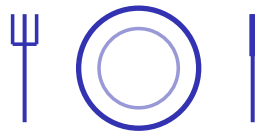


Human Nutrition

IGCSE Biology ■ Topic 7

IGCSE Biology



Human Nutrition

What we will cover

- 1 A balanced diet
- 2 The digestive system
- 3 Teeth & physical digestion
- 4 Enzymes & chemical digestion
- 5 Stomach acid & bile
- 6 Absorption & villi



bite, tear, grind

teeth and physical digestion

1 Diet

A balanced diet



- too little vitamin C → **scurvy** 坏血病 (bleeding gums, slow healing).
- too little vitamin D → **rickets** 佝偻病 (soft, bent bones), because the body cannot take in enough calcium.

Vitamins and deficiency

vitamin C

fruit & veg; short-age → **scurvy** 坏血病

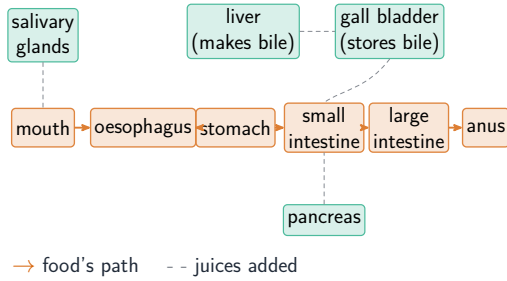
vitamin D

helps absorb calcium; short-age → **rickets** 佝偻病

2

Digestion

The digestive system



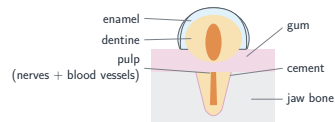
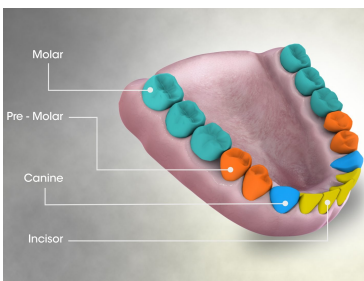
Food travels the **alimentary canal** 消化道: mouth → **oesophagus** 食道 → **stomach** 胃 → **small intestine** 小肠 → **large intestine** 大肠. The **liver** 肝脏, **pancreas** 胰腺 & glands add juices.

Five processes



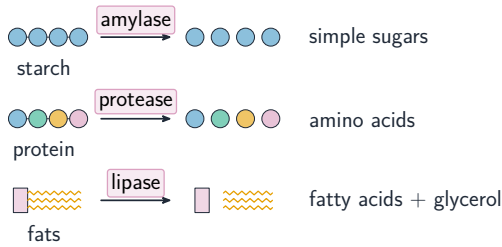
Take in → break down → into blood → used by cells → waste out. **Egestion** (faeces) is **not** excretion.

Teeth and physical digestion



Incisors 门齿 cut, **canines** 犬齿 tear, **premolars** 前臼齿 & **molars** 臼齿 grind. A tooth: hard **enamel** 牙釉质 over **dentine** 牙本质, a soft **pulp** 牙髓. Chewing makes more surface for enzymes.

Enzymes and chemical digestion



Enzymes break big **insoluble** 不溶性 molecules into small **soluble** 可溶性 ones:

- **amylase** 淀粉酶: starch → sugars
- **protease** 蛋白酶: protein → amino acids
- **lipase** 脂肪酶: fat → fatty acids + glycerol

Stomach acid and bile

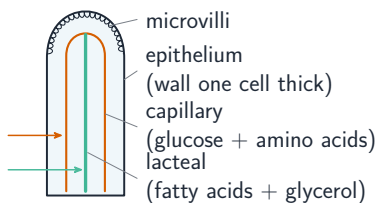
stomach acid

hydrochloric acid 盐酸
kills microbes & sets a low pH for **pepsin** 胃蛋白酶

bile 胆汁

emulsifies 乳化 fat (more surface) & neutralises the acid

Absorption and villi



a villus (huge surface area for absorption)

Millions of **villi** 绒毛 line the small intestine.

- huge **surface area**; wall one cell thick
- **capillaries** 毛细血管 take glucose & amino acids
- a **lacteal** 乳糜管 takes fats

3

Recap

Worked example – matching enzyme to food

A person's pancreas makes no lipase.
Which food is affected, and what is seen?

- Lipase digests **fats**: fat → **fatty acids + glycerol**.
- No lipase ⇒ fat is not broken into small enough molecules to **absorb**.
- Undigested fat stays in the gut and passes out in the faeces.
- Starch and protein are unaffected – **amylase and protease still work**.

Three to know: **amylase**
starch → maltose; **pro-**
tease protein → amino
acids; **lipase** fat → fatty
acids + glycerol.

Topic 7 – key takeaways

1 Diet

vitamin C → scurvy; vitamin D
→ rickets

2 Processes

ingest, digest, absorb, assimilate,
egest

3 Enzymes

amylase, protease & lipase make
it soluble

4 Villi

big surface, thin wall – fast
absorption

Check yourself

- 

Answers 1. too little vitamin C 2. egestion 3. fatty acids & glycerol 4. a short distance for fast absorption