



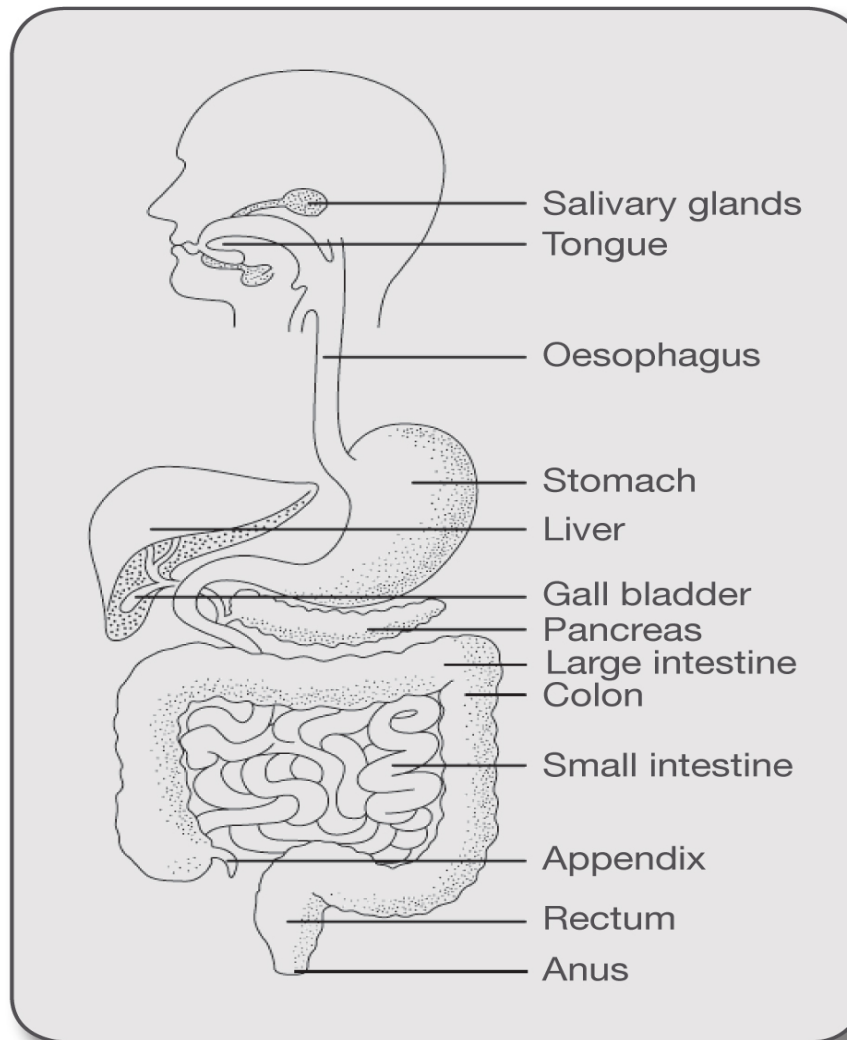
YMCA Awards

Level 3 Nutrition to support
physical activity

2018

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The digestive system



Digestive systems mechanisms

- Mechanical (physical):
 - Chewing
 - Peristalsis
- Chemical:
 - Saliva
 - Hydrochloric acid
 - Digestive enzymes

Mouth

Mechanical:

- Chewing (mastication) - food is torn/ground by teeth
- Tongue rolls food into small balls that are easy to swallow

Chemical:

- Moistened with saliva
- Salivary amylase, which starts a chemical breakdown of starchy carbohydrate into simpler sugars
- No chemical breakdown of fat or protein in the mouth
- The tongue also allows you to experience taste

Oesophagus

Mechanical:

- Peristalsis - a rhythmical waves of muscle contractions which help push food along the alimentary canal

Chemical:

- There is no chemical breakdown in the oesophagus

Stomach

Mechanical:

- Peristalsis continues. This churns and mixes food in stomach

Chemical:

- Hydrochloric acid breaks down food into a liquid 'chyme'
- Digestive enzymes start to break down nutrients (e.g. pepsin breaks down proteins)
- Small molecules such as water, alcohol and some medicines (e.g. aspirin) can be absorbed into blood

Small intestine (Duodenum, Jejunum, Ileum)

Mechanical:

- Peristalsis continues, moving food along small intestine

Chemical:

- More digestive enzymes break down nutrients (e.g. bile emulsifies fats)
- Complex structure of nutrients is broken down into usable components
- Main nutrients (fats, carbohydrates, proteins, vitamins, minerals, water) are absorbed into blood
- Remainder (waste) enters large intestine

Large intestine (Colon)

Mechanical:

- Peristalsis continues, moving food along large intestine
- Waste (faeces) is passed from colon to rectum and then expelled from the body

Chemical:

- Partial breakdown of soluble fibre (cellulose)
- Re-absorption of remaining water from undigested food

Digestion and absorption of carbohydrates

- Carbohydrate is stored in the liver and muscles as glycogen along with three times its weight in water
- Glycogen stored in each muscle cell is for the exclusive use of that muscle cell and cannot be transferred
- Liver glycogen stores are primarily reserved to maintain blood glucose levels
- Three times more glycogen stored in the muscles than in liver
- A limited amount of glycogen can be stored by the body and regular training rapidly depletes reserves. Ample carbohydrates are needed each day to top up the levels

Digestion and absorption of proteins

- Protein is digested and broken down (catabolism) to amino acids
- Used to build and repair body tissue (anabolism)
- Excess is transported to liver

Digestion and absorption of fats

- Fat from the diet is broken down through digestion (catabolism) to fatty acids and glycerol
- Lipase breaks down fats to be absorbed in the intestines. Lipase is produced in the pancreas, mouth, and stomach
- Once digested, fat can be:
 - Oxidised and used as energy
 - Stored as subcutaneous fat
 - Used in the cell membranes of structural molecules
 - Used to synthesis other substances such as hormones

Digestion and absorption of fats

- Fats and cholesterol need to be solubilised in order to be transported to where they are needed in the body
- This is achieved by packaging them with protein into 'transport packages' – plasma lipoproteins PLPs
- Plasma Lipoprotein (PLP) are classified in terms of their density e.g. Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL)

