Fatty Acid Biosynthesis

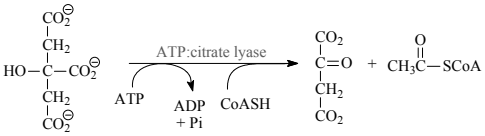
- Location: Cp of many tissues
- Importance: high capacity energy storage, structural element of cell membranes, steroid hormones and other signalling molecules
- Overview: 8 acetyl CoA → palmitic acid

Fatty Acid Synthase Complex (Mammalian)

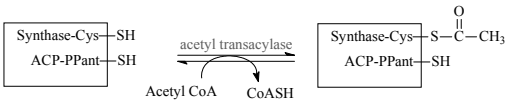
- 7 Enzyme activities in single polypeptide
- Active as a dimer

Acetyl CoA

- Produced in mito matrix
- Transport to Cp in form of citrate
- Tricarboxylate shuttle
- ATP citrate lyase

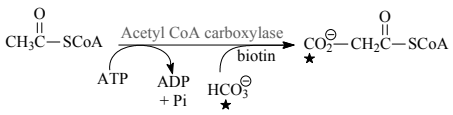


Charging Fatty Acid Synthase I

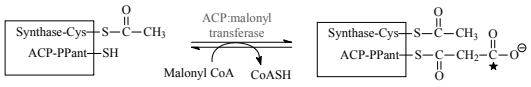


Malonyl CoA Production

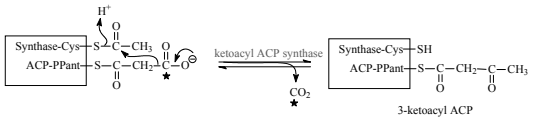
- RDS of FA synth
- (-) long chain FA, cAMP
- (+) citrate



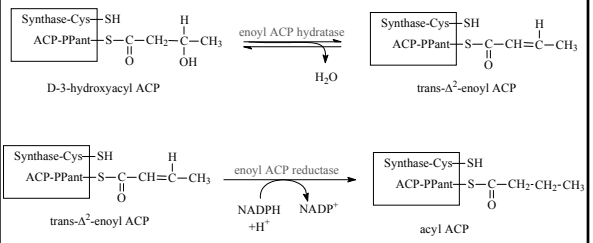
Charging Fatty Acid Synthase II



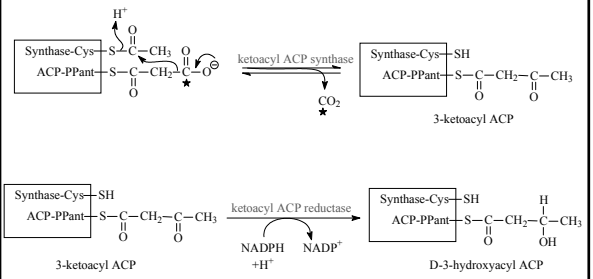
Synthesis *per se*



Synthesis *per se*

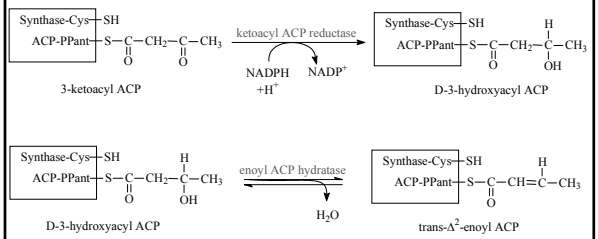


Synthesis *per se*

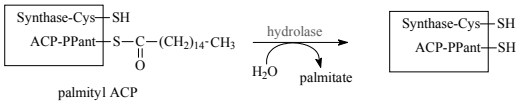


Transacylate and Cycle Again

Synthesis *per se*



After 7* Cycles



Fatty Acid Elongation

- Location: liver ER (major) "Elongase," with CoA instead of ACP
- Minor pathway is reversal of ß-oxidation
- Steps same as synthesis
  - 3-ketoacyl CoA synthase
  - reductase
  - hydratase
  - reductase
- Product: acyl CoA or enoyl CoA

Mammalian Fatty Acid Desaturation

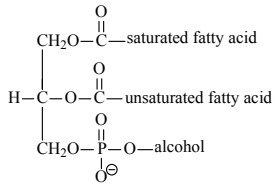
- Liver ER
- 1st double bond introduced at Δ^9 position
- Mechanism
- Additional double bonds introduced between 1st double bond and carboxyterminus only

Mammalian Fatty Acid Desaturation

- Liver ER
- 1st double bond introduced at Δ^9 position

Plant Fatty Acid Desaturation

- Also have a Δ^{12} and/or Δ^{12} desaturase
- Act on bound fatty acids instead of free (e.g. PC)



Mammalian Fatty Acid Desaturation