

key terms

metabolism	- the sum total of all chemical reactions in the body
metabolic waste	- substances produced by metabolism found in excess or are toxic
excretion	- removal of metabolic waste from the body
egestion	- removal of undigested food from the body by the process of defecation

excretion on mammals

The main metabolic waste products are...

- CO₂ - made by cellular respiration and is excreted by the lungs
- urea - made by deamination in the liver and excreted in the urine
- bile pigments - made by the breakdown of erythrocytes in the liver and excreted in small amounts in the urine.

Why must metabolic waste be removed?

- metabolic products are highly toxic if they build up.
- CO₂ can take the place of oxygen and competes for haemoglobin - this increases blood acidity
- Urea is highly toxic and is very soluble so must be converted to ammonia.

The Liver Blood Vessels

The Liver Blood Vessels (cont)

bile duct

- connects to the bile duct
- bile flows out of the liver

Hepatocytes

the liver is made up of lobules which are hexagonally shaped areas of tissues that contain a branch of the hepatic vein.

lobules are made up of hepatocytes - hepatocytes are liver cells

Vessels of the lobule...

- branch of the hepatic artery - takes oxygenated high pressure blood to the liver from the heart

- branch of the hepatic portal vein - takes blood rich in digestive products such as glucose to the liver from the intestine

- hepatic artery - takes deoxygenated low pressure blood that has been cleaned back to the heart to pick up oxygen

- bile duct - takes bile from the bile canaliculus to the gall bladder to be stored before it is released into the intestine to emulsify fats

All the blood entering into the liver from the hepatic artery and the hepatic portal vein enters into a sinusoid so that there is a mixture of oxygenated and nutrient rich blood

Labelling vessels

- hepatic artery
- narrower to maintain high blood pressure
- blood flows into the liver

- hepatic portal vein
- wider to reduce friction
- blood flows into the liver
- hepatic portal vein is branched

- hepatic vein
- blood flows out of the liver

- bile duct - extends further out of the lobule
- connects to a bile canaliculi rather than a sinusoid

blood enters into the liver by the hepatic artery

- the blood is under high pressure and is oxygenated as it is coming from the heart

blood also enters into the liver by the hepatic portal vein

blood is carrying products of digestion such as glucose as it comes from the small intestine. the blood is not oxygenated and is at a lower pressure as it doesn't come from the heart

blood leaves the liver by the hepatic vein
the blood is cleaned and ready to be returned to the heart to pick up oxygen.

the bile duct also leaves the liver
the bile duct carries bile from the bile cannivulus to the gall bladder where it is stored before being secreted into the small intestine to emulsify fats.

How to identify vessels in the liver

hepatic artery

- blood flows into the liver
- blood vessel is narrower to maintain a higher pressure

hepatic portal vein

- blood flows into the liver
- blood vessel is wider to reduce friction
- blood vessel is branched

hepatic vein

- blood flows out from the liver
- blood vessel is thinner to maintain a higher pressure



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