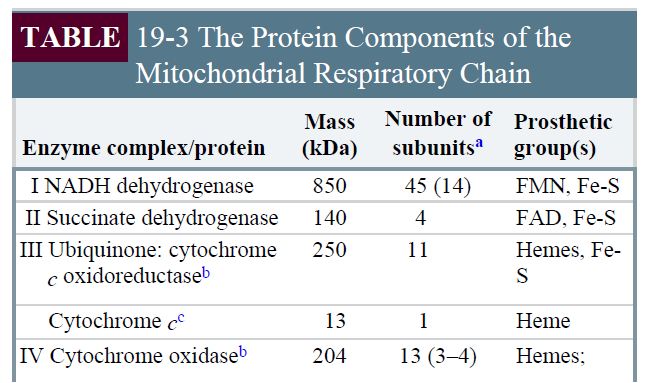
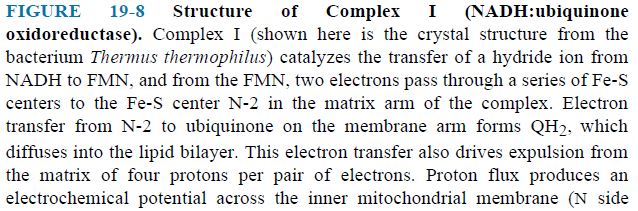
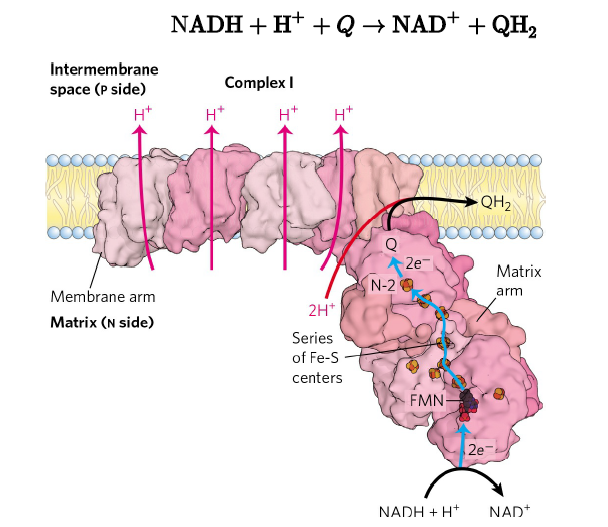
**Electron Carriers Function in Multienzyme Complexes**

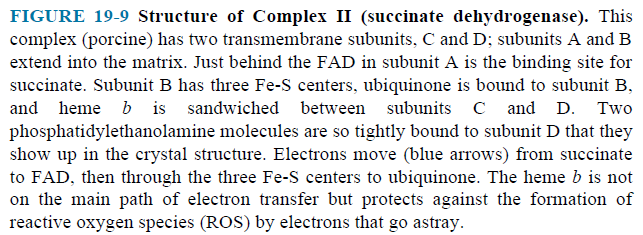
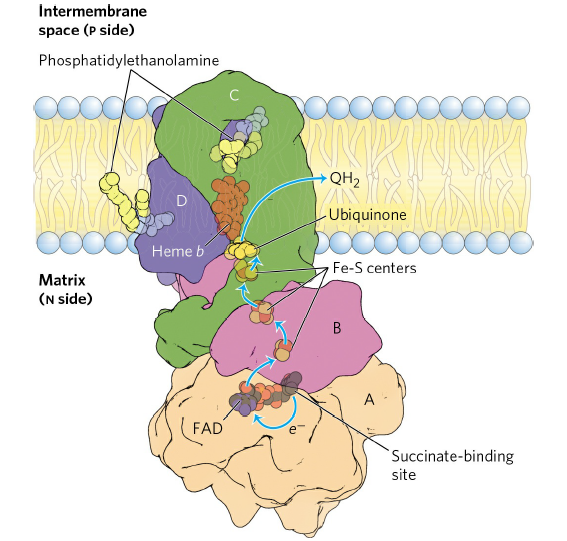
* The electron carriers of the respiratory chain are organized into membrane-embedded supramolecular complexes.
* The inner mitochondrial membrane has four electron carrier complexes **(Table 19-3).**



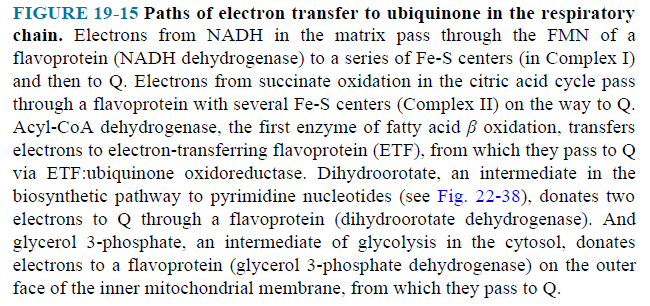
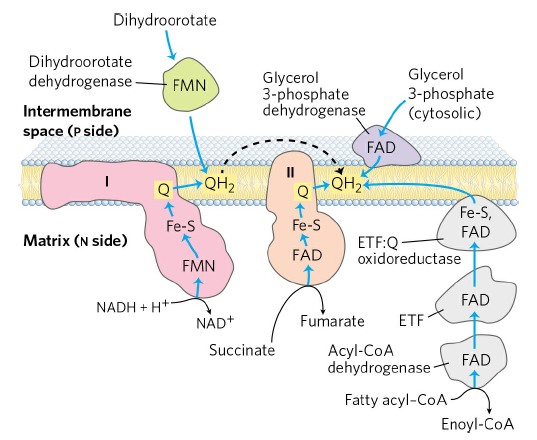
* **Complex I** catalyzes electron transfer to ubiquinone from NADH. **(Fig. 19-8).**
* It is also called **NADH:ubiquinone oxidoreductase** or **NADH dehydrogenase.**
* It contains an FMN and at least six iron-sulfur centers.
* It moves protons from the matrix to the intermembrane space.



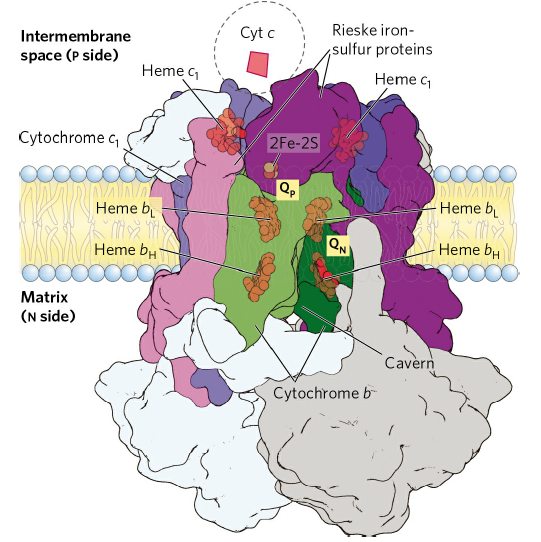
* **Complex II** catalyzes electron transfer to ubiquinone from succinate (FADH2) (**Fig. 19-9)**.
* It is also called **succinate dehydrogenase**, the only membrane-bound enzyme in the citric acid cycle.
* It contains an FAD and three iron-sulfur centers.



* Other substrates pass electrons into the respiratory chain at the level of ubiquinone (**Fig. 19-15)**.



* The first step in the ** oxidation of fatty acyl–CoA, catalyzed by the **acyl-CoA dehydrogenase**, involves transfer of electrons from the substrate to the FAD of the dehydrogenase, then to electron-transferring flavoprotein (ETF), which in turn passes its electrons to **ETF:ubiquinone oxidoreductase**. This enzyme transfers electrons into the respiratory chain by reducing ubiquinone.
* Glycerol 3-phosphate, formed either from glycerol released by triacylglycerol breakdown or by the reduction of dihydroxyacetone phosphate from glycolysis, donates electrons to a **glycerol 3-phosphate dehydrogenase** on the outer face of the inner mitochondrial membrane, from which they pass to Q.
* **Complex III** carries electrons from reduced ubiquinone to cytochrome *c*. (**Fig. 19-10)**.
* It is also called **cytochrome *bc*1 complex** or **ubiquinone:cytochrome *c* oxidoreductase**.
* It contains six hemes and two iron-sulfur centers.
* It moves protons from the matrix to the intermembrane space.

****

****

* **Cytochrome *c***is a soluble protein of the intermembrane space.
* After its single heme accepts an electron from Complex III, cytochrome *c* moves to Complex IV to donate the electron to a copper center.
* **Complex IV**, also called **cytochrome** **oxidase**, carries electrons from cytochrome *c* to molecular oxygen, reducing it to H2O. (**Fig. 19-13)**.
* It contains two hemes and three Cu ions.
* It moves protons from the matrix to the intermembrane space.

