



**Biliary  
&  
Biliary  
&  
Intestinal Secretion**

**Prof. Khaled A. Abdel-Sater**

# Objectives

- Describe the components of bile and intestinal secretions
- Indicate the function of each component secreted in bile and intestinal juice in digestion
- Illustrate the regulation mechanisms involved in the secretion of bile and intestinal fluid

# ● Functions of Liver:

(I) Digestive function: Secretion of bile.

(II) Non-digestive functions:

1-Metabolic functions for CHO, lipids and proteins.

2-Detoxication of harmful materials.

3-Synthetic: plasma proteins, clotting factors, enzymes,

4-It acts as a blood reservoir.

5-Production of red blood cells in fetal life.

6-Destruction of aged red blood cells by kupffer cells.

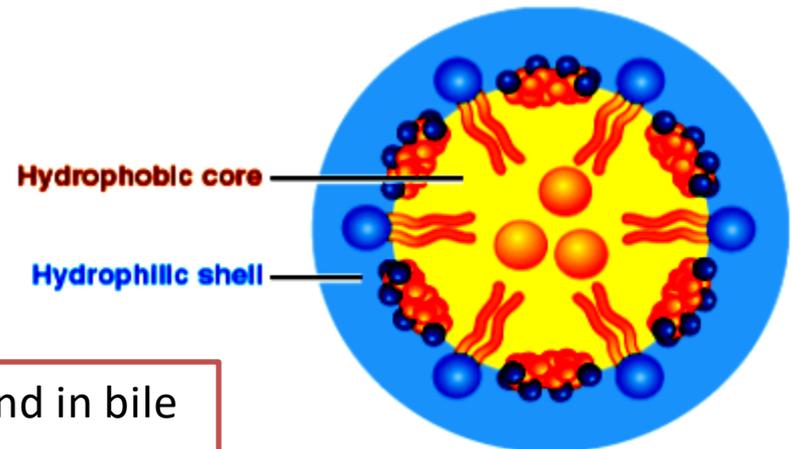
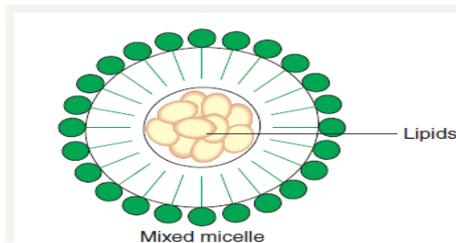
7-Storage of iron, vitamins.

8-Endocrine function: secretion of erythropoietin and somatomedins.

# ● Functions of Bile Salts: A<sup>3</sup> CD<sup>2</sup>

**a) Emulsification of fat:** i- ↓ the surface tension of lipid (hydrotropic action) by forming hydrophilic (water-soluble) shell around fat (lipid-soluble) core this is called micelles .

ii- ↑ surface area for action of lipase by breakdown large fat globules into small parts.



**b) Activation of lipase.**

No digestive enzymes are found in bile

**[2] Absorption: of fat and fat-soluble vitamins.**

**Bile salts help absorption of calcium, magnesium and iron:**

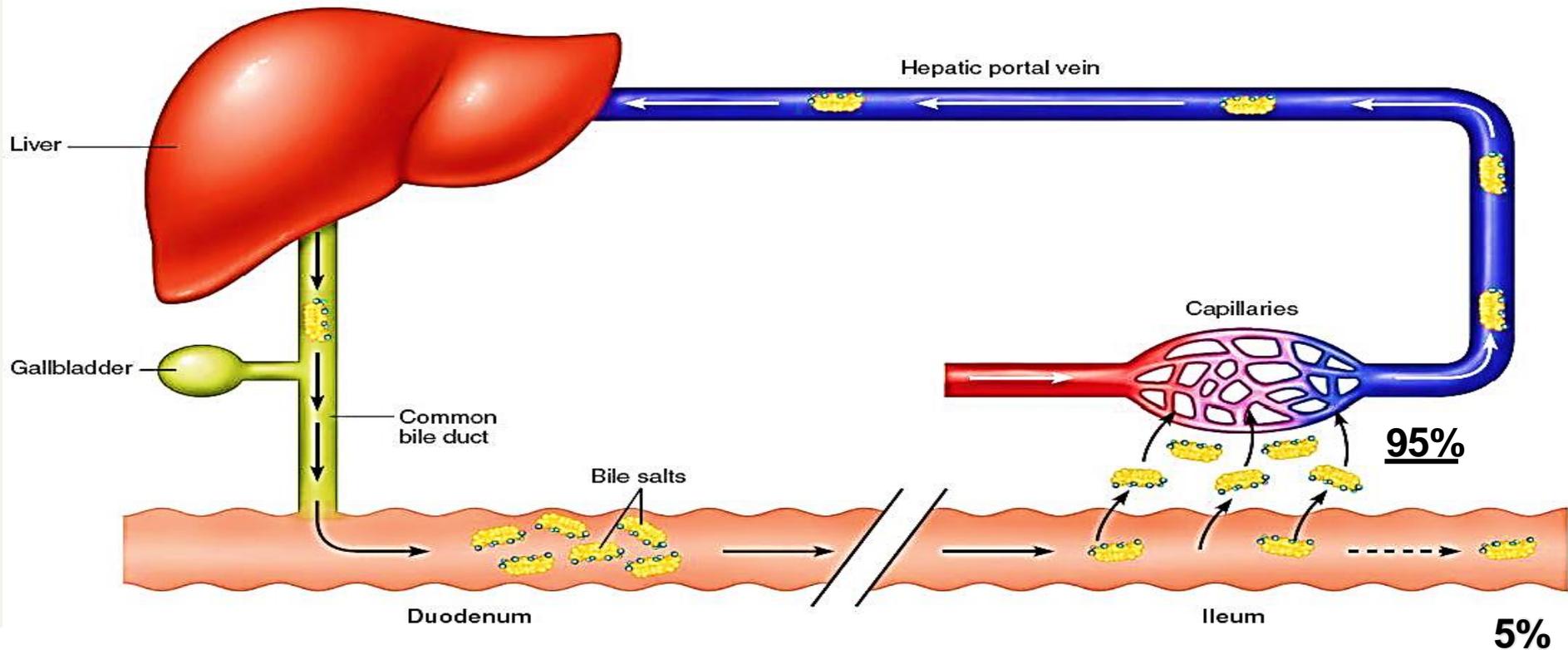
As the nonabsorbed fat decreases their absorption.

**[3] Choleretic action (50%) major choleretics.**

**[4] Dissolvent action: (1/26).** Bile salts by their solvent action keep cholesterol of bile in solution. This prevents cholesterol precipitation in gallbladder & formation of gall stones.

**[5] Anticonstipation (Laxative) action:** Bile salts stimulate intestinal movement.

**[6] Antiputrefactive action:**



95% of bile salts are absorbed from the terminal ileum by an active transport mechanism. The absorbed bile salts pass in portal circulation to the liver to **be secreted in bile.** This circulation is called the entero-hepatic circulation of bile salts.

# Functions of the gall bladder

- 1)-Storage of bile. (inbetween meals)
- 2)-Concentration of bile The capacity of the gall bladder is only 60 ml, & to accommodate the large volume of bile flowing from the liver (500 ml/day), bile concentration takes place (by absorption of H<sub>2</sub>O).
- 3)-Acidification of bile by bicarbonate reabsorption.(no precipitation of Ca)
- 4)-Reducing the pressure in bile ducts.
- 5)-Secretion of mucous which protects its mucosa , lubricant and buffer
- 6)-Evacuation of bile to the duodenum during meals

# Regulation of Bile Secretion =

## [I] Nervous Mechanisms

- Vagal stimulation stimulates bile secretion.
- Sympathetic stimulation decreases bile secretion

## [II] Hormonal Mechanisms

Secretin: stimulates bicarbonate secretion

Gastrin: stimulates secretion directly and indirectly through stimulation of HCl

CCK: stimulates bile secretion from liver indirectly by stimulating gall bladder emptying.

# Regulation of Bile Secretion =

## [III] Other Mechanisms

### 1-Bile Salts in the Enterohepatic Circulation:

- Are the most powerful stimulants of bile secretion (major cholagogues).

### 2-Hepatic blood flow:

- Bile secretion is directly proportional to the liver blood flow.
- During meals bile secretion increases due to ↑ blood flow.

	<b>Choleretic</b>	<b>Cholagogues</b>
<b>Def</b>	Substances stimulate bile synthesis & secretion	Substances stimulate evacuation of the bladder
<b>e.g.</b>	Bile salts (most powerful), Ach & secretin	CCK-PZ & MgSO <sub>4</sub>

# **●Functions of Small Intestine:**

1-Complete the digestion of food (in the upper  $\frac{1}{2}$ ).

2-Absorption of digested food products (in the lower  $\frac{1}{2}$ )

-95% of digested food is absorbed in it because:

It has large surface area by great length (3 – 3.5 meters).

Rich supply with blood & lymph vessels.

3-Secretion of important GIT hormones e.g. secretin, CCK..etc.

# **●Functions of Succus-Entericus:**

**A-Intestinal mucous**: It protects the duodenum from highly acidic gastric contents that enters it.

**B-Intestinal enzymes**:

**(1) Erepsin group**

**-Carboxypeptidase**: separate amino acid with a free carboxylic group.

**-Aminopeptidases**: separate amino acids with a free amino group.

**-Dipeptidases**: splits dipeptides into two amino acids.

## (2) Disaccharidases:

- Maltase enzyme converts maltose into glucose + glucose.

- Sucrase enzyme converts sucrose into glucose + fructose.

- Lactase enzyme converts lactose into glucose + galactose.

(3) Enterokinase: which activate trypsinogen  $\Rightarrow$  trypsin.



(4) Intestinal lipase:

glycerol + fatty acids.

# Regulation of Intestinal Secretion

## I-Nervous Mechanisms

- Local myenteric reflex: It is initiated by the presence of chyme in small intestine causing It is the main mechanism of regulation.

chemical & mechanical stimulation of mucosa.

- Vagal stimulation:

- Sympathetic stimulation:

## II-Hormonal Mechanisms

VIP is the major GIT hormone, which stimulates secretion.

Secretin & CCK stimulate secretion.



Thank you