



Endocrine system

- [Endocrine system](#)
- [Lesson plan \(English\)](#)
- [Lesson plan \(Polish\)](#)



[Link to the lesson](#)

Before you start you should know

- body functions are controlled by the nervous system;
- blood reaches all the cells of the body and transports different substances.

You will learn

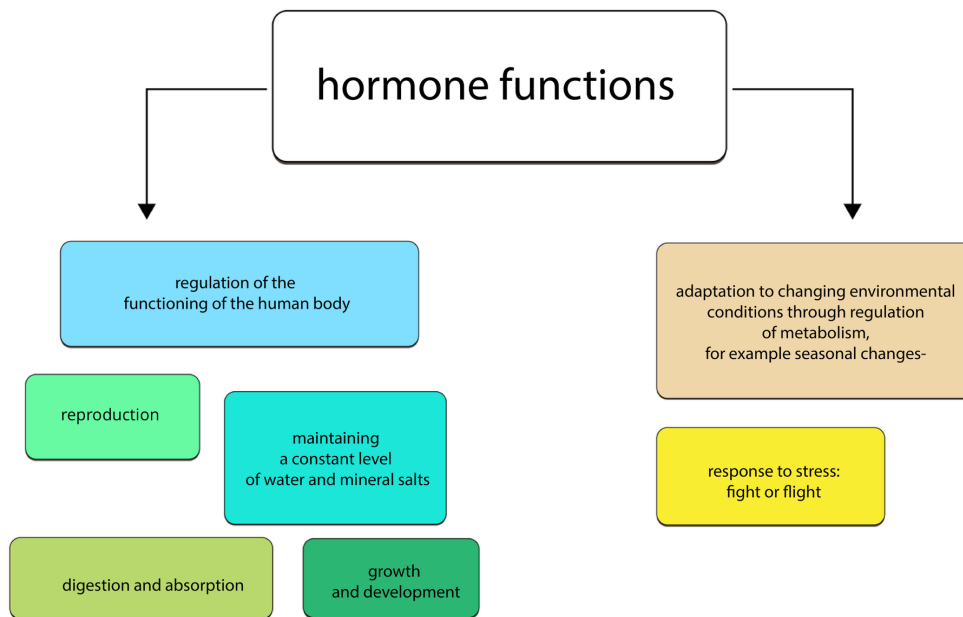
- to list endocrine glands and hormones they produce;
- to show on a schematic drawing the localization of endocrine glands;
- to explain the specificity of hormones;
- to describe the meaning of hormones in regular life functions of the body.

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Nagranie dźwiękowe dotyczące układu hormonalnego człowieka

Endocrine glands and hormones

Endocrine system maintains balance in the internal environment of our body, adapts it to changing conditions, regulates metabolism, controls growth and development. It is composed of **endocrine glands**, also known as **hormonal glands** or internal secretion glands. It is there where production and secretion of hormones takes place.



Functions of hormones

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Endocrine glands are highly vascularized and don't have their own excretory ducts, which means that **hormones** are secreted directly to the blood stream. They work in very low concentration and only on target cells which they reach with blood. These cells have special **receptors** – protein particles (rarely fat particles), which hormones connect with in order to make the cell start or finish a certain process. As a result of a hormone connecting with a receptor, the target cell begins or finishes a specific process that depends on a given hormone.

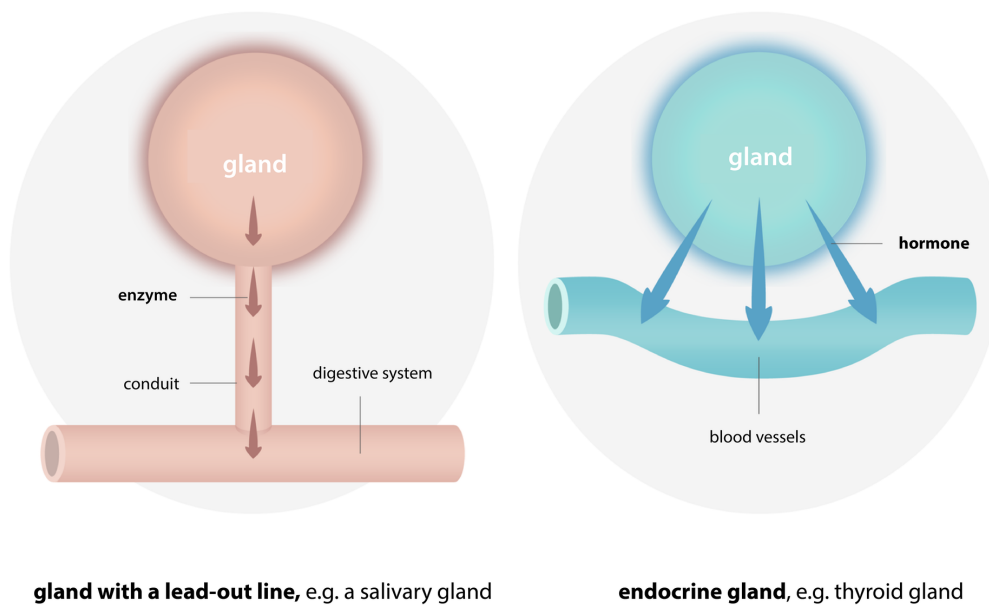
The action of the most hormones on cells

Source: GroMar Sp. z o.o., licencja: CC BY-SA 3.0.

Types of endocrine glands and their functions

Endocrine glands are situated in different parts of the body and are not connected with each other. Thanks to blood and hormones in it they create an integrated system that works together. Endocrine glands: hypothalamus, pituitary gland and pineal gland are the structures of the nervous system, pancreas – of the digestive system, and testicles and ovaries – of the reproductive system.

Endocrine glands are divided into 2 groups: those that produce and secrete hormones and mixed glands, which produce hormones and other substances (e.g. pancreas – digestive enzymes, and reproductive glands – gametes).



A comparison of a digestive gland and an endocrine gland

Source: Tomorrow Sp. z o.o., licencja: CC BY 3.0.

Hormones are produced not only by highly specialized endocrine glands, but also by other organs and tissues, e.g. kidneys, heart, intestinal mucosa cells and nervous tissue.

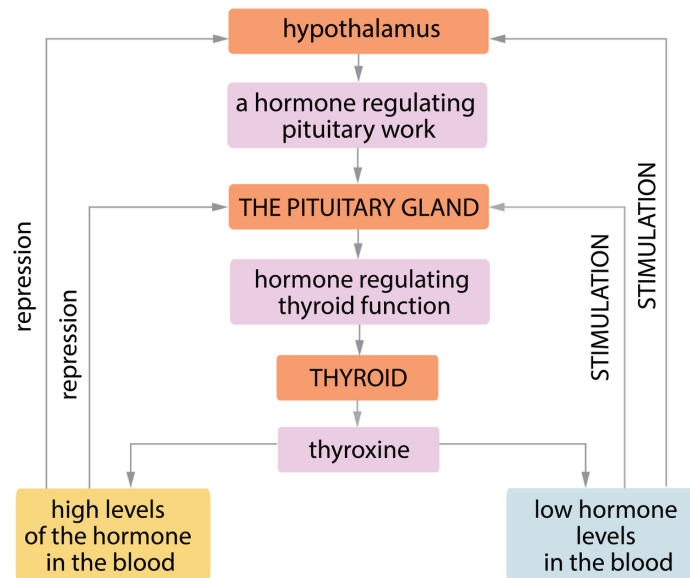
Hormonal regulation

The most important task of the system is to maintain the balance in the organism (**homeostasis**) with changing conditions of the environment. It is mainly the task of hormones. They are produced by endocrine glands nearly all the time. This is why in blood at the same time there are numerous different hormones. They can simultaneously react on one or many organs and regulate one or many physiological processes. The hormonal level is controlled 24-hour a day by 2 superior endocrine glands: hypothalamus and pituitary gland.

The nervous system controls the endocrine system using **hypothalamus**, which is part of the brain. Changes in the level of hormones in blood or information from different parts of the brain cause the hypothalamus to produce 2 types of hormones: **stimulating** ones, which stimulate pituitary gland to produce hormones or **suppressive** ones, which stop the pituitary gland from producing hormones.

Hypothalamus, together with pituitary gland, regulate e.g. how thyroid works. Elevated level of thyroid hormones (e.g. thyroxine) in blood is for the hypothalamus and for the pituitary gland a signal to stop producing the hormones that stimulate secreting functions of the thyroid. And the other way round – when thyroid hormone levels are too low, hypothalamus and pituitary gland release hormones that stimulate thyroid to secrete its hormones.

This regulatory mechanism is called negative feedback. The rule of negative feedback is very simple – any divergence from the given norm starts the mechanism that is responsible for maintaining the norm. This rule regulates most of the processes in your body, which allows you to maintain homeostasis.



Homeostasis process on the example of the secretion of thyroxine

Source: Tomorrow Sp. z o.o., licencja: CC BY 3.0.

On the same basis your body regulates glucose levels. If it is too high, it begins secreting **insulin**. This hormone causes glucose to be converted in glycogen which is stored in the liver, which leads to lowering the amount of glucose in blood. Insulin is produced as long as the optimum level of sugar in blood is achieved. When the amount of glucose drops dramatically, other mechanism starts. Then your body produces other hormone, **glucagon**, which releases glucose by breaking down glycogen. Other example of homeostasis are the thermoregulatory processes. Feeling hot initiates the mechanism that is aimed at lowering the body temperature, e.g. sweating. When your body temperature drops, sweating ceases.

Incorrect functioning of endocrine glands can cause imbalance in your body. When endocrine gland produces too little hormones, we are talking about [decrease in gland functioning](#) and when it produces too many hormones, we talk about [increase in gland functioning](#).

Exercise 1

Where is the thyroxine hormone produced and stored?

- produced: pancreas; stored: thyroid
- produced: liver; stored: pancreas
- produced: thyroid; stored: thyroid
- produced: liver; stored: liver

Summary

- Endocrine system is composed of endocrine glands and specialized cells that produce hormones.
- Endocrine glands as glands of internal secretion do not have ducts, they secrete hormones directly to the blood.
- Hormones are spread throughout the entire body, but they influence only the target cells – this is the specific aspect of how they work.
- Hormones allow you to maintain all your physiological processes in balance.
- Lack of hormone in blood is caused by decrease in gland functioning, and when there is too much of that hormone, we talk about increase in gland functioning.

Keywords

hormones, endocrine glands, endocrine system

Glossary

endocrine gland

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Nagranie dźwiękowe słówka endocrine gland

gruczoł dokrewny – gruczoł hormonalny, gruczoł wydzielania wewnętrznego; produkuje i wydziela hormony bezpośrednio do krwi

homeostasis

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Nagranie dźwiękowe słowa homeostasis

homeostaza – stan równowagi organizmu; zdolność organizmu do utrzymania stałości środowiska wewnętrznego w zmieniających się warunkach, oparta na zasadzie ujemnego sprzężenia zwrotnego

hormones

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decrease in gland functioning

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Nagranie dźwiękowe słowa decrease in gland functioning

niedoczynność gruczołu hormonalnego – zakłócenie czynności wydzielniczej gruczołu dokrewnego, wskutek czego gruczoł produkuje zbyt małe ilości hormonu

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Lesson plan (English)

Topic: Endocrine system

Author: Elżbieta Szedzianis

Target group

7th grade students of an elementary school

Core curriculum

11. Endocrine system. Student:

1) enumerates the endocrine glands (pituitary gland, thyroid gland, pancreas, adrenal glands, testicles and ovaries); shows where they are located and says which hormones are secreted by which endocrine gland (somatotropin, thyroxine, insulin, glucagon, adrenaline, testosterone, estrogen and progesterone) and explains their role.

Lesson aim

The students describe the organs that form the endocrine system and the hormones they secrete.

Key Success Criteria

- you will name six endocrine glands and show where they are located on your body;
- you will explain how selected three hormones work.

Key competences

- communicating in the mother tongue;
- communicating in a foreign language;
- Mathematical competence and basic competences in science and technology;
- digital competence;
- learning to learn;
- Social and civic competences.

Methods/forms of work:

Work with text, workshop method, didactic game.

Individual and group work.

Teaching measures:

- abstract;
- interactive whiteboard or traditional blackboard;
- tablets/computers;
- post-its;
- markers;
- sheets of brown paper;
- metodnik (type of a teacher's book).

Lesson plan overview (Process)

Introduction

The teacher gives the topic of the lesson and the key success criteria. He presents the proposed course of the class.

Realization

1. The teacher asks the students to read the fragment titled "Endocrine glands and hormones".
The students define the notion of hormone, system of hormones and endocrine gland.
2. The teacher divides students into teams. They analyze the illustration "Endocrine glands and their role". They show on themselves the placement of the glands. On post-its they write down the names of the glands and the hormones they secrete.
3. The teacher announces a competition for the most faithful recreation of the illustration the students analyzed. Each group receives a sheet of brown paper and markers. The teacher gives a signal and the students on a sheet of paper draw the outline of a silhouette of one of them and within the outline they draw the endocrine glands and stick the previously made post-its with the names of the glands and hormones). When the time is up, the teams, going clockwise, take each other's work and compare how faithful they were to the illustration. All discrepancies must be recorded. The team whose work has the least amount of discrepancies wins.
4. The students analyze the illustration "Functions of the hormones". The volunteers or students selected by the teacher list the names of the hormones that are related with the functions written down on the illustration. The teacher explains on the basis of the given examples what is the negative feedback in the hormonal system.
5. The teacher presents an interactive illustration of „The action of hormones on cells” and explains the diagram shown on it.
6. Students complete interactive exercises.

Summary

The teacher asks the students to assess the knowledge they gain during this class using metodnik method.

Homework

Write a short note about the topics covered in the lesson

The following terms and recordings will be used during this lesson

Terms

endocrine gland

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Texts and recordings

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Lesson plan (Polish)

Temat: Układ hormonalny

Autor: Elżbieta Szedzianis

Adresat

Uczeń klasy VII szkoły podstawowej.

Podstawa programowa

11. Układ dokrewny. Uczeń:

1. wymienia gruczoły dokrewne (przysadka, tarczyca, trzustka, nadnercza, jądra i jajniki); wskazuje ich lokalizację i podaje hormony wydzielane przez nie (hormon wzrostu, tyroksyna, insulina, glukagon, adrenalina, testosteron, estrogeny i progesteron) oraz przedstawia ich rolę.

Cel lekcji

Uczniowie opisują narządy układu hormonalnego i wydzielane przez nie hormony.

Kryteria sukcesu

- omówisz sześć gruczołów dokrewnych i wskażesz na sobie ich położenie;
- wyjaśnisz działanie trzech wybranych hormonów.

Kompetencje kluczowe

- porozumiewanie się w języku ojczystym;
- porozumiewanie się w językach obcych;
- kompetencje matematyczne i podstawowe kompetencje naukowo-techniczne;
- kompetencje informatyczne;
- umiejętność uczenia się;
- kompetencje społeczne i obywatelskie.

Metody/formy pracy

Praca z tekstem, metoda warsztatowa, gra dydaktyczna.

Praca indywidualna oraz praca w grupach.

Środki dydaktyczne

- abstrakt;

- tablica interaktywna lub tradycyjna;
- tablety/komputery;
- kartki samoprzylepne;
- pisaki;
- arkusze szarego papieru;
- metodniki.

Fazy lekcji

Wstępna

Nauczyciel podaje temat lekcji i kryteria sukcesu. Omawia przebieg zajęć.

Realizacyjna

1. Nauczyciel prosi uczniów, żeby przeczytali fragment pt. „Guczoły dokrewne i hormony”.
Uczniowie definiują pojęcia hormonu, układu hormonalnego i gruczołu dokrewnego.
2. Nauczyciel dzieli podopiecznych na zespoły. Uczniowie analizują ilustrację „Guczoły dokrewne i ich rola”. Wskazują na sobie położenie gruczołów dokrewnych. Wypisują na kartkach samoprzylepnych nazwy gruczołów oraz nazwy wydzielanych przez nie hormonów.
3. Nauczyciel ogłasza konkurs na najwierniejsze odtworzenie analizowanej ilustracji. Każdy zespół otrzymuje arkusz szarego papieru i pisaki. Na znak dany przez nauczyciela, uczniowie na arkuszu papieru obrysowują sylwetkę jednego z uczniów, a następnie wewnątrz jej konturu rysują gruczoły dokrewne i przyklejają przygotowane wcześniej kartki (z nazwami poszczególnych gruczołów i hormonów). Po upływie wyznaczonego czasu zespoły zgodnie z ruchem wskazówek zegara przekazują sobie swoje prace i sprawdzają stopień wierności odwzorowania ilustracji z abstraktu. Zaznaczają wszystkie niezgodności. Zespół, którego praca ma ich najmniej, wygrywa.
4. Uczniowie omawiają ilustrację „Funkcje hormonów”. Ochotnicy lub wskazani przez nauczyciela uczniowie wymieniają nazwy hormonów odpowiadające funkcjom wymienionym na ilustracji. Nauczyciel objaśnia na podstawie podanych przykładów na czym polega sprzężenie zwrotne ujemne w układzie hormonalnym.
5. Nauczyciel prezentuje ilustrację interaktywną „Działanie hormonów na komórki” i objaśnia przedstawiony na niej schemat.
6. Uczniowie wykonują ćwiczenie interaktywne.

Podsumowująca

Nauczyciel prosi uczniów, żeby za pomocą metodników ocenili wiedzę zdobytą na lekcji.

Zadanie domowe

Napisz krótką notatkę dotyczącą tematów poruszanych na lekcji

W tej lekcji zostaną użyte m.in. następujące pojęcia oraz nagrania

Pojęcia

endocrine gland

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Teksty i nagrania

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