Glycolysis

- The conversion of glucose into 2 pyruvate molecules.
- Other sugars enter glycolysis at various steps and are also converted into 2 pyruvates.
Pyruvate Oxidation

- Under aerobic conditions pyruvate is decarboxylated and oxidized into acetyl-CoA. Acetyl-CoA enters into the Krebs cycle, ETC and oxidative phosphorylation.

- Under anaerobic conditions NADH and FADH2 cannot be reoxidized in the ETC. The lack of NAD+ means that pyruvate cannot be oxidized to acetyl-CoA for entry into the Krebs cycle. Pyruvate is reduced to lactate temporarily.
32 Moles of ATP from 1 Mole of Glucose

Glycolysis: +2 ATP directly; +2 NADH which yield 5 ATP from ETC/Oxidative Phosphorylation
Pyruvate Oxidation: +2 NADH which yield 5 ATP from ETC/Oxidative Phosphorylation
Two turns in the Krebs Cycle: +20 ATP
Total yield of ATP= 2 + 5 + 5 + 20 = 32 moles ATP
Diabetes

- Two hormones from the pancreas have the major responsibility for blood glucose regulation.
  - Insulin is released when blood glucose concentrations are high.
  - Glucagon is released when blood glucose concentration is low.
- Type I diabetes: Often called Juvenile Onset Diabetes because it occurs in childhood. Also called Insulin Dependent Diabetes since it is an autoimmune disease in which the body attacks the insulin producing beta cells.
- Type II diabetes: Often called Adult Onset Diabetes because it occurs more often in adults, but it becomes more and more common in children with the rise in childhood obesity. It is also called Non-insulin Dependent Diabetes because it results when insulin is not utilized effectively, or cell receptors do not recognize it as needed. It is controllable with diet, exercise and medications.

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**Rising blood glucose concentration**

- Glucose enters cells faster.
- Breakdown of glucose by glycolysis speeds up.
- Glycogen synthesis increases in liver and skeletal muscles.
- Synthesis of lipids and proteins increases.

Pancreatic β cells release *insulin*.

**Falling blood glucose concentration**

- Glucose entry to cells slows down.
- Glycogen breakdown in liver speeds up.
- Breakdown of lipids and proteins to raw materials for glucose synthesis by gluconeogenesis increases.
- Gluconeogenesis accelerates.

Pancreatic α cells release *glucagon*.

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