



## Unit II – Problem 3 – Biochemistry: Ketogenesis

- Site of ketogenesis: liver.
- There are three types of ketone bodies:
  - Acetoacetate.
  - $\beta$ -hydroxy butyrate.
  - Acetone (which is considered as a non-metabolized side product).  
These are important sources of energy.
- Ketone bodies are water soluble and are used to provide energy in:
  - Cardiac and skeletal muscles.
  - Brain.
  - Kidneys.
- Synthesis of ketone bodies by liver cells is called ketogenesis:
  - **Acetoacetyl CoA  $\rightarrow$  via HMG CoA synthase (and the use of acetyl CoA)  $\rightarrow$  HMG CoA  $\rightarrow$  via HMG CoA lyase (and release of acetyl CoA)  $\rightarrow$  acetoacetate.**
  - **Acetoacetate can be converted to:**
    - ✓ Acetone though removing  $\text{CO}_2$ .
    - ✓  $\beta$ -hydroxybutyrate through adding  $\text{H}^+$
- Use of ketone bodies by the peripheral tissues is known as ketolysis:
  - **$\beta$ -hydroxybutyrate  $\rightarrow$  via dehydrogenase  $\rightarrow$  acetoacetate  $\rightarrow$  via thiophorase (and use of CoA)  $\rightarrow$  acetoacetyl CoA.**
  - **Notice that the enzyme (thiophorase) is not present in the liver!**