

Q23 Outline the principle functions of the liver and give examples (Sept 2009, Q4 Sept 2013)

FUNCTIONS OF THE LIVER:

1. METABOLIC

a. Carbohydrate metabolism

- Glycolat function – maintains a strict BGL range
- In times of high BGL → carries out glycolysis, glycogenolysis and fatty acid synthesis
- In times of low BGL → Contains 100g of glycogen for degradation to glucose in times of starvation.
- Converts lactate (formed from peripheral degradation of glycogen stores to lactate and pyruvate) into glucose via Cori cycle

b. Lipid metabolism

- Synthesis of fatty acids from excess acetyl CoA, which is packaged into lipoproteins for storage in adipocytes. In times of need the FFAs are released from their adipocyte storage and degraded in the liver to Acetyl CoA, used in the krebs cycle or converted into ketone bodies
- Synthesis of cholesterol from dietary cholesterol and excess FFAs

c. Protein metabolism

- Degradation of amino acids to glucose or Acetyl CoA
- Urea cycle converts ammonium to urea for urinary excretion

2. ENDOCRINE →

- Synthesis of 25 hydroxycholecalciferol from cholecalciferol in skin, to be converted to calcitriol in kidney
- Secretion of angiotensinogen
- Metabolism of steroid hormones
- Synthesis of EPO in the fetus

3. SYNTHETIC FUNCTION →

- Synthesis of plasma proteins (albumin acute phase proteins, coagulation factors, globulins, binding proteins such as haptoglobin)
- ynthesis of bile salts
- Synthesis of glucose, AAs and lipids as above

4. IMMUNOPROTECTIVE →

- Reticuloendothelial component filters bacteria from portal blood
- Phagocytosis by Kuepffer cells
- Conjugation and excretion of bilirubin
- Inactivation of toxins and drugs via phase I (redox reaction and hydrolysis) and phase II (conjugation) reactions

5. ACID-BASE BALANCE →

- Metabolism of organic acid anions (lactate, ketones)
- Metabolism of ammonium
- Production of albumin (weak acid)

6. STORAGE ROLE →

- Stores fat soluble vitamins (Vit A 1-2 year supply, Vit D 1-4 months, Vit E, K and B12 1-3 year supply)
- Iron and copper
- Glycogen
- Important blood reservoir (500ml of blood volume usually in liver)