What happens to the sugar that we eat?

Fig. 1

Learning Intentions

- I can explain how the body metabolizes carbohydrates and protein.
- I can explain how the body stores fuel for future use
- I can apply my understanding to new situations
- I can investigate a question through inquiry.

Metabolism

Metabolism: refers to all chemical reactions that occur within the cells of the body.

Two Major Categories:

1. Anabolic Pathways: involved in the synthesis of compounds and require energy
2. Catabolic Pathways: release energy

Healthy Adult, the rates of anabolism and catabolism should be balanced.

Energy

An ATP Molecule

![ATP Molecule](image)
**Hormones**

- Anabolic Hormones (build fuel stores)
  - Ex. insulin
- Catabolic Hormones (breakdown stores)
  - Ex. Glucagon

**Carbohydrates**

- Glucose is metabolized by the body to produce energy. These processes are called [glycolysis](https://en.wikipedia.org/wiki/Glycolysis) and [citric acid cycle](https://en.wikipedia.org/wiki/Citric_acid_cycle).

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**What happens to “extra” Carbohydrates?**

- Excess glucose can be stored as [glycogen](https://en.wikipedia.org/wiki/Glycogen) in the liver and skeletal muscle. Once these stores are “full”, additional glucose can be transformed into [fatty acids](https://en.wikipedia.org/wiki/Fatty_acids) and [glycerol](https://en.wikipedia.org/wiki/Glycerol) and stored as [triglycerides](https://en.wikipedia.org/wiki/Triglyceride) in the adipose tissues.

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Proteins

- **Amino Acids** are predominantly used for protein synthesis.
- Excess circulating amino acids, converted to **glucose** or **fatty acids**, stored as **triglycerides**.

![Amino Acid Structure](image)

**What happens when we don’t get enough fuel?**

- During prolonged fasting, proteins are broken down to amino acids and converted to **ketones** to provide energy for the brain.
- Ketones are produced by the liver during starvation. They are released into the blood and can be used for energy by other tissues, more importantly the brain.
- Ketones are the body’s back up plan!

![Ketone Bodies](image)

**Important Concept**

- When you eat, you use that energy immediately and store the rest for later.
- Later, when you are fasting, you use the stored energy.

**Root Words**

- Glycogenesis: **Making** glycogen from glucose for storage.
- Glycogenolysis: **breaking** down glycogen to use for energy.
Type 1 Diabetes

TED x

- [https://www.youtube.com/watch?v=WlebxoTx408](https://www.youtube.com/watch?v=WlebxoTx408)

During this TEDx: please think about;
1. Why is it important to understand how food is metabolized?
2. What diseases does metabolism impact?

Take Away Tasks

- Project: you are what you eat.
  - Due, Tuesday, October 3rd