



Digestion and Absorption

Dr. Mohammed Alzoghaibi

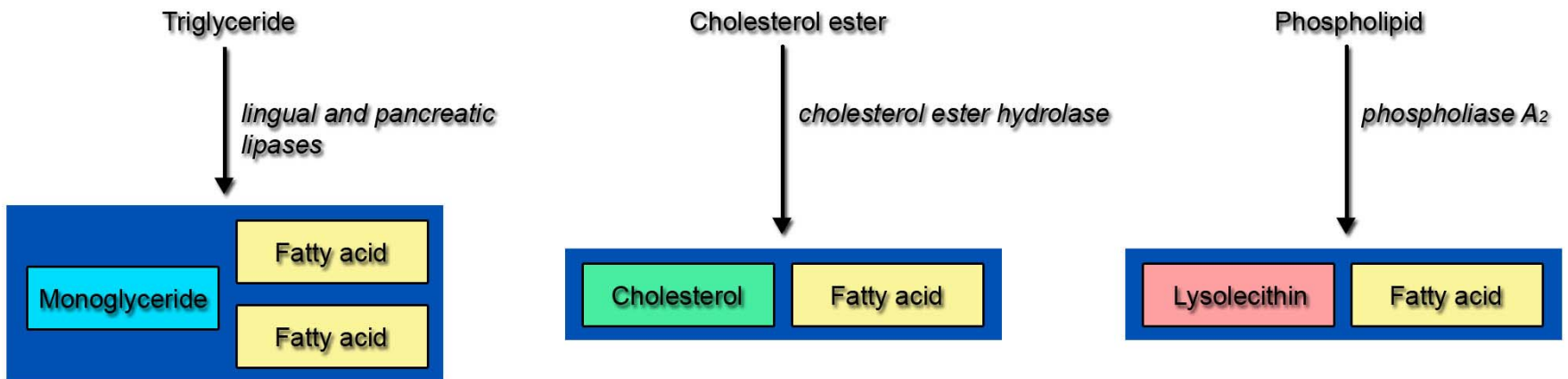
Digestion and Absorption

- Digestion
 - Absorption
 - Pathways of Absorption
 - cellular
 - paracellular
-

Structure of intestinal wall

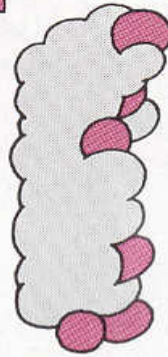
- Longitudinal folds (finger-like villi)
 - longest in duodenum & shortest in ileum
 - increases surface area 600 fold
 - The significance of villi & microvilli
 - increase the surface area
 - maximizing the exposure of nutrients to digestive enzymes
-

DIGESTION OF LIPIDS



Hydrophobic face

Hydrophilic face

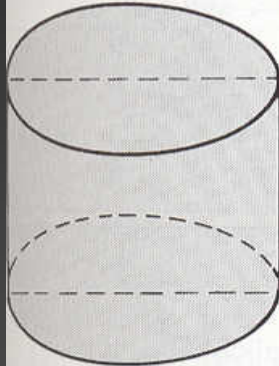


OH groups

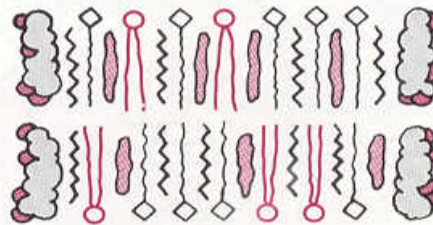
Peptide bond

Carboxyl or sulfonic acid

Cylindrical micelle



Cross-section



Bile acids



Cholesterol



Phospholipids

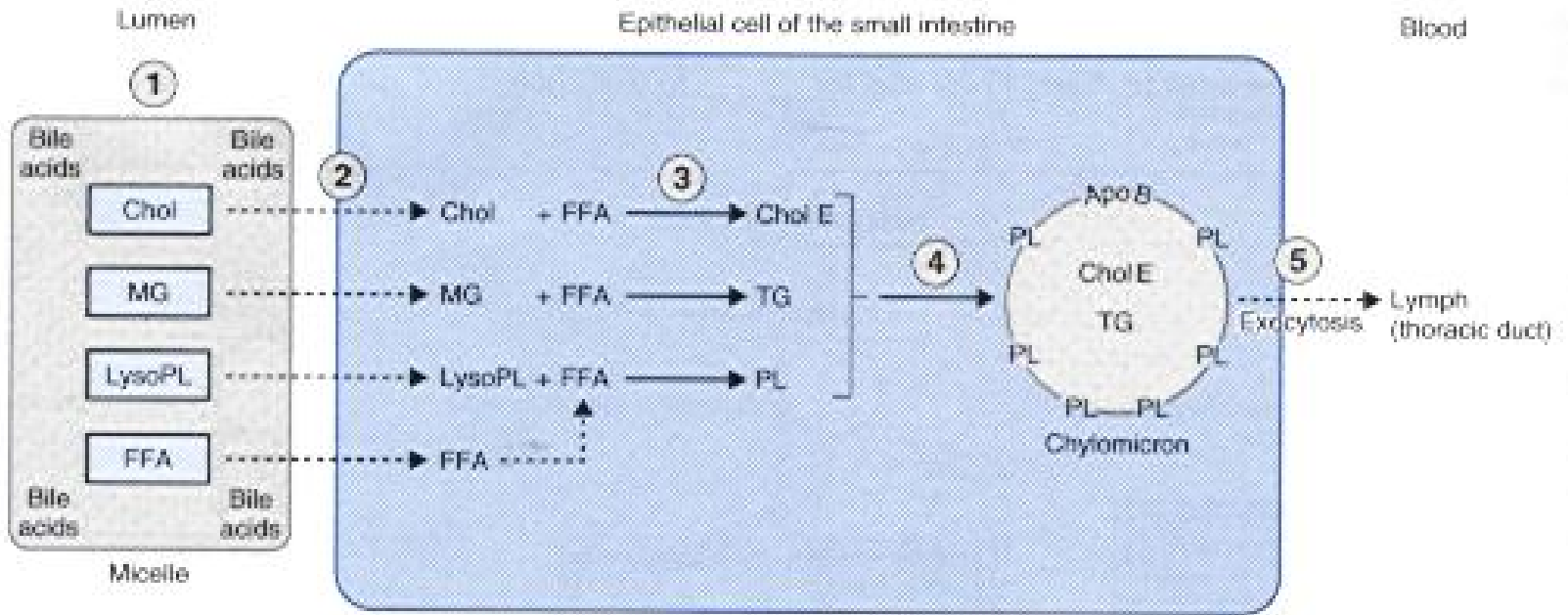


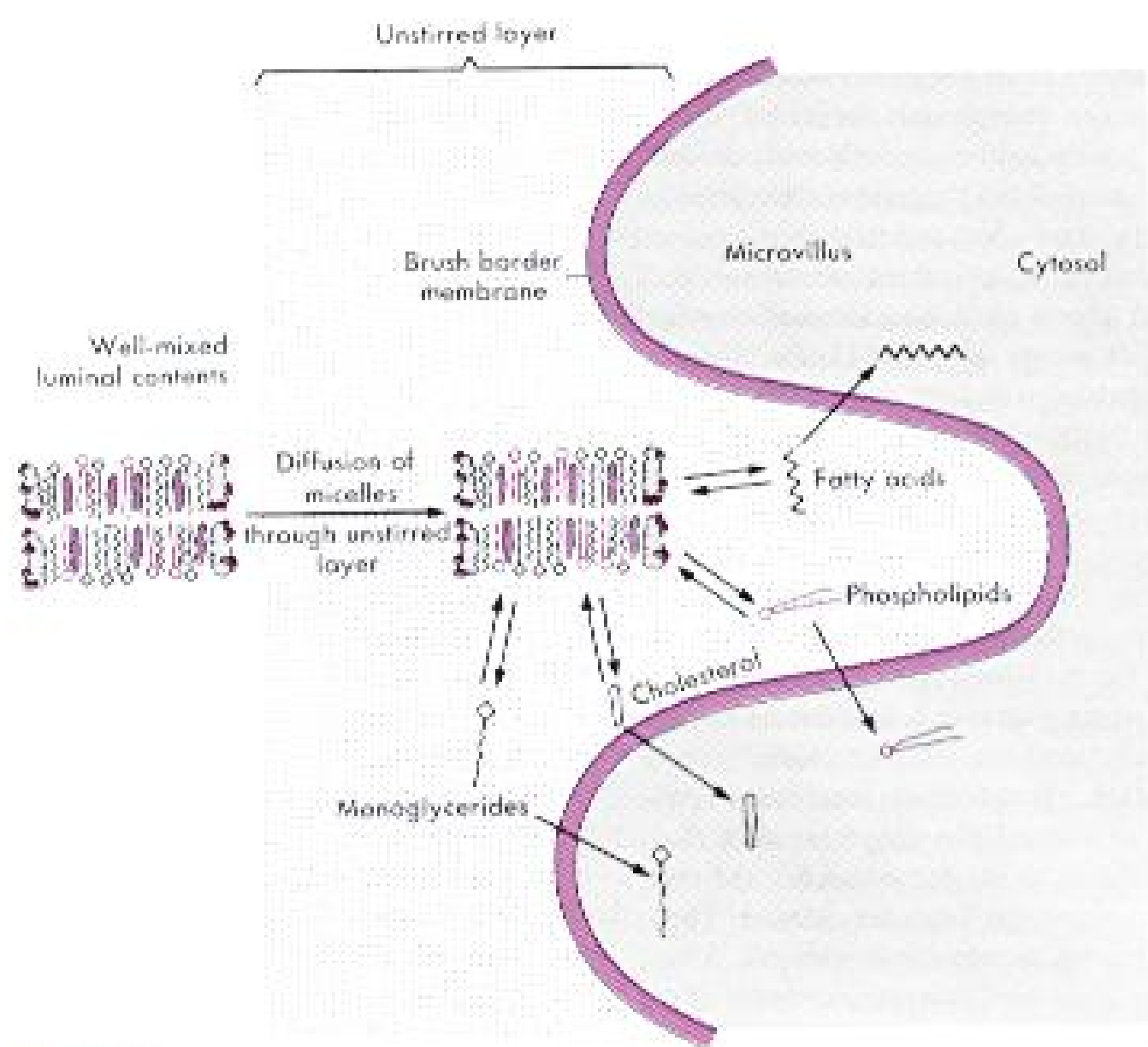
Free fatty acids



2-Monoglycerides

ABSORPTION OF LIPIDS





Abnormalities of lipids digestion

1. **Pancreatic insufficiency** (chronic pancreatitis and cystic fibrosis)
2. **Acidity of duodenal content** (zollinger-Ellison syndrome)
3. **Deficiency of bile salts** (ileal resection)
4. **Bacterial over growth** (deconjugation of bile salts)
5. **Decrease intestinal cells for absorption**
6. **Failure of synthesis of apoproteins** (abetalipoproteinemia)

Causes of gallstones:

1. Too much absorption of water from bile
2. Too much absorption of bile acids from bile
3. Too much cholesterol in bile
4. Inflammation of epithelium

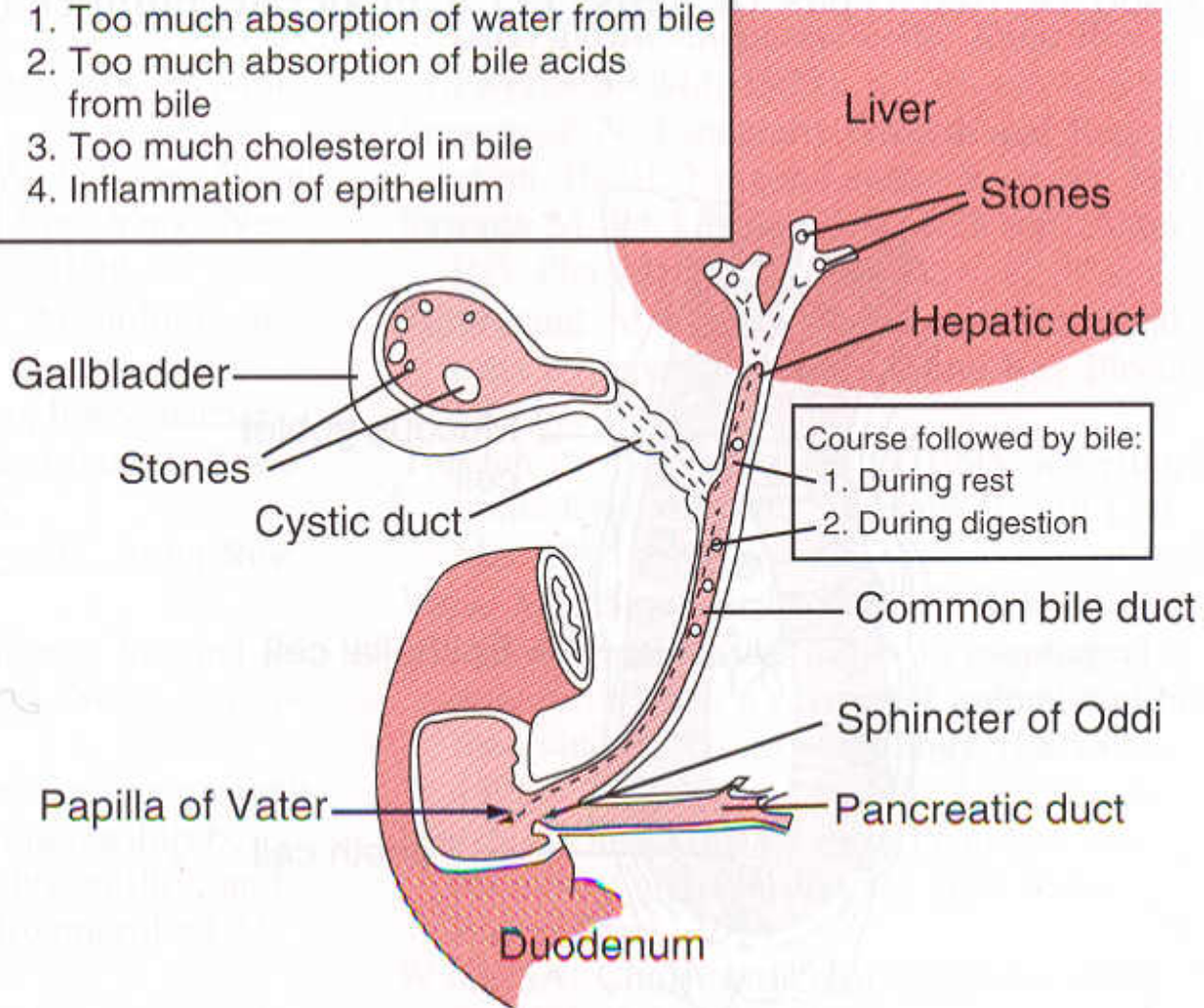
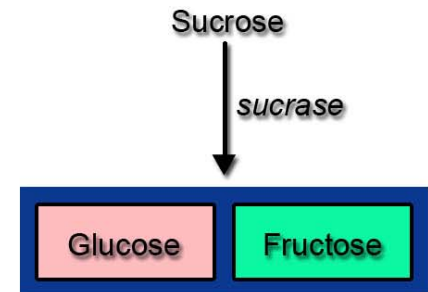
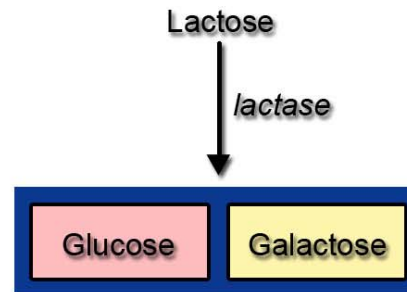
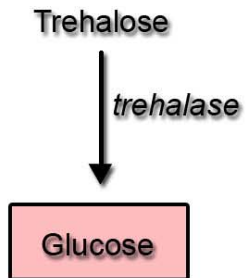
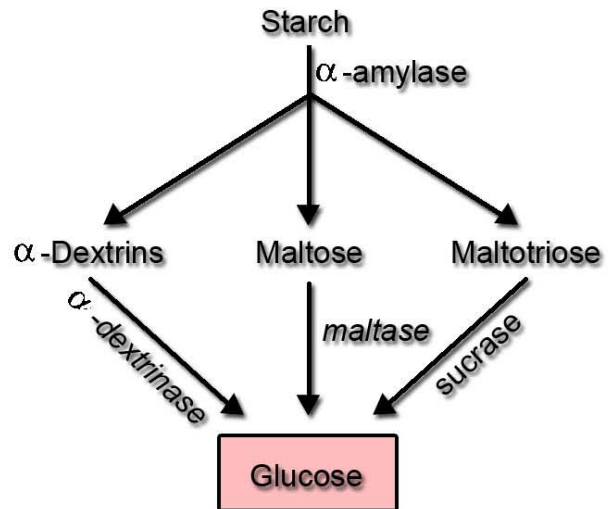
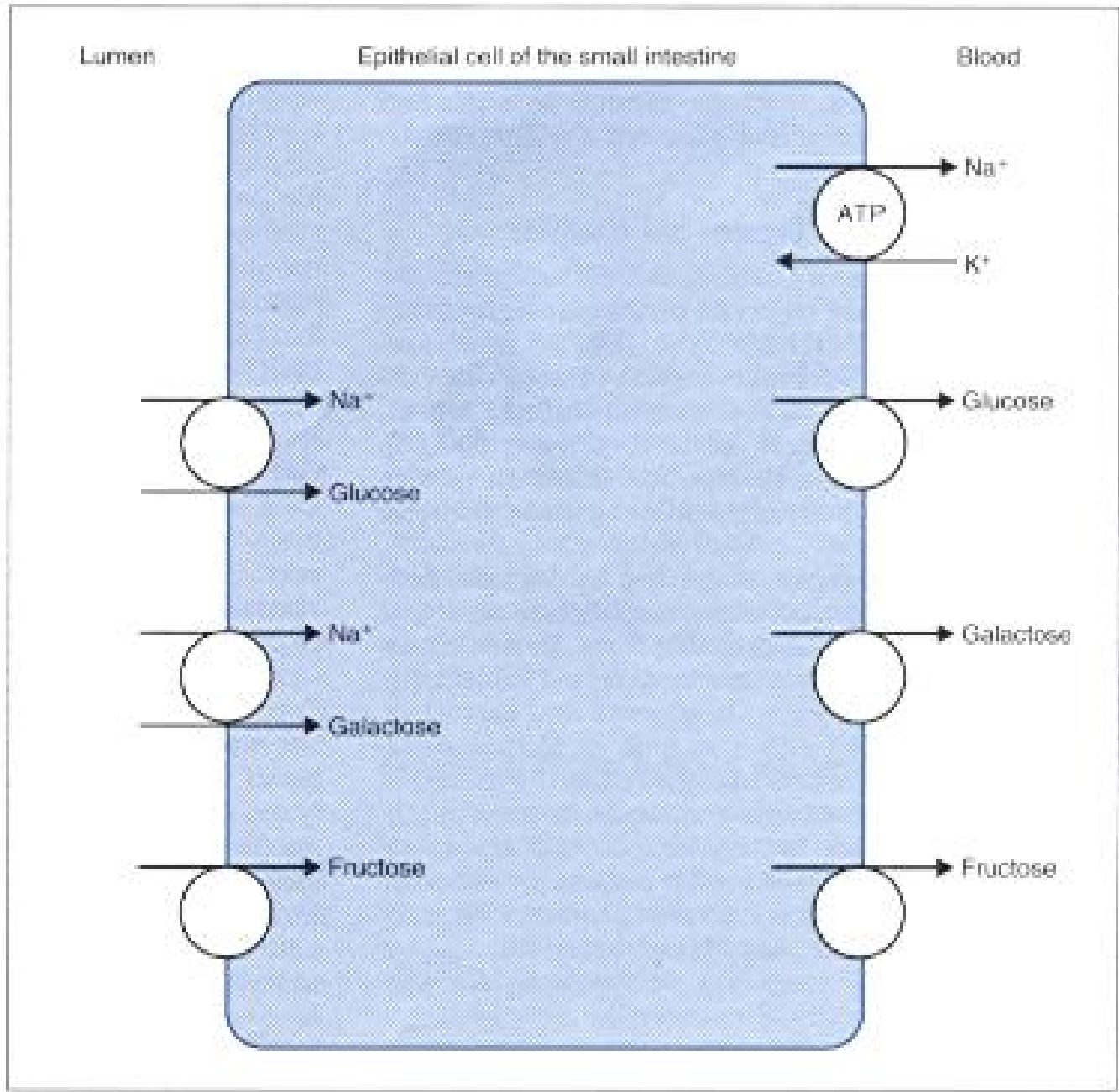


FIGURE 64 - 12

Formation of gallstones.

CARBOHYDRATE DIGESTION



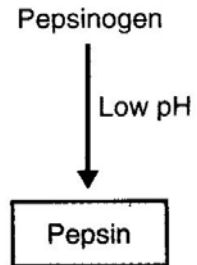


Carbohydrate malabsorption

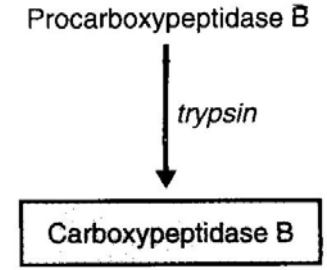
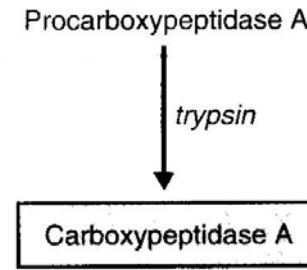
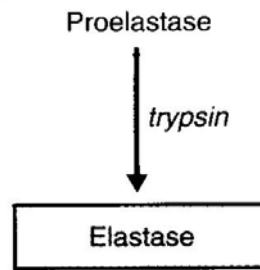
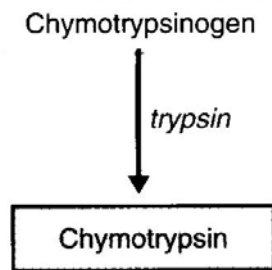
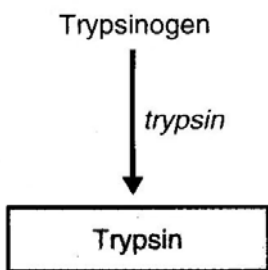
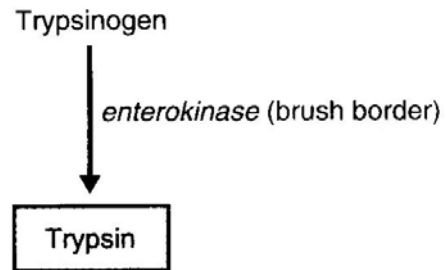
- Lactose malabsorption syndrome
 - Symptoms
 - gurgling noises in the intestine
 - flatulence
 - diarrhea
 - Sucrase-isomaltase deficiency
 - decrease level of sucrase
 - suppression of transporter protein
 - Glucose-galactose malabsorption syndrom
 - deficiency in transporter protein
-

ACTIVATION OF GASTROINTESTINAL PROTEASES

A Stomach



B Small intestine

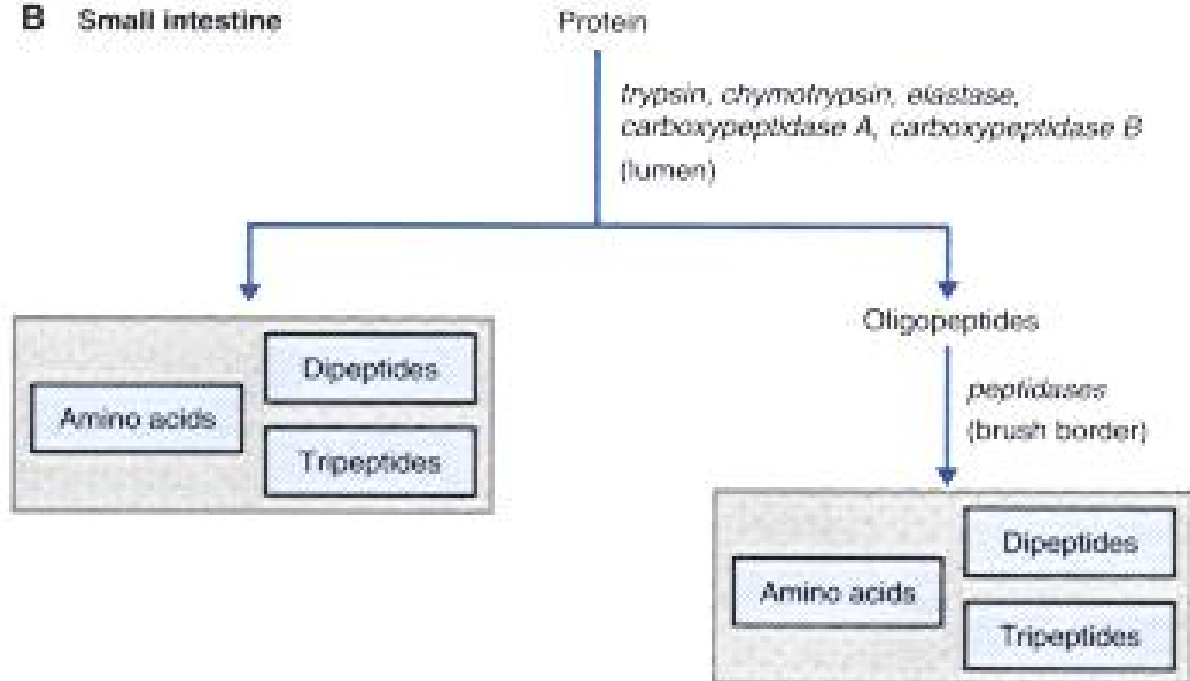


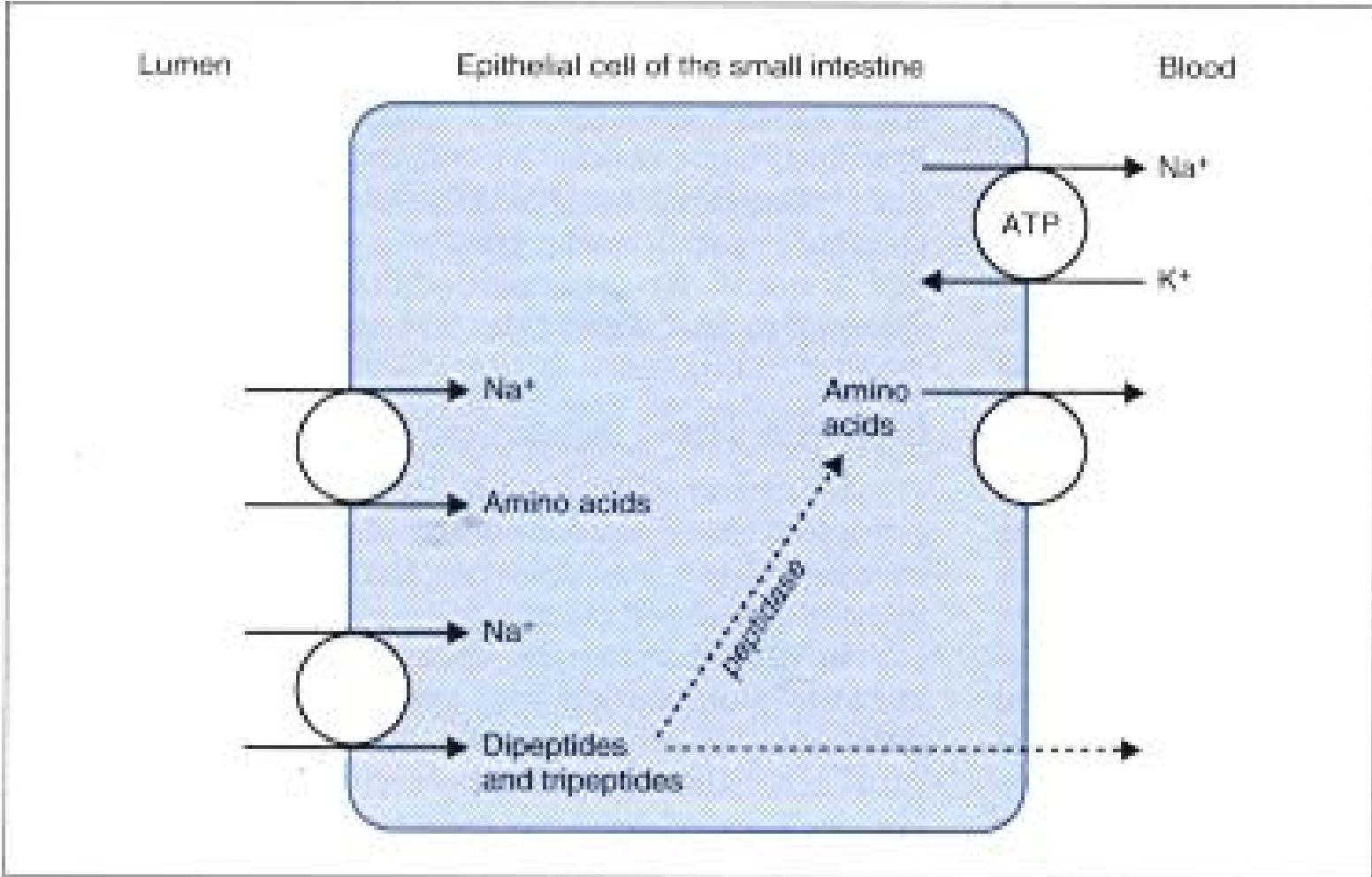
PROTEIN DIGESTION

A Stomach



B Small intestine





Disorder of protein digestion & absorption

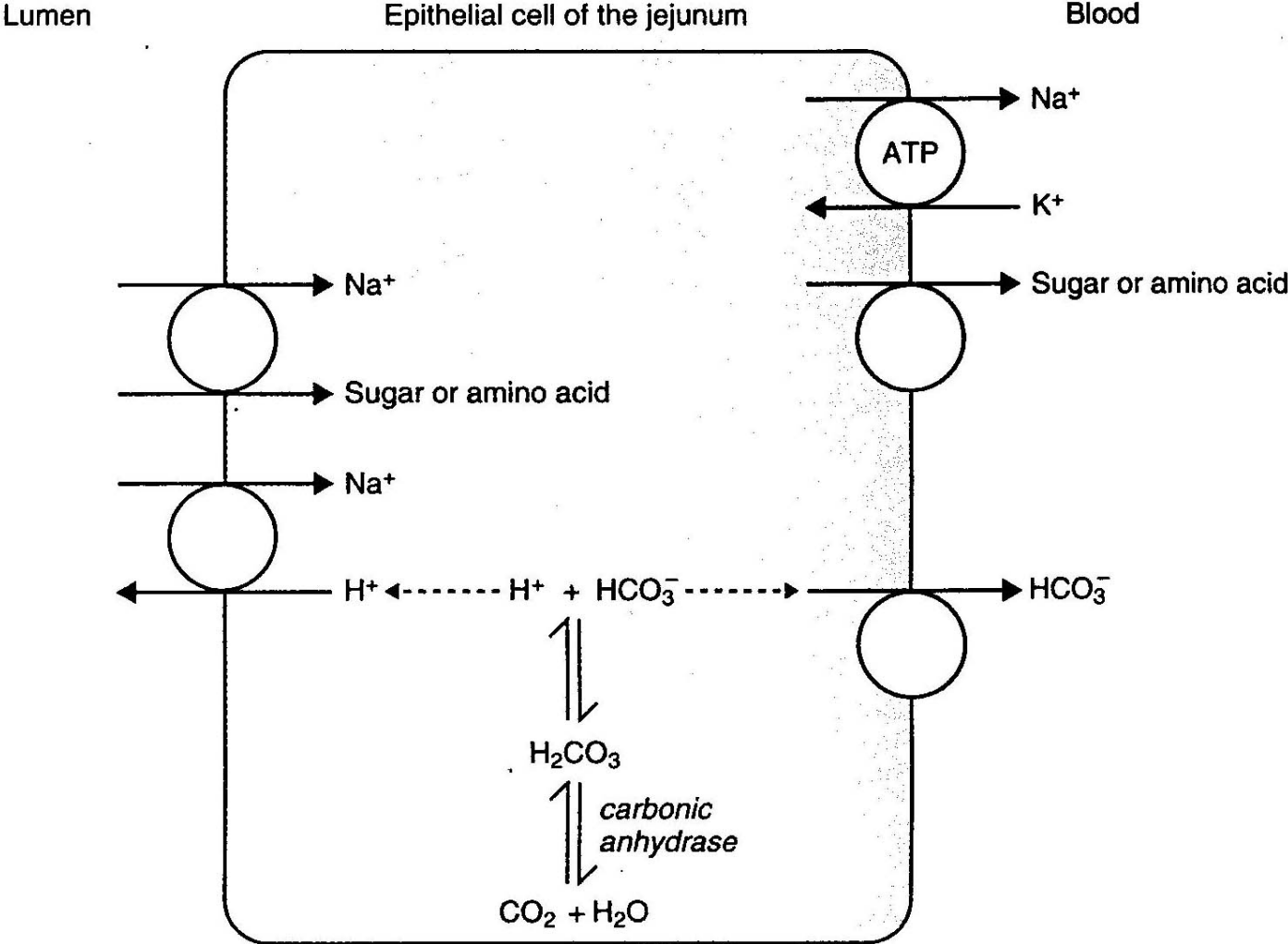
- Cystinuria
 - deficiency in transporter protein

Hormonal control of absorption & secretion

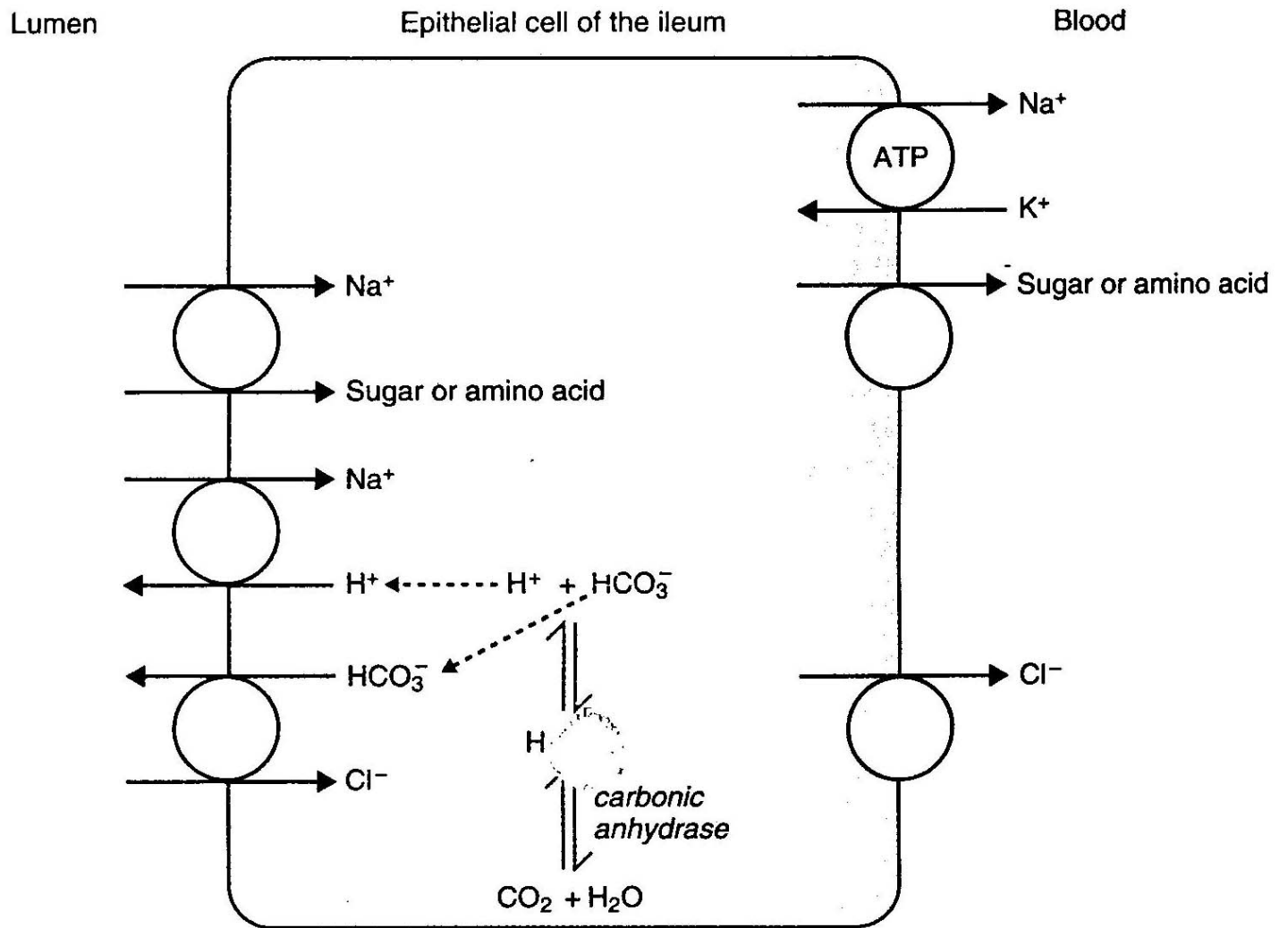
- Glucocorticoid = \uparrow absorption of H_2O & ions (small & large intestine)
- Catecholamines = \downarrow intestinal secretion
- Somatostatin = \uparrow H_2O & ions absorption (ileum & colon)
- Epinephrine = \uparrow NaCl absorption (ileum)
- Aldosterone = \uparrow synthesis of Na channel (colon)

ELECTROLYTE TRANSPORT IN THE SMALL INTESTINE.

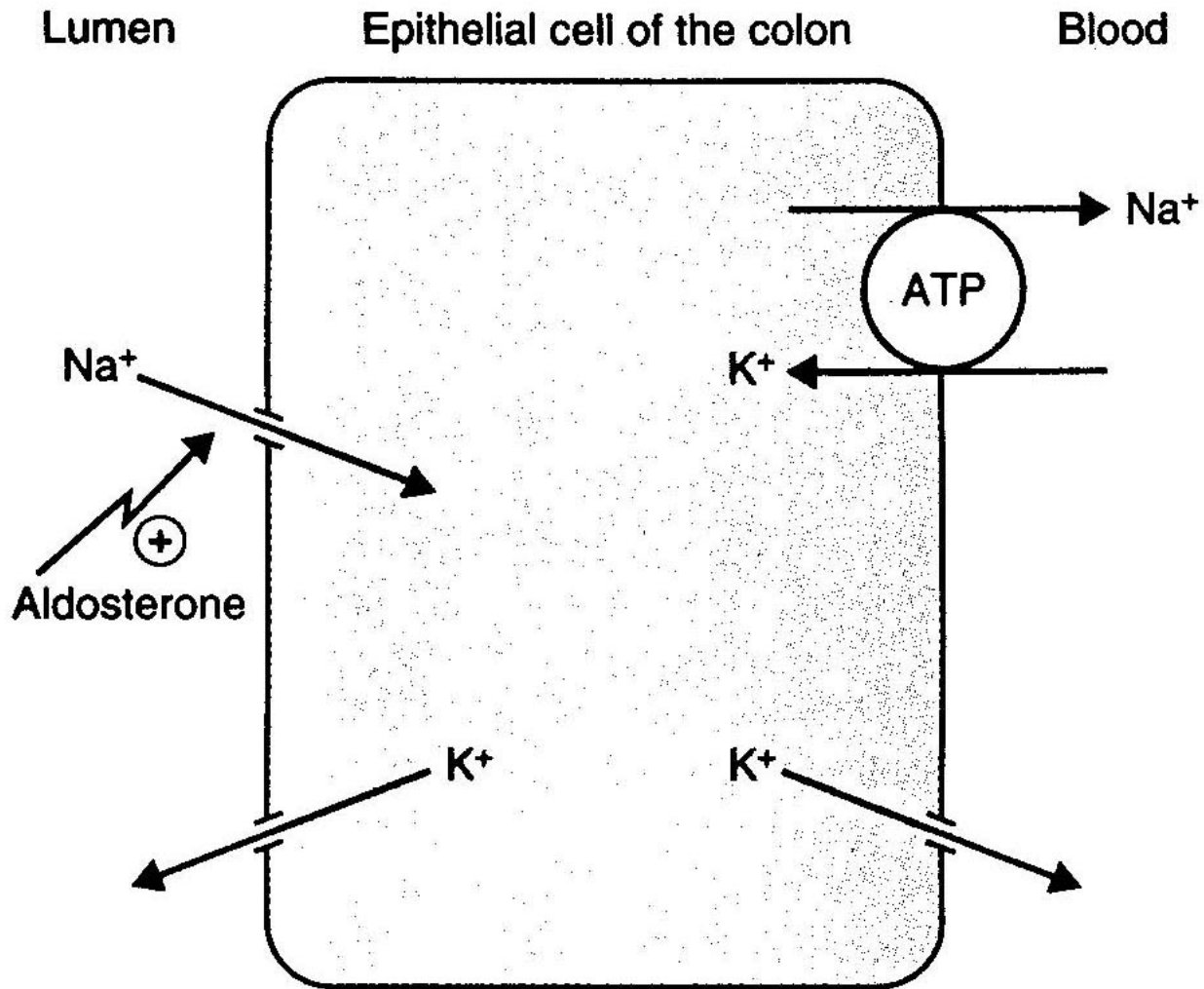
A Jejunum



B Ileum



ELECTROLYTE TRANSPORT IN THE COLON



Cl⁻ SECRETION IN THE INTESTINE

Lumen

Epithelial cells of the crypts

Blood

