




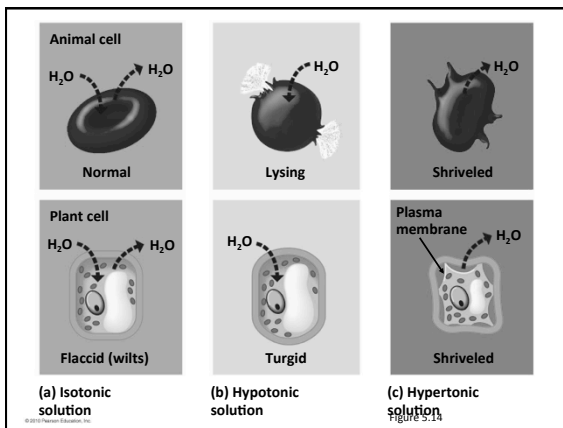


Important Latin Roots				
Aerobic	Anaerobic	Respire	Glyco	Lysis
• With oxygen	• Without oxygen	• Breathe out	• sweet	• Break apart

<h2 style="text-align: center;">Osmosis Notes Re-Do!</h2>	

<h2>Osmosis and Cells</h2> <ul style="list-style-type: none"> • A simple rule to remember is: SALT SUCKS! <ul style="list-style-type: none"> – Salt is a solute, when it is concentrated inside or outside the cell, it will draw the solvent (water) in its direction.

 <h2 style="display: inline;">Solutions</h2> 		
If we only describe the solution OUTSIDE the cell		
<p>_____ solute (salt) molecules outside the cell</p> <ul style="list-style-type: none"> Water will move into the cell The cell will grow larger. 	<p>Has an equal concentration of solute.</p>	<p>_____ solute (salt) molecules outside the cell</p> <ul style="list-style-type: none"> Which causes the water to be sucked out of the cell Cell will shrink
		




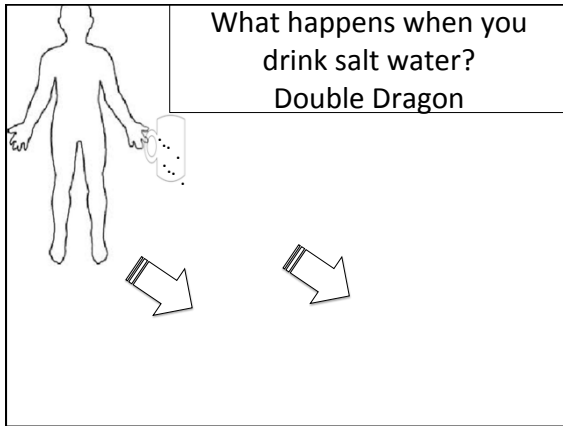
The Problem with HYPERTONIC

DANGER!

- This is why it is dangerous to drink sea water, people marooned at sea will speed up dehydration (and death) by drinking sea water.
- This is also why "salting fields" was a common tactic during war, it would kill the crops in

Its a myth that drinking sea water will cause you to go insane

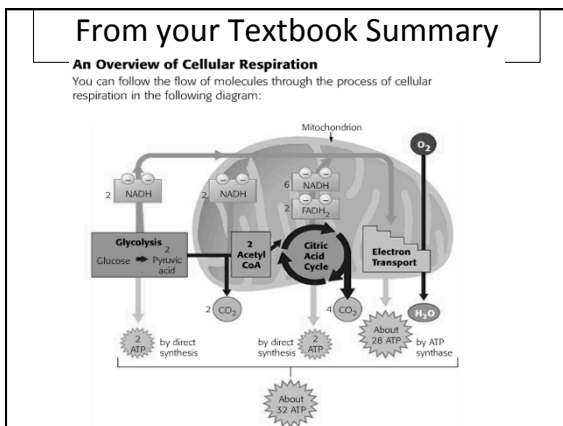




Before we begin, some advice

How to study this topic:

1. Memorize the summary equation
2. Memorize names of the 3 steps
3. Memorize where each step occurs in the cell
4. Describe the general function of each step in your own words
5. Memorize reactants and products for each step
6. Describe the process of each step in your own words



Chemical Cycling

What is the connection between photosynthesis and the human population?

- Chemical cycling between photosynthesis and cellular respiration

Be able to answer by the end

- The figure above represents an overview of the different processes of cellular respiration. Which of the following correctly identifies the different processes?

1. glycolysis, 2. electron transport, 3. citric acid cycle
1. glycolysis, 2. citric acid cycle, 3. electron transport
1. citric acid cycle, 2. electron transport, 3. glycolysis
1. electron transport, 2. glycolysis, 3. citric acid cycle

Cell Respiration: how do we get energy from our food?

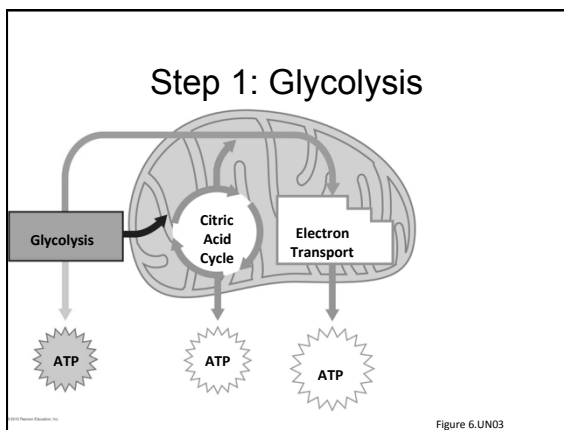
$$C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + \text{Approx. } 32 \text{ ATP Energy}$$

Glucose + Oxygen → Carbon dioxide + Water + Energy

An Overview of Cellular Respiration

Energy is transferred from food molecules to ATP in 3 stages:

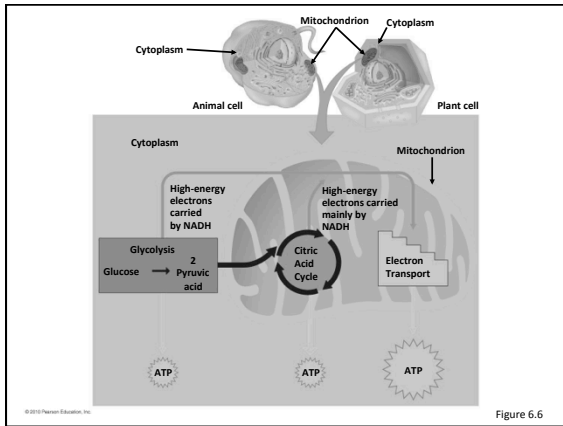
1. Glycolysis
2. The citric acid cycle
3. Electron transport

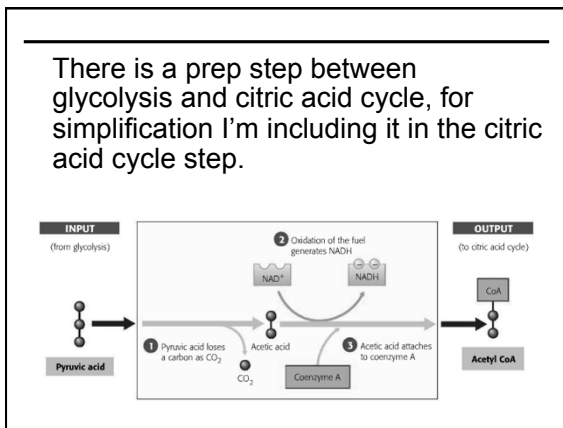


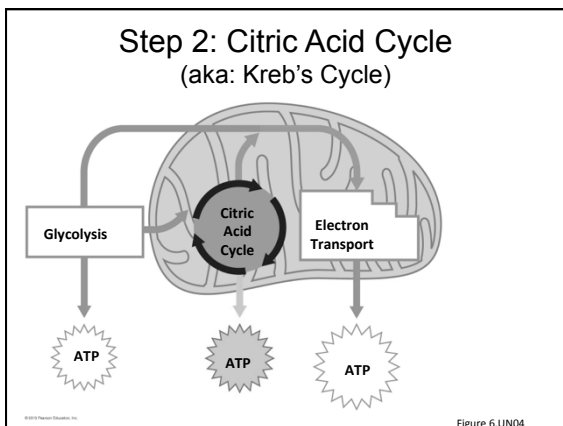
Step 1: Glycolysis

Two big things happen:

1. **Glucose** (6 carbons) gets split into 2 molecules of pyruvate (3 carbons each)
 - This releases enough energy to make 2ATP (net)
2. Hydrogen and electrons are stripped from glucose and picked up by NAD⁺, becoming NADH

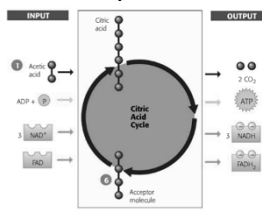






Step 2. Citric Acid Cycle

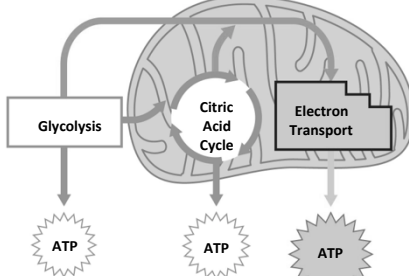
- Completes the breakdown of sugar:
 - Enough energy is released to regenerate 2 more ATP
 - The rest of the hydrogen are stripped from pyruvate and picked up by carriers FAD or NAD⁺ which become FADH₂ and NADH



The diagram shows the Citric Acid Cycle as a circular process. On the left, under 'INPUT', it lists: 1 Acetyl-CoA, ADP + P, 3 NAD⁺, and 3 FAD. On the right, under 'OUTPUT', it lists: 2 CO₂, 4 ATP, 3 NADH, and 3 FADH₂. The cycle itself is a circle with 'Citric acid' at the top and 'Acceptor molecule' at the bottom.

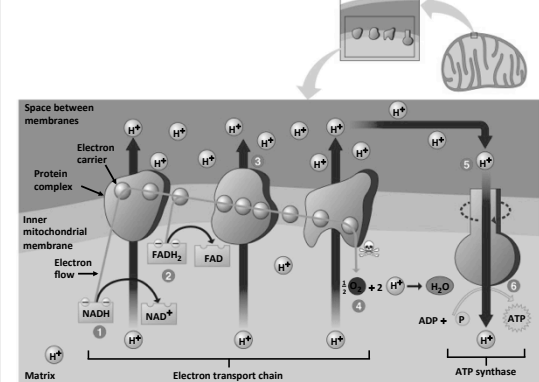
Stage 3: Electron Transport

Electron transport releases the energy your cells need to make most of their ATP.



The diagram shows a mitochondrion with three stages of cellular respiration: Glycolysis, Citric Acid Cycle, and Electron Transport. Arrows indicate the flow of energy from Glycolysis to the Citric Acid Cycle, and then to Electron Transport. Each stage is shown to produce ATP, represented by starburst shapes.

Figure 6. UN



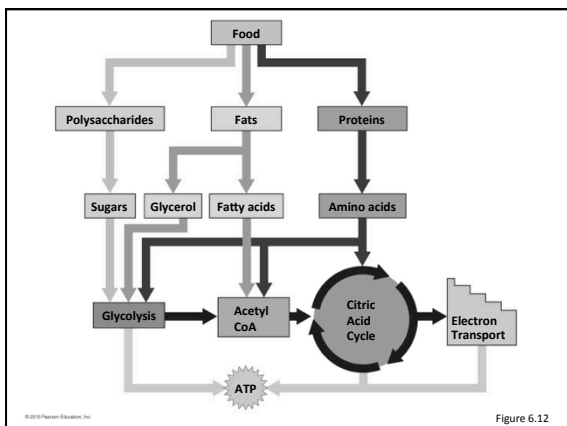
This detailed diagram shows the electron transport chain in the inner mitochondrial membrane. It labels the 'Space between membranes' (intermembrane space) and the 'Matrix'. The chain consists of several protein complexes: 1. NADH dehydrogenase (Complex I), 2. Succinate dehydrogenase (Complex II), 3. Cytochrome bc₁ complex (Complex III), 4. Cytochrome c, 5. Cytochrome c oxidase (Complex IV), and 6. ATP synthase. Electrons flow from NADH and FADH₂ through the complexes, and protons (H⁺) are pumped from the matrix into the intermembrane space. At the end of the chain, electrons and protons combine to form water (H₂O). ATP synthase uses the proton gradient to synthesize ATP from ADP and P.

Figure 6.11

Electron Transport

Each chain functions as a chemical machine that uses the energy released by the “fall” of electrons to pump hydrogen ions (H⁺) across the inner mitochondrial membrane. This pumping causes ions to become more

Is sugar the only food we get energy from??



FERMENTATION: ANAEROBIC HARVEST OF FOOD ENERGY

– Some of your cells can work for short periods without oxygen.

– **Fermentation** is the **anaerobic** (without oxygen) harvest of food energy.

Fermentation in Human Muscle Cells

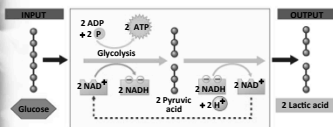
– After functioning anaerobically for about 15 seconds:

- Muscle cells will begin to generate ATP by the process of fermentation

– Fermentation relies on glycolysis to produce ATP.

Glycolysis:

- Does not require oxygen
- Produces two ATP molecules for each glucose broken down to pyruvic acid



Evolution Connection:
Life before and after Oxygen

Glycolysis could be used by ancient bacteria to make ATP when little oxygen was available, and before organelles evolved.


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Today, glycolysis:

- Occurs in almost all organisms
- Is a metabolic heirloom of the first stage in the breakdown of organic molecules

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Helpful Review Video



The image shows three video thumbnails. The first is titled 'Cellular Respiration 1 - Overview' and shows a hand pointing to a diagram of cellular respiration. The second is titled 'Anaerobic Respiration: FERMENTATION' and shows a person speaking. The third is titled 'Electron Transport Chain Animation Overview' and shows a diagram of the electron transport chain.
