

Cytochromes

Cytochromes are hemoproteins linked to a nonprotein, iron-bearing component (*a heme group*), which can undergo the reversible oxidation-reduction reactions that yield energy for the cell. Mitochondria contain three classes of cytochromes: a, b, and c, which have hemes of different structures.



1. Cytochromes contain a **heme group** made of a porphyrin ring containing an atom of iron. They are found in the mitochondrial inner membrane of eukaryotes.
2. The iron atom of the heme group acts as an **electron carrier**.
3. Unlike the heme groups of hemoglobin, the cytochrome iron atom is **reversibly** converted from its ferric (Fe^{3+}) to its ferrous (Fe^{2+}) form as a normal part of its function as a reversible carrier of electrons.
4. The mitochondrial electron transport proteins are clustered into complexes known as Complex I, II, **III**, and IV (*see chart below*).

Protein (*cytochrome*) Complexes of the Electron Transport chain

Complex	Enzymatic Function / Name	Functional Components
I	NADH / CoQ oxidoreductase	FMN; Fe-S clusters
II	Succinate / CoQ oxidoreductase (<i>succinate dehydrogenase</i>)	FAD; Fe-S clusters
III	CoQ-cytochrome c oxidoreductase	Cytochromes b, cytochromes c1, Fe-S clusters
IV	Cytochrome c oxidase	Cytochromes a and a3

Important: Cytochrome oxidase is the terminal enzyme in the chain of events that constitutes cellular oxygen consumption.