Libyan International Medical University
Faculty of Pharmacy
Second Year Block VII

INSULIN & GLUCAGON

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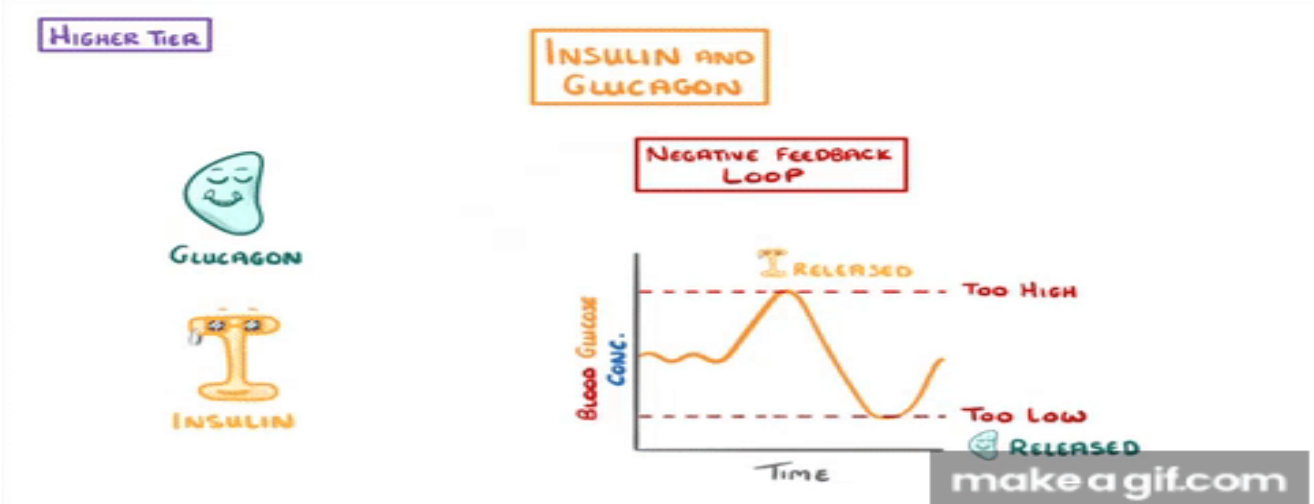
ILOS

- Introduction.
- Discuss the function of insulin.
- Explain the mechanism of action of insulin.
- Discuss the function of glucagon.
- Explain the mechanism of action of glucagon.
- Outline types of insulin deficiency.
- Summary.

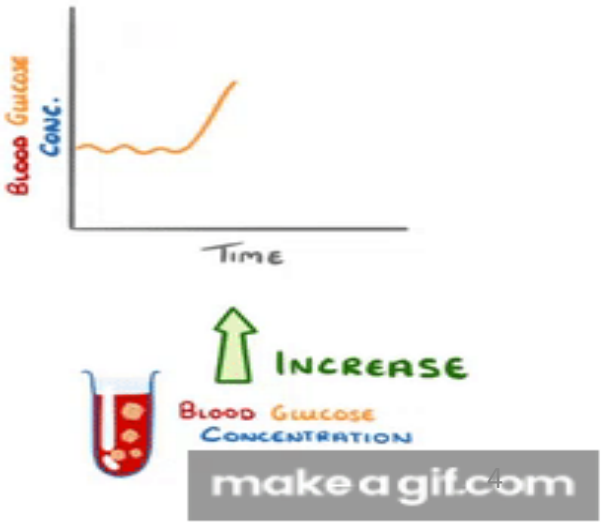
Introduction

- Insulin and glucagon are hormones that help regulate the levels of blood glucose, or sugar, in your body. Glucose, which comes from the food you eat, moves through your bloodstream to help fuel your body.
- They work in what's called a negative feedback loop. During this process, one event triggers another, which triggers another, and so on, to keep your blood sugar levels balanced.

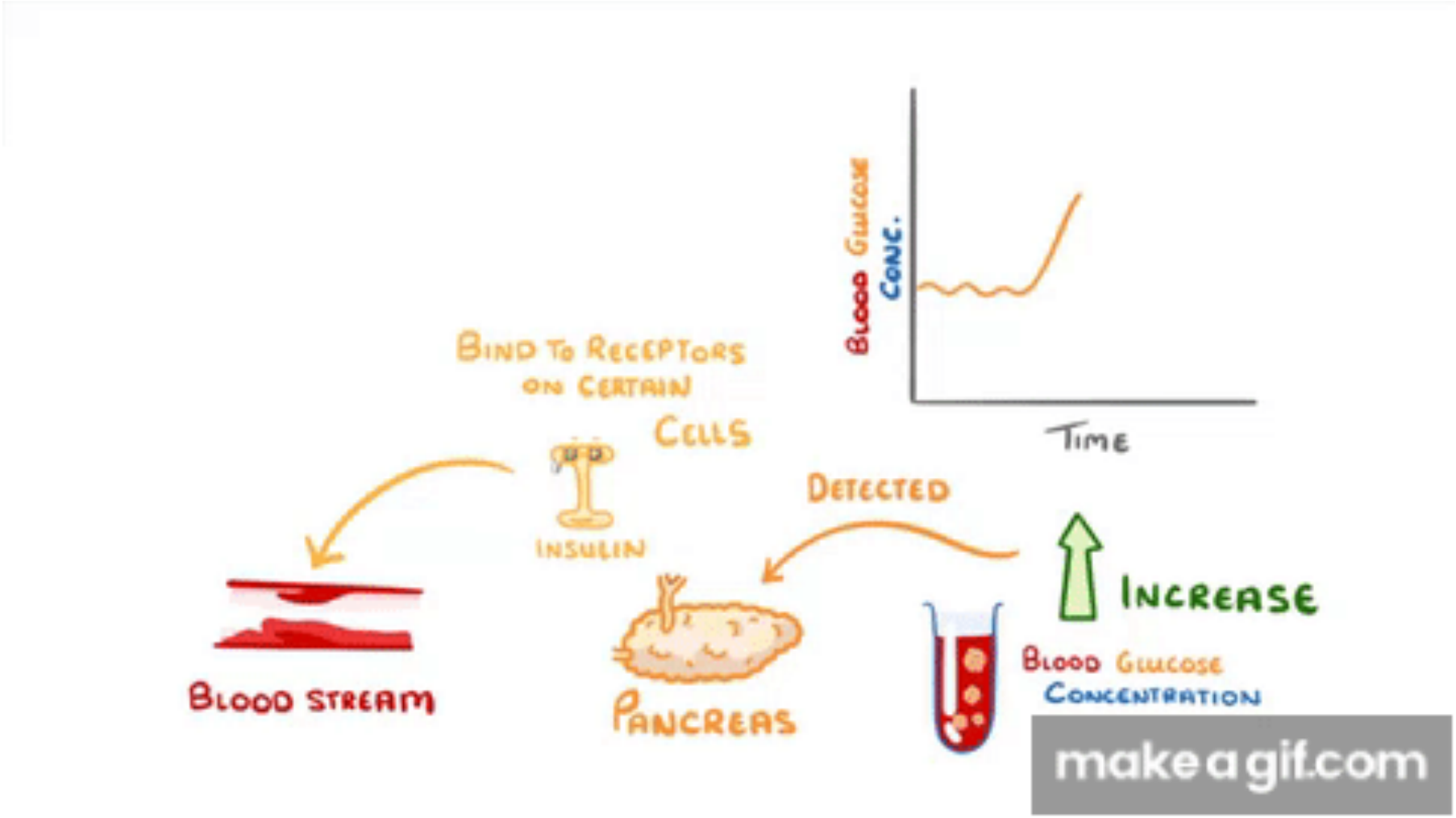


Function of insulin

• During digestion, foods that contain carbohydrates converted into glucose. Most of this glucose sent into your bloodstream, causing a rise in blood glucose levels. This increase in blood glucose signals your pancreas to produce insulin.



Mechanism of action of insulin



Chemical processes of insulin

Insulin ↓ Glucose concentration by storage

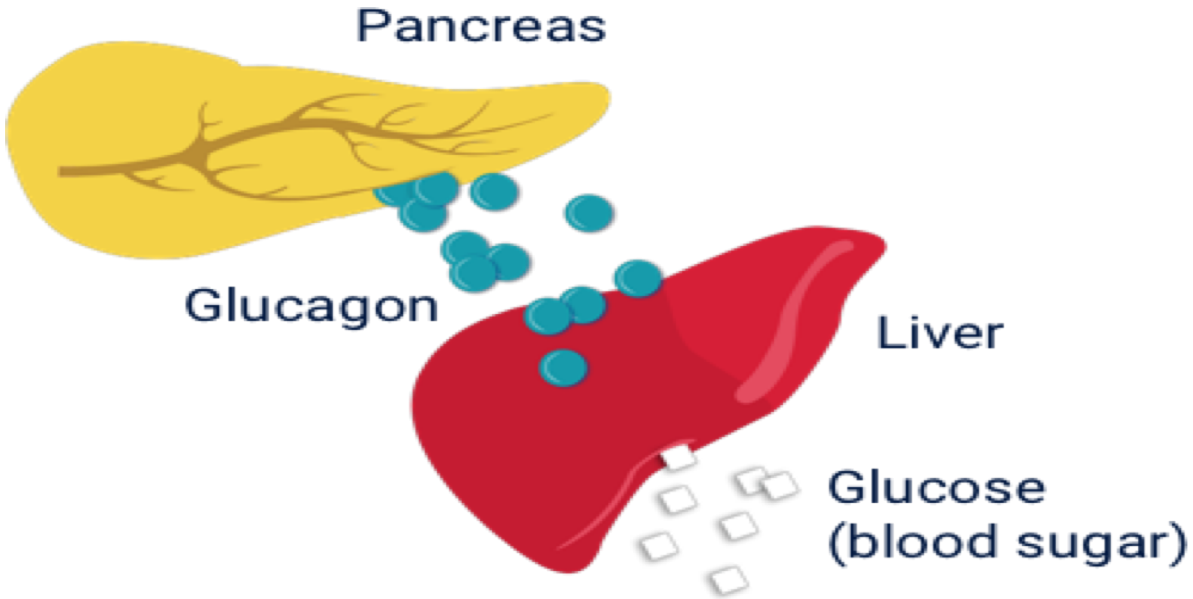
Glycolysis → ATP

Glucose —*Glycogenesis*→ *Glycogen*

Lipogenesis → Libids/Fatty acids

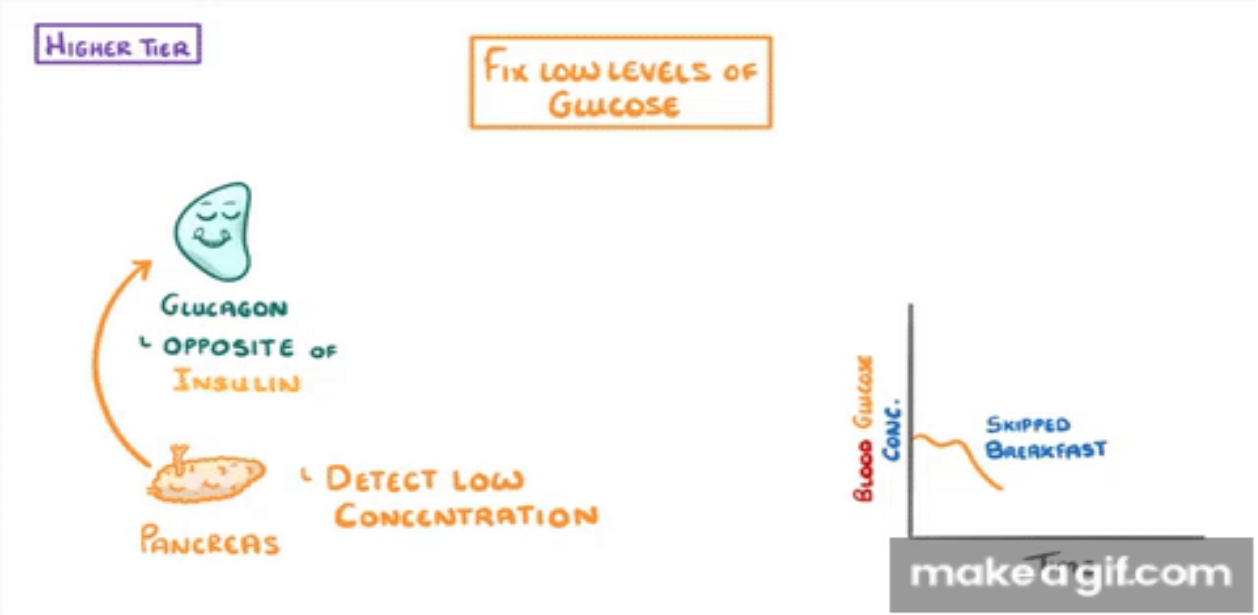
Function of glucagon

- Glucagon works to counterbalance the actions of insulin.
- About four to six hours after you eat, the glucose levels in your blood decrease, triggering your pancreas to produce glucagon.



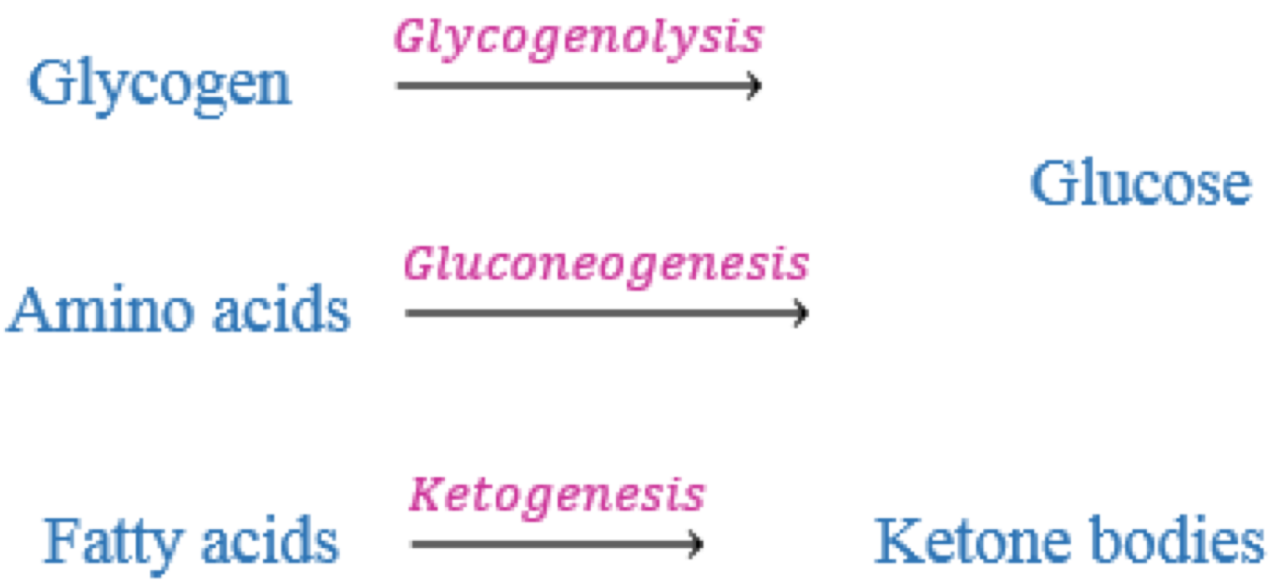
Mechanism of action of glucagon

• This hormone signals your liver and muscle cells to change the stored glycogen back into glucose. These cells then release the glucose into your bloodstream so your other cells can use it for energy.



Chemical processes of glucagon

Glucagon ↑ Glucose concentration by release



Somatostatin Inhibits Glucagon and Insulin

Increased blood glucose.

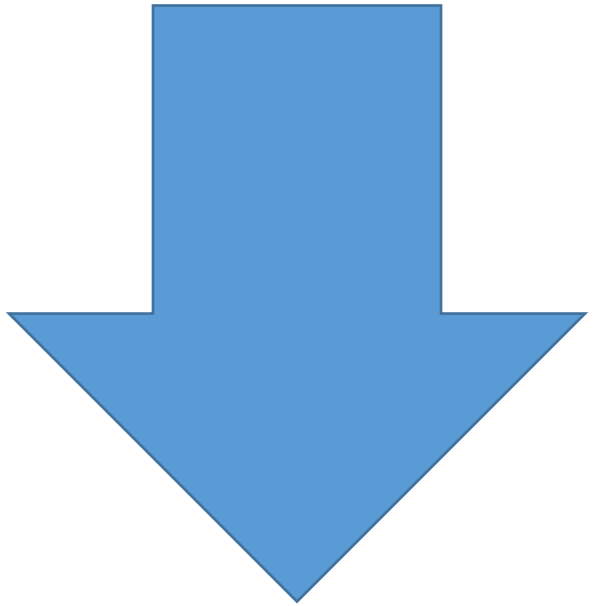
Increased amino acids.

Increased fatty acids.

Increased concentrations of several of the gastrointestinal hormones.

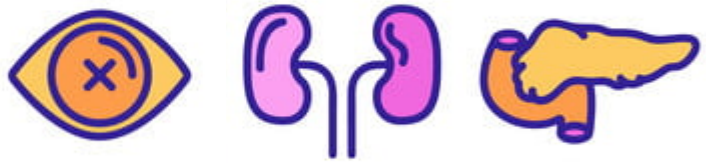
Types of insulin deficiency

- Diabetes mellitus, arguably the most important metabolic disease of human, is an insulin deficiency state.
- Two principal forms of this disease are recognized:



Types of insulin deficiency

• Type 1 or insulin-dependent diabetes mellitus is the result of a deficiency of insulin. The onset of this disease typically is in childhood. It is due to the destruction of pancreatic beta cells, most likely the result of autoimmunity to one or more components of those cells.



Types of insulin deficiency

- Type 2 or non-insulin-dependent diabetes mellitus begins as a syndrome of insulin resistance. That is, target tissues fail to respond appropriately to insulin. Typically, the onset of this disease is in adulthood. Despite monumental research efforts, the precise nature of the defects leading to type II diabetes has been difficult to ascertain, and the pathogenesis of this condition is multifactorial .

Summary

Insulin and glucagon are hormones that help regulate the levels of blood glucose

Some cells use glucose as energy. Other cells, such as in your liver and muscles, store any excess glucose as a substance called glycogen.

Glucagon signals your liver and muscle cells to change the stored glycogen back into glucose.

There is two principal forms of diabetes Type 1 or insulin-dependent diabetes mellitus and Type 2 or non-insulin-dependent diabetes mellitus

References

- John E. Hall, P. D. (2011) *Guyton and Hall Textbook of Medical Physiology*. Edited by 12th edition.

- https://www.healthline.com/health/diabetes/insulin-and-glucagon

- http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/pancreas/insulin_phys.html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