The structure shown on the left is for FAD and is similar to \textit{NAD}^+ in that it contains a vitamin-riboflavin, adenine, ribose, and phosphates. As shown it is the diphosphate, but is also used as the monophosphate (FMN).

\section*{Introduction}

In the form of FMN it is involved in the first enzyme complex 1 of the \textit{electron transport chain}. A FMN (flavin adenine mononucleotide) as an oxidizing agent is used to react with NADH for the second step in the electron transport chain. The simplified reaction is:

\[
\text{NADH} + H^+ + \text{FMN} \rightarrow \text{FMNH}_2 + \text{NAD}^+
\]

\text{Red.Ag. Ox.Ag.}

Note the fact that the two hydrogens and 2e\textsuperscript{-} are "passed along" from NADH to FMN. Also note that NAD\textsuperscript{+} as a product is back to its original state as an oxidizing agent ready to begin the cycle again. The FMN has now been converted to the reducing agent and is the starting point for the third step.

\section*{Coenzyme Q or Ubiquinone}

\textbf{Ubiquinone}: As its name suggests, is very widely distributed in nature. There are some differences in the length of the isoprene unit (in bracket on left) side chain in various species. All the natural forms of CoQ are insoluble in water, but soluble in membrane lipids where they function as a mobile electron carrier in the \textit{electron transport chain}. The long hydrocarbon chain gives the non-polar property to the molecule.

CoQ acts as a bridge between enzyme complex 1 and 3 or between complex 2 and 3. Electrons are transferred from NADH along with two hydrogens to the double bond oxygens in the benzene ring. These in turn convert to alcohol groups. The electrons are then passed along to the cytochromes in enzyme complex 3.
Coenzyme A

Although not used in the electron transport chain, Coenzyme A is a major cofactor which is used to transfer a two carbon unit commonly referred to as the acetyl group. The structure has many common features with NAD$^+$ and FAD in that it has the diphosphate, ribose, and adenine. In addition it has a vitamin called pantothenic acid, and finally terminated by a thiol group. The thiol (-SH) is the sulfur analog of an alcohol (-OH). The acetyl group (CH$_3$C=O) is attached to the sulfur of the CoA through a thiol ester type bond. Acetyl CoA is important in the breakdown of fatty acids and is a starting point in the citric acid cycle.

Contributors

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