JAMES, Emem Grace

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BCH 20

BETA OXIDATION STEPS

The steps are namely;

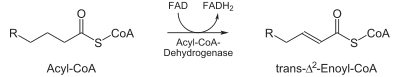
* Dehydrogenation
* Hydration
* Oxidation

and Thyolisis

Each step is catalyzed by a distinct enzyme. Briefly, each cycle of the cycle begins with an acyl-CoA, one FADH2, one NADH and water, and the acyl-CoA chain becomes 2 carbons shorter. The total energy yield per cycle is 17 ATP molecules.

* Dehydrogenation

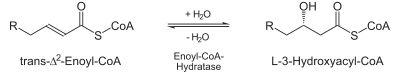
[Dehydrogenation](https://en.wikipedia.org/wiki/Dehydrogenation) by [FAD](https://en.wikipedia.org/wiki/Flavin_adenine_dinucleotide): The first step is the oxidation of the fatty acid by Acyl-CoA-Dehydrogenase. The enzyme is [acyl CoA dehydrogenase](https://en.wikipedia.org/wiki/Acyl_CoA_dehydrogenase). This enzyme catalyzes the formation of a [double bond](https://en.wikipedia.org/wiki/Double_bond) between the C-2 and C-3.

[](https://en.wikipedia.org/wiki/File:Beta-Oxidation1.svg)

The enzyme is [acyl CoA dehydrogenase](https://en.wikipedia.org/wiki/Acyl_CoA_dehydrogenase)

* Hydration

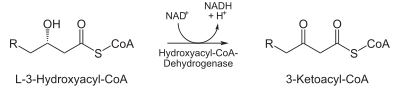
The next step is the [hydration](https://en.wikipedia.org/wiki/Hydration_reaction) of the bond between C-2 and C-3. The reaction is [stereospecific](https://en.wikipedia.org/wiki/Stereospecific), forming only the L [isomer](https://en.wikipedia.org/wiki/Isomer).

[](https://en.wikipedia.org/wiki/File:Beta-Oxidation2.svg)

The enzyme is [enoyl CoA hydratase](https://en.wikipedia.org/wiki/Enoyl_CoA_hydratase)

* Oxidation

[Oxidation](https://en.wikipedia.org/wiki/Oxidation) by [NAD+](https://en.wikipedia.org/wiki/NADH): The third step is the [oxidation](https://en.wikipedia.org/wiki/Oxidation) of L-β-hydroxyacyl CoA by NAD+. This converts the [hydroxyl](https://en.wikipedia.org/wiki/Hydroxyl) group into a [keto](https://en.wikipedia.org/wiki/Ketone) group.

[](https://en.wikipedia.org/wiki/File:Beta-Oxidation3.svg)

Enzyme active here is [3-hydroxyacyl-CoA dehydrogenase](https://en.wikipedia.org/wiki/3-hydroxyacyl-CoA_dehydrogenase) and the end product being β-ketoacyl CoA

* Thiolysis

The final step is the cleavage of β-ketoacyl CoA by the [thiol](https://en.wikipedia.org/wiki/Thiol) group of another molecule of [Coenzyme A](https://en.wikipedia.org/wiki/Coenzyme_A). The thiol is inserted between C-2 and C-3.

[](https://en.wikipedia.org/wiki/File:Beta-Oxidation4.svg)

The enzyme present is [β-ketothiolase](https://en.wikipedia.org/wiki/%CE%92-ketothiolase) and the end product, an [acetyl-CoA](https://en.wikipedia.org/wiki/Acetyl-CoA) molecule, and an [acyl-CoA](https://en.wikipedia.org/wiki/Acyl-CoA) molecule that is two carbons shorter.

This process continues until the entire chain is cleaved into acetyl CoA units. The final cycle produces two separate acetyl CoAs, instead of one acyl CoA and one acetyl CoA. For every cycle, the Acyl CoA unit is shortened by two carbon atoms. Concomitantly, one molecule of FADH2, NADH and acetyl CoA are formed.