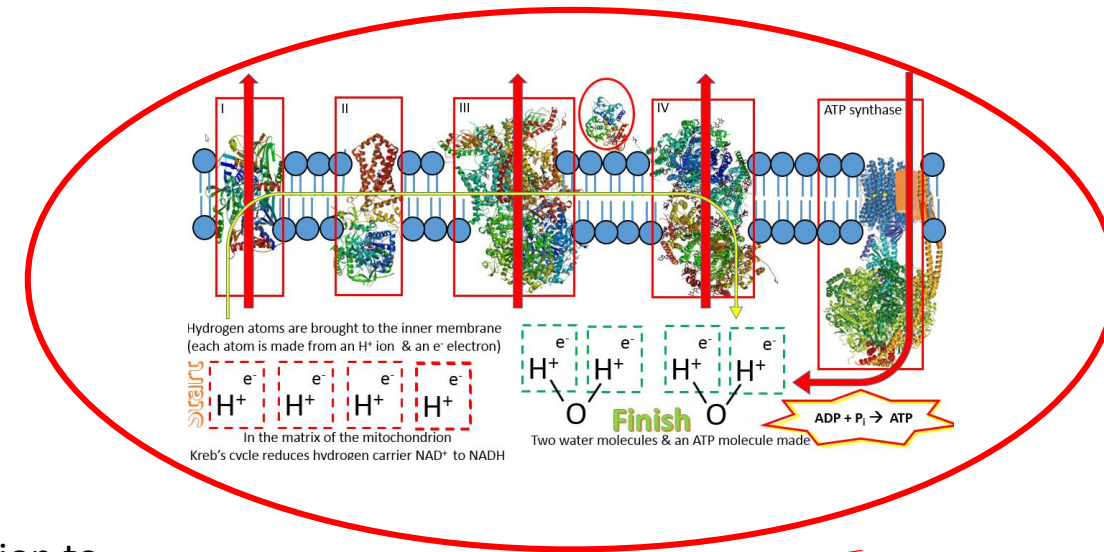
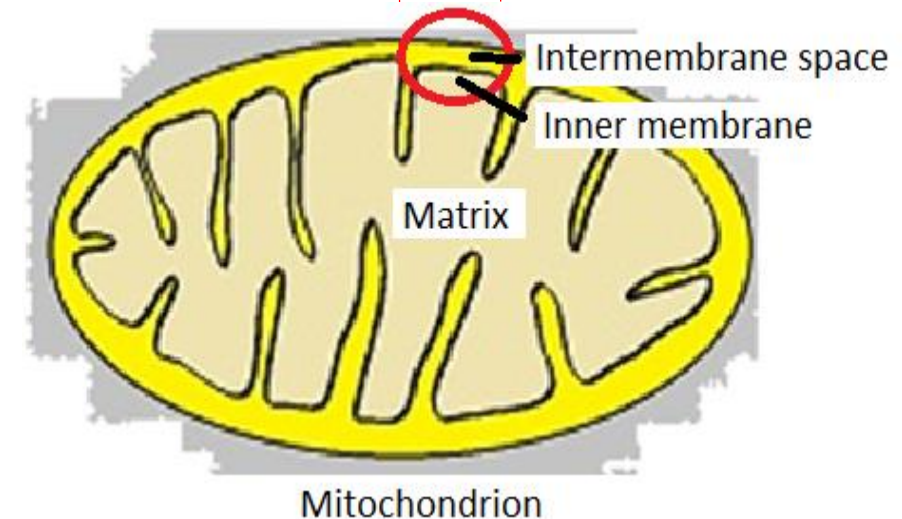


Electron transport game

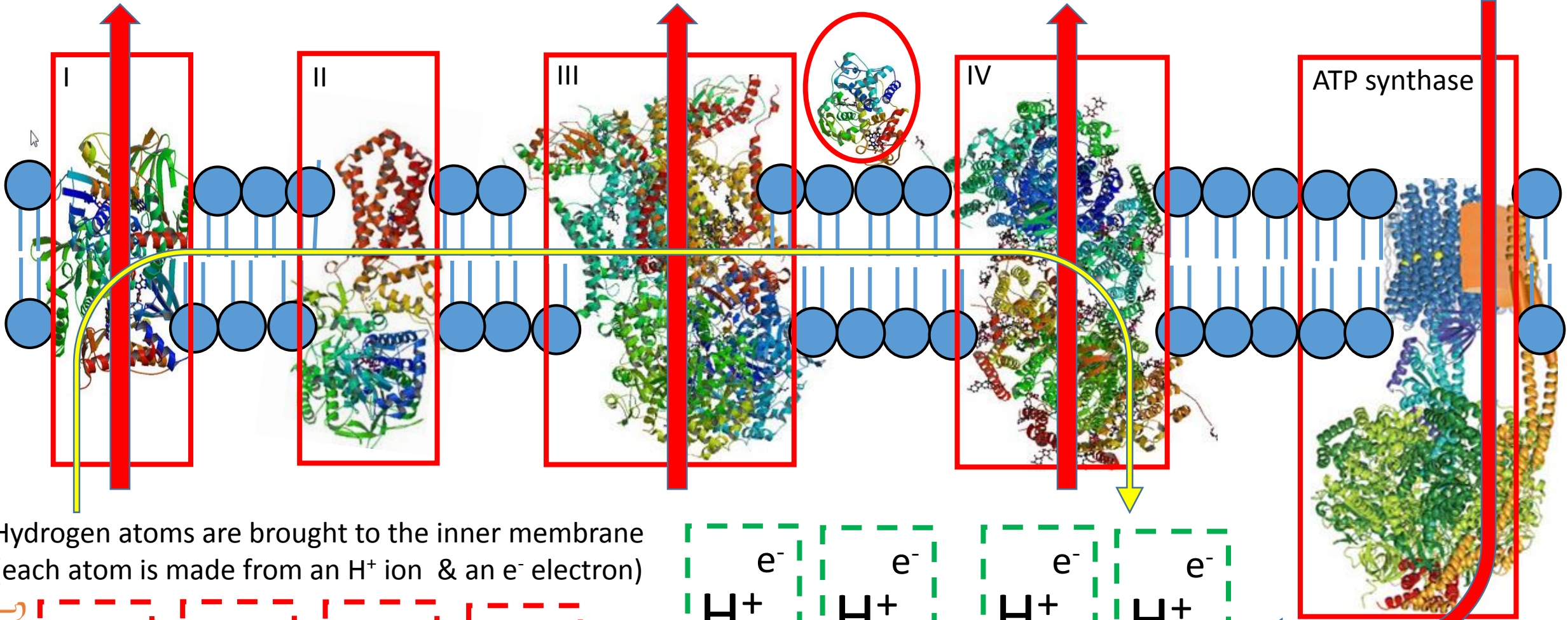


This activity illustrates the following processes:

- NAD⁺ carries hydrogen from reactions in the matrix of the mitochondrion to the inner membrane of the mitochondrion.
- NADH gives hydrogen to the protein complexes of the electron transport chain.
- H⁺ ions (protons) are pumped across the mitochondria inner membrane to the intermembrane space.
- The energy to do this is released from electrons passing from one protein complex to the next.
- A high concentration of H⁺ ions (protons) accumulates in the intermembrane space.
- H⁺ ions (protons) flow back into the matrix of mitochondria through ATP synthase producing ATP
- Oxygen accepts the electrons and H⁺ ions forming water molecules

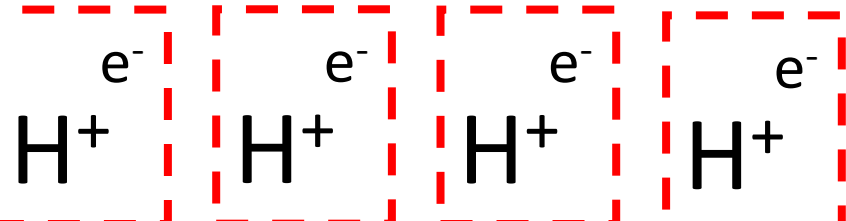


This is the INTER-MEMBRANE space. The gap between the inner membrane and outer membrane of the mitochondrion

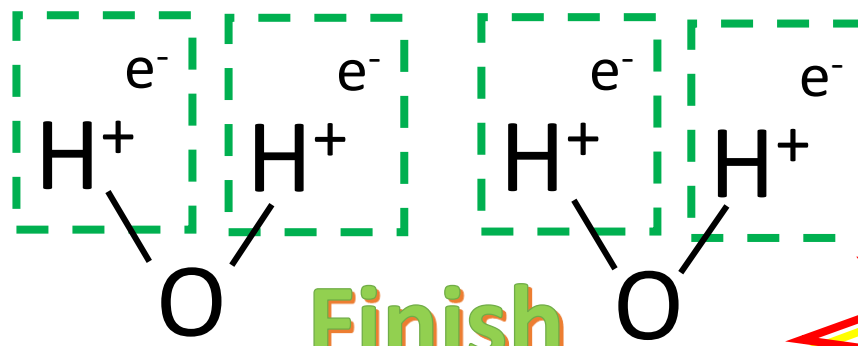


Hydrogen atoms are brought to the inner membrane (each atom is made from an H^+ ion & an e^- electron)

Start

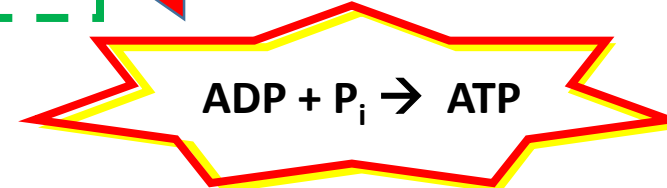


Each hydrogen atom is attached to a hydrogen carrier NAD^+ (or FAD^+) forming $NADH$ (or $FADH$)



Finish

METABOLIC WATER AND ATP



To play the electron transport chain game

The winner of the game is the 1st group to make 2 water molecules and an ATP molecule

To start

Small groups of students each have:

- 1 game board
- 1 “question” cube
- 4 hydrogen atoms placed in the red boxes labelled “start”.
 - 4 pieces of red modelling clay (H^+ ions) each with a dried pea (e^- electron) stuck to it.

To play

- Students take it in turns to roll the “cube”
- They read out the statement showing on the top face of the cube
- If the H^+ or e^- pieces are in the right place on the board students move as described.
- If not, nothing moves and the next student rolls the cube.
- When all the H^+ or e^- pieces have arrived at the ‘finish’ to make 2 water molecules shout **“METABOLIC WATER and ATP”**

Electron transport game Question cube

Cut out the question cube
Glue the shaded flaps
Fold the shape into a cube

