

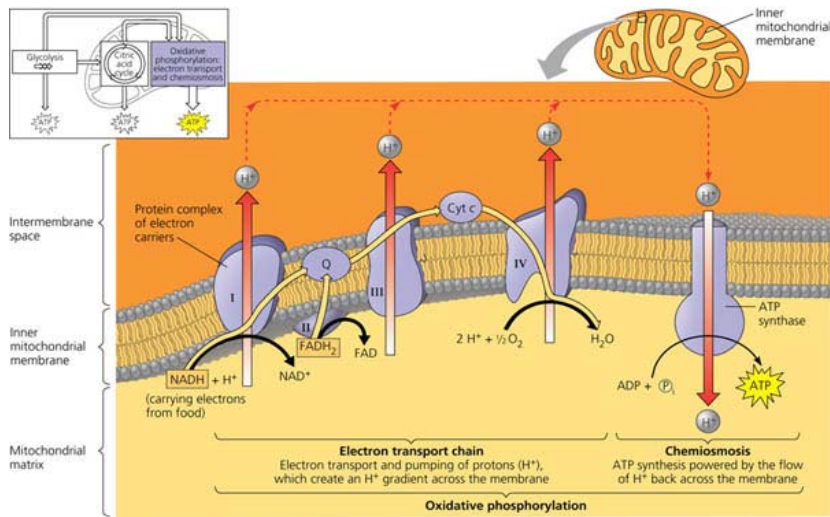
ELECTRON TRANSPORT CHAIN ATP SYNTHASE

Campbell's 9th: 172-177, 10th: 172-177
221 October 2016

ELECTRON TRANSPORT occurs within the intramembranous hydrophobic region.

Free energy of reactions (P 172):
the system serves as a **proton pump**
uses electron energy to pump H^+ into **intermembranous space**

Structure of electron transport chain: (p 174)



complex I NADH to FMN to coenzyme Q,
ubiquinone reductase

pumps out 2 H^+

complex II $FADH_2$ to coenzyme Q (ubiquinone)

succinate dehydrogenase

complex III **ubiquinone to cytochrome c**

cytochrome reductase

pumps out 2 H^+

complex IV **cytochrome c thru cytochrome a to O_2**

cytochrome c oxidase

pumps out 2 H^+

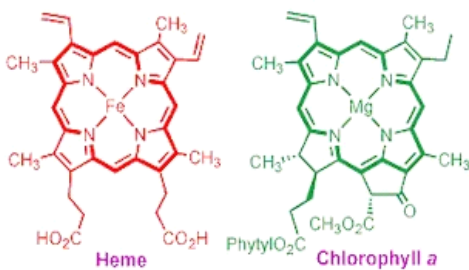
cytochromes a and a_3 in cytochrome c oxidase donate electrons to oxygen, creating **water**.

Cytochromes extract energy from the oxidized electrons from NADH an $FADH_2$

The energy is used to pump hydrogen ions out of the matrix into the intermembranous space.

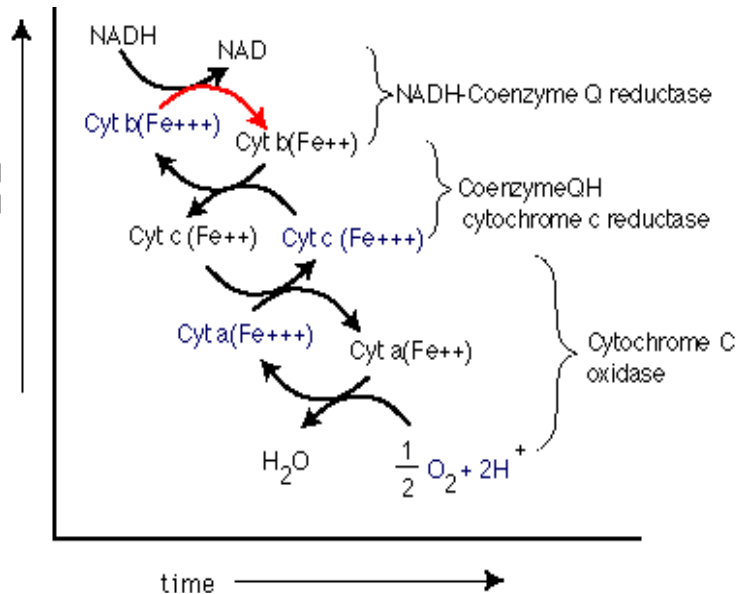
("Proton pump")

$FADH_2$ donates at this lower energy level]



Chemical potential energy

(G)



Electron Transport Chain animation:

(starts at around 24 seconds) <http://www.youtube.com/watch?v=xbJ0nbzt5Kw>

Chemiosmotic process: protons push back into the matrix thru ATP Synthase powers the phosphorylation of ADP.

Electron Transport: https://www.youtube.com/watch?v=1O1oXQ3eS_s

ATP SYNTHASE: (p 151) Proton gradient drives H^+ through triggering phosphorylation of ADP:

<https://www.youtube.com/watch?v=PjdPTY1wHdQ>

Start mechanism around 1:25: <http://www.youtube.com/watch?v=3y1dO4nNaKY>

