CELLULAR RESPIRATION

Metabolism—the sum of all biochemical reactions in an organism or cell.
  a) anabolic—synthesis of compounds; an example is photosynthesis
  b) catabolic—breakdown of compounds; an example is cellular respiration

Metabolic pathways—are the steps (enzymes, substrates and products) used or followed to convert one substance to another.

example: 2 metabolic pathways can be followed for the oxidation (or breakdown) of glucose—Anaerobic (no O2) or aerobic (O2 present) respiration

Fates of Pyruvate from glycolysis (2/glucose)

Pyruvate

anaerobic yeast

anaerobic muscle

pyruvate dehydrogenase complex

NADH, H+

NAD+

NADH, H+

NAD+

Ethanol + CO2 2 ATP

Lactate 2 ATP

Acetyl COA

Citric Acid Cycle

Electron Transport 36 ATP

Cytoplasm
Overall Eqn. for anaerobic respiration:
   a) glucose $\rightarrow$ 2 ethanol + 2 CO$_2$ + 2ATP (commercial use: 
      beer & wine)
   b) glucose $\rightarrow$ 2 lactic acid + 2ATP (commercial use: yogurt, 
      cheese, sauerkraut, spoilage)

Overall Eqn. for aerobic respiration:
   glucose ($C_6H_{12}O_6$) + 6 O$_2$ $\rightarrow$ 6 H$_2$O + 6 CO$_2$

<table>
<thead>
<tr>
<th>glycolysis</th>
<th>Anaerobic</th>
<th>Aerobic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>cell location</td>
<td>all cytoplasm</td>
<td>cytoplasm</td>
</tr>
<tr>
<td>pathways</td>
<td>glycolysis no</td>
<td>glycolysis</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>Kreb’s/Citric Acid</td>
</tr>
<tr>
<td>ATP</td>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>Products</td>
<td>Ethanol + CO$_2$ or Lactate</td>
<td>CO$_2$+H$_2$O</td>
</tr>
</tbody>
</table>

Today’s lab:
1) Omit or demo of anaerobic respiration
2) Omit Thermo bottles w/ seeds
3) Omit CO$_2$ gas released during respiration (CO$_2$ + OH $\rightarrow$ ppt.)
4) O$_2$ consumption of Endotherms (organisms that generate own 
   heat during respiration) at 10°C and room temperature.
   Calculate respiration rate and graph data. Using mice with CO$_2$
   absorber (ascarite) and water absorber (drierite)
5) O$_2$ consumption of Ectotherms (organisms that rely more on 
   environment for heat). Use data provided in lab manual to 
   calculate respiration rates and graph.