

Topic: oxidation of fats
Class: B.Sc Part –III (Hons.)
Paper- V
Group – A

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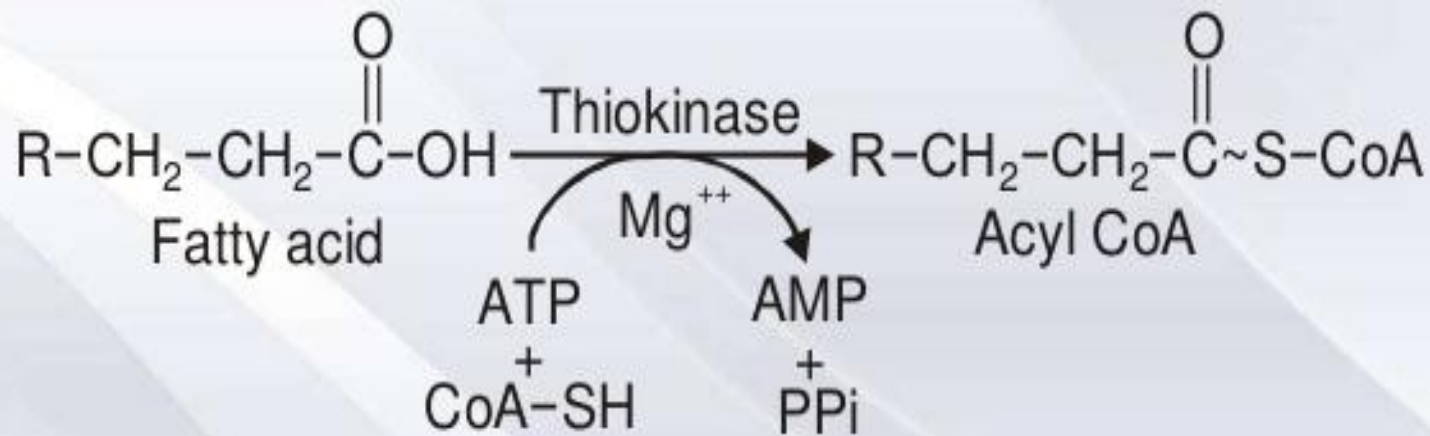
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Oxidation of Fatty Acids

- Oxidation of fatty acids is an important source of energy
- Fatty acids are stored in tissues in the form of triglycerides
- Intestines, liver and adipose tissue release triglycerides in blood
- Triglycerides released by intestines and liver are in the form of lipoproteins
- VLDL and chylomicrons are the lipo- proteins that transport triglycerides in blood
- VLDL is released by the liver
- Chylomicrons are released by the intestine
- Triglycerides are hydrolysed to free fatty acids and glycerol by lipoprotein lipase
- The hydrolysis occurs in the capillaries of liver, adipose tissue and skeletal muscle
- The fatty acids are taken up by the cells

- Fatty acids released from adipose tissue are bound to albumin in blood
- They are transported to different tissues bound to albumin
- Upon interaction with cell surface, fatty acids dissociate from albumin
- Fatty acids are taken up by the cells with the help of some proteins
- These are membrane proteins having high affinity for fatty acids
- There are several such proteins
- The proteins involved in cellular fatty acid uptake include:
 - Fatty acid translocase (FAT)
 - Plasma membrane-associated fatty acid-binding protein (FABPpm)
 - Fatty acid transport proteins (FATPs)

- Mitochondria and peroxisomes are the sites for oxidation of fatty acids
- Short- and medium-chain fatty acids are oxidized solely in mitochondria
- Long-chain fatty acids are oxidized both in mitochondria and peroxisomes
- Very-long-chain fatty acids are oxidized in peroxisomes
- Fatty acids have to be activated before they are oxidized
- Activation occurs in cytosol and involves binding of fatty acid with CoA
- Two molar equivalents of ATP are consumed in the reaction ($\text{ATP} \rightarrow \text{AMP}$)
- The reaction is catalysed by thiokinase (acyl CoA synthetase)



Activation of fatty acid

- There are several pathways for oxidation of fatty acids
- The major pathway is beta-oxidation
- beta-oxidation occurs in mitochondrial matrix
- Acyl CoA derivatives of long- and medium- chain fatty acids have to enter mitochondria
- The inner mitochondrial membrane is not permeable to acyl CoA
- A special transport system is required to transport acyl CoA into mitochondria
- The key component of acyl CoA transport system is carnitine