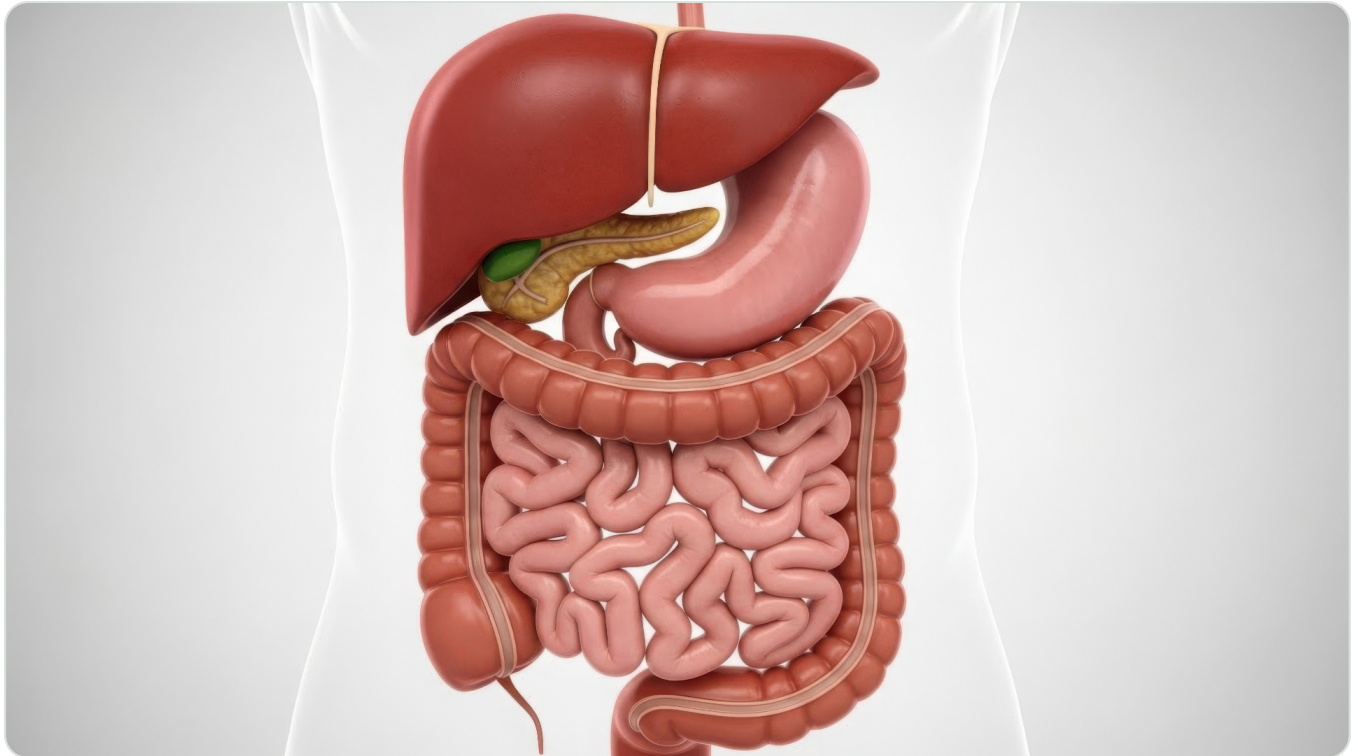




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Digestion: how the gastrointestinal tract works - from mouth to anus





Digestion is the process by which the body breaks down food and drink into smaller molecules that can be absorbed into the blood and used for energy, building blocks or signalling. The **gastrointestinal tract** is around **8-9 metres long** from mouth to anus and contains more than **100 trillion bacteria** - our gut microbiome. A typical Western diet transits the tract in **24-72 hours** [1].

The five main sections

Section	Length	Main function
Mouth and oesophagus	~25 cm	Chewing, salivary amylase, transport
Stomach	~25 cm (holds 1-4 L)	Acid, pepsin, mechanical breakdown, storage
Small intestine (duodenum, jejunum, ileum)	6-7 m	Main site of digestion and absorption
Large intestine (colon)	1.5 m	Water resorption, electrolytes, bacterial fermentation

Section	Length	Main function
Rectum and anal canal	15-20 cm	Storage and evacuation of stool

The four phases of digestion

1. Oral cavity - digestion begins:

- Chewing doubles surface area for digestive enzymes.
- **Salivary amylase** starts starch breakdown.
- **Lingual lipase** initiates fat digestion in infants.
- Saliva also contains **lysozyme** (antibacterial) and **IgA**.

2. Stomach - acid environment and storage:

- Produces **1.5-3 L of gastric acid daily** (pH 1.5-3).
- **Pepsin** breaks down proteins.
- **Intrinsic factor** is required for B12 absorption in the ileum.
- Gastric emptying takes **2-4 hours**, depending on meal composition (fat delays it).

3. Small intestine - the main stage:

- **Duodenum** receives bile from the gallbladder and enzymes from the pancreas.
- **Jejunum and ileum** absorb 95 % of all nutrients via villi and microvilli (total surface area ~250 m² - tennis-court size).
- **Bile acids** emulsify fat; **lipase, amylase, proteases** complete breakdown.
- B12 and bile salts are resorbed in the **terminal ileum**.

4. Large intestine - water and bacteria:

- Absorbs **1-1.5 L water daily**.
- The **microbiome** ferments undigested fibre into **short-chain fatty acids** (butyrate, propionate, acetate) - energy for colonocytes.
- Produces **vitamin K and biotin**.

- Stool concentrates from liquid (caecum) to formed (sigmoid).

Key accessory organs

Organ	Contribution
Liver	Produces bile, detoxifies blood from gut (portal vein)
Gallbladder	Stores and concentrates bile
Pancreas	Produces digestive enzymes + bicarbonate + insulin/glucagon

The gut-brain axis

The gut contains around **500 million nerve cells** - the "enteric nervous system" or "second brain". It produces **95 % of the body's serotonin**. The gut-brain axis explains why stress can trigger IBS, bloating or diarrhoea, and why microbiome imbalance is linked to depression and anxiety [2].

What can go wrong?

Level	Examples
Oesophagus	<u>GERD</u> , <u>eosinophilic oesophagitis</u> , <u>dysphagia</u>
Stomach	<u>Peptic ulcer</u> , <u>H. pylori</u> , gastric cancer
Small intestine	<u>Coeliac</u> , <u>SIBO</u> , <u>Crohn's</u> , <u>bile acid malabsorption</u>
Large intestine	<u>IBD</u> , <u>IBS</u> , <u>polyps</u> , <u>colorectal cancer</u> , <u>diverticula</u>
Rectum/anus	<u>Hemorrhoids</u> , <u>anal fissure</u> , <u>anal fistula</u>

How to keep digestion healthy?

- **Fibre intake** 25-35 g/day (whole grains, vegetables, legumes)

- 2-2.5 L of fluid daily
 - Regular physical activity - increases motility
 - Limit red and processed meat (WHO recommendation)
 - Probiotics after antibiotics or for [IBS](#)
 - Stress management - meditation, sleep, routine
 - Avoid smoking and excess alcohol
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Investigation at Kirurgen.dk

We investigate the entire GI tract with [oral](#) and [nasal gastroscopy](#), [colonoscopy](#) and [sigmoidoscopy](#). See also: [Peptic ulcer](#), [Bloating](#), [IBD overview](#), [IBS](#).

References

1. Asnicar F, Leeming ER, Dimidi E, et al. *Blue poo: impact of gut transit time on the gut microbiome using a novel marker*. Gut 2021;70:1665-74.
2. Mayer EA, Tillisch K, Gupta A. *Gut/brain axis and the microbiota*. J Clin Invest 2015;125(3):926-38.