





Complete breakdown of Glucose:

• Almost all free energy released as heat



 \clubsuit breakdown by burning (combustion)

But burning is not useful in cells...

 Cellular respiration is needed in cells to obtain energy.
 Occurs in steps

Some free energy conserved as ATP

• The resulting ATP is later used in other metabolic functions.















- 1) Glycolysis (Greek: "To break down a sweet")
 - Ancient biochemical pathway (all organisms do it...)Occurs in the cytoplasm; Does not require oxygen

Two Major Components:

A) Glucose Activation: Initiate the reaction (takes energy)B) Energy Harvesting: Complete the reaction (makes energy)











2) Fermentation: Process for regenerating NAD⁺ for glycolysis
Occurs in organisms which live where oxygen is rare

Intestines / stomach; soils / sediments / bogs

Two Types of Fermentation:

A) Lactate Fermentation: Pyruvate converted to lactate (lactic acid)

2 NADH
2 NAD⁺ (Back to glycolysis)
C C C x 2
Pyruvate
Lactate

























































What energy molecules have we produced so far:

- 1) 2 ATP (from glycolysis)
- 2) 2 ATP (from Krebs cycle)
- 3) Multiple Electron-carrier Molecules:
 - 2 NADH (from glycolysis)
 - 8 NADH (from Krebs cycle)
 - 2 FADH₂ (from Krebs cycle)

Know these – they are products from Glycolysis or Krebs cycle reactions.











- 4) Chemiosmosis:
 - Captures energy stored in hydrogen ion gradient and produces ATP
 - · Located in inner mitochondrial membrane













Respiration movies http://vcell.ndsu.nodak.edu/animations /home.htm







- Glycerol \rightarrow glycolysis
- + Fatty Acids \rightarrow Krebs cycle

Proteins:

· Enter at multiple stages

Reversal true as well: Glucose \rightarrow Fats



Epo: blood doping in athletic events

• Epo: Erthropoietin

A natural hormone (a glycoprotein) that boost red blood cell production.

- Increase in red blood cells results in greater oxygen content (due to increase in hemoglobin)
- Used to treat patients with anemia, but use has fallen off due to sometimes deadly side effects.
 Blood clots, strokes, pulmonary embolism