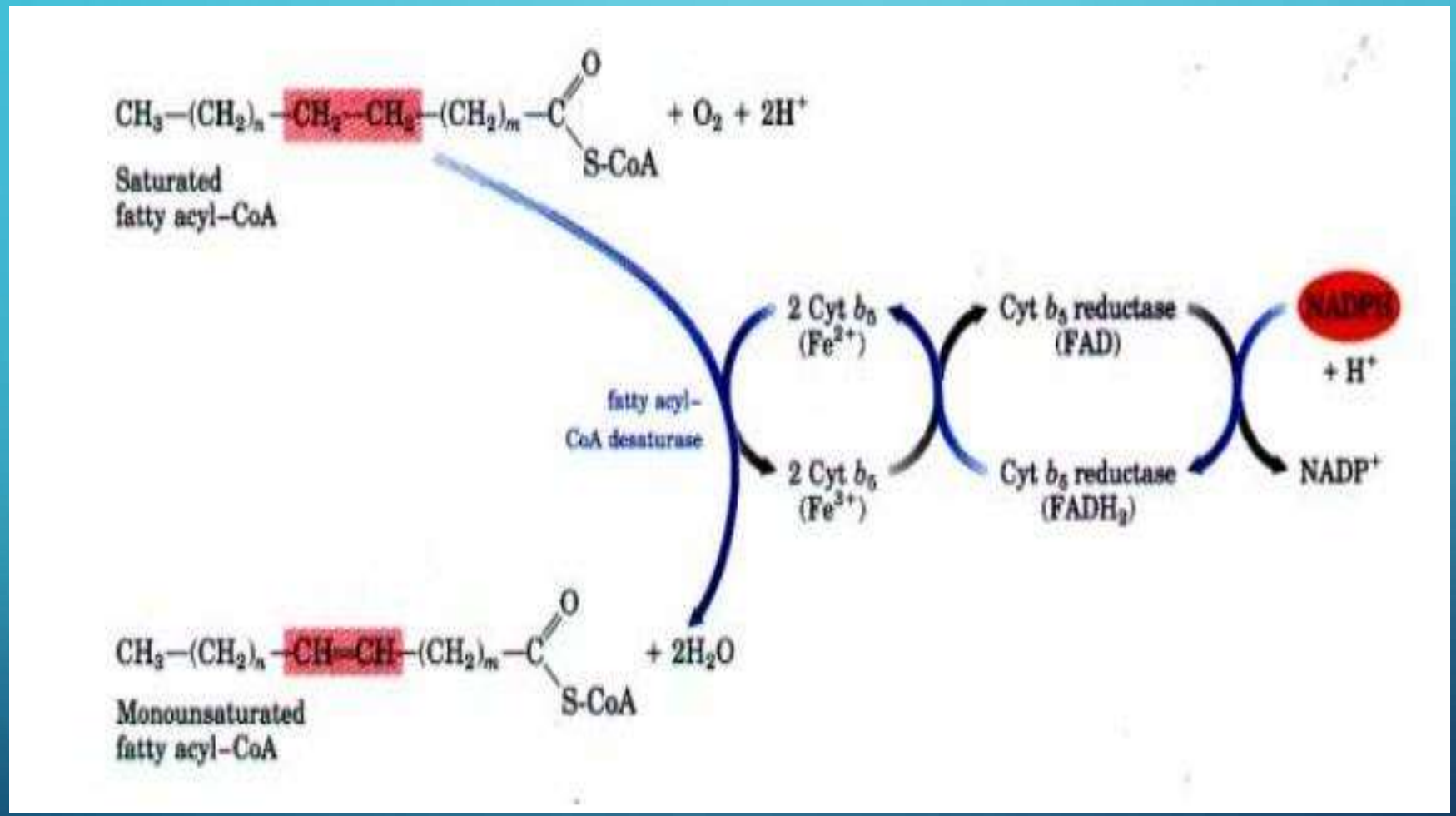
Department of Biotechnology

Biosynthesis of unsaturated fatty acids

By Mayuri S. Bhad

- Palmitate and stearate serve as precursors of the most common monounsaturateacids fatty acid of animal , palmitoleate and oleate .
- Sterate is 18C saturated compound.
- In this three components are responsible for the formation of unsaturated fatty acids i.e .NADPH+ H+ , cytochrome b5 reductase (FADH2) And cytochrome b5 complex (Fe dependent) .
- In this mechanism there is formation of 4H+ Where The 2H+ is given when NADPH+ oxidise to gives NADP + 2H+ and secondly When the Fe2+ is oxidised to form Fe3+ .
- Where cyto. B5 Fe dependent complex under reduction to give Fe 2+ and gets oxidise to form Fe3+ when reacted with fatty acyl Co. A leading to the formation of unsaturated fatty acid .
- The 4H+ is Transferred to the fatty acyle Co.A Saturated monosaccharide oxidise to give 2H2O and unsaturated fatty acid .

- The two different substrates– a fatty acyl–CoA and NADPH– undergo oxidation by molecular oxygen.
- These reactions occur on the lumenal face of the ER.
- In this procedure sterate fatty acid is used so it will first form usaturation in its C9 and C10 by giving an 18:1 Oelic acid . Where it gives linolenic acid at 18:2 ratio.
- The enzyme desaturase is Responsible for Formation of unsaturation at position 4,5,6 ,9 and so on. .
- The enzyme Fatty acyle desaturase is an example of a mixed-function oxidase because it oxidise two different substrates at Same time .
- The Double bond is Introduced into the fatty acid chain by an oxidative reaction catalyzed by fatty acyl- Co.A.


CH3—(CH2)n—CH2—CH2—(CH2)m—C(=O)—S-CoA + O2 + 2H+
Saturated fatty acyl-CoA
fatty acyl-CoA desaturase
2 Cyt b5 (Fe2+)
2 Cyt b5 (Fe3+)
Cyt b5 reductase (FAD)
Cyt b5 reductase (FADH2)
NADPH
+ H+
NADP+
CH3—(CH2)n—CH=CH—(CH2)m—C(=O)—S-CoA + 2H2O
Monounsaturated fatty acyl-CoA