بسم الله الرحمن الرحيم

Diarrhea

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Diarrhea

Objective

- Definition
- Classification
- Mechanism
- Evaluation of Chronic Diarrhea
- Management

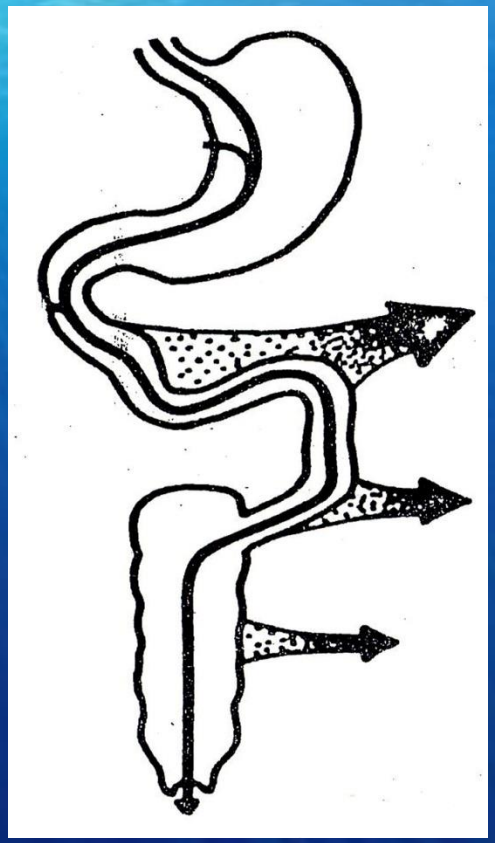
Definition

- **Symptomatic definition:** Increased frequency, fluidity or volume, or a combination of these

- **Physiologic definition:** Decreased absorption or Increased secretion, or usually both, causing > 200 mL liquid excretion (or 300 grams) per day

Input

Diet/Saliva	: 3 L/d
Stomach	: 2 L
Bile	: 1 L
Pancreas	: 2 L
Bowel	: 1 L
Total	**9 L**



Absorption

Jejunum	: 5 L/d
Ileum	: 2-3 L
Colon	: 1-2 L
Total	**8.8 L**

Fecal Water 100-200 mL/d

Thus, diarrhea is defined as >200 mL liquid excretion per day. In extremus, the gastrointestinal tract can both absorb and secrete 20 L of water per day.

Classification

1) Acute vs Chronic
2) Infectious vs Non-infectious
3) Osmotic vs Secretory
4) Inflammatory vs Non-inflammatory
5) Large intestine vs Small intestine
6) Drug induced

Clinical Clues:
1) Acute vs. Chronic

- Chronic means persistence of diarrhea > 2 weeks

Acute diarrhea

- Infection
- Iatrogenic
- Toxin
- Diet
- Nervous

Chronic diarrhea

- Mal absorption syndrome (causes)
- Colonic causes
- Endocrinal causes

Acute

- Dietary indiscretion
- Infective
  - Food poisoning
  - Viral gastroenteritis
- Traveller's diarrhoea
  - *E. coli*
  - *G. lamblia*
  - *Shigella*
  - *Entamoeba histolytica*

Chronic

Inflammatory bowel disease
Parasitic/fungal infections
Malabsorption
Gut resection
Drugs
Colonic neoplasia
Endocrine
- Pancreatic tumours, e.g. gastrinoma
- Medullary carcinoma of the thyroid
- Thyrotoxicosis
- Diabetic neuropathy

Faecal impaction—in the elderly

Clinical Clues
Osmotic vs Secretory

- **What is the stool osmotic gap ?**
- Intestinal lumenal contents are in osmotic equilibrium at 290 mOsm/kg with other body fluids. Thus, the osmotic gap = 290-2([Na] + [K])
- It is the amount of solutes other than Na and K in stool water.

Osmotic diarrhea

- Non absorbed solutes(e.g. Lactulose or sorbitol ingestion) →↑ intraluminal oncotic pressure →out pouring of water
- Improve by fasting
- Stool osmotic gap > 50 **mOsm/kg**

Secretory diarrhea

- Active ion secretion →obligatory water loss & ↑ stool Na&K
- Causes... viral infection,HIV associated, vipoma, carcinoid
- **Stool osmotic gap < 50 mOsm/kg**
- Not affected by fasting

Clinical Clues:
3) Inflammatory vs Non-inflammatory

- **Inflammatory - Frequent, blood, pus, fever, abdominal pain, tenesmus, fecal leukocytes**

- **Non-inflammatory - Watery stool, without blood/pus/fever/fecal leukocytes**

Clinical Clues:
4) Infectious vs Non-infectious

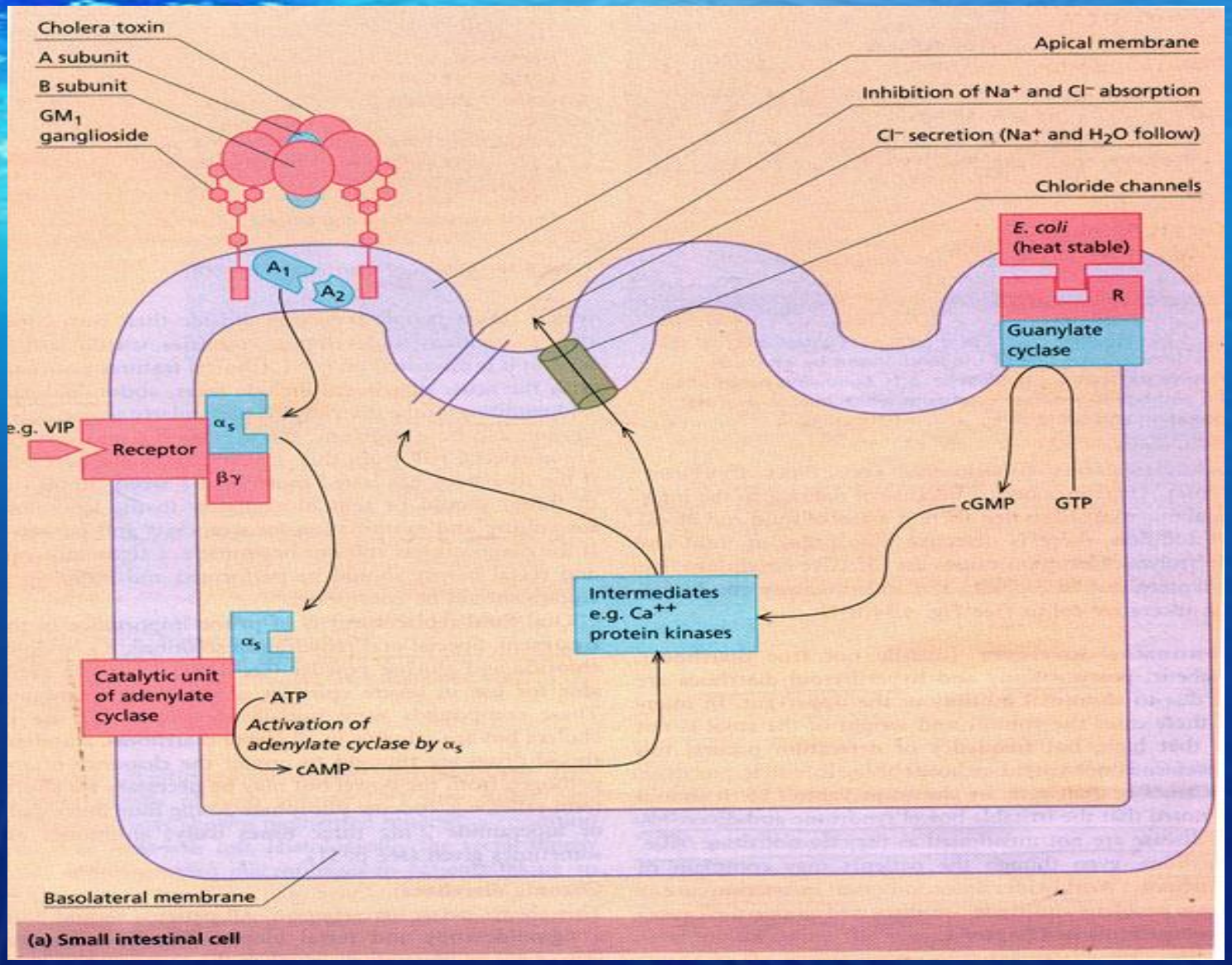
- **Infectious - Fever, blood, pus, epidemic, travel (bacterial in visited country and parasitic after return)**

- **Less likely infectious - Afebrile, non-bloody, non-mucoid, sporadic, no travel**

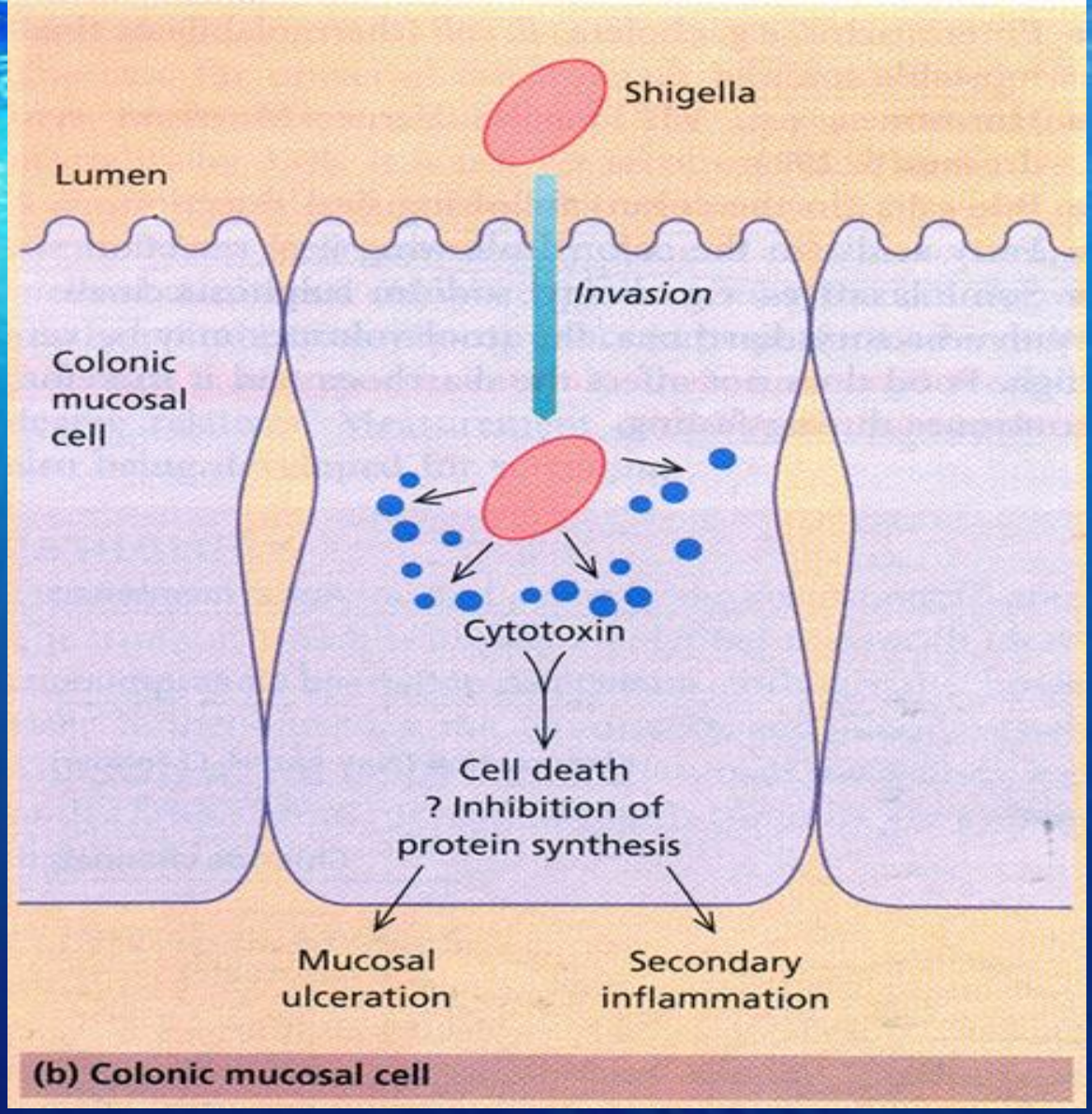
Clinical Clues:
5) Large Intestine vs Small Intestine

- **Large intestine - Frequent urges, dark colored/rarely foul, left lower quadrant pain, tenesmus, small volume**

- **Small intestine - Watery/light colored/foul, periumbilical /RLQ pain, large volume**



Mechanisms of diarrhoea. *Small intestinal cell.* Cholera toxin binds to its receptor (monosialoganglioside GM_1) via its B subunits. The enzymatically active A_1 subunit activates G_s (G-stimulated) protein shown as its three subunits γ, β and α_s. α_s dissociates from G_s protein and activates the catalytic unit of adenylate cyclase on the basolateral membrane. The resulting increase in cAMP activates intermediates, e.g. protein kinases **(KUMAR P (2007))**



Mechanisms of diarrhoea. *Colonic mucosal cell.* This demonstrates one of the mechanisms by which an invasive pathogen, e.g. *Shigella*, acts. Following penetration, the pathogens generate cytotoxins which lead to mucosal ulceration and cell death. (KUMAR P (2007))

Clinical Clues:
6) Small Volume vs Large Volume

Small Volume (< 400 ml)

Rectal and sigmoid disease - UC, ulcerative proctitis

Large Volume (> 400 ml)

Osmotic - Lactase deficiency.

Secretory - Cholera, laxatives

Dysmotility - Post-gastrectomy syndrome, carcinoid.

Altered permeability - Sprue

Clinical Clues:
7) Drug-Induced Diarrhea

- **Temporal relation to the diarrhea**
- **E.g. Acarbose, Antibiotics & Metformin**

Evaluation: Who to Workup

- Acute diarrhea: Since most acute diarrheas resolve within 24 hr, evaluate patient when dehydrated, febrile or blood or pus in stool

- Chronic diarrhea: Evaluate when > 2 weeks

Initial evaluation of Chronic Diarrhea

- **History**
- **Physical examination**
- **Routine laboratory tests**
- **Analysis of stool sample**

History

1-Age (recent onset in elderly, IBS unlikely – celiac sprue – food allergy)

2-Duration of symptoms.

3- The severity of the diarrhea:

* Stool frequency is the easiest for patients to define but not necessarily correlate with stool weight
* Symptoms of dehydration.
* Acute weight loss (good marker for severity).

4- Drugs, coincidence with the onset of diarrhea.

5- Aggravating and relieving factors

6-The patient's diet should be reviewed.

History (cont.)

7- Surgery or radiation.

8- Stool characteristics:

- Blood in the stool signals the possibility of inflammatory bowel disease or malignancy.
- Watery stools suggest an osmotic or secretory process
- Oil is suggestive of malabsorption, maldigestion.
- Relationship to fasting.

History is essential in differentiating patients with irritable bowel syndrome, the most common cause of chronic diarrhea Current definitions of irritable bowel syndrome emphasize the presence of abdominal pain associated with defecation. A long history usually extending back to adolescence or young adulthood, passage of mucus and exacerbation of symptoms by stress. The majority have a normal stool weight.

Factors against diagnosis of irritable bowel syndrome include a recent onset, especially in older patients; Painless diarrhea, diarrhea that wakes the patient form sleep; weight loss; blood in the stool; and stool weight greater than 400 to 500 g per day. Abnormal blood tests, such as a low hemoglobin level, low serum albumin or high ESR, also are **against** this diagnosis.

Why is Hx. of previous surgery important?

Small intestinal disruption →	Bacterial overgrowth
Removal >100 cm terminal ileum →	Cholorretic diarrhea
Cholecystectomy →	Cholorretic diarrhea
Gastrectomy →	Dumping syndrome

Physical Examination

Useful in determining the severity of diarrhea:

- Volume status (orthostatic changes in blood pressure and pulse, dehydration).
- Fever and other signs of toxicity .
- Abdominal examination (bowel sounds, abdominal distention, tenderness, masses and an enlarged liver).

Physical Examination (cont.)

Characteristic skin changes may be seen in:

Addison's disease, Carcinoid syndrome.

Peripheral neuropathy and orthostatic hypotension (Amyloidosis & DM)

A thyroid nodule with cervical lymphadenopathy (MCT).

Tremor and other systemic signs (hyperthyroidism).

Physical Examination (cont.)

Right sides heart murmurs, enlarged hard liver (Carcinoid)

Arthritis e.g inflammatory bowel disease, Whipple's disease.

Lymphadenopathy (AIDS or lymphoma).

peripheral vascular disease ± abdominal bruit

Chronic liver disease in a patient with colitis

Investigations

1. Laboratory

   CBC, serum electrolytes, calcium, albumin, liver chemistry, prothrombin time, Urea , Creatinine & ESR.

2. Stool examination

A-Randum stool sample or timed collected

a- Randum sample provide diagnostic clues as stool Na, K, pH, occult blood testing, WBCs, fat content, for laxatives and markers of inflammation as lactoferrin.

b- Collected samples:

- 48-72 hrs
- Regular diet with fat 80-100 gm fat.

- **1- Fecal occult blood & fecal leukocytes**

  inflammatory diarrhea or malignancy.
- **2-Parasite**
- **3- PH of stool water**

  ↓ (< 5.5) in carbohydrate malabsorption.

- **4- Measurement of stool Na & K & calculate osmotic gap**

  Osmotic gap = 290 mOsm/Kg - 2 (Na + K)

  - Small gap (<50) = secretory diarrhea
  - Large gap (>50) = osmotic diarrhea
  - **NB**… Stool osmolality < 290 (addition of water or hypotonic urine to stool).

- **5-Culture for bacterial pathogens**

- Other studies

D-Xylose absorption test

Test for small bowel absorptive capacity.

^{14}C xylose

Test for bacterial over growth .

Treatment

- Treat the etiology
- Rehydration therapy(IV-Oral)
- Electolyte replacement
- Binder of osmotically active substance (kaolin & pectin)
- Opiate to ↓ intestinal motility e.g. lopramide & diphenoxylte (contraindicated in infectious diarrhea)

MCQ

- **The typical features of the irritable bowel syndrome Include**
  - nocturnal diarrhoea and weight loss
  - onset after the age of 45 years
  - history of abdominal pain in childhood
  - right iliac fossa pain and urinary frequency
  - abdominal distension, flatulence and pellety stools

- **In IBS red flag signs include all of the following <u>except:</u>**
  - Bleeding/rectum.
  - Loss of weight..
  - Nocturnal pain.
  - Systemic illness.
  - Diarrhea.

- **Mechanisms of diarrhea include the following <u>except:</u>**
- Malabsorption.
- Increased fluid intake.
- Mucosal injury
- Motility disorder.

- **Osmotic Gap increase in:**
  - Malabsorption diarrhea
  - Motility disorder.
  - Secretory diarrhea.
  - Osmotic diarrhea.

- In irritable bowel syndrome (IBS):

  (a) mucus may be passed rectally

  (b) bloody mucoid diarrhoea is common

  (c) treatment options include 5-ASA compounds

  (d) symptoms are unrelated to stressful life events

  (e) a gluten-free diet is first-line treatment

Thank you