

Controlling Blood Glucose

Glucose and Glucagon Control Blood Glucose Level

- **Glucose** enters the body as part of **carbohydrates** in **food**, gets **digested** into individual glucose molecules and is **absorbed** into the **bloodstream**.
- **Use of Glucose:**
 - a. Glucose stored as **glycogen** in the **liver** and **muscles**
 - b. **Glucose** used for **respiration** and other **metabolic reactions**. When a person **exercises**, more **energy** is required and more **glucose** is removed from the blood for **respiration**.
- The **pancreas** monitors blood glucose concentration and responds to any changes by releasing **hormones**.

Homeostasis of Blood Glucose level

- When **blood glucose concentration is too high**, the pancreas releases the hormone **insulin**.

Function of insulin:

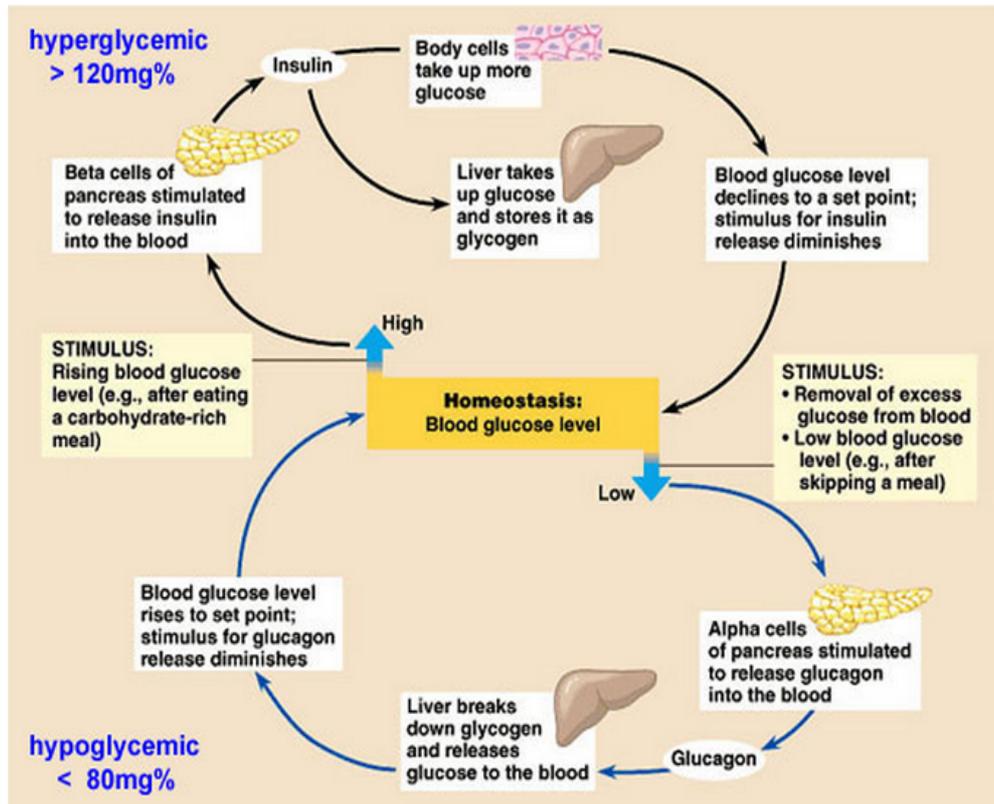
- a. **Insulin** causes **glucose** to move out of the **blood** and into the surrounding **cells**.
- b. It also converts **glucose** into **glycogen** in the **liver** and **muscle cells** where it can be stored until more glucose is required.
- c. This decreases the concentration of glucose back to normal levels

- When **blood glucose levels are too low**, the pancreas releases the hormone **glucagon**.

Function of Glucagon :

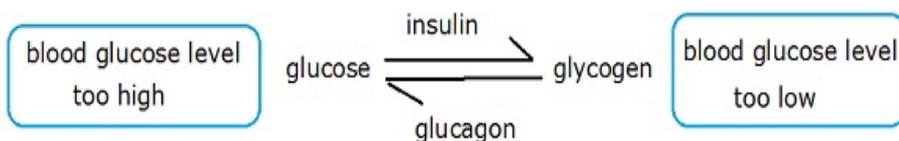
- a. Glucagon turns **glycogen** in the **liver** back to **glucose**.
- b. The glucose is then released into the **bloodstream** and the **blood glucose concentration** increases again.
- c. This increases the concentration of glucose in the blood back to normal levels

B5: Homeostasis and Response



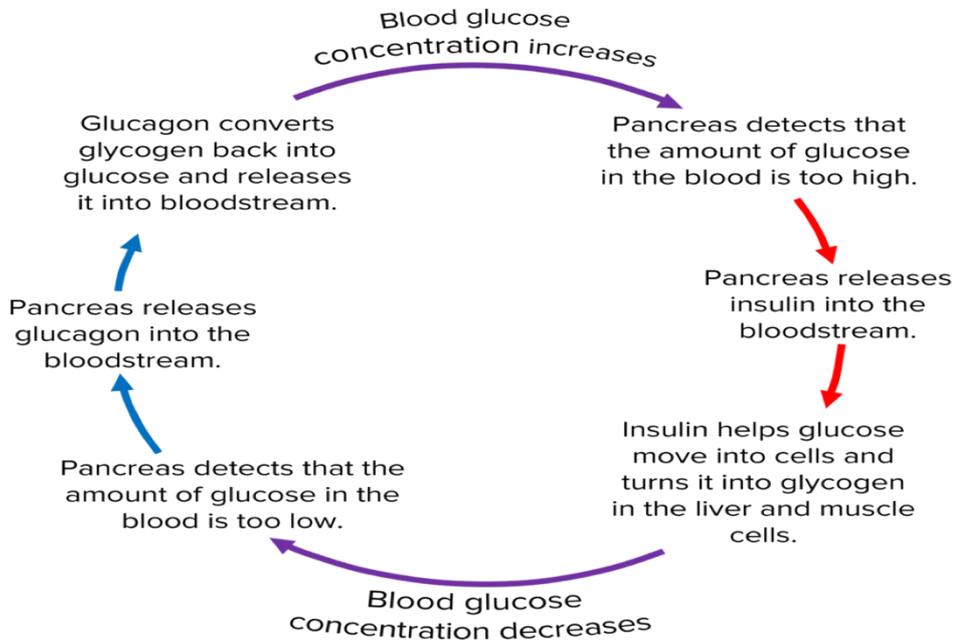
Negative Feedback Cycle: Interaction between insulin and Glucagon

- ① The **pancreas** detects that the **blood glucose concentration** is too high or too low.
- ② The **pancreas** releases **hormones** in response- **insulin** if there is too much glucose and **glucagon** if there is too little glucose.
- ③ **Insulin** helps **glucose** move into cells and converts it into **glycogen**, decreasing the **blood glucose concentration** back to a normal amount. **Glucagon** converts **glycogen** back to **glucose** which gets released into the bloodstream, increasing the **blood glucose concentration** to a normal amount.



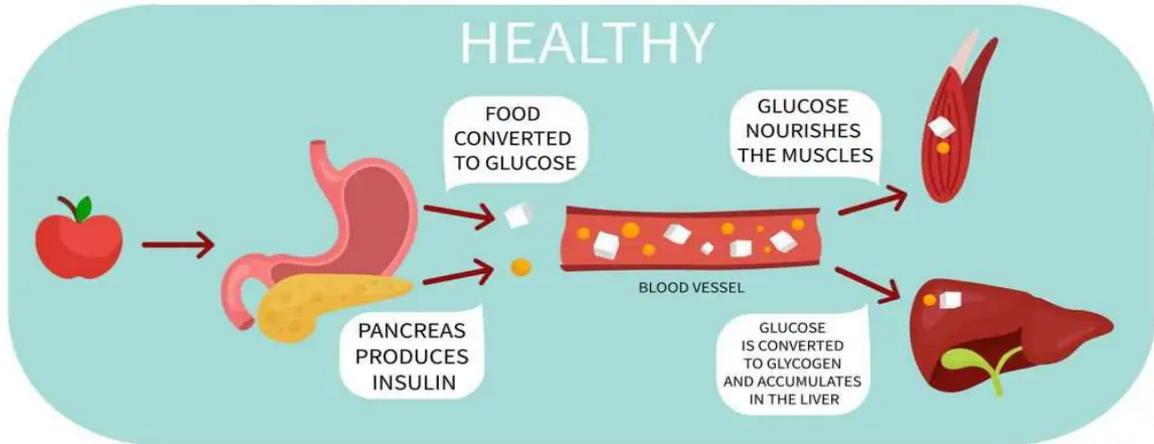
B5: Homeostasis and Response

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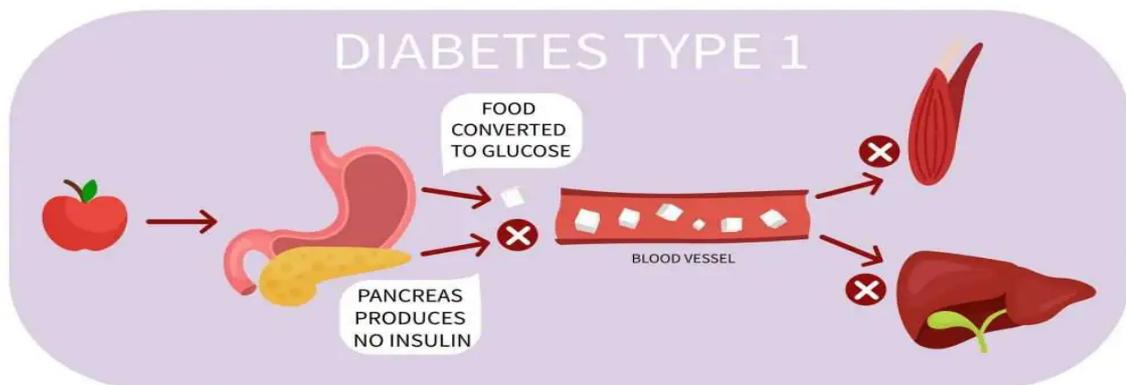
Type 1 and Type 2 Diabetes

- ▶ **Diabetes** is a condition that affects your ability to control blood sugar levels.
- ▶ There are two types of diabetes:
 - **Type 1 diabetes**
 - **Type 2 diabetes**
- ▶ The diagram below shows the normal process that occurs in healthy individuals without diabetes.



Type 1 diabetes

1. **Pancreas** produces very little **insulin** or produces none at all.
2. This causes uncontrolled **high blood sugar** levels and can be fatal.
3. Patients can be treated with regular **insulin injections** (mainly after food).
4. This helps to reduce the amount of glucose in the blood.
5. To control their blood glucose levels, individuals with type 1 diabetes should follow a balanced diet or sugar free diet.
6. Exercising will also help to reduce blood sugar levels because working muscles can use glucose during respiration.

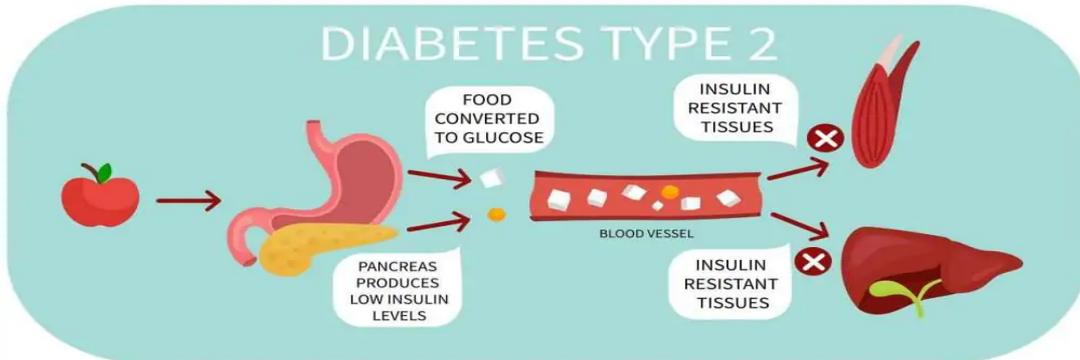


Type 2 diabetes - Insulin Resistant

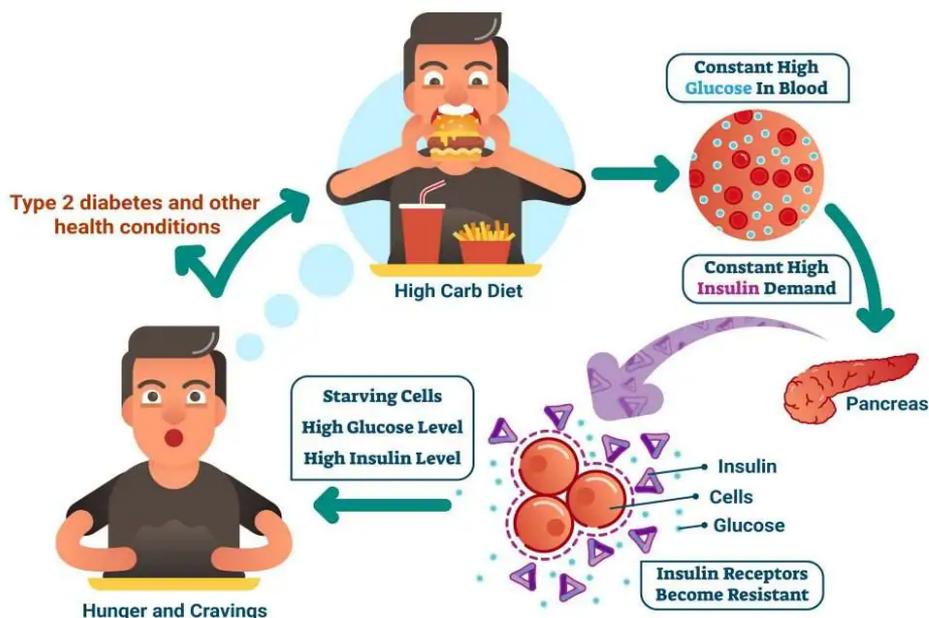
1. **Pancreas** produces **insulin** but body cells no longer respond to it- they are **resistant**.
2. This causes uncontrolled **high blood sugar levels** and can be dangerous.

B5: Homeostasis and Response

3. Type 2 diabetes is often controlled with strict **carbohydrate-controlled diets** and taking regular **exercise**.
4. To control their blood glucose levels, individuals with type II diabetes should eat carbohydrate- controlled diet and getting regular exercise



5. **Obesity** is a **risk factor** for type 2 diabetes.
6. **Obese** people usually consume higher amounts of **carbohydrates** so produce more **insulin** and causes body cells to develop **resistance**.
7. There is a strong relation between body mass index (BMI) and both type 2 diabetes and insulin resistance. In fact, obesity is a major risk factor for type 2 diabetes.



**B5: Homeostasis and
Response**

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