BIOCHEMISTRY ASSIGNMENT

# ABU ANGEL ANONE

## 18/MHS02/006

### NURSING SCIENCE (200L)

**BETA OXIDATION OF FATTY ACIDS.**

Describe the three (3) stages of beta oxidation. (Show pathways where necessary)

BETA OXIDATION OF FATTY ACIDS

Three main reaction steps are sequentially repeated for a complete oxidation of fatty acids. After one round of the three metabolic steps, one acetyl CoA unit is split off and acyl CoA with two carbon atoms less is produced. This will undergo same series of reactions again until the fatty acid is completely oxidized.

* STEP 1

FAD Linked dehydrogenase.

The fatty acyl CoA is dehydrogenated to a transenoyl CoA with FAD (flavin- adeno- di- nucleotide) accepting the hydrogen atom FAD-H2 when oxidized in electron transport chain will produce I.5 ATP molecules.

 FAD FAD – H2

 1.5 ATP Molecules

 Acyl-CoA Dehydrogenase

 Fatty-acyl-CoA Alpha-beta-Unsaturated Fatty acyl-CoA

 (R-CH2-CH2-CH2-CO -ScoA) ( FAD – FADH+) (R-CH2-CH=CH-CO -ScoA)

 Electron transport chain ………... 1.5 ATP Molecules

* STEP 1b

This is catalyzed by enoyl CoA hydratase forming a beta-hydroxy fatty acyl-CoA.

Alpha-beta-unsaturated-fatty-acyl-CoA B-Hydroxy-fatty-Acyl-CoA

 (R-CH2-CH=CH-CO – ScoA) (R-CH2-CHOH-CH2-CO – ScoA)

 Enol CoA Hydratase + H2O

* STEP 2

NAD+ dependent dehydrogenase.

The beta-hydroxy fatty acyl-CoA is again oxidized to form beta-keto-fatty-acyl-CoA. The NAD-H when oxidized in electron transport chain will generate 2.5 ATP molecules.

 B-Hydroxy-fatty-acyl-CoA Dehydrogenase.

 B-hydroxy Fatty-Acyl-CoA Beta-Keto Fatty-acyl-CoA

 (R-CH2-CHOH-CH2-CO – ScoA) ( NAD+ - NADH+H+) ( R-CH2-CO-CH2-CO – ScoA)

 Electron Transport chain …………… 2.5 ATP Molecules.

* STEP 3

Cleavage

The beta-keto-fatty-acyl-CoA undergoes thiolytic cleavage, splitting off a molecule of acetyl-CoA and leaving behind a fatty acid with two carbon atoms short. The newly formed fatty-acyl-CoA will sequentially undergo further cycles of steps 1,2 and 3 of beta oxidation until the fatty acid id completely converted to acetyl-CoA.

 Thiolase

 Beta-keto-fatty-acyl-CoA Fatty-Acyl-CoA + Acetyl CoA

 ( R-CH2-CO-CH2-CO – ScoA ) (R-CH2-CO – ScoA) (CH3-CO – ScoA)

 Co ASH