M06 L4 How Cells Produce Energy

Thursday, March 05, 2009
11:30 AM

VoiceThread	http://voicethread.com/share/248704/
Cmap	http://cmapspublic2.ihmc.us/rid=1161044542275_1575087030_6478/Cellular%20Respiration.cmap

35 minute delivery in a live class

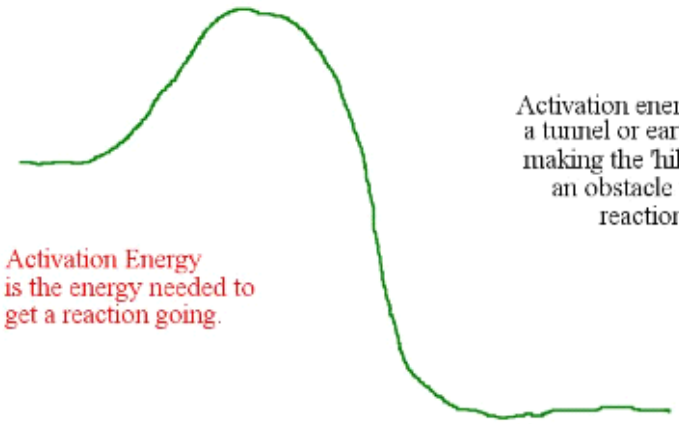
Slides	Notes
 Module 06: The Cell Lecture 1: Cellular Structure Lecture 2: Cellular Transport System ☞ Lecture 3: How Cells Produce Energy Lecture 4: Protein Synthesis Lab Day Interactive Practice	Have the students watch the video at http://multimedia.mcb.harvard.edu/ to get an idea of the active movement that they couldn't see from the slides.
☞ Glycolysis Krebs Cycle Electron Transport System Summary	Start glycolosis which is followed by the others

Chemical bonds store potential energy

Glycolosis 'sugar-breaking'

Enzymes (catalysts) and activation energy

Activation energy is like a match.



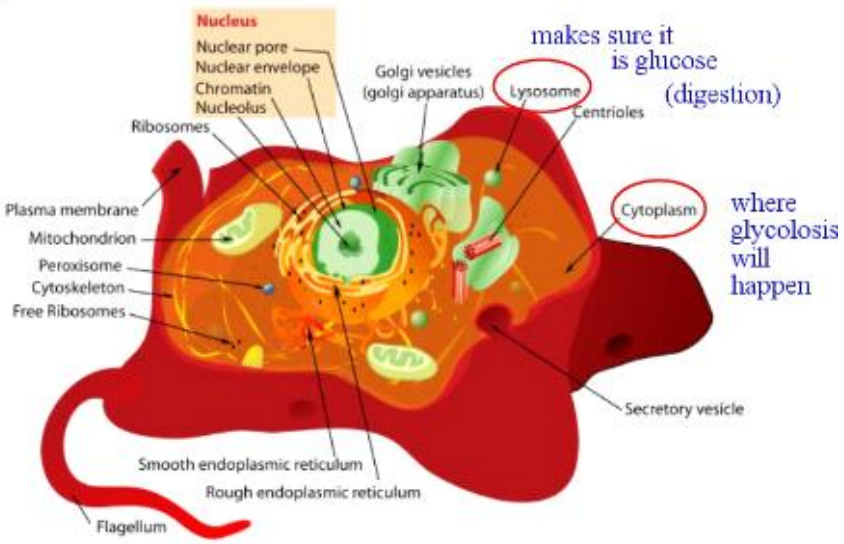
Activation energy is like a tunnel or earth mover making the 'hill' less of an obstacle to the reaction.

Activation Energy is the energy needed to get a reaction going.

Once the activation energy gets the process started, the burning needs to be controlled.

Enzymes not only keep the whole process going, they also work to control the reactions so they do not happen to fast/strong and destroy the cell nor do they happen too slow and cause the cell to starve for energy.

No oxygen - anaerobic reactions

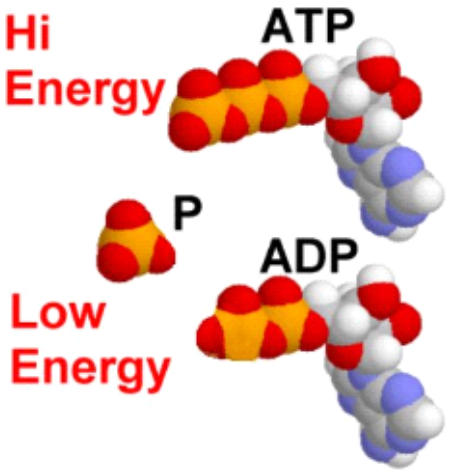


Where does glycolosis happen?

Cytoplasm (lysosome may need to do some digestion too)

The energy coinage of the cell

energy package - ATP



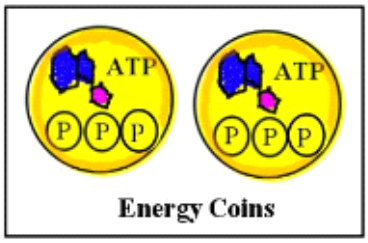
ATP is the coinage of the cell (talk about the coinage analogy - Bartering before money - ATP is something that can be used in all cells and all living things.

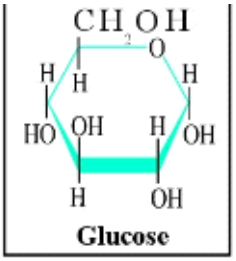
ATP short for adenisine triphosphate

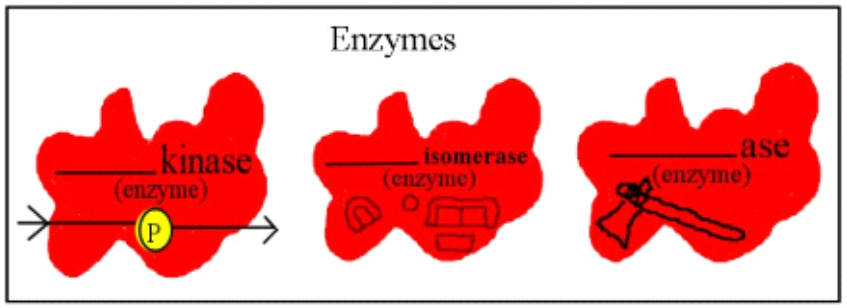
Tri means three - notice three Ps

Cannot spend it again - you spend the phosphate and got energy

ATP to ADP







Process starts here

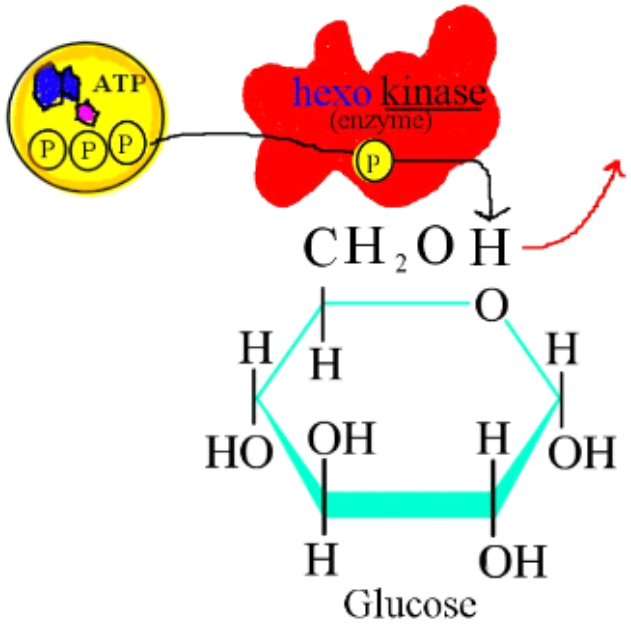
You have to put in energy (2 ATPs) to make energy - NEED THESE THINGS TO GET STARTED - like investing

Talk about jobs of enzymes

Kinase - transfers P

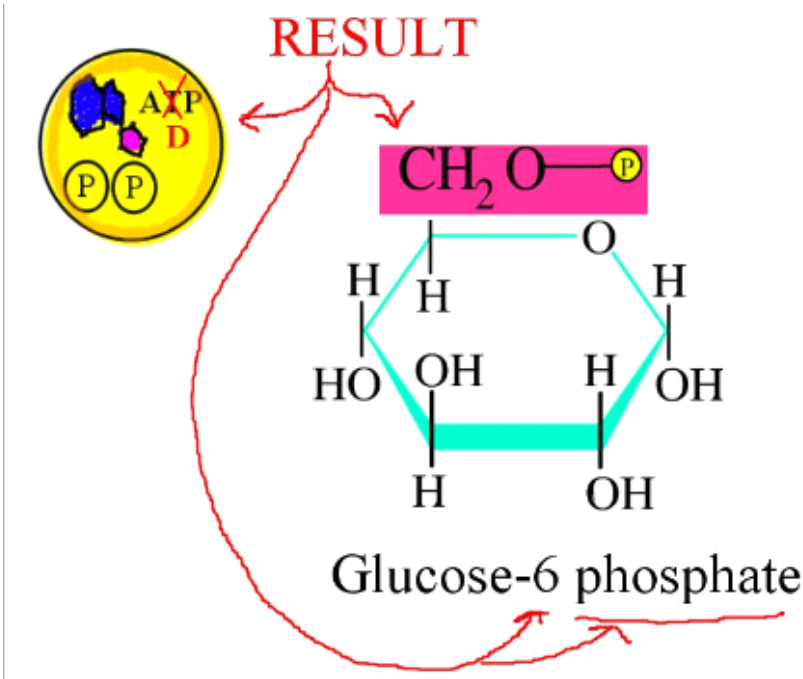
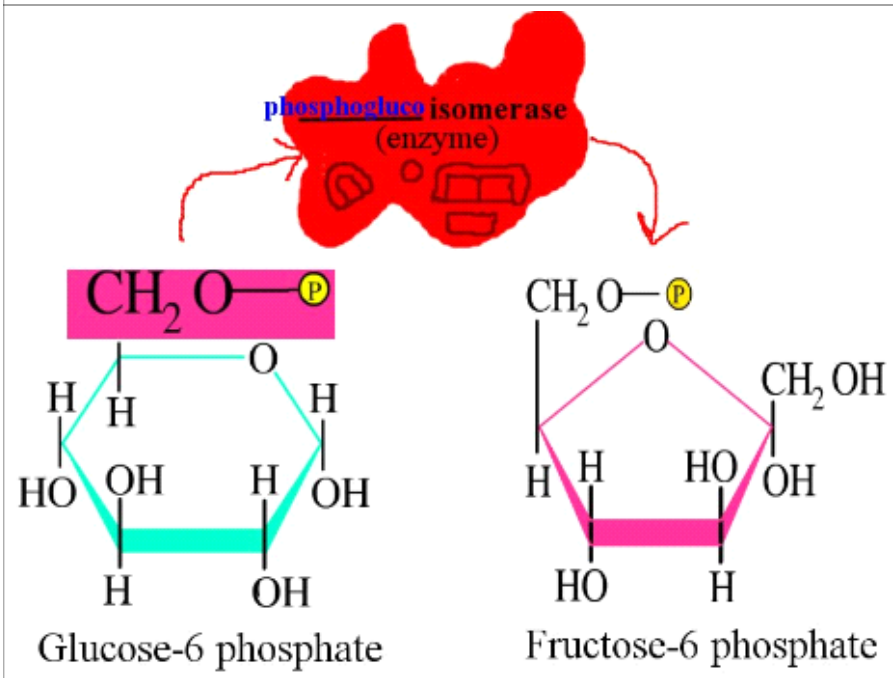
Isomerase - re arranges

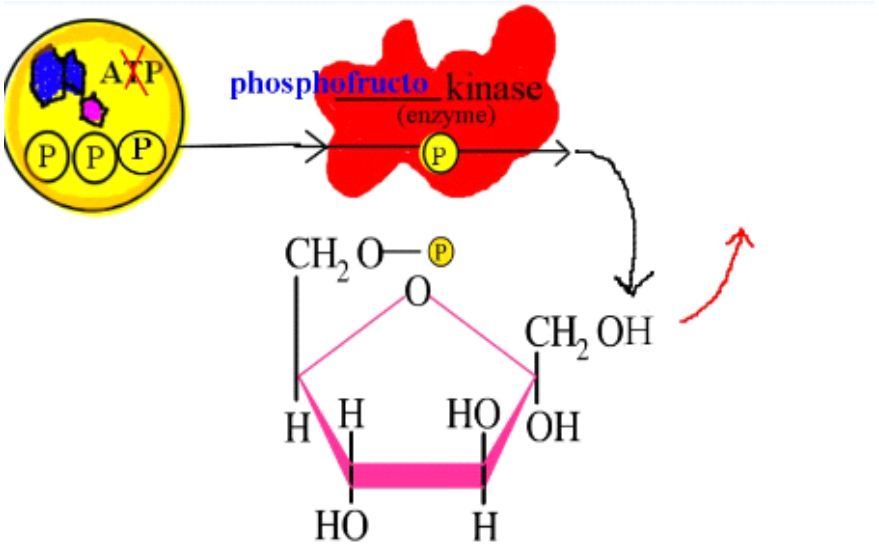
Ase - cuts it off



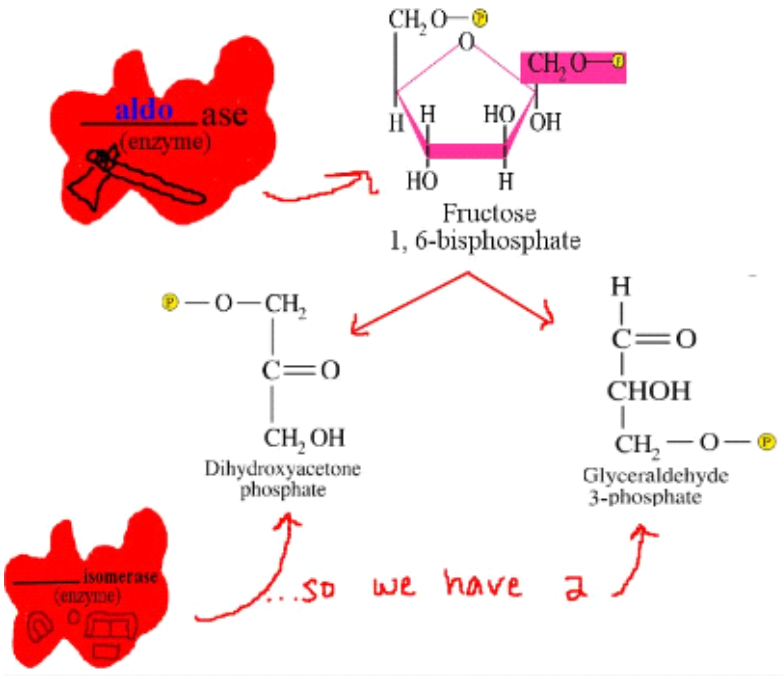
STEP 1

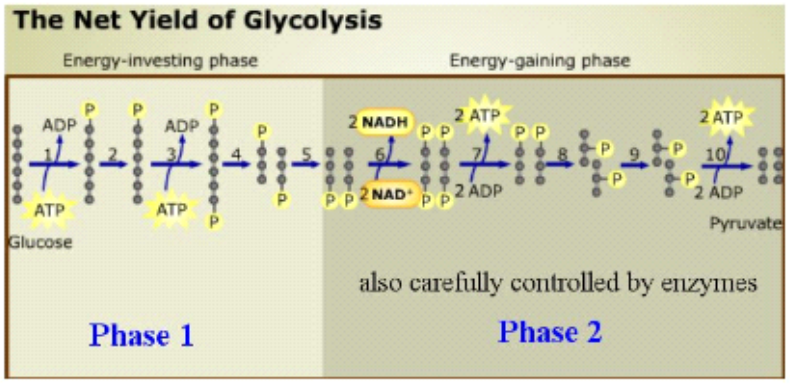
The P will replace a hydrogen

	Result
	Same number of each atoms, but rearranged



2nd coin gets spent - Adds a p in and removes an H





So far, in phase 1, we have spent 2 ATP coins and gotten no net gain...

... Phase 2 will remedy the bankruptcy problem.

phase 2 profit

2 ATP + 2 NADH + 2 Pyruvate

each NADH is worth 3 ATP (savings bonds)

Phase 1 done

Spent two coins and didn't get any coins out of it.

Echa step has its own enzyme. I will no longer talk about the enzymes, but now you realize enzymes at each step.

Phase 2 remedies the bankruptcy.

NADP is equal to 3 ATPs but in savings not spendable

Look at total profit.

If there is not enough oxygen the pyruvate will not go to the mitochondria

SPRINTER

Anaerobic Fermentation

2 pyruvate

2 lactate 2 NAD+

lactic acid

drops pH muscle fatigue, cramps, and soreness

less mitochondria

Sprinters have a higher percentage of muscle cells that process anaerobically than ...

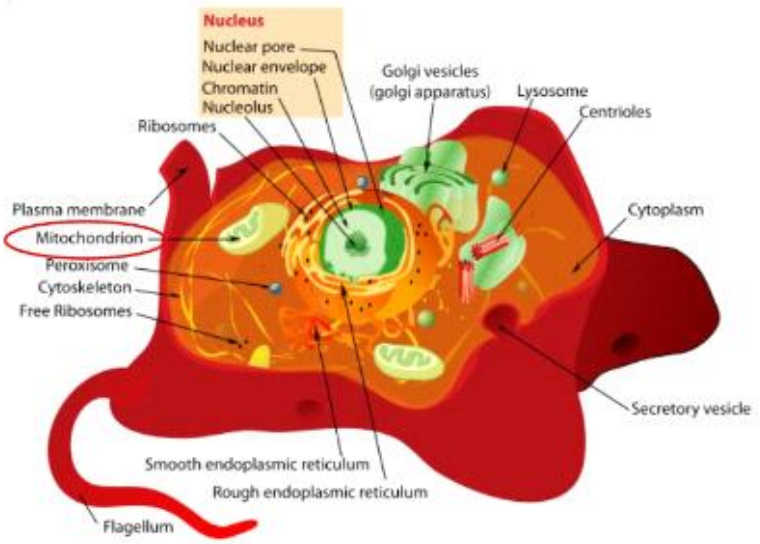
MARATHONER

Aerobic

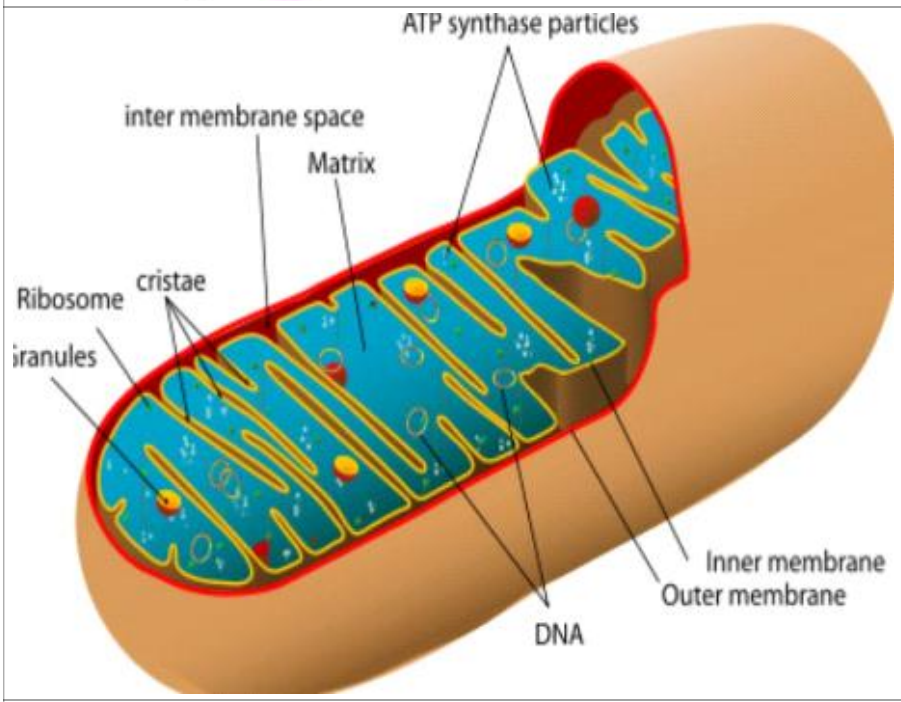
more mitochondria

- Glycolysis
- Krebs Cycle
- Electron Transport System
- Summary

Kreb's Cycle happens in the mitochondria oxygen - aerobic reactions



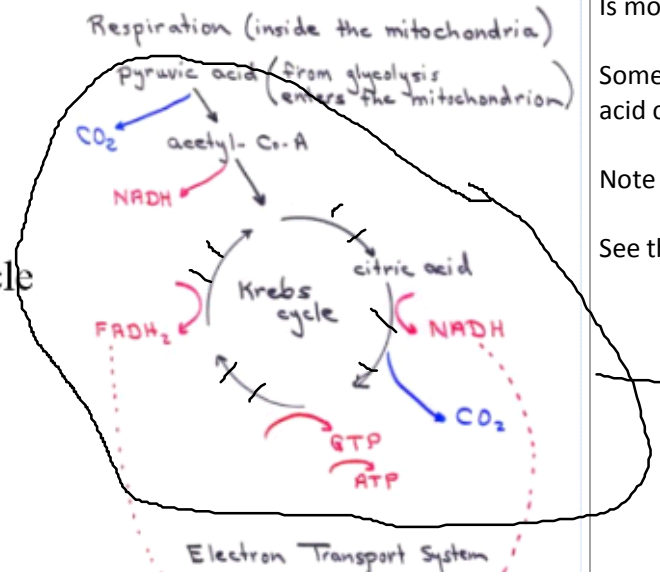
Location - mitochodrion



Mitochonria has DNA!

Just go over anatomy on this slide
Matrix, inner membrane space

Krebs
Citric Acid Cycle
TCA



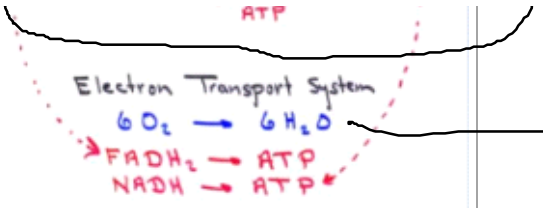
Is more complicated but this is fine

Some texts will call it Krebs and some Citric acid cycle or TCA

Note the Pyruvate fits in here

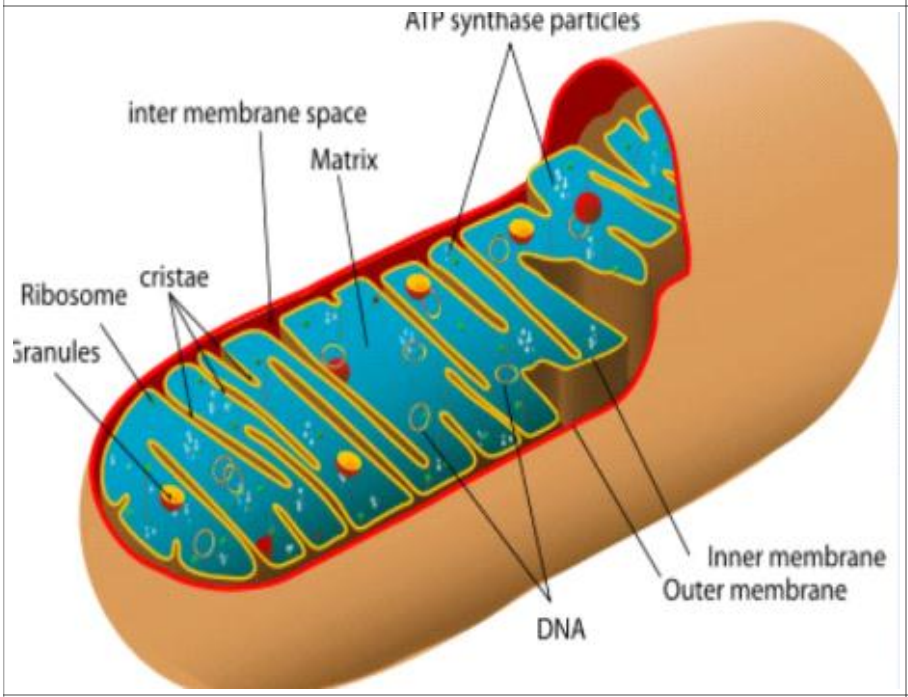
See the CO2?

Krebs

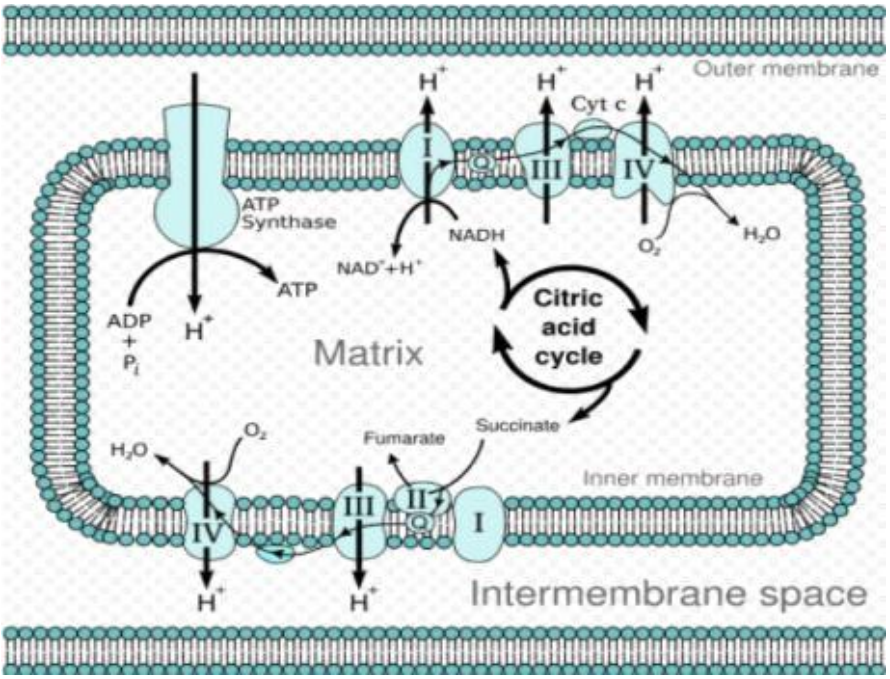


next step coming up

- Glycolosis
- Krebs Cycle
- ☞ Electron Transport System
- Summary

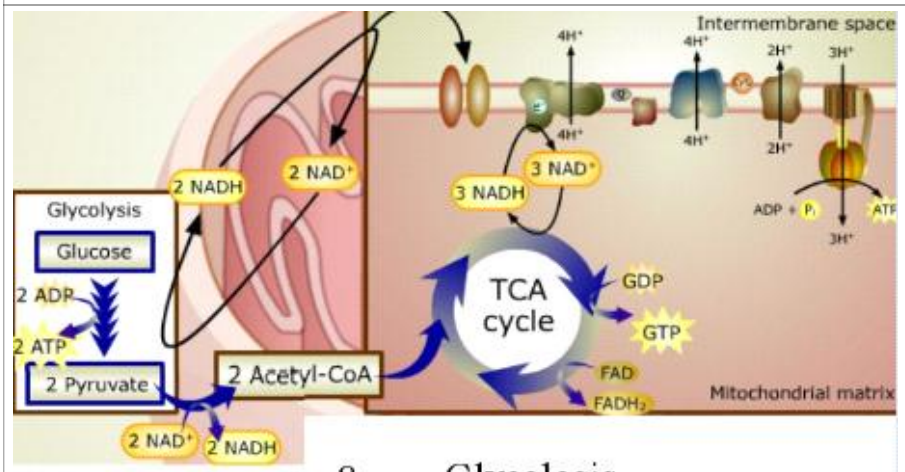


Also happens in the mitochodrion



Simplified diagram to show where it happens

Glycolysis
Krebs Cycle
Electron Transport System
☞ Summary



8	Glycolysis	
6	Krebs Cycle	
+ 24	Electron Transport System	
38	Total	

ROI

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9am: http://www.virtualhomeschoolgroup.com/mod/quiz/view.php?id=10903
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