

Stage 1 – Mevalonate Formation (Cytosol)



Enzyme: Thiolase

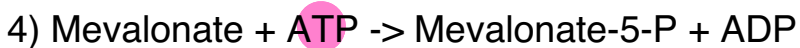


Enzyme: HMG-CoA synthase

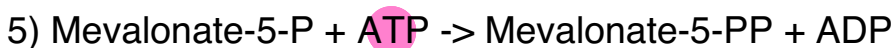


Enzyme: HMG-CoA reductase

Stage 2 – Isoprene Unit Formation (Peroxisome)



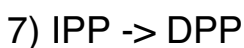
Enzyme: Mevalonate kinase



Enzyme: Phosphomevalonate kinase



Enzyme: Decarboxylase



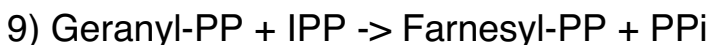
Enzyme: Isomerase

Mevalonate
kinases 2 ATP
5-Mevalonate PP

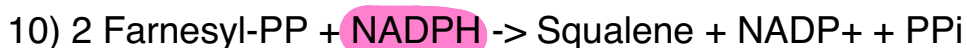
Stage 3 – Squalene Formation



Enzyme: Synthase

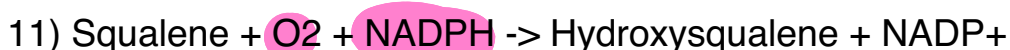


Enzyme: Synthase



Enzyme: Squalene synthase

Stage 4 – Cyclization (Smooth ER)



Enzyme: Squalene monooxygenase

12) Hydroxysqualene $\rightarrow$ Lanosterol

Enzyme: Lanosterol synthase

Stage 5 – Final Modification (Smooth ER)

13) Lanosterol + O_2 + NADPH $\rightarrow$ Cholesterol + $NADP^+$

Enzyme: Multiple enzymes

* For 1 cholesterol molecule it takes:

- 18 Acetyl CoA molecules (36 carbons)
 - 1 carbon (Mevalonate $\rightarrow$ IPP) * 6
 - 3 carbons (Squalene $\rightarrow$ Cholesterol)
- 18 ATP molecules
 - Mevalonate $\rightarrow$ 5-Mevalonate PP (2 ATP) * 6
 - 5-Mevalonate PP $\rightarrow$ IPP (1 ATP) * 6
- 15 NADPH molecules:
 - HMG $\rightarrow$ Mevalonate (2 NADPH) * 6
 - 2 FPP $\rightarrow$ Squalene (1 NADPH)
 - Squalene $\rightarrow$ Lanosterol (1 NADPH)
 - Lanosterol $\rightarrow$ cholesterol (1 NADPH)
- 2 O_2 molecules:
 - Squalene $\rightarrow$ Lanosterol
 - Lanosterol $\rightarrow$ cholesterol