



Pyruvate Dehydrogenase

The product of glycolysis, the pyruvate molecule is the source of carbon and electrons for aerobic respiration reactions inside your mitochondria. Pyruvate enters pores on the mitochondria membrane and is transported into the interior.

The reactions linking pyruvate with aerobic respiration are performed by a huge protein complex made with multiple copies of three types of enzyme.

[Enzyme 1: Pyruvate dehydrogenase]

The first enzyme catalyzes decarboxylation, transforming three-carbon pyruvate into a two-carbon acetyl group, generating carbon dioxide as waste.

[Enzyme 2: Dihydrolipoyl transacetylase]

The acetyl group is grabbed by the second enzyme using flexible arms to efficiently transfer the product between reaction sites. In the active site of the second enzyme, the acetyl group is attached to coenzyme A, generating acetyl-CoA: fuel for the citric acid cycle. Two electrons from pyruvate oxidation are retained by the second enzyme...

[Enzyme 3: Dihydrolipoyl dehydrogenase]

...before passing them to coenzyme NADH, catalyzed by the third enzyme. Coenzyme NADH travels through the matrix, delivering electrons for the electron transport chain.

In a sequence of reaction steps, the pyruvate dehydrogenase enzyme complex generates fuel for aerobic respiration reactions of the citric acid cycle and the electron transport chain.