Secretory Functions (Secretions) of GIT

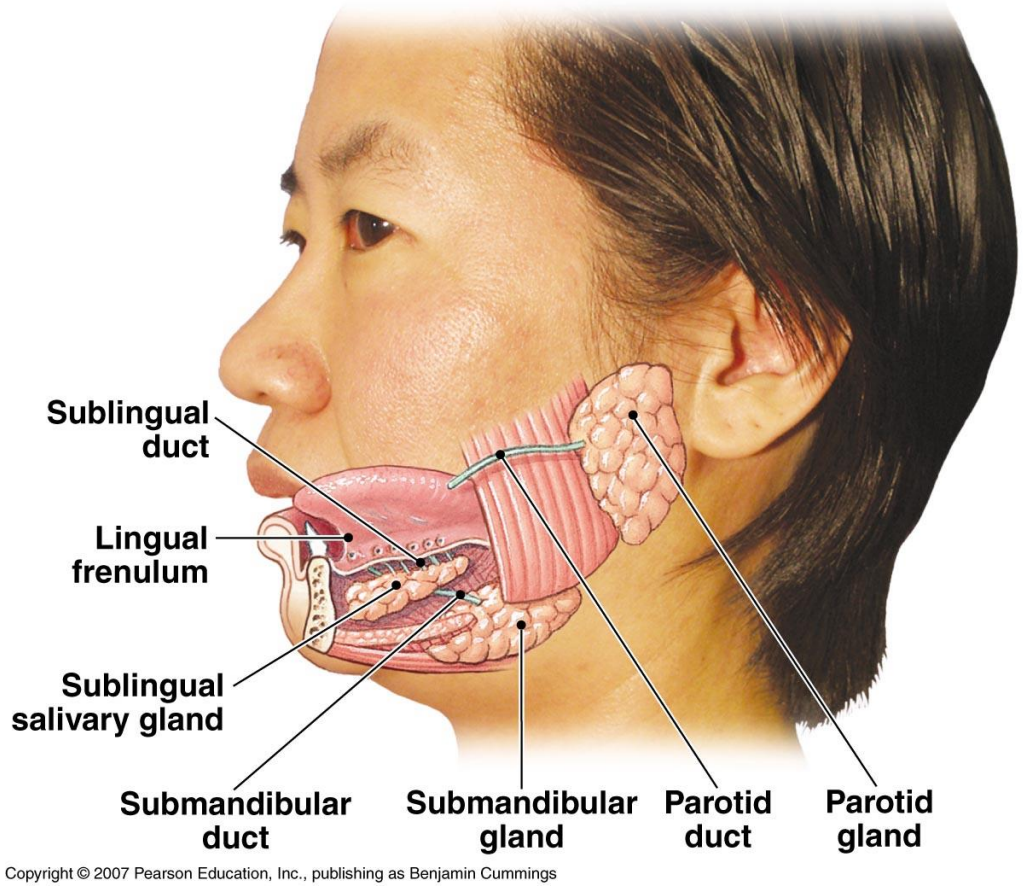
Secretions of GIT

- GI secretions function to **lubricate** (water and mucus), **protect** (mucus), **sterilize** (HCl), **neutralize** (HCO_3^-), and **digest** (enzymes).
- Secretions arise from **specialized cells** lining the **GI tract**, the **pancreas**, **liver** and **gallbladder**.
- The **total volume** of GIT secretions is about **6-8 L/day**

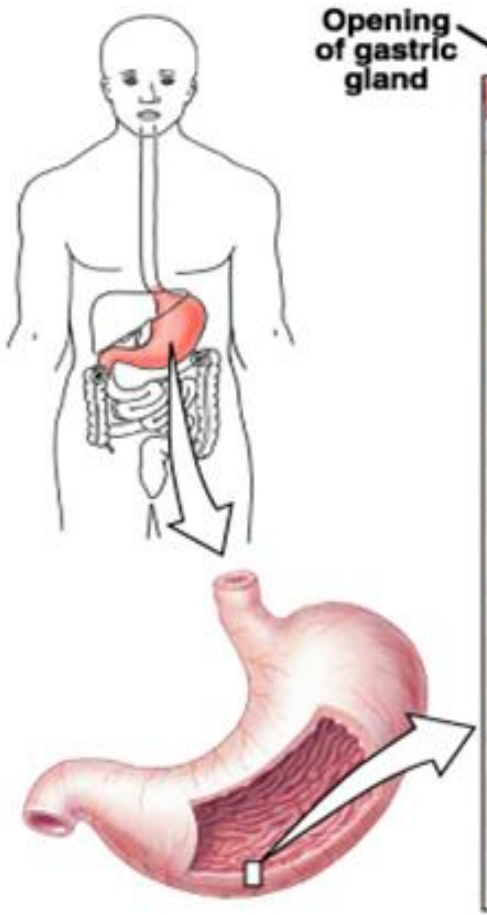
Secretions of GIT in Mouth

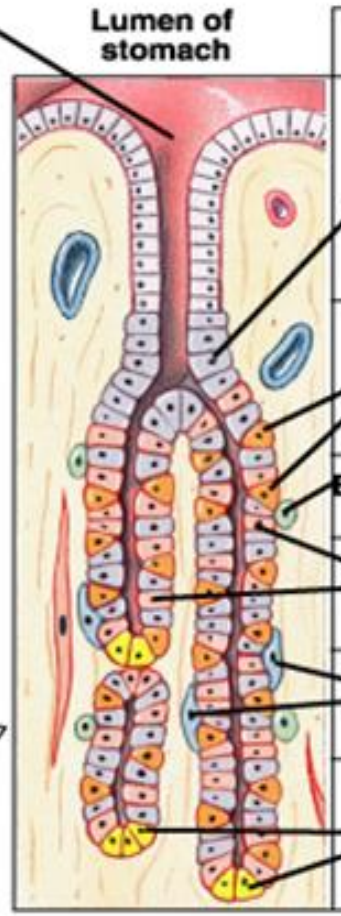
Salivary Glands

- **Three pairs** of glands
  - *Parotid*
  - *Sublingual*
  - *Submandibular*
- **Functions of saliva**
  - Lubricates, cleanses oral cavity
  - Dissolves chemicals
  - Suppresses bacterial growth
  - Digest starch by amylase



GIT secretions in Stomach





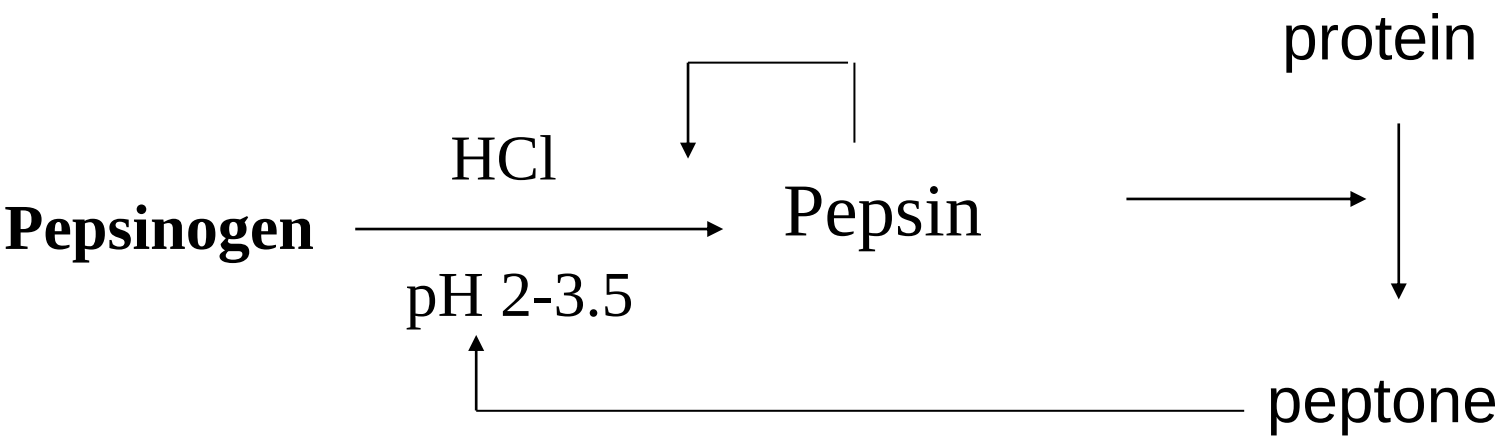
Source	Substance Secreted	Function
Mucous neck cell	Mucus	Physical barrier between lumen and epithelium
	Bicarbonate	Buffers gastric acid to prevent damage to epithelium
Parietal cells	Gastric acid (HCl)	Activates pepsin; kills bacteria
	Intrinsic factor	Complexes with vitamin B_{12} to permit absorption
Enterochromaffin-like cell	Histamine	Stimulates gastric acid secretion
Chief cells	Pepsin(ogen)	Digests proteins
	Gastric lipase	Digests fats
D cells	Somatostatin	Inhibits gastric acid secretion
G cells	Gastrin	Stimulates gastric acid secretion

Function of hydrochloric acid

1. Activating pepsinogen
2. Provide optimum for pH for action of pepsins
3. Food protein denaturation and easy decomposition；
4. Kill bacteria in food into the stomach
5. Promoting pancreatic, small intestinal and bile secretion
6. Helping Fe^{2+}、Ca^{2+} absorption.

Function of pepsins

Function of pepsinogen



Function of mucous and intrinsic factor

Mucus secretion

- Soluble and insoluble mucus are secreted by cells of the stomach.
- **Soluble mucus** mixes with the contents of the stomach and helps to lubricate chyme.
- **Insoluble mucus** forms a protective barrier against the high acidity of the stomach content.

Intrinsic Factor

- Help absorption of vitamin B12

Pancreatic Secretion

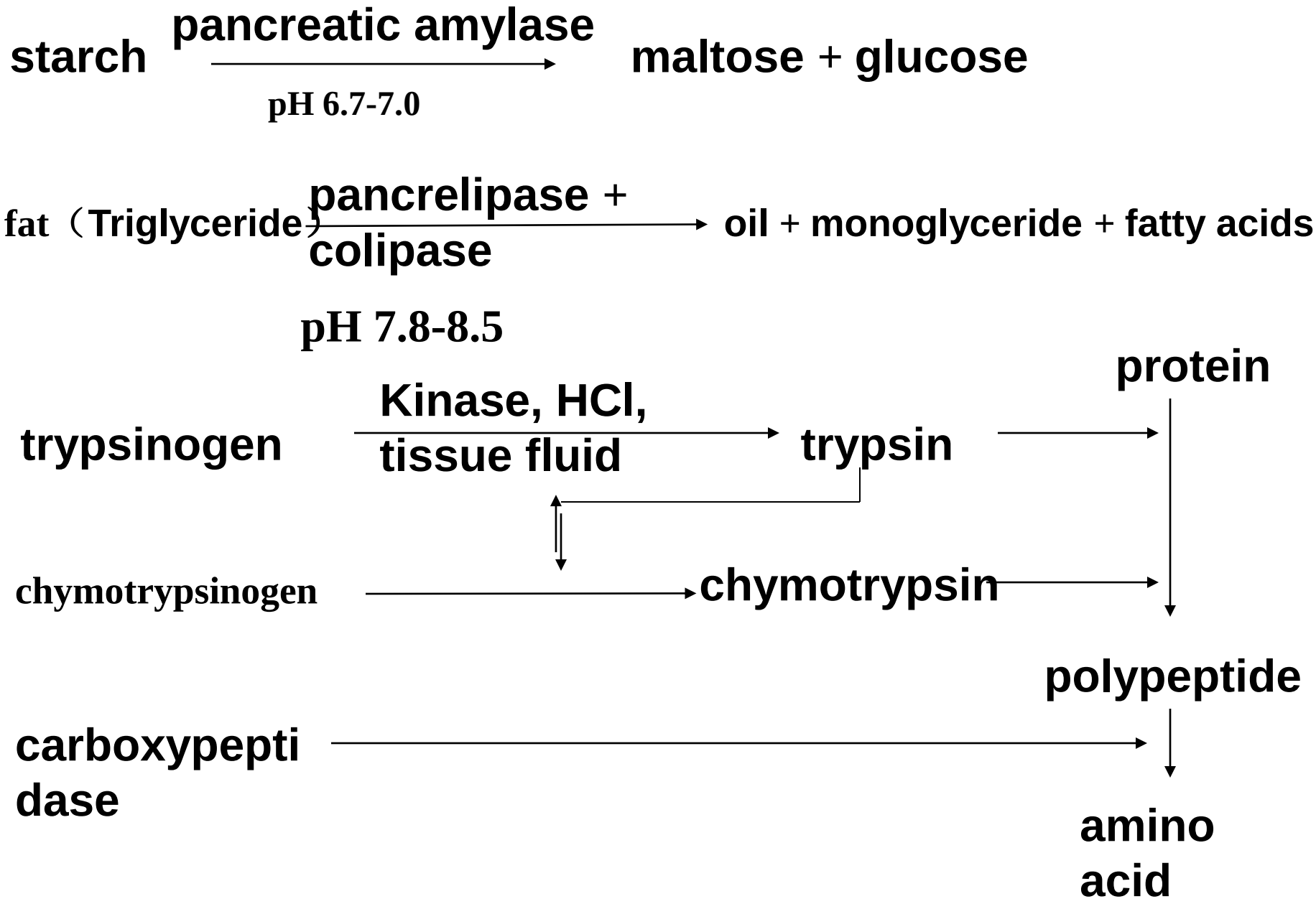
- Pancreas has **2 functions**:

a) Endocrine functions: secretes insulin and glucagon from islets of Langerhans

b) Exocrine function: secretion of pancreatic juice

- It has **2 components**: aqueous and enzymatic components.
- **Aqueous component** (contains HCO3) is important for neutralizing stomach acid in the duodenum so pancreatic enzymes can function properly
- **Enzymatic component** is essential for the proper digestion and absorption of carbohydrates, fats, and proteins
- **Pancreatic enzymes** include trypsin, chemotrypsin, lipase, and amylase

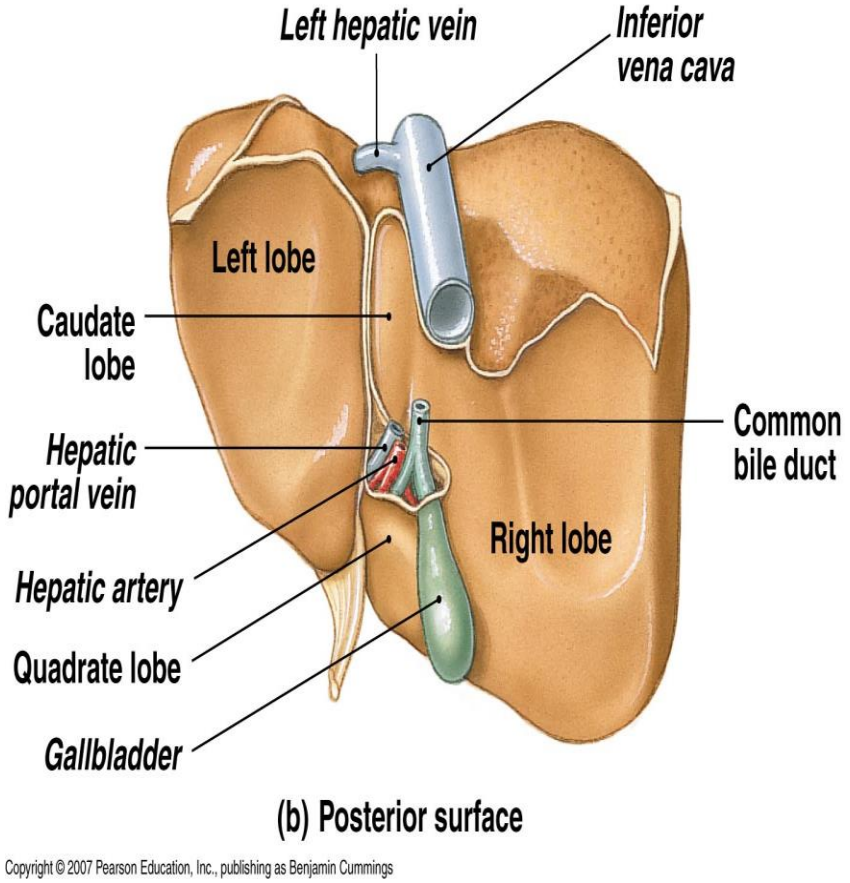
Functions of pancreatic juice enzymes



The Liver and Gall Bladder

Functions of the Liver

- **Metabolic regulation**
  - Store absorbed nutrients, vitamins
  - Release nutrients as needed
- **Hematological regulation**
  - Plasma protein production
  - Remove old RBCs
- **Production of bile**
  - Required for fat digestion and absorption



Secretion of small intestine

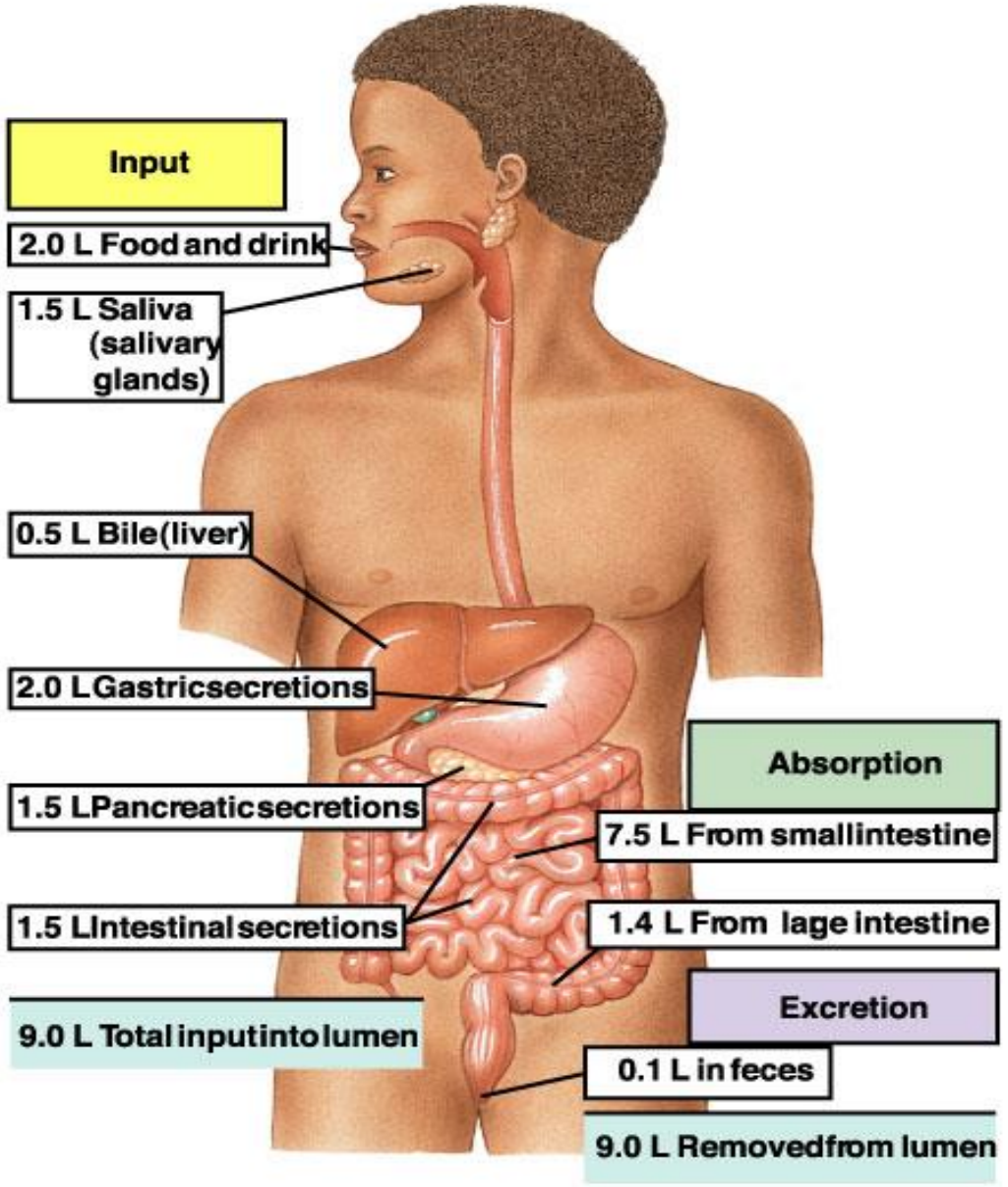
- Secretion from duodenal gland and intestinal gland
- Secretory volume is 1～3L/day
- It contains inorganic ion, mucoprotein, IgA, various enzyme, e.g. enterokinase ,etc
- **Function:**
  - Protective effect by mucous
  - Digestion by enzymes such as peptidase, sucrase, lipase
  - Dilution

Digestion and Absorption

Digestion and Absorption

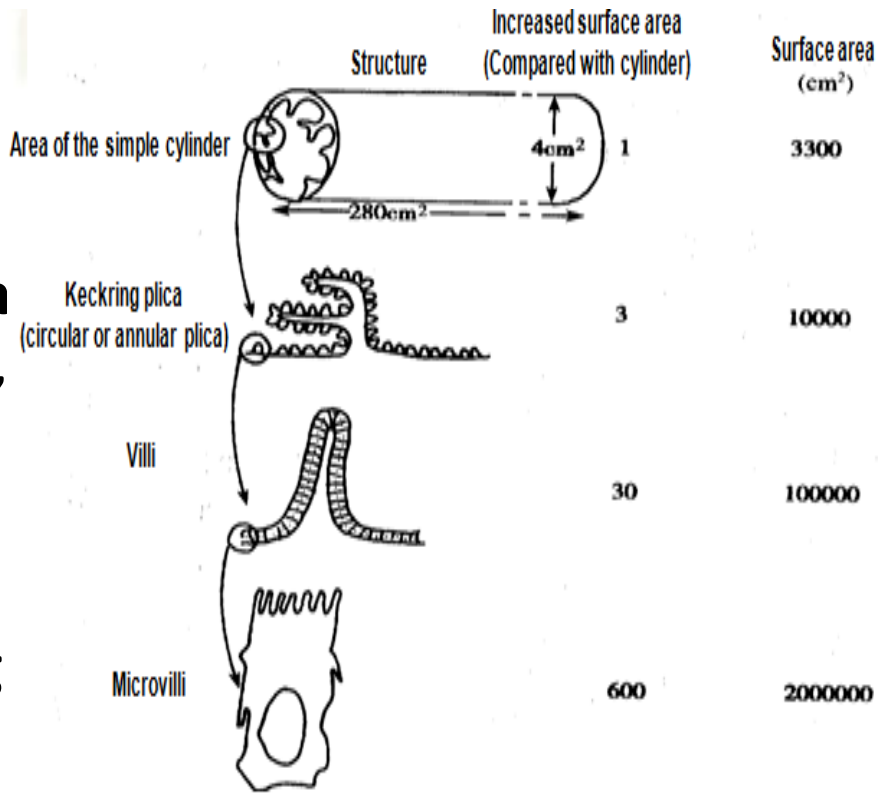
- **Digestion is a process essential for the conversion of food into a small and simple form.**
  - mechanical digestion by mastication and swallowing
  - chemical digestion by enzymes
- **Absorption is the process of transporting small molecules from the lumen of the gut into blood stream or** lymphatic vessel**.**

Digestion and Absorption

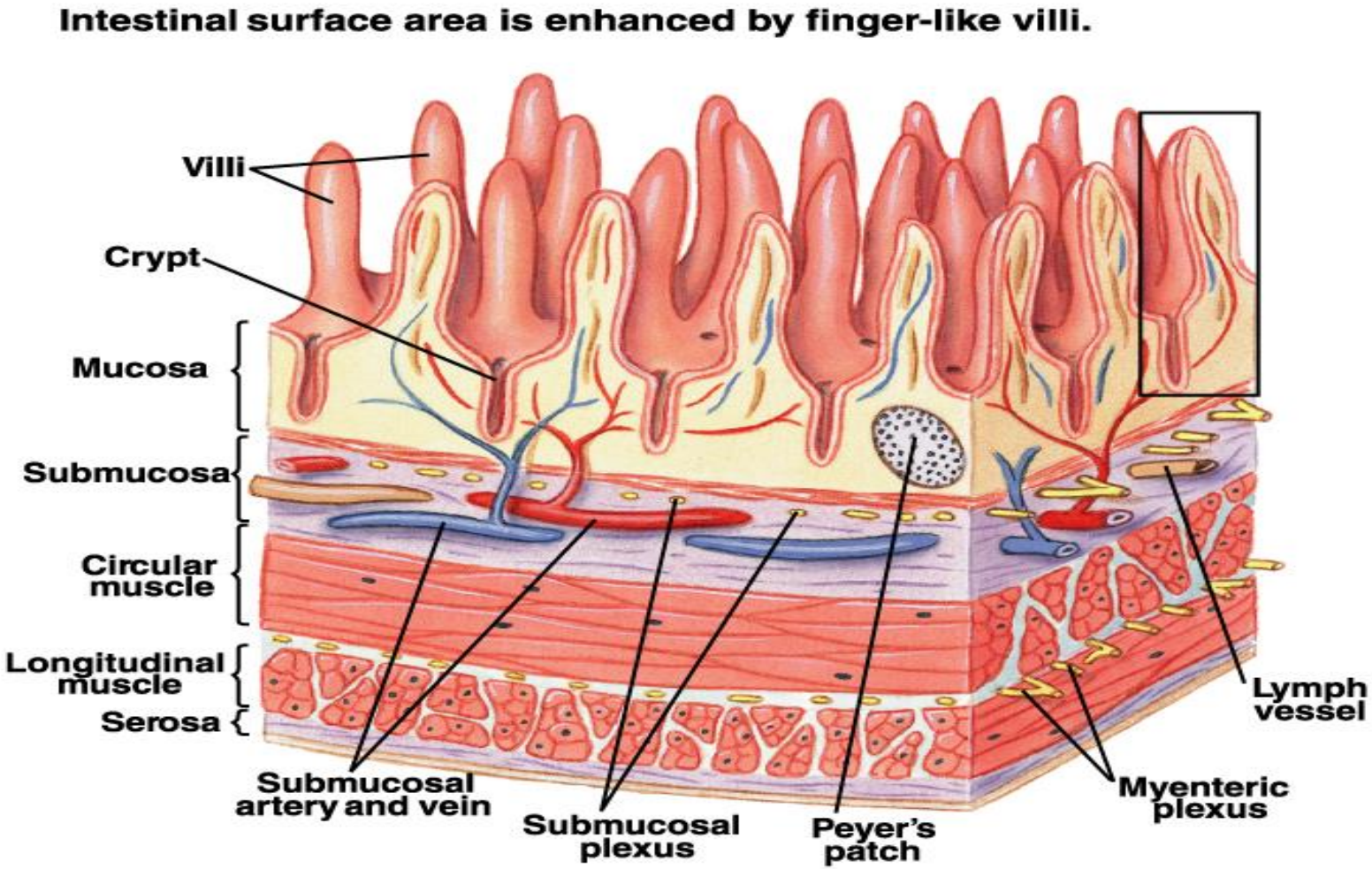


Digestion and Absorption

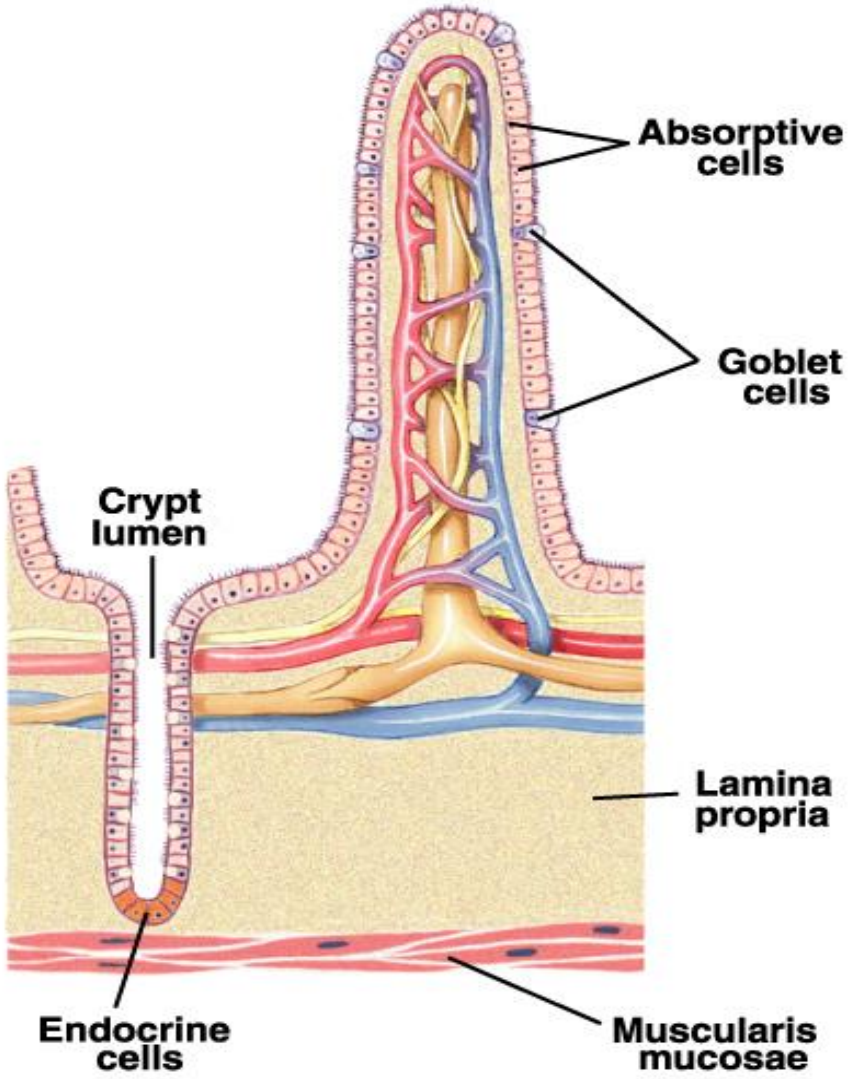
- **Small intestine** is primary site **for digestion** and **absorption** of food.
- **Digestion** occurs in the GI lumen by **secreted enzymes** and on surface of enterocytes by **membrane-bound enzymes**.
- Absorption occurs by **simple diffusion facilitated diffusion**, **active transport**, **endocytosis**, and paracellular transport.
- **Surface area** of small intestine is greatly increased by extensive **folding** and the projection of **fingerlike villi** covered with **microvilli**.



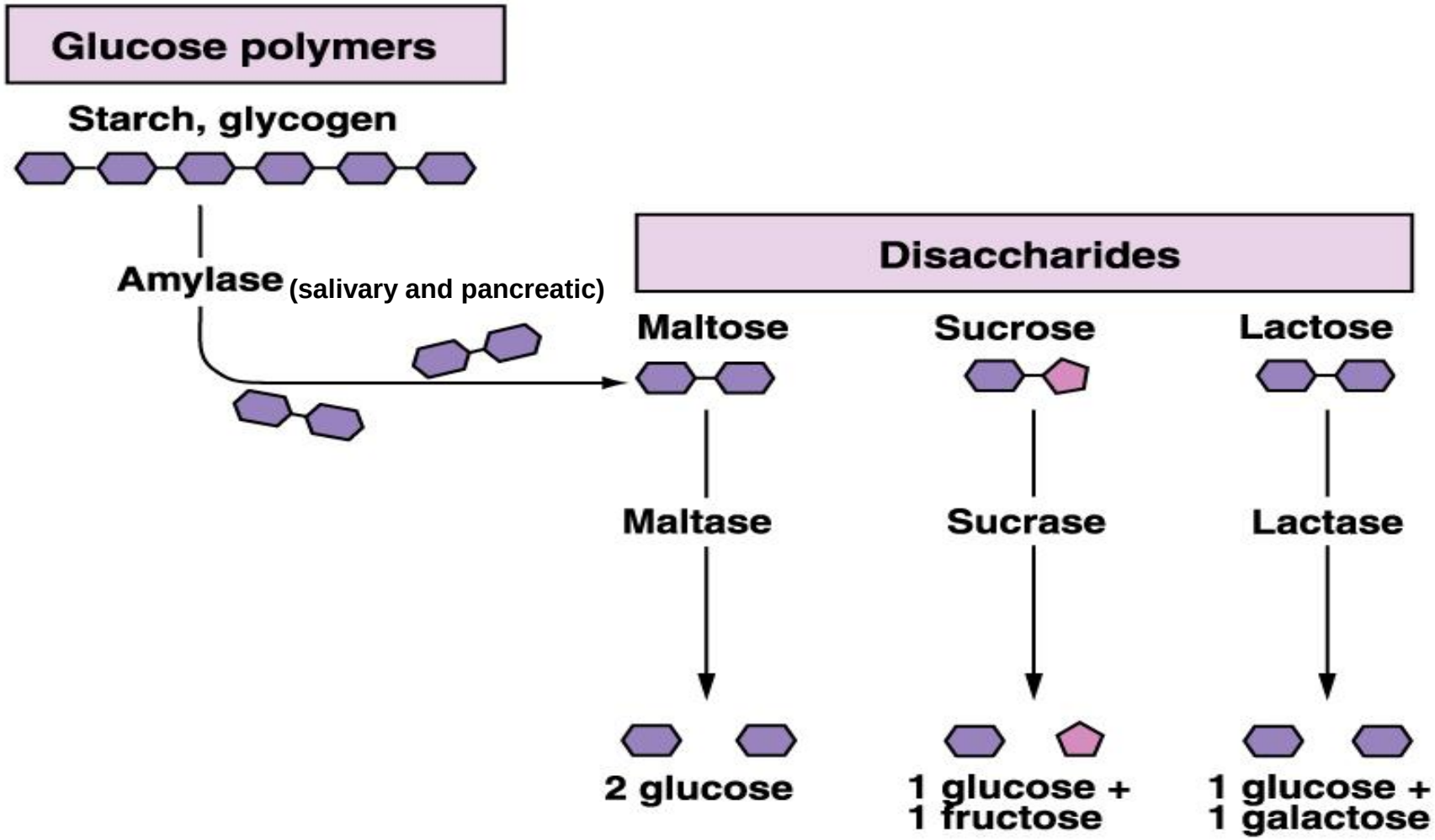
Intestinal Villi



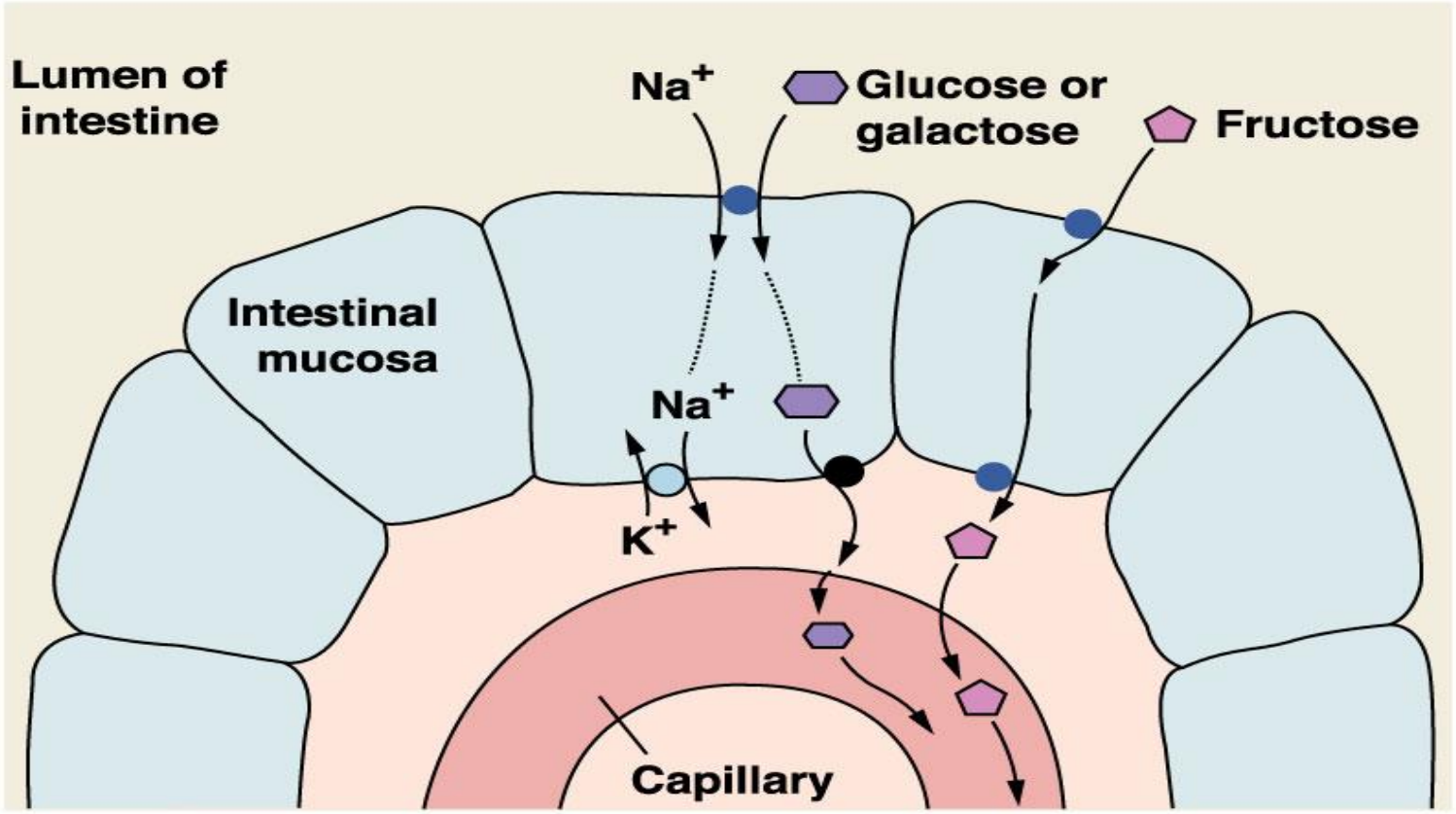
Intestinal Villi



Digestion of CHO

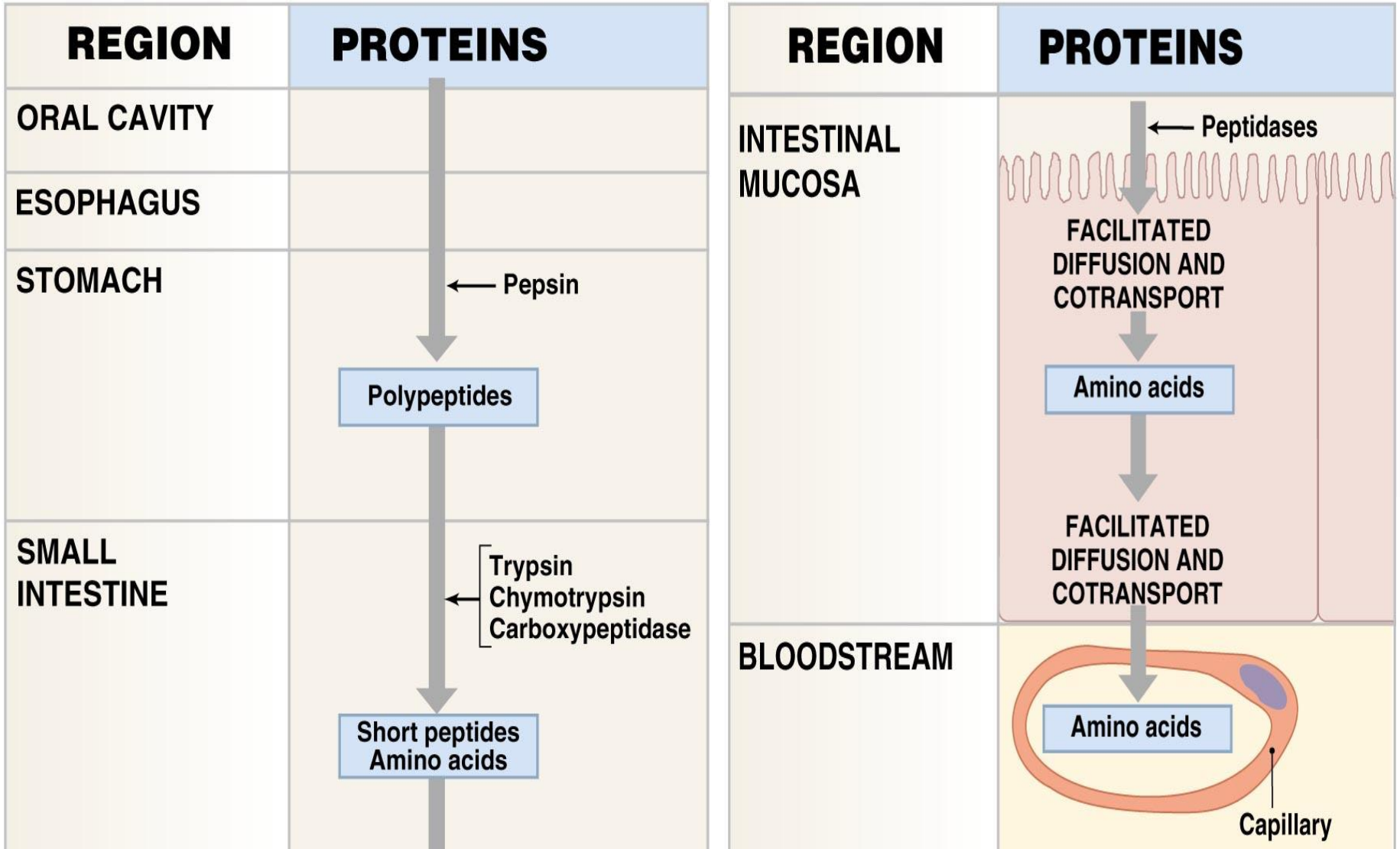


Absorption of CHO



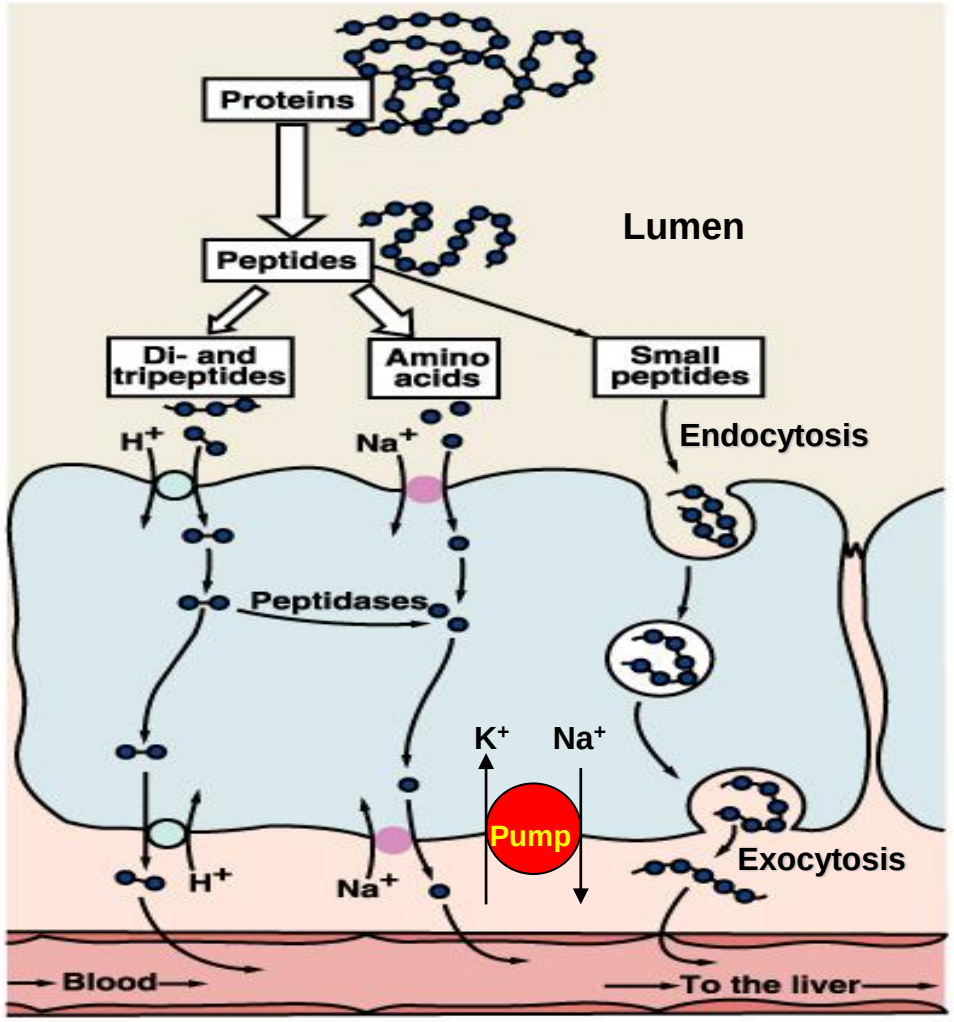
Enterocytes absorb **glucose and galactose** through an **Na-dependent secondary active transport process**, while **fructose** is absorbed by **facilitated transport**.

Digestion of proteins

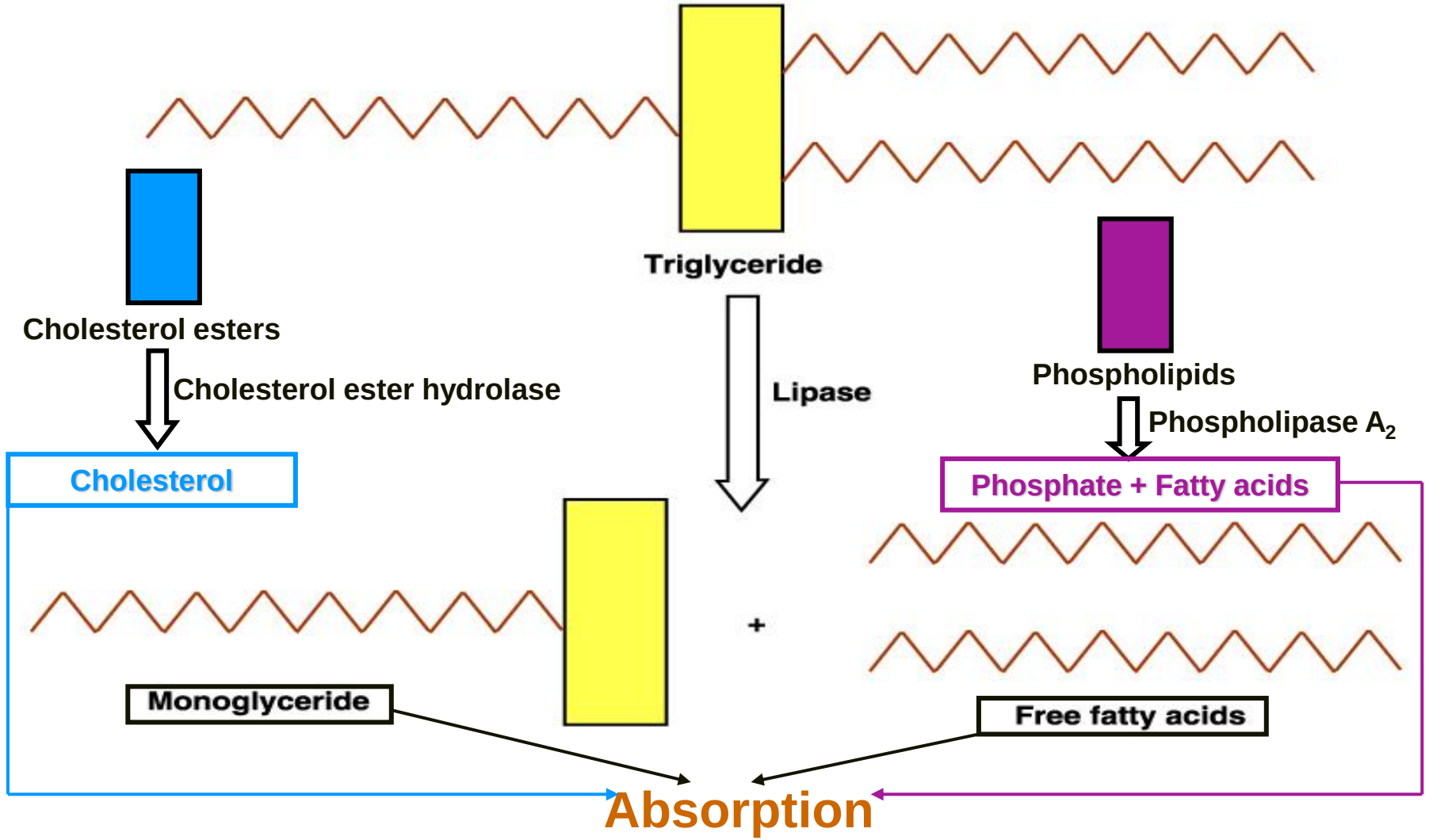


Absorption of proteins

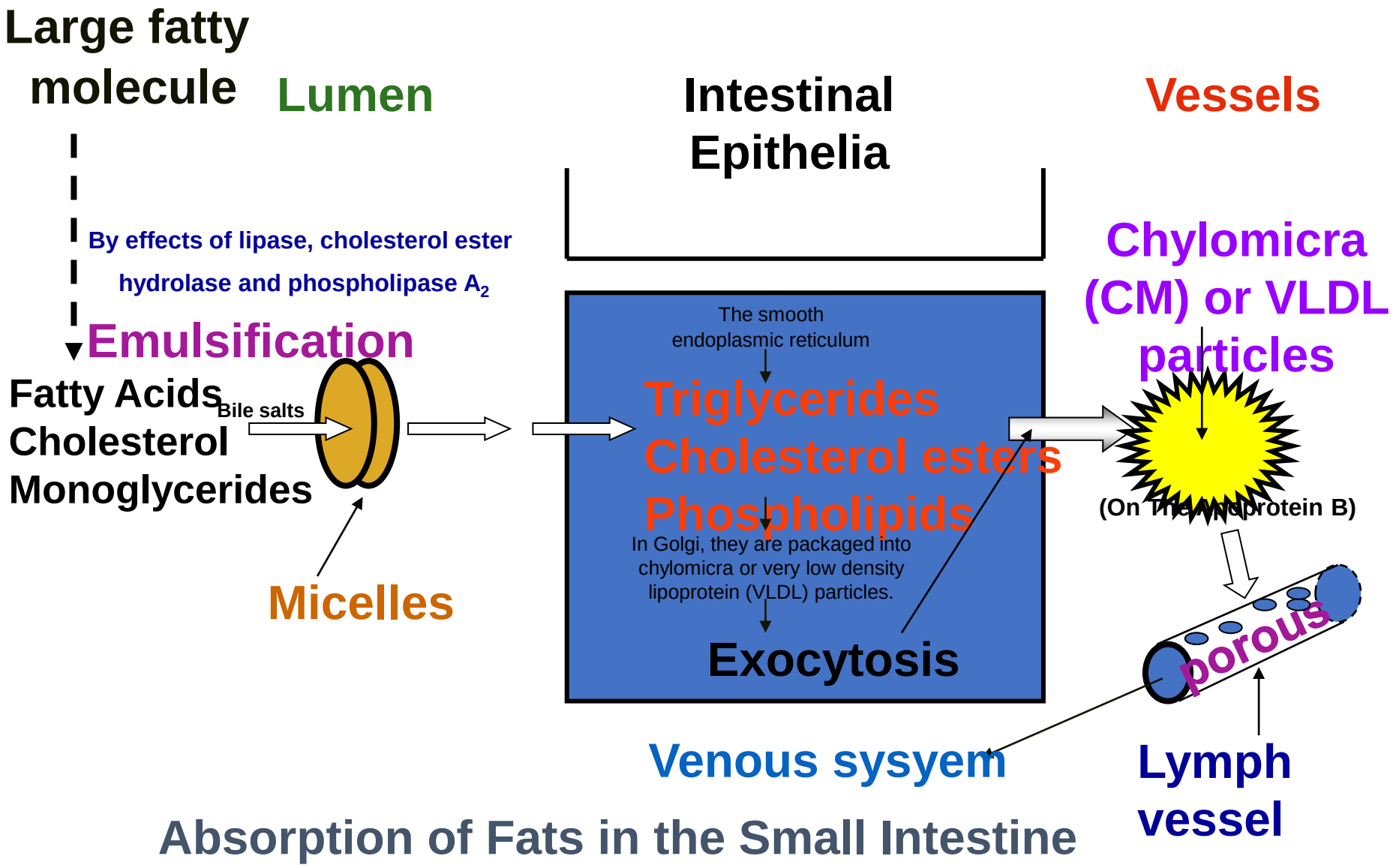
- The whole proteins by **endocytosis**
- Amino acids and di and tripetides by **Na-dependent 2ry** active transport



Digestion of fats



Lipid digestion and absorption



Absorption of Fats in the Small Intestine