

DIGESTION I

I. THE BUCCAL CAVITY = MOUTH **Tortora Fig 24.5 (11th or 12th ed); OR Martini (8th ed) Fig 24-6**

- the roof of the mouth is made up of **hard & soft palate** → separates nasal passage from food passage
- the **uvula** is a finger-like projection at the back of the soft palate
- **functions** include:
 - (i) **mastication** (chewing) of food
 - (ii) mixing of food with saliva to form a soft and flexible ball = **bolus**
 - (iii) beginning of **starch digestion**

II. DEGLUTINATION = SWALLOWING

Fig 24.10 in T11 or T12; OR Fig 24-11 in M8

- occurs in 4 steps:
 - (i) tip of tongue is pressed against the hard palate → pushes bolus to back of buccal cavity
 - (ii) soft palate & uvula move upward → closes off the nasal cavity
 - (iii) larynx is pulled forward & upward so it meets epiglottis → seals off glottis (respiratory tract)
 - (iv) muscles of pharynx squeeze the bolus into esophagus

III. ESOPHAGUS - tube from pharynx to stomach thru the neck, thorax & diaphragm

- runs behind the trachea and in front of vertebral column

IV. MOVEMENT OF FOOD (PERISTALSIS) Figs 24.2 & 24.10c in T11 or T12 OR 24-3 & 24-4 in M8

- the esophagus, stomach & intestines are lined with both circular and longitudinal smooth muscle
- when the circular muscles contract, the lumen (cavity) diameter ↓
- when the longitudinal muscles contract, the length ↓ & the diameter ↑
- **peristalsis** = movement of bolus by repeated contractions of circular muscles above the bolus & contractions of the longitudinal muscles below the bolus

V. THE STOMACH

Fig 24.11 in T11 or T12; OR Fig 24-12 in M8

- “J” shaped enlargement of the digestive tract
- 4 major areas:
 - (i) cardia - part where esophagus enters
 - (ii) fundus - rounded portion above & left of cardia
 - (iii) body - large central part below fundus
 - (iv) pylorus - narrow part leading to duodenum
- the opening of the pyloris into the duodenum is controlled by the circular **pyloric sphincter** muscle
- **orientation** – see Fig 24.1 - immediately below diaphragm on left side of abdominal cavity
 - fundus on left, pyloris on right
- **functions** :
 - (i) **holds** food for controlled release into small intestine
 - (ii) produces **gastric juice (enzymes + HCl)** & mixes it with bolus
 - thin acidic liquid called **chyme**
 - (iii) **small** amount of chemical digestion of proteins and lipids

VI. THE LIVER

A.) Anatomy

Fig 24.14 in T11 or T12 : OR Fig 24-19 in M8

- the largest single organ in human body (\approx 1.5-2 kg)
- **falciform ligament** separates right lobe from the smaller left lobe & attaches liver to diaphragm

B.) Functions:

- (i) breaks down old RBCs & **makes bile** from haemoglobin; bile emulsifies (breaks up) fats
- (ii) regulates the amount of **glucose** in the blood → turns glucose into glycogen or fat to store
→ changes glycogen back into glucose
- (iii) converts harmful nitrogenous wastes into less toxic **urea**
- (iv) makes many plasma proteins (e.g. fibrinogen)
- (v) stores some vitamins & minerals

C. Connections to the Gall Bladder, Pancreas and Duodenum**(i) Ducts****Fig 24.14 in T11 or T12 ; OR Fig 2 in manual**

- transport bile and pancreatic juice to duodenum
- **right & left hepatic ducts** from right & left lobes of the liver join to form the **common hepatic duct**
- joined by **cystic duct** from gall bladder (which stores bile) → **common bile duct**
- joins with **pancreatic duct** from pancreas & then enters duodenum as **ampulla of vater**

(ii) Hepatic Portal System**Bioch. Handout Fig 19.13; Figs 21.28 in T11 or 12 OR Fig 21-32 in M8**

- liver receives some blood through the hepatic artery BUT receives most of its blood from the hepatic portal system
- veins from the stomach & intestines join to form the **hepatic portal vein**
- **the hepatic portal vein goes TO the liver** and forms capillaries
 - takes blood containing nutrients absorbed from food to the liver for modification/storage before entering circulatory system
- after modification, blood enters **2 hepatic veins** that lead to the inferior vena cava

VII. THE PANCREUS**Fig 24.14 in T11 or T12; OR Fig 24-18 in M8**

- a soft gland just inferior to the stomach
- consists of 3 parts: (i) **head** - near C shaped curve of duodenum
- (ii) **body** - narrower central portion
- (iii) **tail** - tapered end at left
- **functions:** (i) produces a mixture of **digestive enzymes** (= pancreatic juice)
(ii) pancreatic juice is highly alkaline to **neutralize the acidity of the chyme**
(iii) produces hormones (glucagon and insulin) that **regulate blood glucose level**

VIII. THE SMALL INTESTINE**Fig 24.17 in T11 or T12; OR Fig 24-16 in M8**

- 3 parts: **duodenum, ileum and jejunum**
- 20 foot long tube from pyloric sphincter to large intestine
- longer but narrower than large intestine
- **functions:** (i) **most chemical digestion** occurs here (ii) **most absorption** of nutrients
- the internal lining has folds (villi) to increase surface area for absorption **Fig 24.18**

IX. THE LARGE INTESTINE**Fig 24.22 in T11 or T12; or Fig 24-23 in M8**

- 6 foot long tube from small intestine to anus
- 4 parts: (i) **cecum** - first 2 inches from which appendix arises
- (ii) **colon** - largest part; can be further divided into ascending, transverse, descending & sigmoid colon

(iii) rectum - about 8 inches **(iv) anal canal** - last inch or so of rectum

- functions: (i) absorption of **some** water and mineral salts (ii) formation of feces

X. DEFACATION

- controlled by 2 sphincters:
 - (i) internal sphincter - opens when pressure sensitive receptors in rectum cause reflex (**involuntary**)
 - (ii) external sphincter - opens when feces is forced out by diaphragm & abdominal muscles (**voluntary**)

XI. PERITONIUM

- thin membranes that join digestive organs together while allowing some movement between them
- consists of:
 - (i) peritoneal layer - along abdominal wall
 - (ii) visceral layer - around digestive organs
 - (iii) peritoneal cavity – fluid filled cavity between 2 membranous layers \Rightarrow protection

DIGESTION II

I. PARTS OF A TOOTH

Fig 24.7 in T11 or T12; OR 24-8 in M8

- (i) **crown** = above gums
- (ii) **root** = 1-3 projections into socket
- (iii) **neck** = region where crown & root join

II. TOOTH STRUCTURE

- bulk of tooth = **dentin** → similar to bone but harder
- crown on outside is **enamel** (mostly calcium phosphate, the hardest substance in the body)
- inside the dentin is the **pulp cavity** which contains **pulp** (connective tissue with blood vessels, lymph vessels & nerves)
- **root canals** are narrow extensions of the pulp cavity with a hole (apical foramen) at the base
→ allows vessels & nerves to enter
- the dentin of the root is covered with **cementum** (another bone-like substance) which attaches the root to the **periodontal ligament**

**III. PERMANENT VERSUS DECIDUOUS DENTITION Fig 24.8 in T11 or T12; OR Fig 24-9 in M8;
- plus manual Table 1**

IV. SALIVARY GLANDS Fig 24.6 in T11 or T12; OR Fig 24-7 in M8

- saliva contains 2 active enzymes: 1) a bacteriolytic enzyme (lysozyme)
2) an enzyme (amylase) that starts the digestion of starch

QUESTIONS TO TRY:

Tortora 11th or 12th ed. Chapter 24:- Self-Quiz 4, 13(a,b,d,f-k,m,n) & 15(b,g) in
- Fig Questions 24.5, 24.7, 24.8, 24.10, & 21.28

Tortora 10th ed. Chapter 24: - Self-Quiz 4, 7, 13(a,b,d,f,g,h,j) & 15(b,e,g)
 - Fig Questions 24.4 24.6 24.7 24.8 24.10 & 21.29

Martini & Nath Chapter 24 (8th ed.): - Checkpoint Questions 1, 7, 12, 14, 16, 17, 21, 22 & 26
- Review Questions 5, 10, 11, 17, 18, 22 & 31