



CHRONIC DIARRHEA AND MALABSORPTION

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OBJECTIVES

- To recognize the definition and different classifications of chronic diarrhea
- To understand the mechanism of chronic diarrhea
- To learn systematic approach of patient with chronic diarrhea
- To understand the different mechanisms and causes of malabsorption
- To be able to recognize the clinical manifestation of malabsorption and approach to patient with malabsorption

CASE#1

- Sarah is 22 Y F c/o non bloody diarrhea for 7 months
- 6-10 times/ Day
- Mild LIF pain
- Weight loss 10 kg (49 kg -> 39)
- O/E cachexia, LIF tenderness (mild)
- Lab (low hb 8 , low mcv) High ESR and CRP

What is the most likely next STEP?

CASE#2

- Ahmed is 18 years old with fatigue, abdominal bloating and diarrhea for 3 months. Itchy skin rash
- Unremarkable physical examination, except pallor and skin rash over thighs
- Has low Hb (low mcv)
- Serology : anti TTG ab positive

- Most likely diagnosis and second step?

CASE #3

- Nada is 27 years old F, with intermittent diffuse abd pain and diarrhea for 3 years.
- No blood in stool
- Diarrhea is triggered by fatty food, no nocturnal diarrhea
- Symptoms improved with defecation.
- Symptoms free for weeks
- Weight and appetite stable
- Examination: N
- CBC, ESR: N

- Most appropriate next step and diagnosis?

DEFINITIONS

- **Diarrhea**: decrease in fecal consistency (weight of stool and frequency are not reliable)
- Chronic diarrhea: > 4 weeks
- Diarrhea is a symptom, not a disease and may occur in many different conditions.

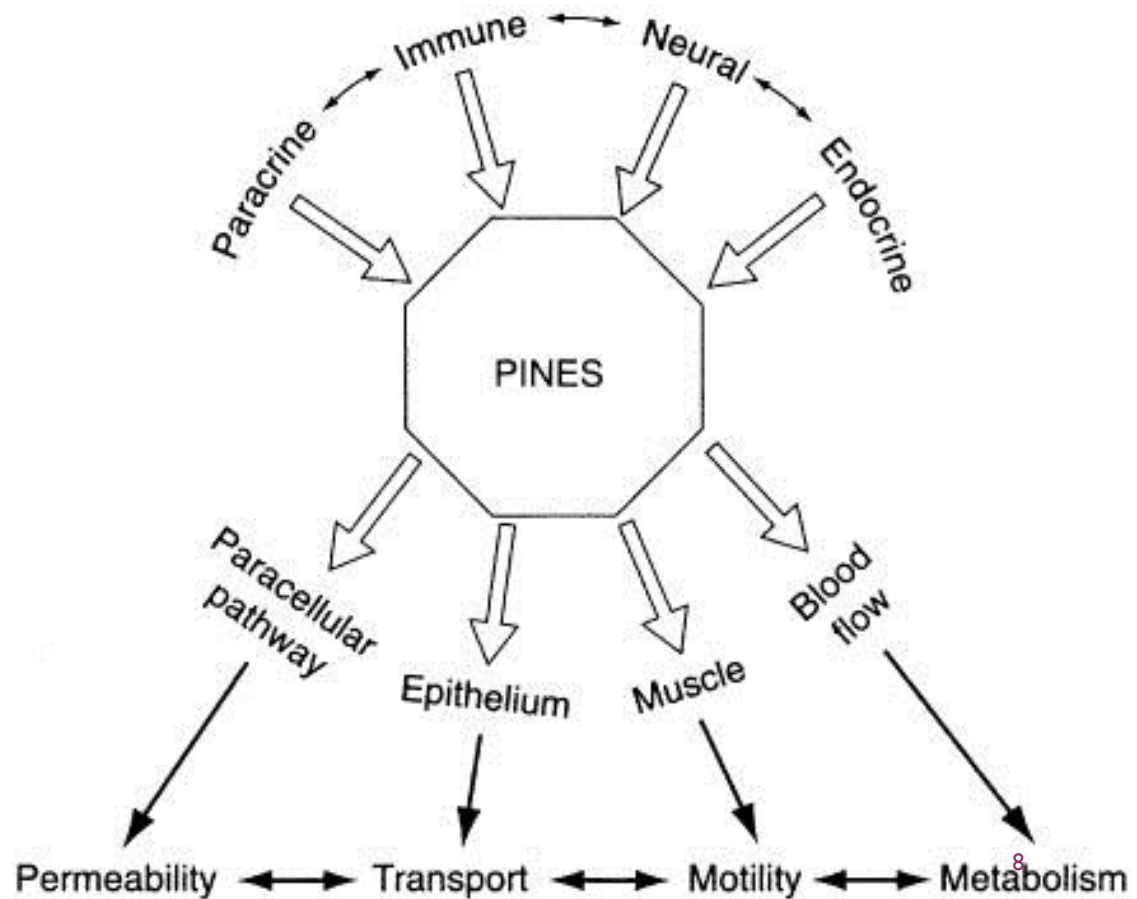
- **Malabsorption**: abnormality in absorption of food nutrients across the gastrointestinal (GI) tract.

DIARRHEA

- Acute diarrhea is a common and usually transient, self-limited, Infection related
- Chronic diarrhea: usually requires work up, non-infectious cause.

MECHANISM OF DIARRRHEA

- Change in:
 - Absorption
 - Secretion
 - Motility of the gut
- >in response to various etiology



CLASSIFICATIONS

- Time course (acute vs. chronic)
- Volume (large vs. small)
- Pathophysiology (secretory vs. osmotic)
- Stool characteristics (watery vs. fatty vs. inflammatory).
- Epidemiology (epidemic vs. travel-related vs. immunosuppression-related)

Classification of Diarrhea:

➤ According to mechanism:

	<u>Osmotic</u> Diarrhea	<u>Secretory</u> Diarrhea	<u>Motility</u> Diarrhea
<i>DESCRIPTION</i>	Non – absorbable solute pulls excess water into intestine tract.	Intestinal wall is damaged resulting in increased secretion rather than absorption of electrolytes into intestinal tract.	Motility disorder results in decreased contact time of fecal mass with intestinal wall so decrease water absorption from feces.
<i>EXAMPLE</i>	Lactase deficiency		<u>Motility disorders:</u> •IBS •Gastric/intestinal resection.

OTHER CLASSIFICATION

- Fatty diarrhea
- Inflammatory diarrhea

COMMON CAUSES OF DIARRHEA

Developing countries

- Chronic bacterial
- Mycobacterial
- Parasitic infections

Then

- Functional disorders,
- Malabsorption
- Inflammatory bowel disease

Developed countries

- Irritable bowel syndrome (IBS)
- Inflammatory bowel disease (IBD)
- Malabsorption syndromes (such as lactose intolerance and celiac disease)
- Chronic infections (particularly in patients who are immunocompromised)

APPROACH TO PATIENT WITH DIARRHEA

- History
- Physical examination
- Investigations
 - Laboratory tests
 - Radiology
 - Endoscopy
- Management

HISTORY



Main Symptom	Consistency or frequency of stools, the presence of urgency or fecal soiling)
Duration	Acute or chronic (weeks)
Stool characteristics	<u>Greasy stools that float</u> and are malodorous may suggest fat malabsorption while the presence of <u>visible blood</u> may suggest inflammatory bowel disease
Volume of the diarrhea	voluminous watery diarrhea is more likely to be due to a disorder in the small bowel while small-volume frequent diarrhea is more likely to be due to disorders of the colon
Specific food	Fatty , diary, allergy to certain food
Change with fasting or night	Secretory , IBS

HISTORY ...

Specific food	Fatty , diary, allergy to certain food
Associated symptoms	ABD PAIN, Weight loss, appetite change Extra-intestinal manifestation (rash, arthritis. Mouth ulcers etc..)
History of travel	Travelers diarrhea, parasitic etc...
Drug hx	Antibiotic use, others
F Hx	GI illnesses
Systemic review	e.g endocrine causes , thyroid, DM, Addison



PHYSICAL EXAMINATION



- Rarely provides a specific diagnosis.
- Findings suggestive of IBD (eg, mouth ulcers, a skin rash, episcleritis, an anal fissure or fistula, the presence of visible or occult blood on digital examination, abdominal masses or abdominal pain)
- Evidence of malabsorption (wasting, physical signs of anemia, scars indicating prior abdominal surgery)
- Lymphadenopathy (possibly suggesting, lymphoma, HIV infection)
- Palpation of the thyroid and examination for exophthalmos and lid retraction may provide support for a diagnosis of hyperthyroidism

INVESTIGATIONS

ARE GUIDED BY HX AND PH EXAM

(ESSENTIALS)

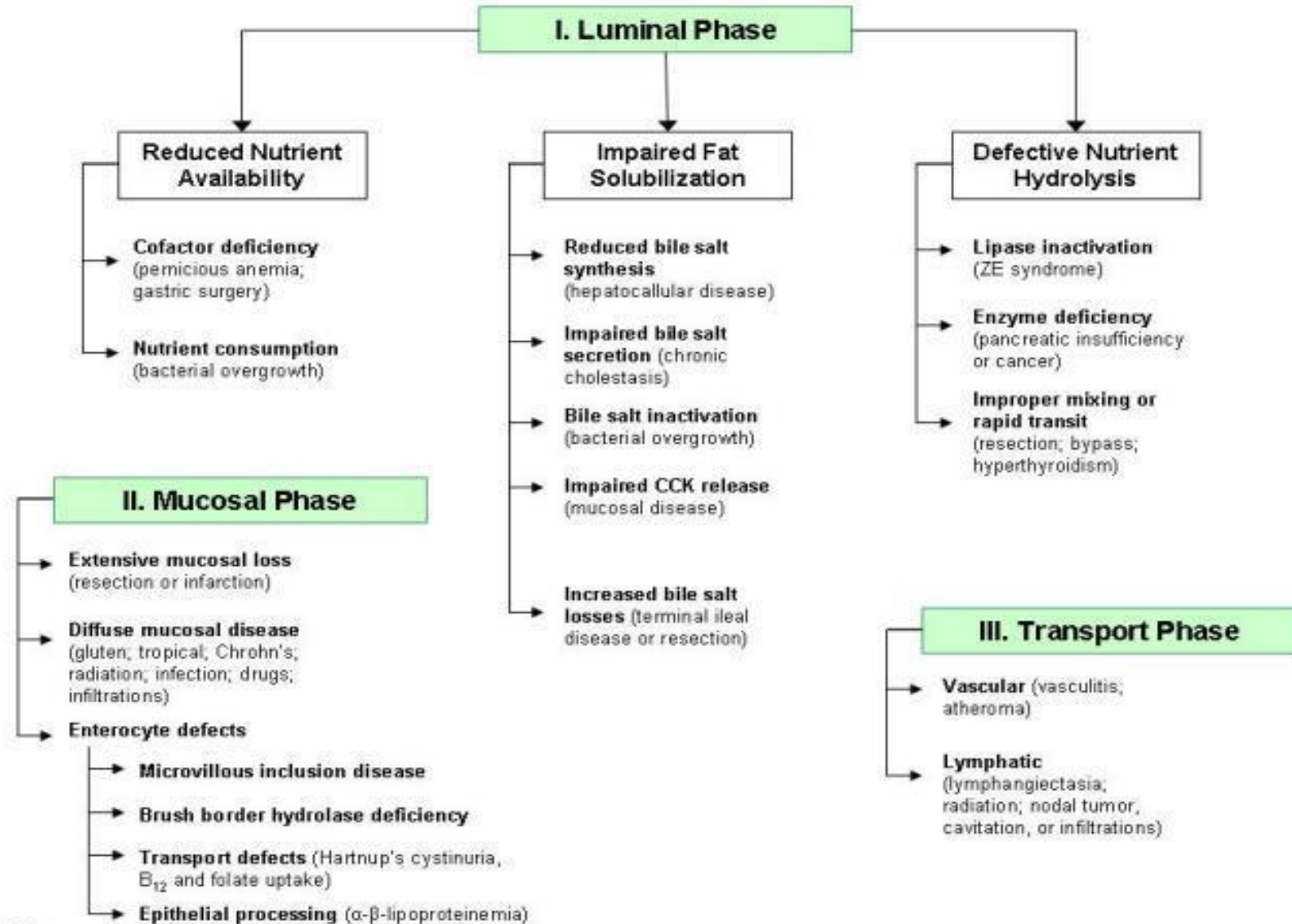
- CBC
- ESR
- Electrolytes
- Total protein and albumin
- TFT
- Stool : occult blood, C/S, ova and parasites, C-D toxin (if hx suggestive)

SPECIFIC INVESTIGATIONS

- The history and physical examination may point toward a specific diagnosis for which testing may be indicated



MALABSORPTION



CLINICAL FEATURES

- Depend upon the cause and severity of the disease
- Malabsorption may either be global or partial (isolated).
- **Global malabsorption:** results from diseases associated with either diffuse mucosal involvement or a reduced absorptive surface
 - An example is celiac disease in which diffuse mucosal disease can lead to impaired absorption of almost all nutrients
- **Partial or isolated malabsorption:** results from diseases that interfere with the absorption of specific nutrients.
 - Defective cobalamin absorption, for example, can be seen in patients with pernicious anemia or those with disease (or resection) of the terminal ileum such as patients with Crohn's disease.

SIGNS AND SYMPTOMS OF MALABSORPTION

Malabsorption of	Clinical features	Laboratory findings
Calories	Weight loss with normal appetite	
Fat	Pale and voluminous stool, diarrhea without flatulence, steatorrhea	Stool fat >6 g/day
Protein	Edema, muscle atrophy	Hypoalbuminemia, hypoproteinemia
Carbohydrates	Watery diarrhea, flatulence, acidic stool pH, milk intolerance, stool osmotic gap	Increased breath hydrogen
Vitamin B12	Anemia, subacute combined degeneration of the spinal cord (early symptoms are paresthesias and ataxia associated with loss of vibration and position sense)	Macrocytic anemia, vitamin B12 decreased, abnormal Schilling test, serum methylmalonic acid and homocysteine increased

SIGNS AND SYMPTOMS OF MALABSORPTION....

Malabsorption of	Clinical features	Laboratory findings
Folic acid	Anemia	Macrocytic anemia, serum and RBC folate decreased, serum homocysteine increased
Vitamin B, general	Cheilosis, painless glossitis, acrodermatitis, angular stomatitis	
Iron	Microcytic anemia, glossitis, pagophagia	Serum iron and ferritin decreased, total iron binding capacity increased
Calcium and vitamin D	Paresthesia, tetany, pathologic fractures due to osteomalacia, positive Chvostek and Trousseau signs	Hypocalcemia, serum alkaline phosphatase increased, abnormal bone densitometry
Vitamin A	Follicular hyperkeratosis, night blindness	Serum retinol decreased
Vitamin K	Hematoma, bleeding disorders	Prolonged prothrombin time, vitamin K-dependent coagulation factors decreased

EXAMPLE OF MANIFESTATIONS ASSOCIATED WITH CELIAC DISEASE

Dermatological manifestations

- Pale skin



- **Neurological examination**
- Motor weakness, peripheral neuropathy, or ataxia may be present .
- The Chvosteks sign or the Trousseau sign may be evident due to hypocalcemia .

INVESTIGATION FOR MALABSORPTION

- Investigations for nutrients deficiency
- Specific investigations to define the etiology and severity

EXAMPLES OF INVESTIGATIONS

- Common lab: CBC , ESR, CRP, PT, INR, LFT
- Serology: Anti TTG (anti endomysial ab)
- Endoscopy
- Imaging

SEROLOGY

- No specific serology tests for all causes of malabsorption
- Serum Anti-TTG and antiendomysial antibodies can be used to help diagnose celiac sprue .
- Determination of fecal elastase and chymotrypsin can be used to try to distinguish between pancreatic causes and intestinal causes of malabsorption.

IAMGING

- **Small bowel barium studies**
 - Strictures
 - Mucosal changes
 - Diverticula
- **CT scan of the abdomen**
 - Strictures
 - Mucosal changes
 - Diverticula
 - Wall thickness
 - Massesss, lymph nodes
- **ERCP:** pancreatitis (duct changes) ,
biliary doseases



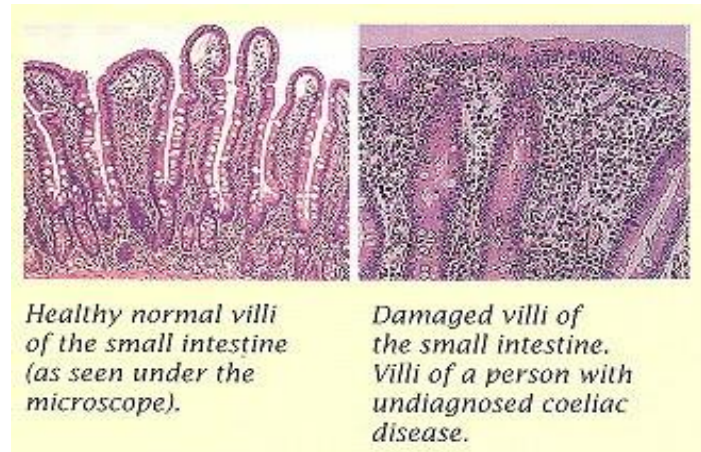
IMAGING STUDIES

Plain abdominal x-ray film: Pancreatic calcifications are indicative of chronic pancreatitis.



ENDOSCOPY

- ❖ Upper endoscopy with small bowel mucosal biopsy.... Examples
 - Celiac sprue
 - Giardiasis
 - Crohn disease
 - Whipple disease
 - Amyloidosis
 - Lymphoma.
- ❖ Lower GI endoscopy: colonic and terminal ileal pathology (e.g Chrons disease)



TREATMENT

Treatment of causative diseases

- A gluten-free diet helps treat celiac disease .
- Similarly, a lactose-free diet
- Protease and lipase supplements are the therapy for pancreatic insufficiency .
- Antibiotics are the therapy for bacterial overgrowth .
- Corticosteroids, anti-inflammatory agents, such as mesalamine, and other therapies are used to treat CD

NUTRITIONAL SUPPORT

- Supplementing various minerals calcium, magnesium, iron, and vitamins
- Caloric and protein replacement also is essential .
- Medium-chain triglycerides can be used for lymphatic obstruction .
- In severe intestinal disease, such as massive resection and extensive regional enteritis, **parenteral nutrition** may become necessary

THANK YOU

- Additional essential reading.....



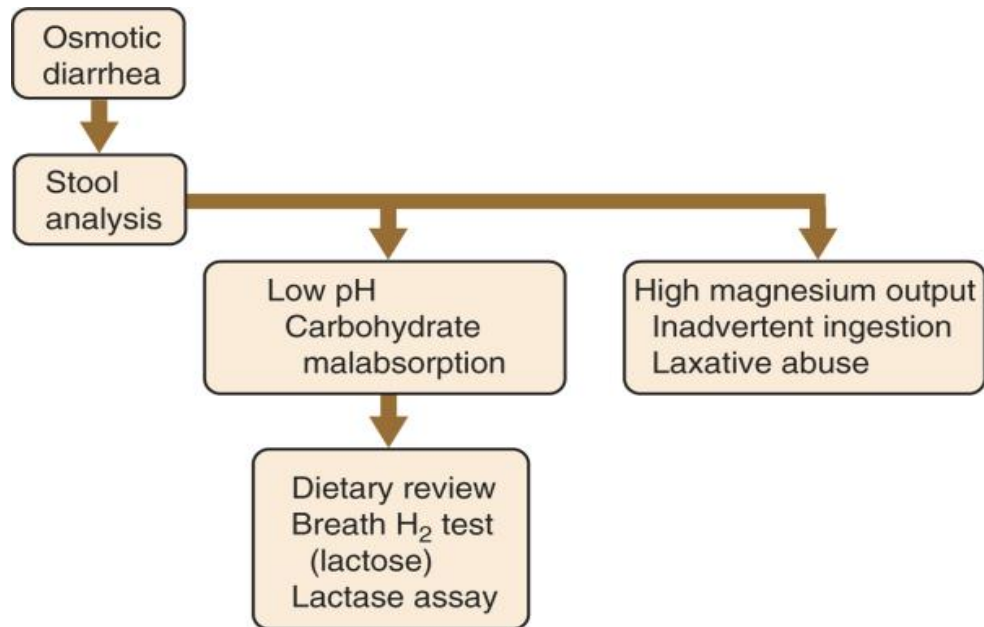
SECRETORY DIARRHEA

CLUES: LARGE VOLUME (>1 L/D); LITTLE CHANGE WITH FASTING;
NORMAL OR LOW STOOL OSMOTIC GAP

- **Bacterial toxins**
- **Inflammatory bowel disease**
 - Crohn's disease
 - Ulcerative colitis
 - Microscopic colitis
 - Collagenous colitis
 - Lymphocytic colitis
- **Vasculitis**
- **Endocrinopathies**
 - Addison's disease
 - Carcinoid syndrome
 - Hyperthyroidism
 - Medullary carcinoma of the thyroid
 - Pheochromocytoma
 - Gastrinoma, Somatostatinoma, VIPoma
- **Disordered motility**
 - Diabetic autonomic neuropathy
 - Irritable bowel syndrome
 - Postsympathectomy diarrhea
 - Postvagotomy diarrhea
- **Ileal bile acid malabsorption**
- **Laxative abuse (stimulant laxatives)**
- **Medications and toxins**
- **Neoplasia**
 - Colon carcinoma
 - Lymphoma
 - Villous adenoma in rectum
- **Congenital syndromes (e.g., congenital chloridorrhea)**
- **Idiopathic**

OSMOTIC DIARRHEA

CLUES: STOOL VOLUME DECREASES WITH FASTING
INCREASED STOOL OSMOTIC GAP



INFLAMMATORY DIARRHEA

- **Inflammatory bowel disease**

- Ulcerative colitis
- Crohn's disease

- **Infectious diseases**

- Invasive bacterial infections (e.g., tuberculosis, yersiniosis)
- Invasive parasitic infections (e.g., amebiasis, strongyloidiasis)
- Pseudomembranous colitis (*Clostridium difficile* infection)
- Ulcerating viral infections (e.g., cytomegalovirus, herpes simplex virus)

- **Ischemic colitis**

- **Radiation colitis**

- **Neoplasia**

- Colon cancer
- Lymphoma

FATTY DIARRHEA

- **Malabsorption syndromes**
 - **Mucosal diseases**
 - **Short bowel syndrome** Postresection diarrhea
 - **Small bowel bacterial overgrowth**
 - **Mesenteric ischemia**
- **Maldigestion:**
 - **Pancreatic exocrine insufficiency**
 - **Inadequate luminal bile acid**

PHASES OF ABSORPTION

- **Luminal phase:** dietary fats, proteins, and carbohydrates are hydrolyzed and solubilized by secreted digestive enzymes and bile.
- **Mucosal phase:** relies on the integrity of the brush-border membrane of intestinal epithelial cells to transport digested products from the lumen into the cells.
- **Postabsorptive phase:** nutrients are transported via lymphatics and portal circulation from epithelial cells to other parts of the body.

LUMINAL PHASE

Phase and nature of malabsorptive defect	Example
A. Substrate hydrolysis	
1. Digestive enzyme deficiency	Chronic pancreatitis
2. Digestive enzyme inactivation	Zollinger-Ellison syndrome
3. Dyssynchrony of enzyme release, inadequate mixing	Post Billroth II procedure
B. Fat solubilization	
1. Diminished bile salt synthesis	Cirrhosis
2. Impaired bile secretion	Chronic cholestasis
3. Bile salt de-conjugation	Bacterial overgrowth
4. Increased bile salt loss	Ileal disease or resection
C. Luminal availability of specific nutrients	
1. Diminished gastric acid	Atrophic gastritis - vitamin B12
2. Diminished intrinsic factor	Pernicious anemia - vitamin B12
3. Bacterial consumption of nutrients	Bacterial overgrowth - vitamin B12

MUCOSAL (ABSORPTIVE) PHASE

Phase and nature of malabsorptive defect	Example
A. Brush border hydrolysis*	
1. Congenital disaccharidase defect	Sucrase-isomaltase deficiency
2. Acquired disaccharidase defect	Lactase deficiency
B. Epithelial transport	
1. Nutrient-specific defects in transport	Hartnup's disease
2. Global defects in transport	Celiac sprue
(a) decreased absorptive surface area	intestinal resection
(b) damaged absorbing surface	celiac sprue, tropical sprue, giardiasis, Crohn disease, AIDS enteropathy, chemotherapy, or radiation therapy;
(c) infiltrating disease of the intestinal wall	lymphoma and amyloidosis

* This process is sometimes considered as part of the luminal phase.

POSTABSORPTIVE, PROCESSING PHASE

Phase and nature of malabsorptive defect	Example
A. Enterocyte processing	Abetalipoproteinemia
B. Obstruction of Lymphatic	Both congenital (e.g. intestinal lymphangiectasia)
	Acquired (e.g. Whipple diseases , lymphoma, tuberculosis),

LAB STUDIES

- **Hematological tests**
 - A CBC
 - Serum iron, vitamin B-12, and folate
 - Prothrombin time.
- **Electrolytes and chemistries**
 - Hypokalemia, hypocalcemia, hypomagnesemia, and metabolic acidosis .
 - Protein malabsorption may cause hypoproteinemia and hypoalbuminemia .
 - Fat malabsorption can lead to low serum levels of triglycerides, cholesterol
 - ESR which is elevated in inflammatory diseases like Crohn disease and Whipple disease

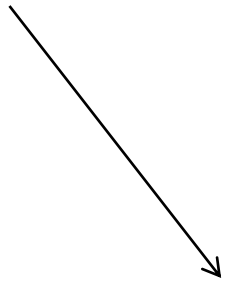
STOOL ANALYSIS

- Stool pH may be assessed. Values of <5.6 are consistent with carbohydrate malabsorption
- Stool C/S
- Pus cells in the stool e.g IBD, some infections

TESTS OF FAT MALABSORPTION

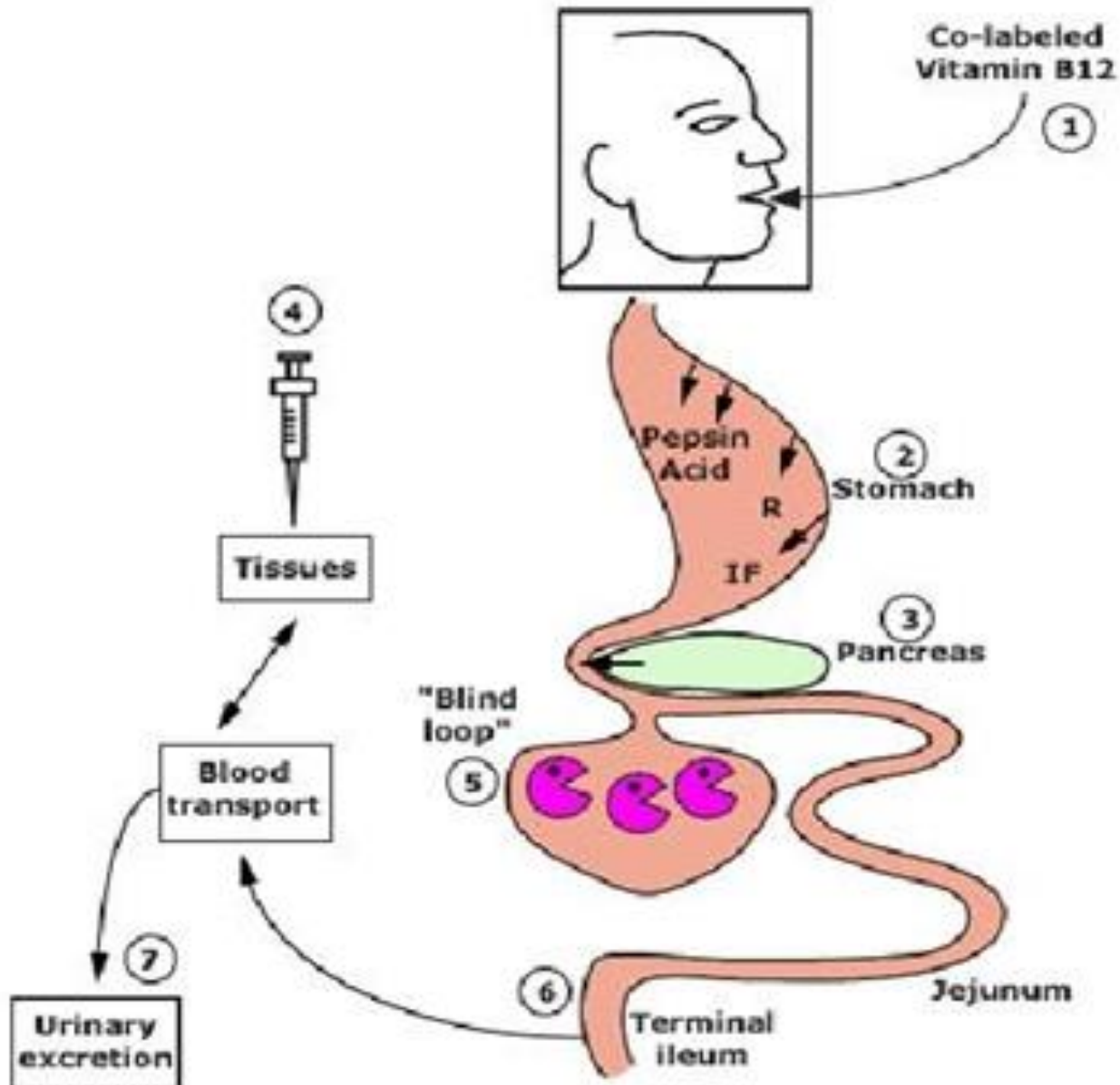
- For a quantitative measurement of fat absorption, a 72-hour fecal fat collection
- Qualitative test Sudan III stain of stool, less reliable .

■ Stool → fat → pancreatic, celiac



inflammatory --→ IBD ,infection

The Schilling test (part one)



SCHILLING TEST

- Malabsorption of vitamin B-12 may occur as a consequence of:
 - Deficiency of intrinsic factor (eg, pernicious anemia, gastric resection)
 - Pancreatic insufficiency, bacterial overgrowth
 - Ileal resection, or disease .

3 STEPS SCHILLING TEST

1. Oral VIT B12

2. VIT B12 orally +intrinsic factor

3. VIT B12 orally +intrinsic factor+ oral antibiotics

BACTERIAL OVERGROWTH

- Bacterial overgrowth cause an early rise in breath hydrogen
- JEJUNAL CULTURE
- ^{14}C D-xylose breath test ,high sensitivity and specificity