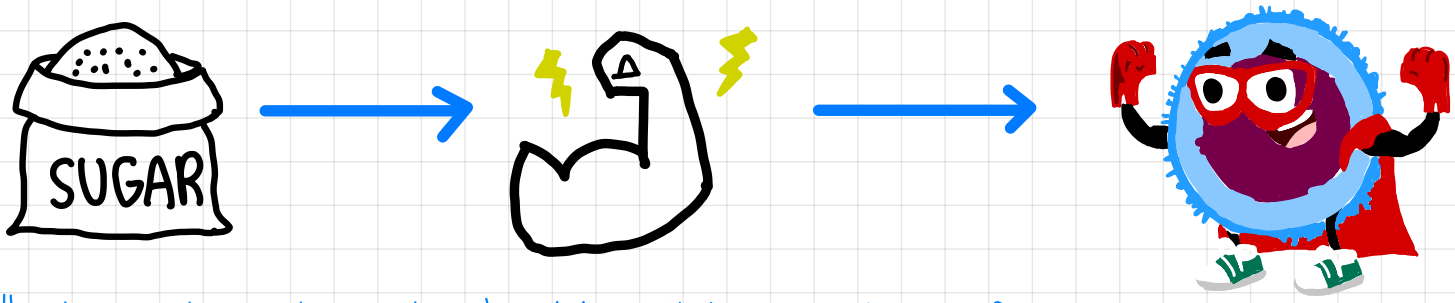
CELLULAR RESPIRATION

Objectives: * to learn about cellular respiration
* to learn about the steps involved in cellular respiration

What is cellular respiration?

- process through which cells convert sugars into energy
- they use this energy to do work



What are the steps involved in cellular respiration?

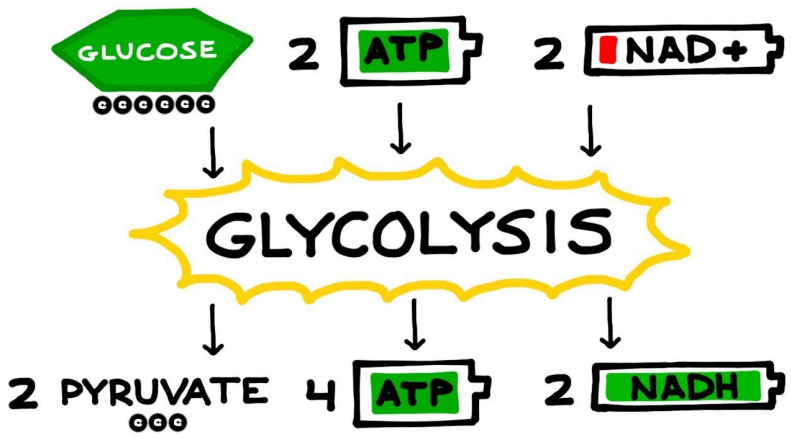
Glucose + oxygen —> carbon dioxide + water + ATP

STAGES OF CR

1. Glycolysis
   - Link Reaction (pyruvate oxidization)
2. Citric Acid Cycle
3. Oxidative Phosphorylation

Glycolysis step 1

- occurs in cytoplasm
- splits glucose into pyruvate in 9 chemical reactions
- 1 glucose = 2 pyruvate



IN → OUT

* 1 glucose → * 2 pyruvate
* 2 ADP + P → * 4 ATP
* 2 NAD^+ → * 2 NADH
* net ATP = 2

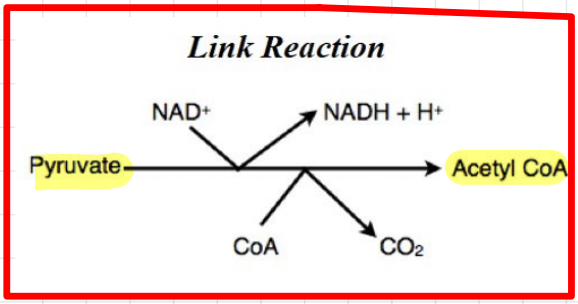
Link Reaction

Step 2

- pyruvate enters mitochondria from cytoplasm
- pyruvate doesn't directly enter the citric acid cycle

1. Carbonyl group is removed —> given of as CO2
2. 2-Carbon molecule is oxidized (NAD+ —> NADH)
3. Coenzyme A joins with 2-carbon group = Acetyl CoA

Acetyl CoA enters citric acid cycle

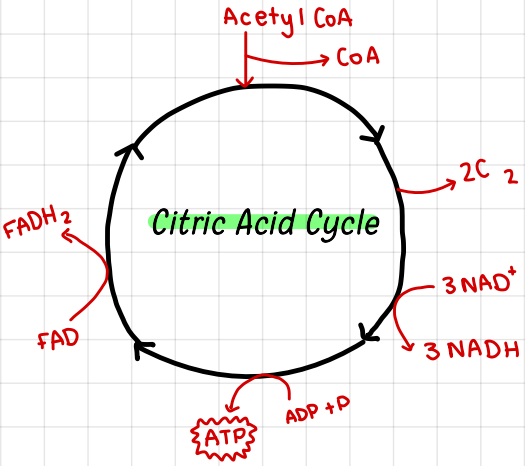


Citric Acid Cycle

Step 3

- completes oxidization of organic molecules (NADH --> FADH2)
- occurs in mitochondrial matrix
- ingredients for 1 turn of cycle (per 1 acetyl CoA)

IN	OUT
1. 1 molecule of acetyl CoA	
2. Carbon compound (oxalocetate	1. 2 CO2
3. 3 NAD+	2. 3 NADH
4. 1 FAD	3. 1 FADH2
5. 1 ADP + P	4. 1 ATP



Oxidative Phosphorylation

step 4

Where does it occur?

- mitochondria —> inner membrane

- produces the most/majority of ATP
- requires oxygen

IN	OUT
-NADH	-H2O
-FADH2	- 26- 28 ATP
-proteins in ET chain	
- O2	
- ATP synthase	
- ADP + P	

Important Notes

1 glucose molecule —> 2 acetyl CoA molecules
1 glucose molecule = 2 turns of citric acid cycle '

- YIELDS:
  - 2 ATP
  - 6 NADH
  - 2 FADH
  - 4 CO2

Total ATP yield =

glycolysis: 2 ATP
citric acid cycle: 2 ATP
OP: 28 ATP

total = 32 ATP