

# Biochemistry

## Lesson 1.1

### Homeostasis, Feedback Mechanisms, and Diabetes

## 1.1b Diabetes

### 1.1.5 Introduction to Diabetes

*"Insulin is not a cure for diabetes; it is a treatment. It enables the diabetic to burn sufficient carbohydrates, so that proteins and fats may be added to the diet in sufficient quantities to provide energy for the economic burdens of life."*

— **Sir Frederick Grant Banting** '[Diabetes and Insulin](#)', Nobel Lecture, 15 September 1925. In *Nobel Lectures: Physiology or Medicine, 1922-1941* (1965), 68.

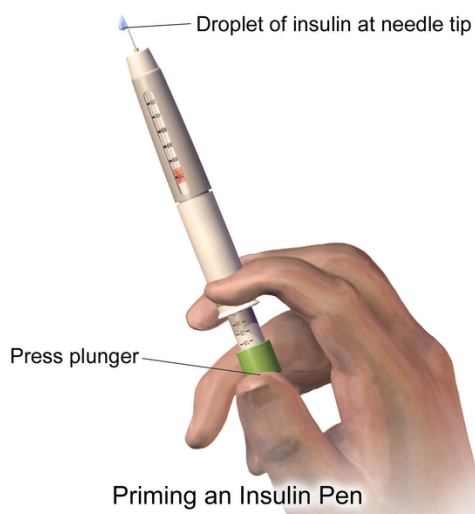


Figure 1.1.6. [Insulin Pen](#) by BruceBlaus / [Creative Commons Attribution 3.0 Unported](#)

#### Essential Question:

What happens when the human body is not able to stay in balance?

#### Prior Knowledge Quick Write:

Please read the above quote and look at the image on this page (Figure 1.1.6). On the lines below, please write your ideas as to what you think this lesson is going to be about.

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### Comprehension Quick Write:

Using complete sentences, please explain negative feedback in the body by describing what is taking place in Figure 1.1.7 below. Please use the following terms in your explanation: glucose, insulin, glucagon, glycogen, pancreas, liver, increase, decrease, blood.

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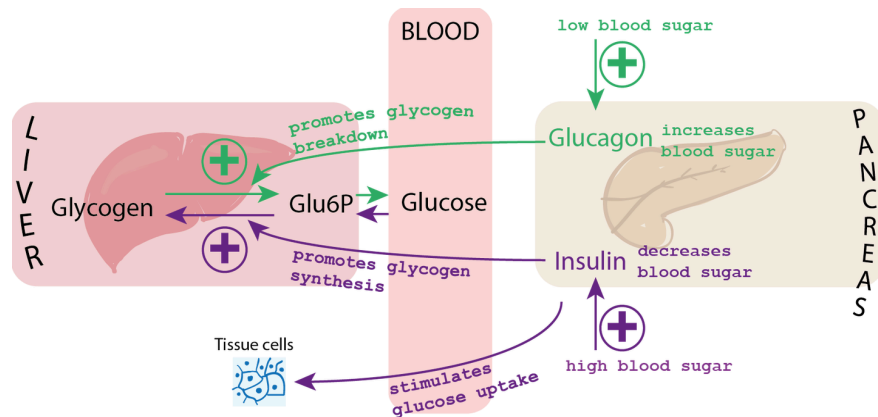


Figure 1.1.7. [Blood Glucose Control](#) by [C. Muessig](#) / [Creative Commons Attribution-Share Alike 3.0 Unported](#)

### Vocabulary Check:

Please fill in the vocabulary table found at the beginning of this lesson for terms 2-8 (definitions and extra practice).

### Prior Knowledge Quick Write:

Describe what happens when homeostasis does not take place, and the body is not able to transport the glucose from your blood to all of your other cells.

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### Please read and mark the text below.

If you are unfamiliar with how to mark the text, please read the following instructions:

1. Before reading, please **number the paragraphs**. (Start with the number one and continue numbering sequentially throughout, placing the number near the start of the paragraph.)

2. **Circle** key terms and other essential words or numbers.
3. Put a **box** around any terms you do not know the meaning of or are unfamiliar with.
4. **Underline** information relevant to the reading purpose (concerns, claims, data, definitions, descriptions, evidence, examples, explanations, guiding language, hypotheses, “if then” statements, main ideas, methods, processes, etc.)

Diabetes is a disease where high levels of glucose exist in the blood. Glucose levels can be monitored by either testing blood or urine samples.

Type 1 diabetes occurs when beta pancreatic cells produce little or no insulin. With little or no insulin, cells in the body are unable to use glucose for energy (ATP). Cell death can result. If blood glucose levels get too high, insulin must be injected. If blood glucose levels get too low, carbohydrates are consumed (through food or drink).

Type 1 diabetes is likely an **autoimmune disorder** where an infection or some other trigger causes the body to mistakenly attack itself and harms its own pancreas cells, affecting insulin production. Autoimmune disorders occur when the immune system produces antibodies (Y-shaped proteins: see Figure 1.1.8) that attack the body’s own tissues. (Auto- = self). Other examples of autoimmune disorders are: rheumatoid arthritis and multiple sclerosis.

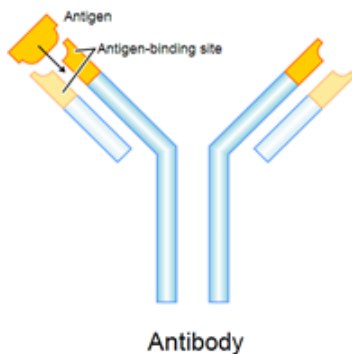


Figure 1.1.8 [Antibody](#) by [Evasconcellos](#) / Public Domain

Type 2 diabetes occurs when cells do not respond correctly to insulin. This is called insulin resistance. As a result, glucose does not get into cells, and the cells in the body are unable to use glucose for energy (ATP). Cell death can result. Type 2 diabetes usually occurs slowly over time and is the most common form of diabetes. Family history and genes play a role in type 2 diabetes. Low physical activity level and poor diet might increase the risk of developing type 2 diabetes. If diet and exercise do not help keep blood glucose at normal levels, a doctor may prescribe medication.

### Practice:

Please fill in the chart below comparing and contrasting type 1 and type 2 diabetes.

TYPE 1 Diabetes	BOTH	TYPE 2 Diabetes
<p>TYPE 1 Diabetes is an autoimmune disease where the body's immune system attacks and destroys the insulin-producing beta cells in the pancreas. It typically develops in childhood or young adulthood and requires lifelong insulin therapy.</p> <p>TYPE 2 Diabetes is a metabolic disease characterized by insulin resistance and/or a deficiency in insulin production. It is often associated with obesity, sedentary lifestyle, and family history, and typically develops in middle-aged or older adults.</p>		