18/MHS01/087

Asibor Osemhanhu Immanuella

Biochemistry

Beta oxidation takes place in four steps. Dehydration, hydration, oxidation and thyolisis. Each step is catalyzed by a distinct enzyme.

Dehydrogenation: Acyl-CoA is oxidized by the enzyme acyl- CoA dehydrogenase. A double bond is formed between the 2nd and 3rd carbons (C2 and C3) of the Acyl-CoA chain entering the beta oxidation cycle; the end product of this reaction is trans-Δ2-enoyl-CoA (trans delta 2-enoyl CoA). This step uses FAD and produces FADH2, which will enter the citric acid cycle and form ATP to be used as energy.

Hydration: in the second step, the double bond between C2 and C3 of trans-Δ2- enoyl-CoA is hydrated, forming the end product L-B-hydroacyl CoA, which has a hydroxyl group (OH) in place of the double bond. This reaction is caused by another enzyme: enoyl CoA hydratase. This step requires water.

Oxidation: In the third step, the hydroxyl group in C2 of L-B-hydroacyl CoA is oxidized by NAD + in the reaction that is catalyzed by 3-hydroxyacyl –CoA dehydrogenase. The end products are β-ketoacyl CoA and NADH + H. NaDH will enter the citric acid cycle and produce ATP that will be used as energy.

Thiolysis: In the first step, β-Ketoacyl CoA is cleaved by a thiol group(SH) of another CoA molecule(CoA- SH). The enzyme that catalyzes this reaction is β- ketothiolase. The cleavage takes place between C2 and C3; therefore, the end products are an acetyl- CoA molecule with the original two first carbon( C1 and C2), and an acyl-CoA chain two carbons shorter than the original acyl- CoA chain that entered the beta oxidation cycle.