cystic Fibrosis:

- GI symptoms are more prominent in infancy, while pulmonary manifestations predominate thereafter.

Cystic Fibrosis:

- Dx.:
 - Sweat chloride Test:
 - > 60 mEq/L.
 - Genetic analysis:
 - Are confirmatory.

Cystic Fibrosis:

- Others:
 - DM.
 - Infertility.
 - Unexplained hyponatremia.
 - Fat soluble vitamins (A, D, E, K) deficiency.
 - ..etc.

Cystic Fibrosis:

- Management.:
 - Pulmonary manifestations :are managed with chest physical therapy, bronchodilators, corticosteroids, antibiotics, and DNase.
 - Administer pancreatic enzymes and fat-soluble vitamins A, D, E, and K for malabsorption.
 - Nutritional counseling and support with a high-calorie and high-protein diet are essential for health maintenance.



IBD

Crohn's
Disease

Ulcerative
Colitis

Inflammatory Bowel Diseases

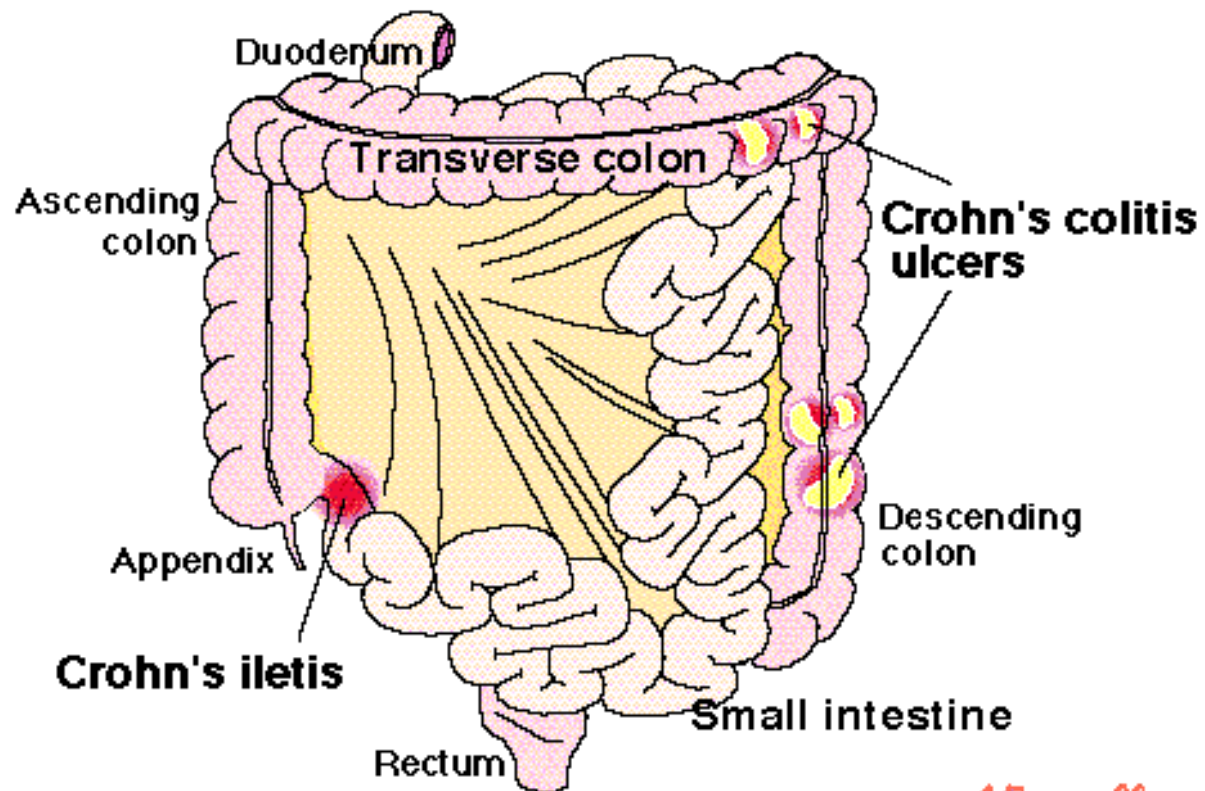
IBDs:

- **Epidemiology:**

- More common Jewish.
- The incidence of IBDs is increasing especially in industrialized countries.
- Environmental factors are needed to drive the disease in genetically susceptible individuals.
- 30 folds increased risk in those with first degree relatives involved.

Crohn's Disease:

- May involve any part of GIT.
- The commonest site is ileocecal junction.
- Discontinuous pattern “ SKIP LESIONS ”.
- Rectum is often spared.



CROHN'S DISEASE

A. Bonsall

Crohn's Disease:

- C/P:
 - Abdominal pain.
 - Abdominal tenderness.
 - Abdominal mass.
 - Low grade fever.
 - Weight loss.
 - Watery diarrhea.
 - Perianal fissure/fistula.

Ulcerative Colitis:

- Mainly affect the colon.
- The rectum is always involved.
- May extend proximally in a continuous fashion.

Ulcerative Colitis:

- C/P:
 - Bloody diarrhea.
 - Lower abdominal cramps.
 - Tenesmus.
 - Urgency.
 - Abdominal pain/tenderness.
 - Blood on rectum.
 - Usually, no abdominal mass.

Extraintestinal Manifestations of IBDs:

- Aphthous stomatitis,
- Episcleritis/uveitis,
- Arthritis,
- Erythema nodosum,
- Pyoderma gangrenosum.



Inflammatory Bowel Diseases

IBDs:

- Investigations:
 - Blood test.
 - Endoscopy.
 - Colonscopy.(biopsy)
 - Plane Abdominal XR.
 - US, CT.

Inflammatory Bowel Diseases IBDs:

- Management:
 - 5-ASA.
 - Steroids.
 - Azathioprine.
 - Infliximab
 - MTX.
 - -surgical



Glucose-galactose
malabsorption

Glucose-Galactose Malabsorption:

- a condition in which the cells lining the intestine cannot take in the sugars glucose and galactose.
- Generally becomes apparent in the first few weeks of a baby's life.

Glucose-Galactose Malabsorption:

- C/P:
 - Severe diarrhea.
 - Life-threatening dehydration,
 - Increased acidity of the blood and tissues (acidosis), and
 - weight loss
- This occurs when fed breast milk or regular infant formulas.

Glucose-Galactose Malabsorption:

- C/P:
 - However, they are able to digest fructose-based formulas that do not contain glucose or galactose.
 - Some affected children are better able to tolerate glucose and galactose as they get older.

Glucose-Galactose Malabsorption:

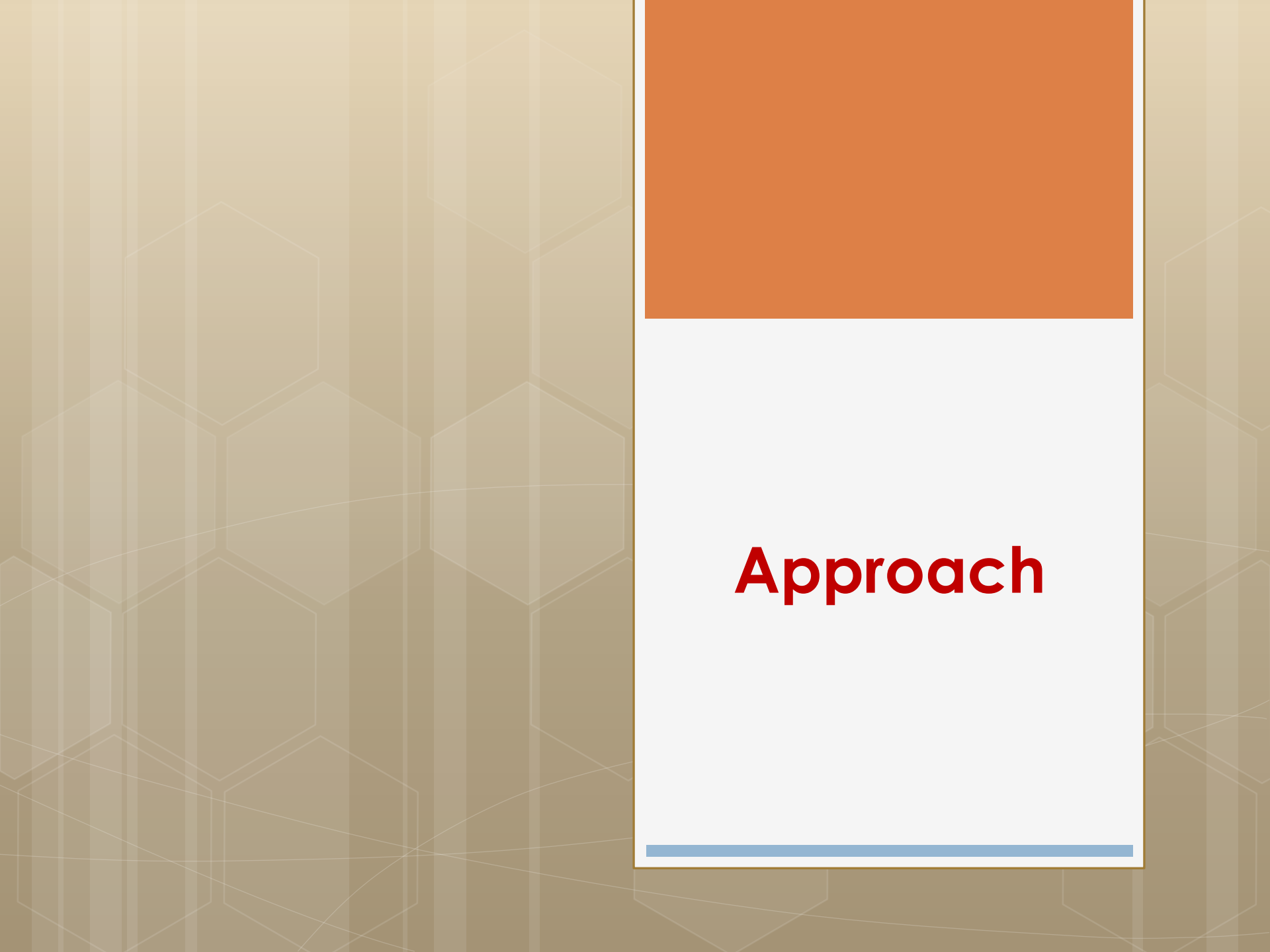
- C/P:
 - Small amounts of glucose in the urine (mild glucosuria).
 - Affected individuals may also develop **kidney stones** or more widespread deposits of calcium within the kidneys.



Familial Chloride
Losing Enteropathy

Familial Chloride Losing Enteropathy:

- An inherited defect of chloride absorption in ileum and colon.
- Defect in chloride-bicarbonate exchange protein.
- Presents since birth with abdominal distension and watery diarrhea.



Approach

History:

- Age:
- Duration:
- Consistency? Blood? Mucus? Pus?
- Offensive?
- Frequency?
- Volume?
- Associated symptoma:
 - Vomiting? Fever? Abdominal pain? Tenesmus? Convulsion? Cough? Appetite? Weight loss? Height intolerance? Tremorr?
- Type and quantity of milk? Food?

History:

- ◉ Allergy to food?
- ◉ Past history of similar attack? How frequent?
- ◉ Past Medical and Surgical History?
- ◉ Family hx of a similar condition?
- ◉ Living conditions?
- ◉ Drug history?
- ◉ Travel history?

PHYSICAL EXAMINATION



GENERAL:

- General appearance and mental status
- Vital signs
- Growth Parameters: FTT???
- Hydration assessment.
- Orthostasis- volume depletion, autonomic dysfunction

- Pallor?
- Exophthalmos (hyperthyroidism)
- Aphthous ulcers (IBD and celiac disease)
- Lymphadenopathy (malignancy, infection or Whipple's disease)
- Thyroid Examinations:
- Clubbing (liver disease, IBD, laxative abuse, celiac disease,)

SKIN LESIONS

- Dermatitis herpetiformis (celiac disease)
- Erythema nodosum and pyoderma gangrenosum (IBD)
- Hyperpigmentation (Addison's disease)

ABDOMINAL EXAMINATION

- Surgical scars
- Abdominal tenderness
- Masses
- Hepatosplenomegaly
- Auscultation:
 - Malabsorption
 - bacterial overgrowth
 - obstruction, or rapid intestinal transit.



PERINEAL AND RECTAL EXAMINATION

- Ulcers
- fissures
- abscesses
- Fistulas
- stenoses.

SYSTEMIC EXAMINATION

- Chest Examinations?
- Joints: Arthritis (IBD, Whipple's disease)

INVESTIGATIONS

INVESTIGATIONS:

- Investigations are directed by clinical findings:
 - CBC.
 - Stool culture.
 - Electrolytes.
 - RFTs.
 - endoscopy, colonoscopy,
 - TFTs,
 - Antibody test for celiac disease.
 - Sweat chloride test.
 - Trial of lactose restriction? Lactose breath hydrogen.

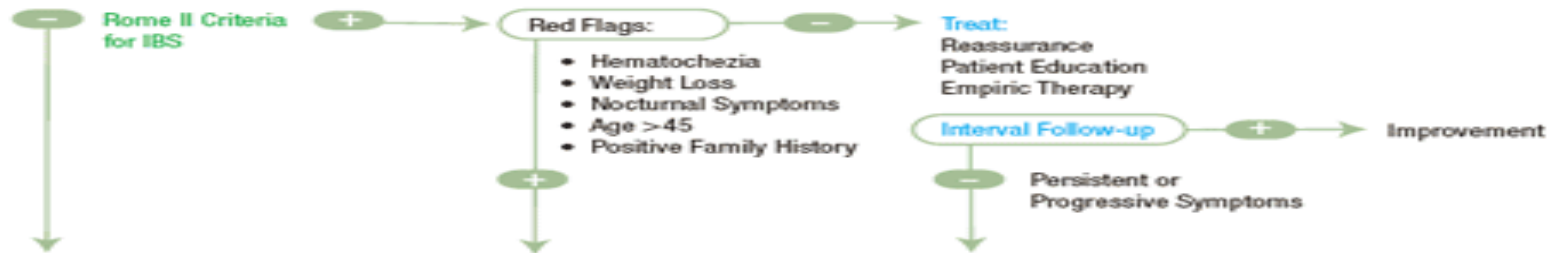
Diagnostic Algorithm for Chronic Diarrhea

Patient Presentation

CHRONIC DIARRHEA

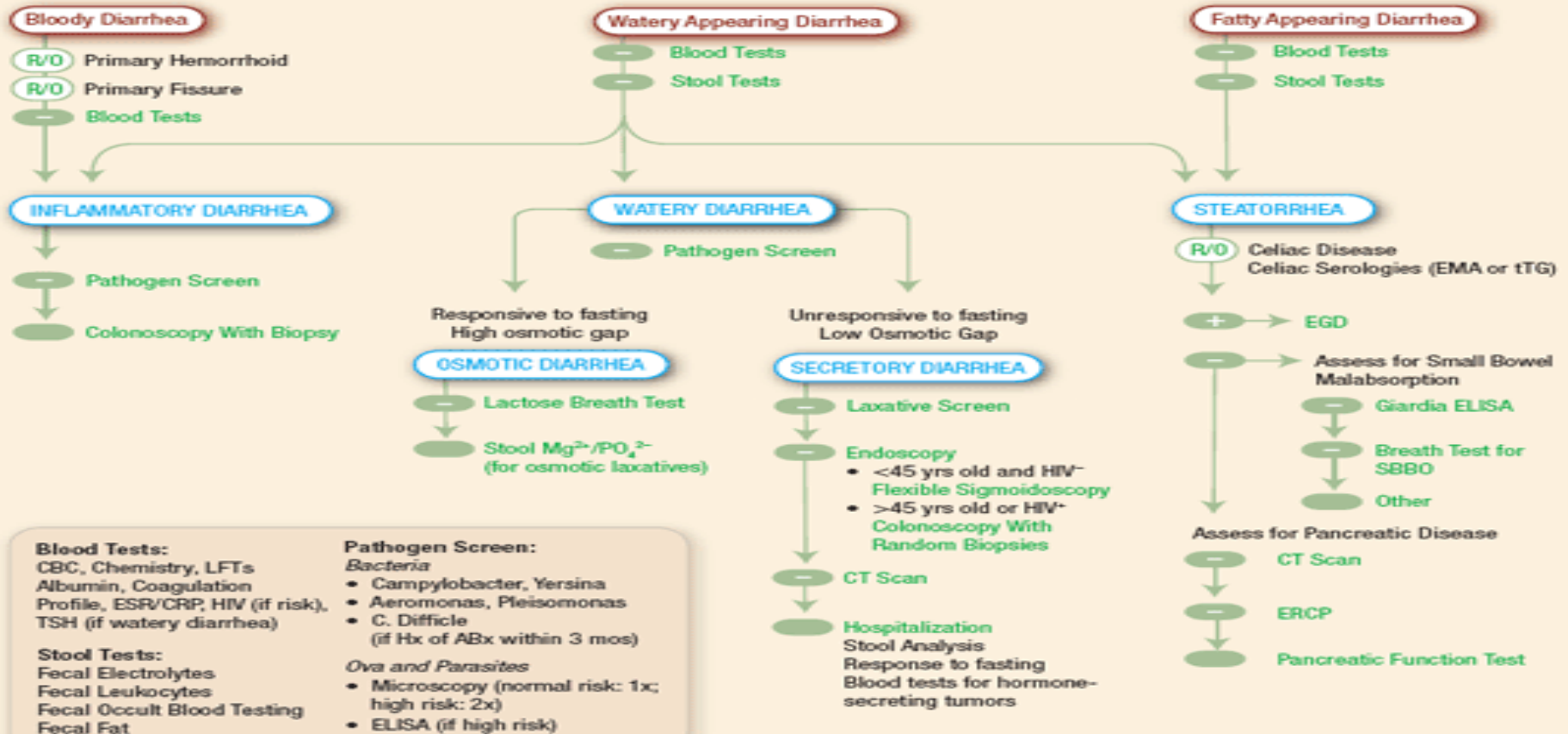
History
Physical Examination

1 FREQUENT SMALL VOLUME STOOLS



2 PRIMARY FECAL INCONTINENCE + → Evaluate and Treat

Gross Appearance of Stool





Conclusion:

Conclusion:

- Chronic diarrhea lasts more than 2 weeks.
- Has wide range of causes.
- Causes can be infectious, familial , inherited, metabolic,...
- May interfere with normal growth of child.
- Careful assessment and detection of the underlying cause is needed to prevent serious sequelae.

