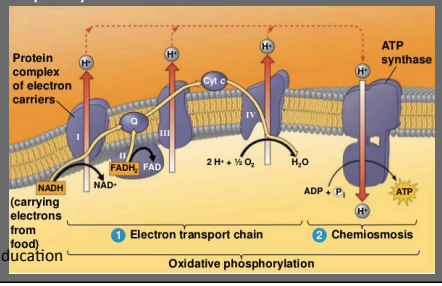
VII. Oxidative phosphorylation

A. Energy released by oxidation reactions is carried to the cristae of the mitochondria by reduced NAD and FAD-
   1. Oxidative phosphorylation occurs when NADH + H^+ and $FADH_2$ produced during glycolysis, the link reaction, and Kreb's cycle are oxidized , releasing energy to phosphorylate ADP to ATP.



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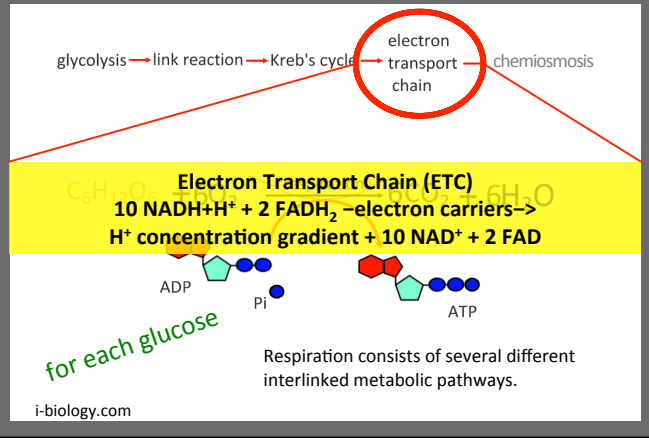
VIII. The electron transport chain (ETC)



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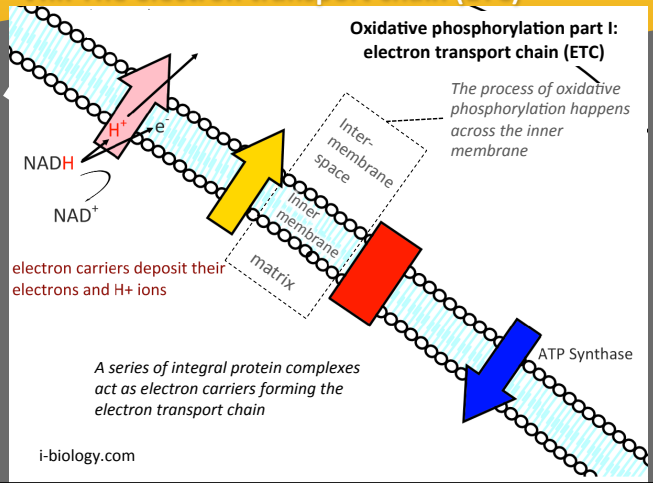
VIII. The electron transport chain (ETC)

A. Transfer of electrons between carriers in the electron transport chain is coupled to proton pumping-
   1. NADH + H^+ and $FADH_2$ donate their electrons and hydrogen ions to a series of electron carriers situated on the inner membrane of the mitochondria
   2. As electrons are passed along the electron carriers, the energy is used to actively transport protons from the matrix into the intermembrane space of the mitochondria
   3. A large concentration gradient of protons is built up in the intermembrane space which wlll be used to make a ATP

VIII. The electron transport chain (ETC)



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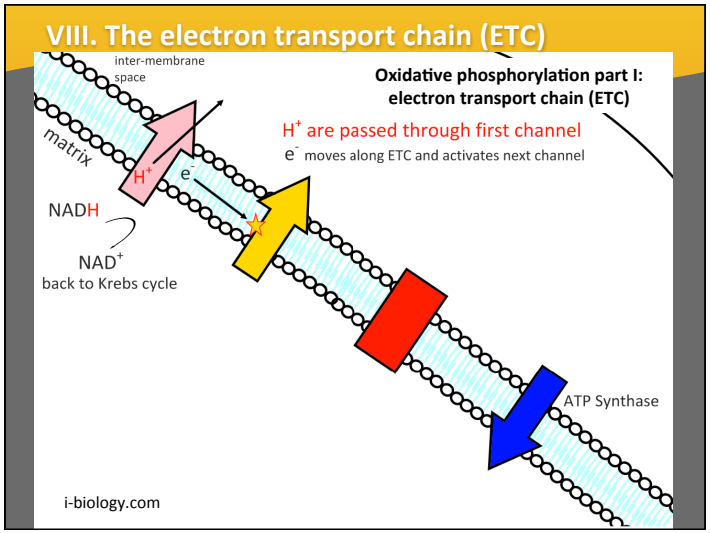
VIII. The electron transport chain (ETC)
inter-membrane space
matrix
Oxidative phosphorylation part I: electron transport chain (ETC)
H+ are passed through first channel
e- moves along ETC and activates next channel
H+
e-
NADH
NAD+
back to Krebs cycle
ATP Synthase
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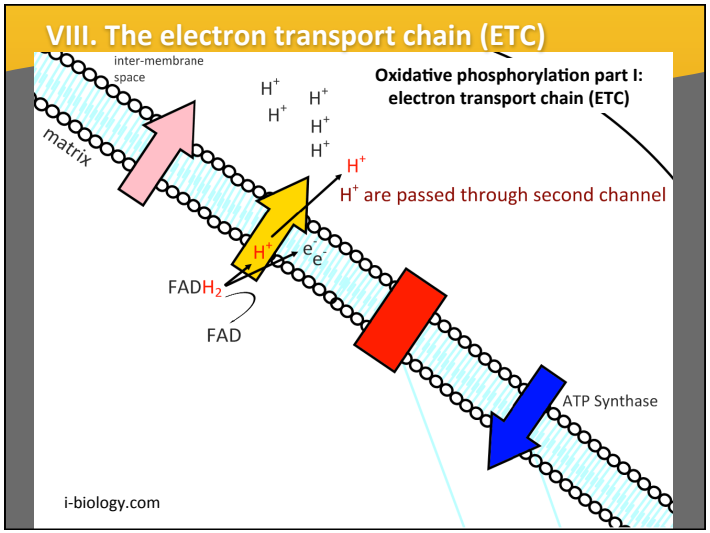
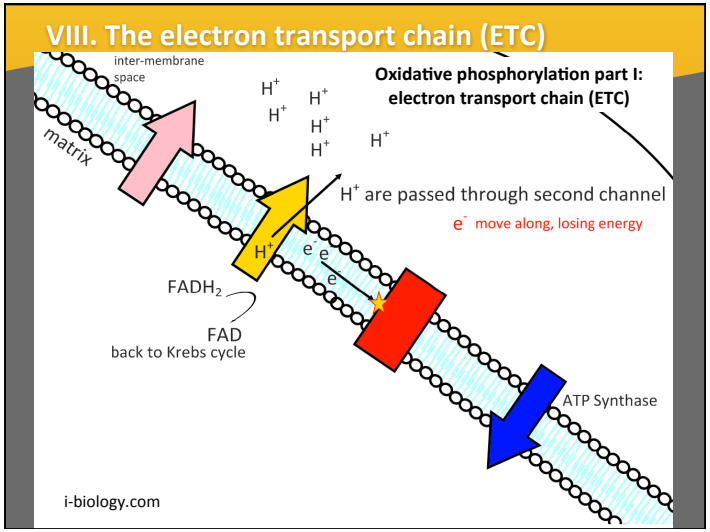

VIII. The electron transport chain (ETC)
inter-membrane space
matrix
Oxidative phosphorylation part I: electron transport chain (ETC)
H+
H+ are passed through second channel
e-
FADH2
FAD
ATP Synthase
i-biology.com


VIII. The electron transport chain (ETC)
inter-membrane space
matrix
Oxidative phosphorylation part I: electron transport chain (ETC)
H+
H+ are passed through second channel
e- move along, losing energy
e-
FADH2
FAD
back to Krebs cycle
ATP Synthase
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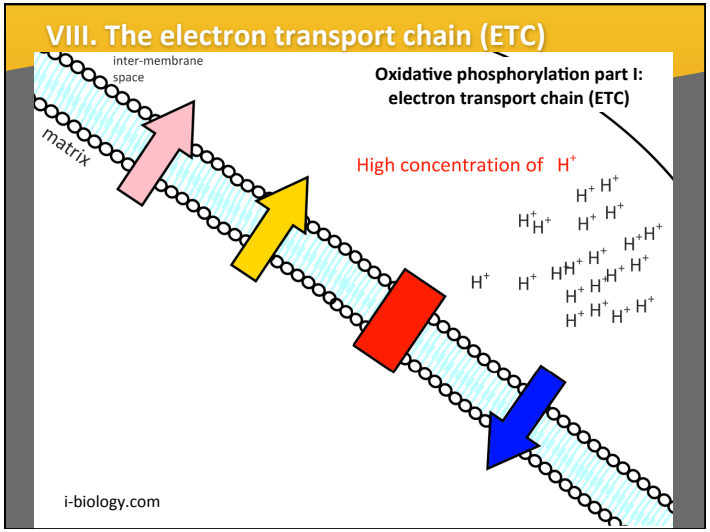
VIII. The electron transport chain (ETC)
inter-membrane space
matrix
Oxidative phosphorylation part I: electron transport chain (ETC)
High concentration of H+
H+
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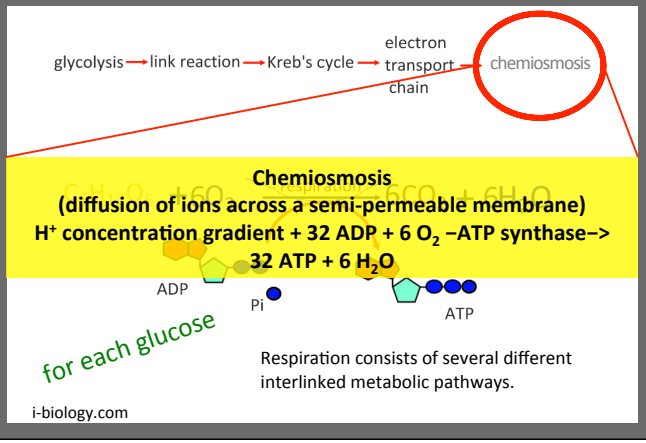
IX. Chemiosmosis

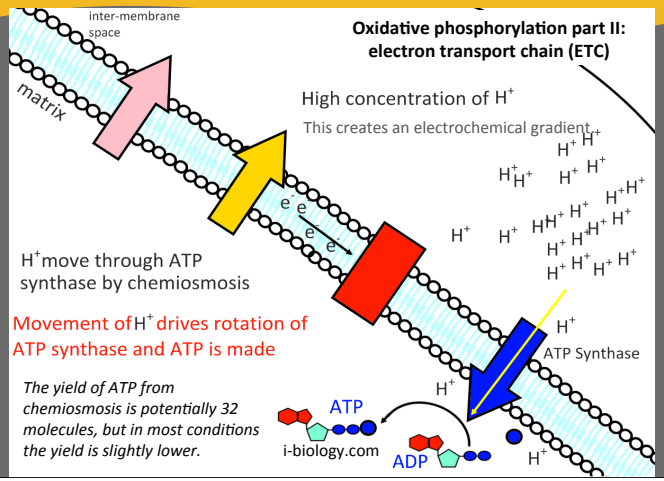


IX. Chemiosmosis and the role of oxygen

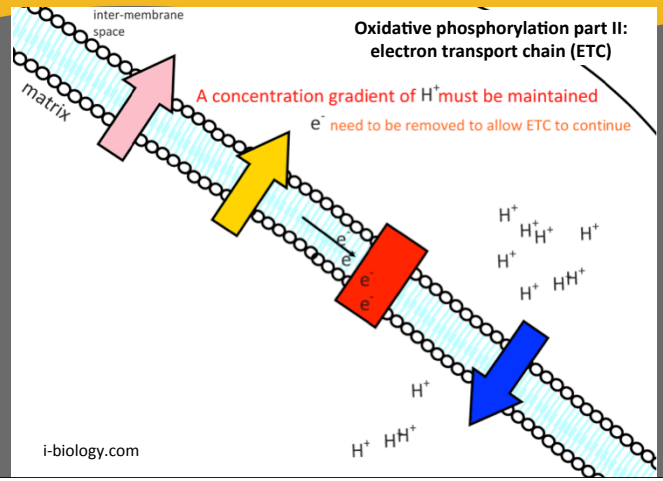
A. In chemiosmosis protons diffuse through ATP synthase to generate ATP and Oxygen is needed to bind the free protons to form water to maintain the hydrogen gradient-

1. ADP to ATP generation is coupled to chemiosmosis
2. The high concentration of protons in the intermembrane space creates chemical potential energy
3. Protons cannot directly diffuse through the inner membrane due their polarity.
4. Protons are able to diffuse down their concentration gradient through ATP synthase which harnesses their energy to phosphorylate ADP to ATP
5. Oxygen is the last electron acceptor in the ETC
6. Oxygen is reduced to water by combining with the electron at the end of the ETC and protons in the matrix
7. The removal of protons to form water allows the concentration gradient to be maintained

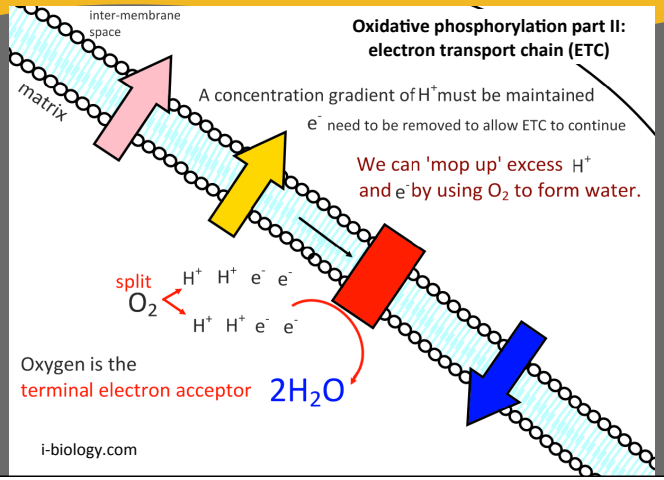
IX. Chemiosmosis



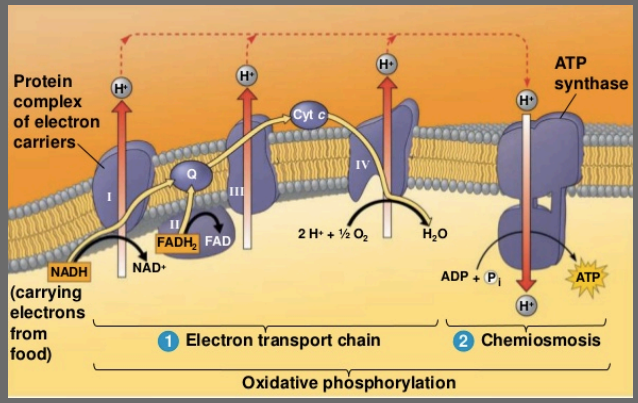
IX. Chemiosmosis



IX. Chemiosmosis



Summary of oxidative phosphorylation



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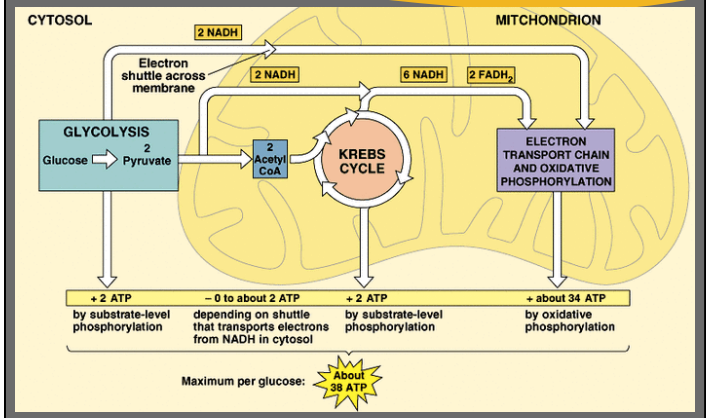
Summary of cell respiration



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