

Nutrition in humans

Digestion

Physical

- break food into smaller pt mechanically
- 1. Saliv. rather for more efficient digestion

Chemical

- (catalyse breakdown of big mol. to small sol. mol. + hydrolytic reactions)

Mouth

Teeth: Chew food food

Tongue: Taste buds

Roll into bolus

Salivary glands: Mucin to soften food
(salivary amylase) starch → maltose

Pharynx

- Connects mouth to oesophagus

bolus swallowed
pharynx is raised, gullet is blocked by epiglottis.

Oesophagus

- connects pharynx to stomach
- Gravity + peristalsis = move food
- secretes mucus to lubricate food

Stomach

- Sphincters: keep food in stomach until liquefied (chyme)

- stomach wall → gastric glands

- Secrete gastric juice

↳ HCl

• Denature S-amylase

• kills harmful microorganisms

• Activate pepsinogen → pepsin, prorennin → rennin

• provide v acidic env. for Δ 2

protein → polypeptide

soluble caseinogen
↳ insoluble → polypeptides

- Pyloric sphincter contracts to close S.I. entrance, relaxes to open entrance, let small amt of food enter duodenum

Rhythmic contractions of a.e. 5 muscular walls



Small Intestine

- Chyme stimulates

↳ intestinal glands to secrete intestinal juice

↳ Pancreas to secrete pancreatic juice

↳ gall bladder to secrete bile

- Δ 3 neutralise acidic chyme

- provide/alkaline env. for action of Δ 2 juice.

maltase, lactase, sucrase

intestinal lipase

enterokinase, trypsin

pancreatic amylase

pancreatic lipase

trypsinogen

trypsinogen → p. juice → trypsin

protein → Δ 2 polypeptide

2 acids ← trypsin

Bile: Reduce off. forces thru fat mol, cause fats to break into tiny droplets suspended in water (emulsion)

↑ Δ H = Vol ratio

Small Intestine (adaptations)

- 1) Long coiled tube
 - Sufficient time for complete digestion & absorption of food
- 2) Inner walls have numerous folds & lined w/ villi & microvilli on epithelial cells of villi projecting into intestinal cavity
 - ↑ SA:Vol ratio for absorption

- 3) Wall of each villus is 1-cell thick
 - Facilitates diffusion of digested food into cells of villus
- Blood capillaries Lacteals
- Simple sugars & a.a.
 - Fatty acids & glycerol

- 1- continual transport of digested food maintains conc. gradient for absorption
- 2- Simple sugars & a.a. diffuse into blood capillaries of villi & transported to other parts
- 3- Active transport helps absorb food when blood sugar lvs are same or higher
- 4- Glycerol & fatty acids diffuse into epithelium forming minute fat globules which enter lacteals

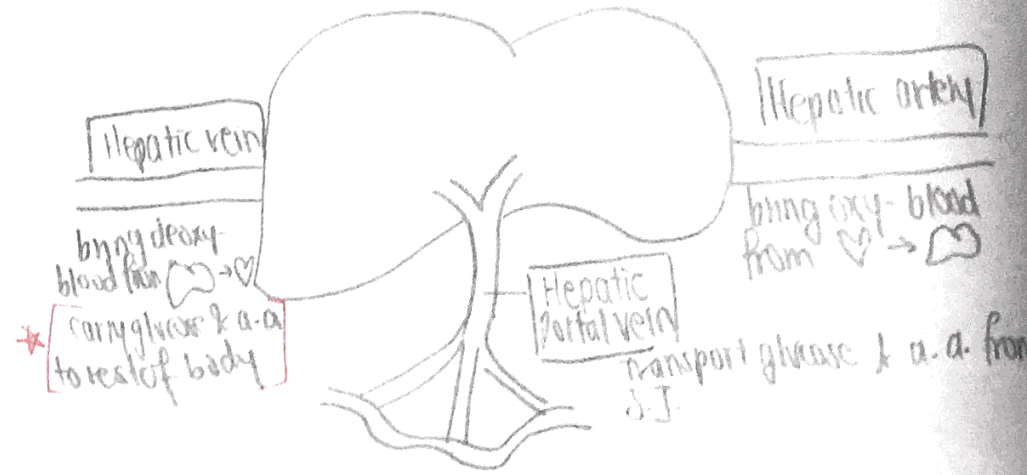
Absorption

- Large Intestine (colon & rectum)
- No digestion
 - Water & min salts absorbed from undigested food

Rectum & Anus

Stores undigested & unabsorbed matter temp.
Discharged as faeces (egestion)

Assimilation (Transportation & utilization of food in metabolic processes)



Glucose

- source of energy for cells
- Release energy through aerobic resp. in mito

↓ H.P. vein
Liver
Excess glu. stored as glycogen in muscles (pancreas produces insulin to stimulate conversion)
Remaining glu transported to rest of body

A.A.

↓ Liver
Excess A.A. not stored, deamination

converted into new protoplasm used for growth & repair of worn out body parts
- Produce enzymes & hormones

FA & Glycerol

Lymphatic vessel

Blood circulation

Source of energy when bld sugar lvl low

Excess fats stored in adipose tissue beneath skin, around heart & kidneys

Liver

Carbohydrate metabolism

- Regulate blood glu conc.

① If higher, pancreas is stimulated to release insulin, transported by blood
Stimulate excess glu. to be converted ... stored

② If lower, ... glucagon
Stimulates glycogen to be converted to glucose
- Glu. transported to cells to be used as substrate, lubricants
- Excess → Fats/Glycerol

Fat digestion

Produce bile to emulsify fats

A.A. metabolism & form urea

- A. grp of A.A removed,
↓
Toxic Ammonia (NH₃)
↓
Non-toxic urea

Deamination

- Remains (carbon residue)
converted to glucose

↓
Glycogen

- synthesize proteins in blood plasma

Breakdown of haemo. in RBC

Bone marrow produce RBC

broken down in spleen
Haemoglobin (protein in RBC)
↓
Bile pigments (secreted into SI as bile)
Iron (stored in liver)

Breakdown of alcohol (detoxification)

Alcohol
↓
Alcohol dehydrogenase

Acetaldehyde

↓
F. Acids

↓
Gp. used in respiration

Excessive consumption

- Alcohol stimulates acid secretion
↓
gastric ulcers

Cirrhosis → haemorrhage/bleeding
Death ← liver failure

- Depressant, slow down brain function
- Reduced self-control
- Poor judgment/muscular coordination