FREE NOTES · NCERT + NEET LEVEL

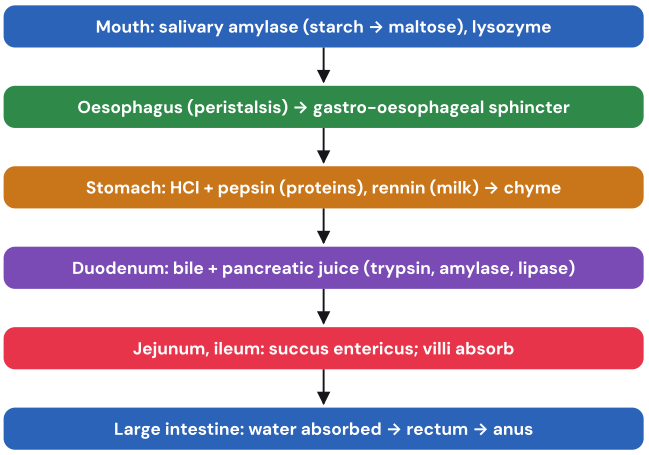
Digestion & Absorption

Extra reading (old NCERT chapter): human digestive system, dentition, digestive glands, digestion in each part with enzymes, absorption of digested food, and disorders.

01 Digestive system
02 Digestive glands
03 Digestion of food
04 Absorption
05 Disorders and vitamins
06 Important Q&A
07 Common mistakes
08 Practice (NEET style)
09 Quick revision

01 Digestive system

- Alimentary canal: mouth → buccal cavity → pharynx → oesophagus → stomach → small intestine (duodenum, jejunum, ileum) → large intestine (caecum with vermiform appendix, colon, rectum) → anus.
- Teeth: **thecodont** (in sockets), **diphyodont** (two sets), **heterodont** (4 types). Adult 32 teeth; dental formula **2123/2123** (incisor, canine, premolar, molar in half upper / half lower jaw). Enamel = hardest substance in body.
- Tongue: papillae with taste buds; frenulum attaches it to floor. Epiglottis prevents food entering windpipe.
- Stomach: cardiac, fundic, pyloric parts. Gut wall layers: serosa, muscularis, submucosa, mucosa (rugae in stomach, villi in intestine).



Digestion along the alimentary canal

02 Digestive glands

- Salivary glands: **parotid** (largest, cheek), **sub-maxillary/sub-mandibular** (lower jaw), **sub-lingual** (below tongue). ~1.5 L saliva/day.
- Gastric glands: **mucus neck cells** (mucus), **chief/peptic cells** (pepsinogen, prorennin), **parietal/oxyntic cells** (HCl, Castle's intrinsic factor for vitamin B_{12}).
- **Liver**: largest gland (~1.2–1.5 kg); hepatic lobules with Glisson's capsule; bile stored in gall bladder; bile duct + pancreatic duct → hepato-pancreatic duct guarded by **sphincter of Oddi**. Bile has no enzymes; bile salts emulsify fats.
- **Pancreas**: exocrine (pancreatic juice) + endocrine (islets: insulin, glucagon).

03 Digestion of food

Food	Enzyme	Where	Product
Starch	Salivary amylase (ptyalin)	Mouth (~30%)	Maltose
Proteins	Pepsin (HCl activates pepsinogen)	Stomach	Proteoses, peptones
Milk protein (infants)	Rennin	Stomach	Curdled milk
Proteins	Trypsin (enterokinase activates trypsinogen), chymotrypsin, carboxypeptidase	Duodenum	Peptides, dipeptides
Starch	Pancreatic amylase	Duodenum	Disaccharides
Fats	Lipase (after bile emulsifies)	Duodenum	Diglycerides, monoglycerides
Nucleic acids	Nucleases	Duodenum	Nucleotides
Disaccharides, dipeptides	Maltase, lactase, sucrase, dipeptidases (succus entericus)	Small intestine	Monosaccharides, amino acids

Hormones: gastrin, secretin, CCK, GIP. Bacteria in large intestine; no significant digestion there. Food in stomach stays 4–5 h.

04 Absorption

- Simple diffusion: some glucose, amino acids, Cl^-. Facilitated (carrier): fructose, some amino acids. Active transport: glucose, amino acids, Na^+. Passive: water (osmosis).
- Fatty acids and glycerol (insoluble) ⇒ form **micelles** ⇒ re-formed into **chylomicrons** (protein-coated fat globules) in intestinal cells ⇒ enter **lacteals** (lymph) ⇒ blood.
- Maximum absorption in small intestine (villi, microvilli = brush border). Water, some minerals and drugs in large intestine; alcohol and some drugs in stomach.
- **Assimilation**: absorbed substances used by tissues. **Egestion**: faeces removed through anus (voluntary).

05 Disorders and vitamins

- **Jaundice**: liver affected, bile pigments deposited ⇒ yellow skin and eyes. **Vomiting**: reflex controlled by medulla. **Diarrhoea**: frequent watery stool, less absorption. **Constipation**: faeces retained. **Indigestion**: from inadequate enzymes, anxiety, food poisoning, overeating, spicy food.
- Protein-energy malnutrition: **marasmus** (protein and calorie deficiency, infants <1 year) and **kwashiorkor** (protein deficiency, 1–5 years; swelling).
- Vitamin deficiency: A (night blindness), B_1 (beri-beri), B_2 (ariboflavinosis), B_3 (pellagra), B_6 (anaemia, dermatitis), B_9 and B_{12} (megaloblastic anaemia), C (scurvy), D (rickets, osteomalacia), E (reduced fertility), K (poor clotting).

06 Important Q&A

Q1. What is the dental formula of adult humans? How many teeth?

2123/2123 per half jaw ⇒ (2+1+2+3) × 4 = 32.

Q2. Why does bile help fat digestion though it has no enzyme?

Bile salts emulsify fats into small droplets, increasing surface area for lipase; bile also activates lipase.

Q3. Which cells secrete HCl and intrinsic factor?

Parietal (oxyntic) cells of gastric glands.

07 Common mistakes

- Saying bile contains digestive enzymes.
- Calling pancreas the largest gland (liver is).
- Mixing marasmus and kwashiorkor.
- Thinking fats enter blood capillaries directly (they go via lacteals).

08 Practice (NEET style)

1. Largest salivary gland?
2. Enzyme activating trypsinogen?
3. Fat globules in intestinal cells?
4. Sphincter of hepato-pancreatic duct?
5. Hardest substance in body?

ANSWERS

1) Parotid · 2) Enterokinase · 3) Chylomicrons · 4) Sphincter of Oddi · 5) Enamel

09 Quick revision: 5 minutes before the exam

MOUTH

- 2123/2123, 32 teeth
- Amylase ~30% starch

STOMACH

- Parietal: HCl
- Chief: pepsinogen, prorennin

INTESTINE

- Enterokinase → trypsin
- Bile emulsifies
- Villi absorb

DISORDERS

- Jaundice, diarrhoea
- Marasmus vs kwashiorkor
- Vitamin table

Have a doubt? Ask the AI Doubt Solver at padhaiadda.netlify.app, or take the mock test on this chapter.