

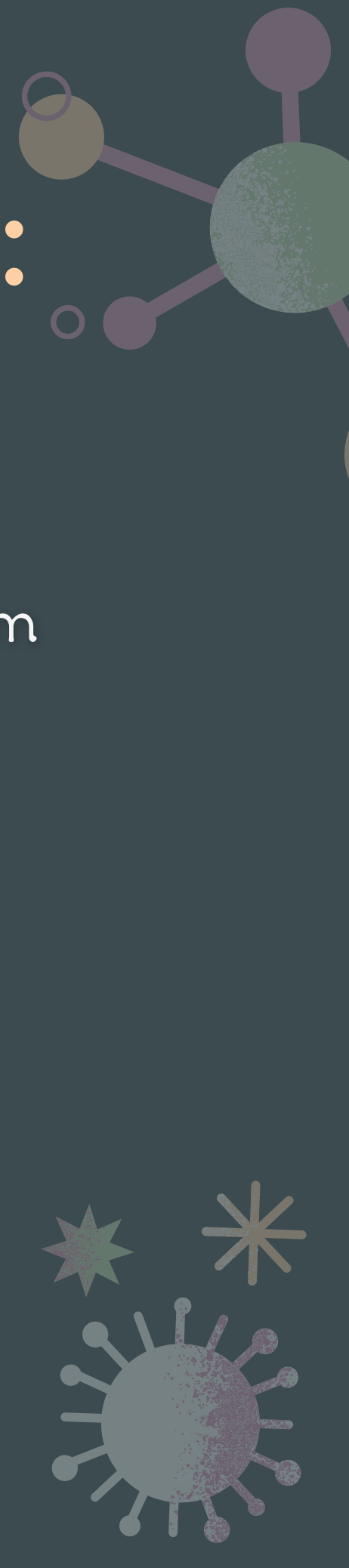


# Chemical choreography

Nervous and endocrine systems



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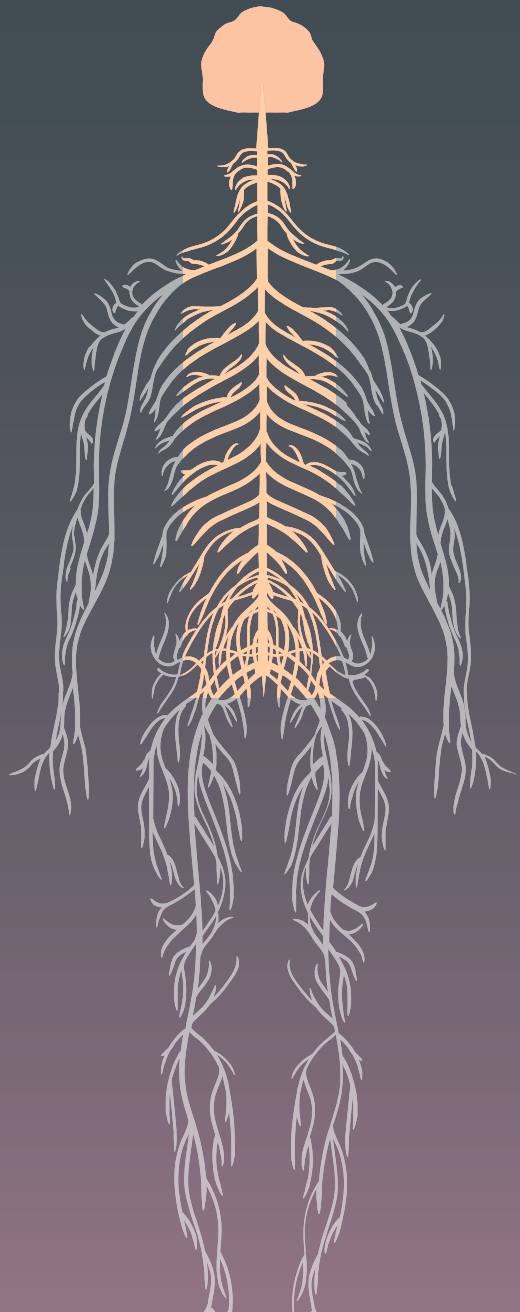
An abstract illustration on a dark blue background. On the left, a figure in shades of teal and pink is in a dynamic, almost dancing pose. On the right, a figure in shades of green and yellow is in a similar pose. Between them are various geometric shapes: a central cluster of circles connected by lines, several individual circles in different colors (teal, purple, brown), and several star-like shapes. The overall composition is balanced and artistic.

# The symphony of the body

Coordination is key to health. Let's imagine the body as a symphony where the nervous and endocrine systems dance together. This harmony ensures the coordination of essential functions, maintaining balance and health in an internal spectacle.

# Moving to the rhythm of the nervous system

The nervous system, our main dancer, is divided into two fundamental parts: the central nervous system (CNS) and the peripheral nervous system (PNS).



## Central nervous system

### **BRAIN**

The command center, where information is processed, decisions are made, and memories are stored.

### **SPINAL CORD**

It acts like an information highway, transmitting signals between the brain and the rest of the body.

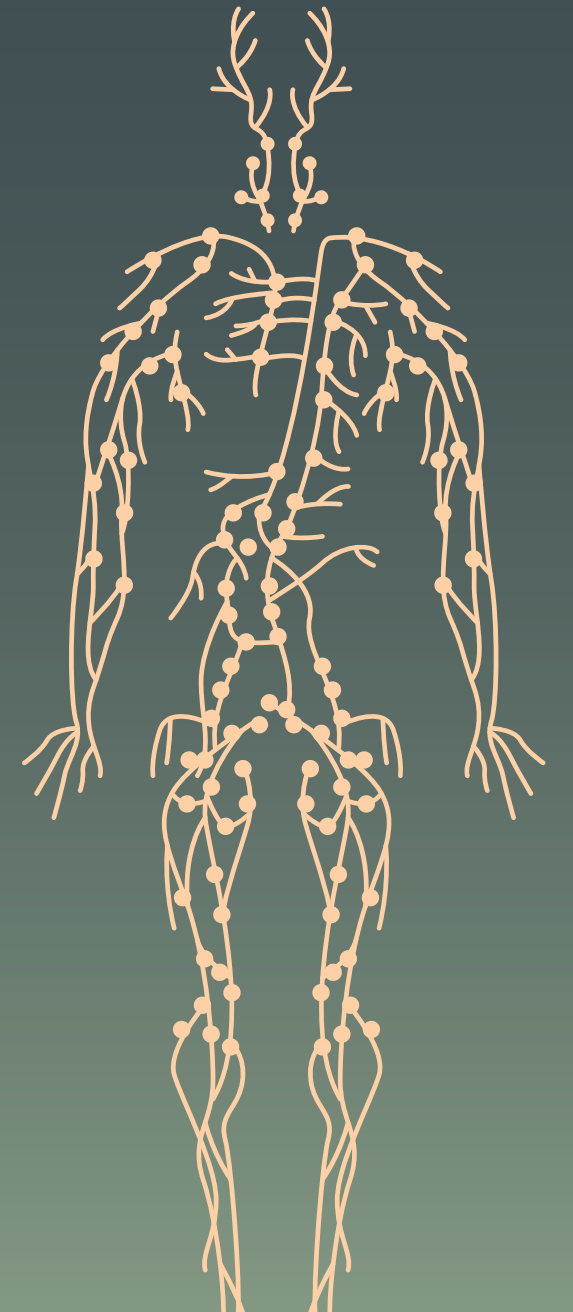
## Peripheral nervous system

### **NERVES**

Conduits carrying information to and from the central nervous system.

### **GANGLIA**

Information processing points.





# Functions of the nervous system

## **STIMULUS RECEPTION**

Capture information from the environment through sensory receptors.

## **INFORMATION PROCESSING**

The central nervous system analyzes the incoming information.

## **RESPONSE GENERATION**

Signals are transmitted through the peripheral nervous system to execute appropriate responses.





# Neurons dancing to the hormonal tune

Nerve impulses are like a choreographed movement: electric and chemical signals traveling between neurons, coordinating responses.

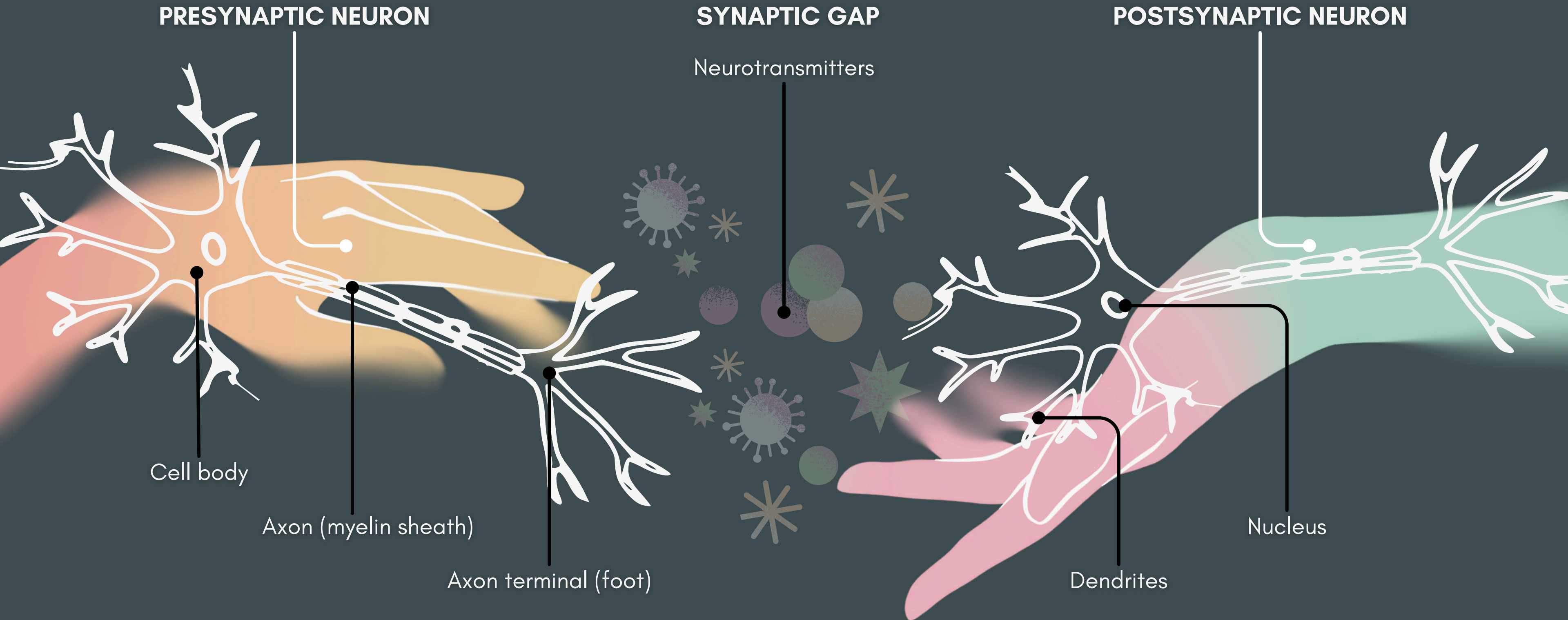
## NEURONS

Nerve cells are the key players. They have dendrites (receptors), the cell body (control center), and axons (signal transmission).

## SYNAPSES

Points of connection between neurons. Here, the signal is transmitted via neurotransmitters.

# Neurons dancing to the hormonal tune



# The dance of immediate response

Synapses, an electric and chemical dance, enable swift transmission of nervous signals. It's like the perfect choreography between neurons, ensuring the body's immediate responses to changes.

1

## EXTERNAL STIMULUS

For example, touching a hot surface.

2

## RECEPTION

Sensory receptors detect the stimulus and transmit the information through sensory neurons.

3

## PROCESSING

The central nervous system interprets information, assessing the need for a response.

4

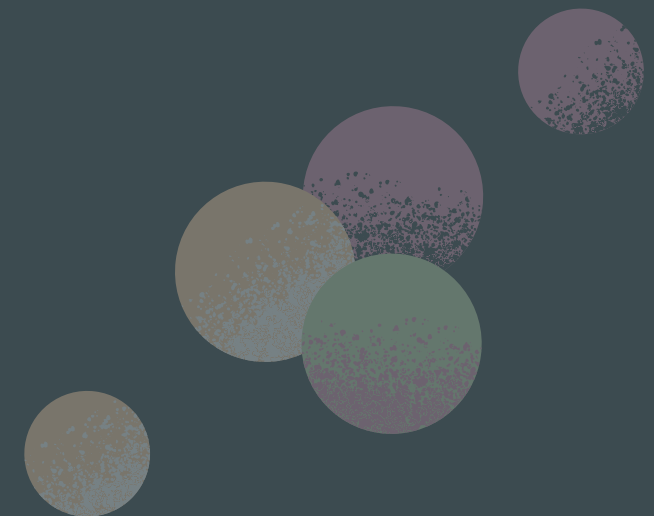
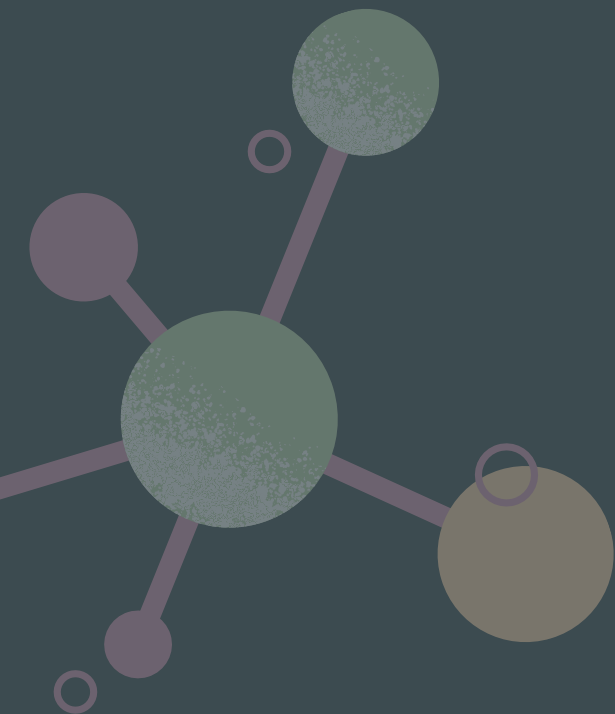
## RESPONSE EXECUTION

The muscles or organs respond immediately by pulling the hand away from the hot surface.

5

## RESPONSE GENERATION

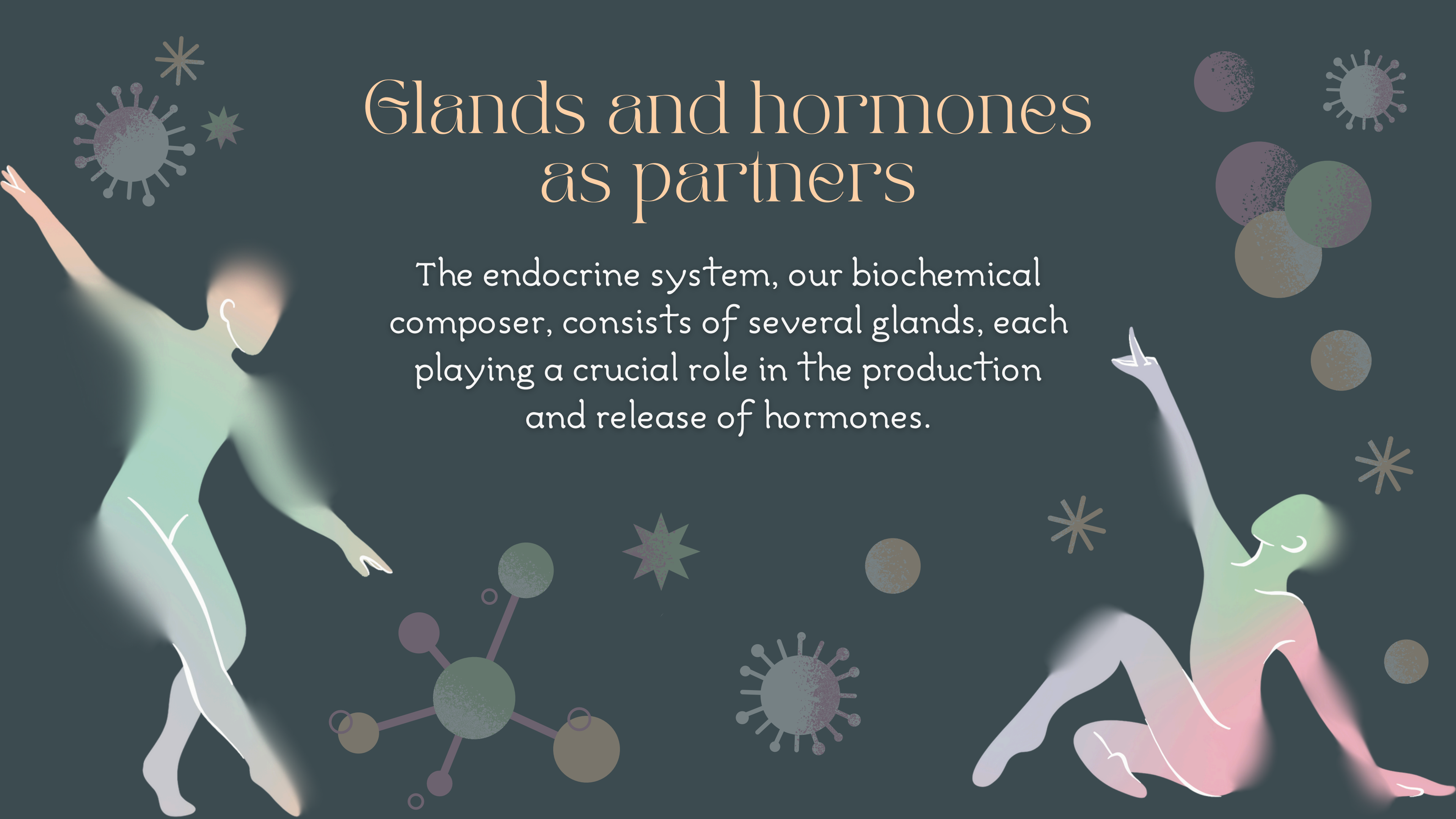
If necessary, the central nervous system sends motor signals through motor neurons.





# Glands and hormones as partners

The endocrine system, our biochemical composer, consists of several glands, each playing a crucial role in the production and release of hormones.



# Endocrine melody

## Hypothalamus

Regulates bodily functions and releases hormones that control the pituitary gland.

## Pituitary

Secretes various hormones that regulate other endocrine glands.

## Pineal Gland

Releases melatonin, regulating the sleep-wake cycle and other circadian rhythms.

## Thyroid

Produces hormones that regulate metabolism and growth.

## Parathyroid

Regulates calcium levels in the blood.

## Thymus

Contributes to the development of the immune system.



# Endocrine melody

## Adrenals:

They release hormones like cortisol and adrenaline, controlling stress and metabolism.

## Páncreas

It secretes insulin and glucagon, regulating blood glucose levels.

## Ovaries (in females):

They produce sex hormones, regulating the menstrual cycle and reproduction.

## Testicles (in males)

They produce sex hormones and are responsible for sperm production.





# Functions of the endocrine system

## **METABOLISM REGULATION**

Thyroid and pancreas influence energy usage.

## **MINERAL BALANCE**

Parathyroid maintains calcium levels.

## **STRESS RESPONSES**

Adrenals release hormones in response to stressful situations.

## **SEXUAL GROWTH AND DEVELOPMENT**

Hypothalamus and gonads influence sexual maturation and growth.



# The long-term hormonal dance

In this hormonal dance, hormones act as scores, directing the complex symphony of long-term bodily functions.

1

## INTERNAL OR EXTERNAL STIMULUS

For example, the need to regulate blood glucose.

2

## HORMONE RELEASE

The relevant gland, such as the pancreas, secretes specific hormones.

3

## BLOOD CIRCULATION

The hormones travel through the bloodstream.

4

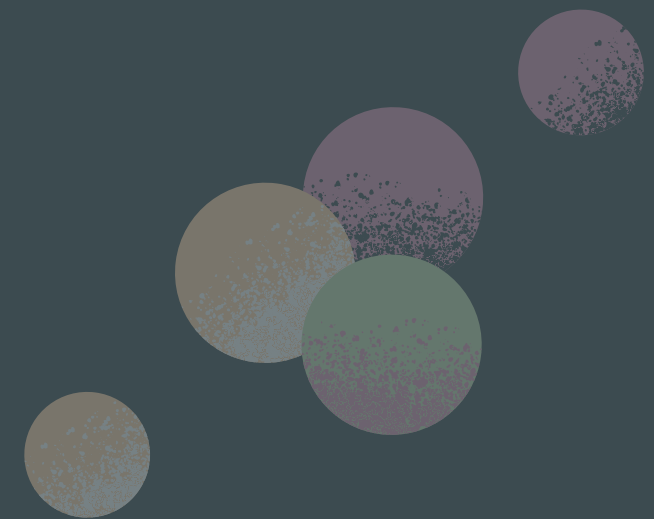
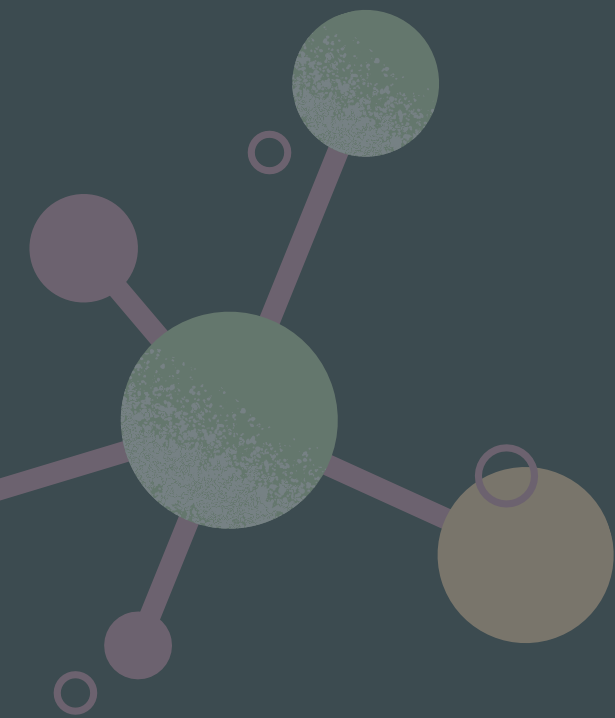
## RECEPTION IN TARGET CELLS

"Diana" cells respond to hormones, regulating specific functions.

5

## FEEDBACK

The endocrine system adjusts hormone production according to the body's needs.





# All set for the show!

Hormonal dance contrasts with nervous agility. While the nervous system acts swiftly, endocrine responses, like an elegant choreography, unfold over time.





# Harmony in action



Both systems dance together to maintain homeostasis, ensuring a complete and balanced response. The coordinated interplay between the nervous and endocrine systems is evident in various situations.

## STRESS AND DANGER RESPONSE

The nervous system reacts quickly, while the endocrine system maintains alertness, ensuring a prolonged response to stressful situations.

## BLOOD SUGAR REGULATION

The nervous and endocrine systems collaborate to maintain stable sugar levels, essential for metabolic balance.

## MENSTRUAL CYCLE

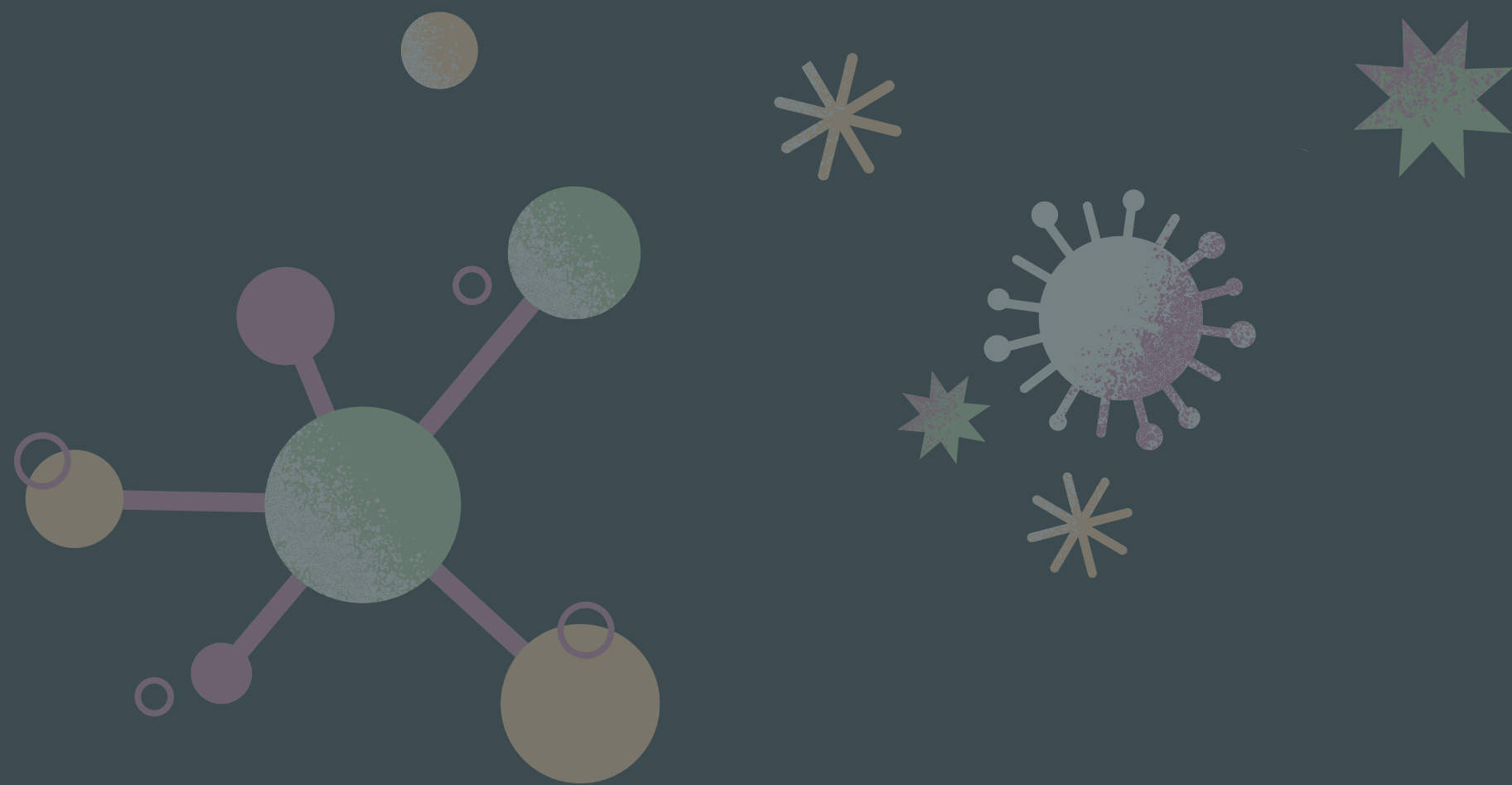
Both the nervous and endocrine systems coordinate during the menstrual cycle, regulating the release of eggs and preparing the uterus.

## TEMPERATURE REGULATION

The nervous system responds immediately to temperature changes, while the endocrine system contributes to long-term adjustments.

# The ballet of maturity and reproduction

The nervous and endocrine systems perform a delicate dance that guides sexual development and reproductive processes throughout life.

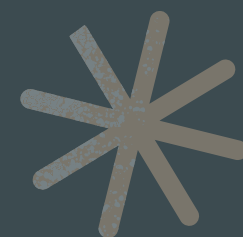
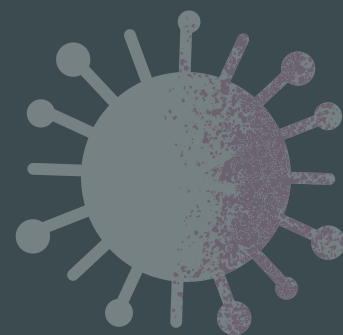




1

## PUBERTY AND SEXUAL DEVELOPMENT

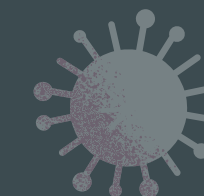
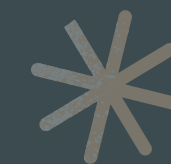
The endocrine system, primarily the pituitary gland and the gonads, orchestrates the onset of puberty, triggering hormonal changes that lead to secondary sexual development.



3

## FERTILIZATION AND PREGNANCY

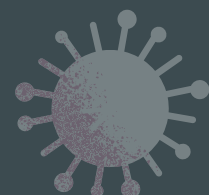
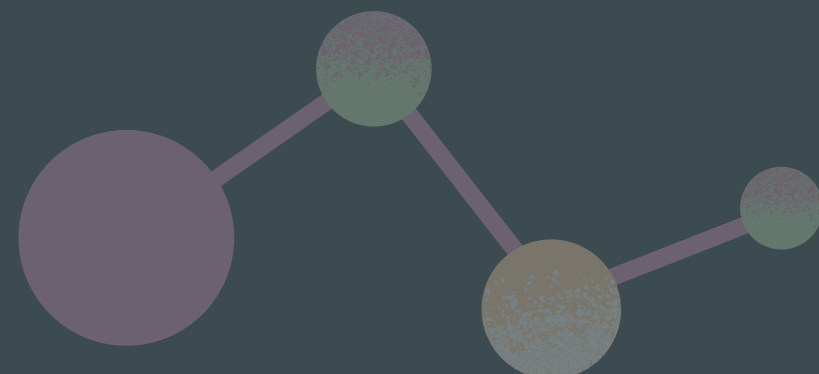
Coordination between systems is crucial in fertilization, where hormones from the endocrine system prepare the uterus and regulate the implantation of the fertilized egg.



2

## MENSTRUAL CYCLE AND OVULATION

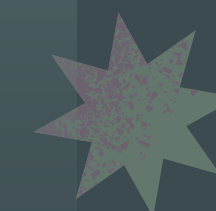
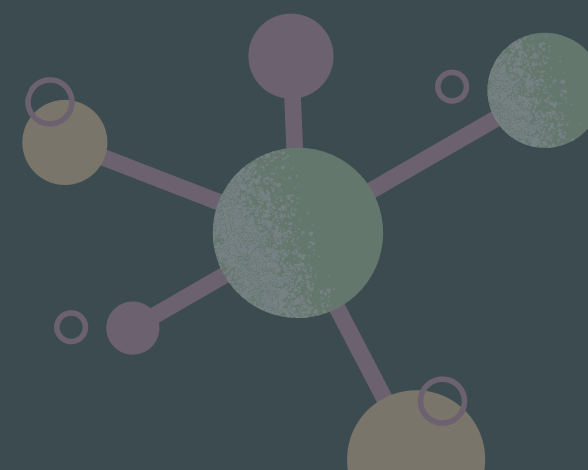
The hormonal dance between the nervous and endocrine systems regulates the menstrual cycle, marked by hormone changes that prepare the body for potential conception.



4

## BREASTFEEDING AND MATERNAL CARE

After childbirth, prolactin from the endocrine system facilitates milk production, while oxytocin promotes uterine contraction and maternal bonding.



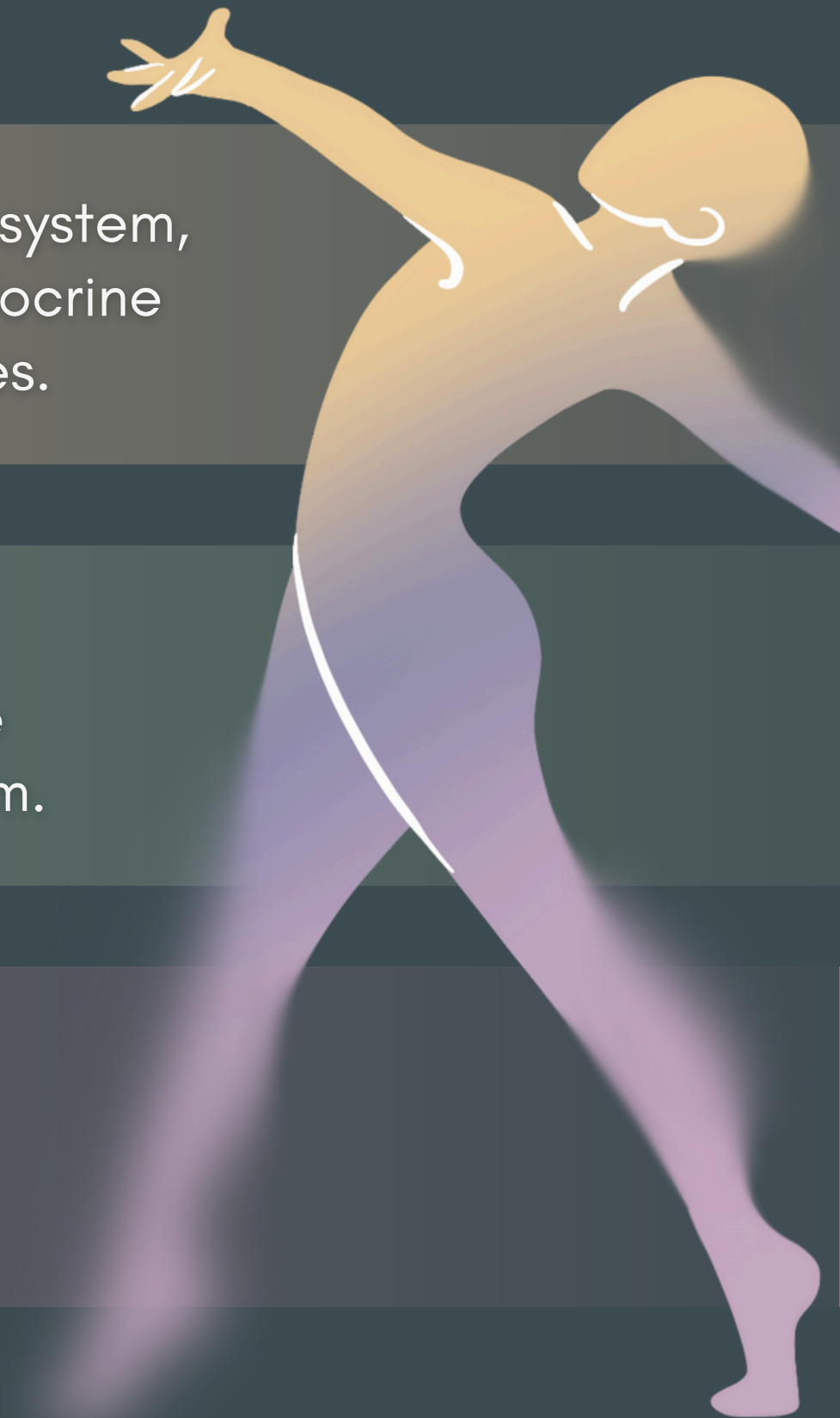


# Summary:

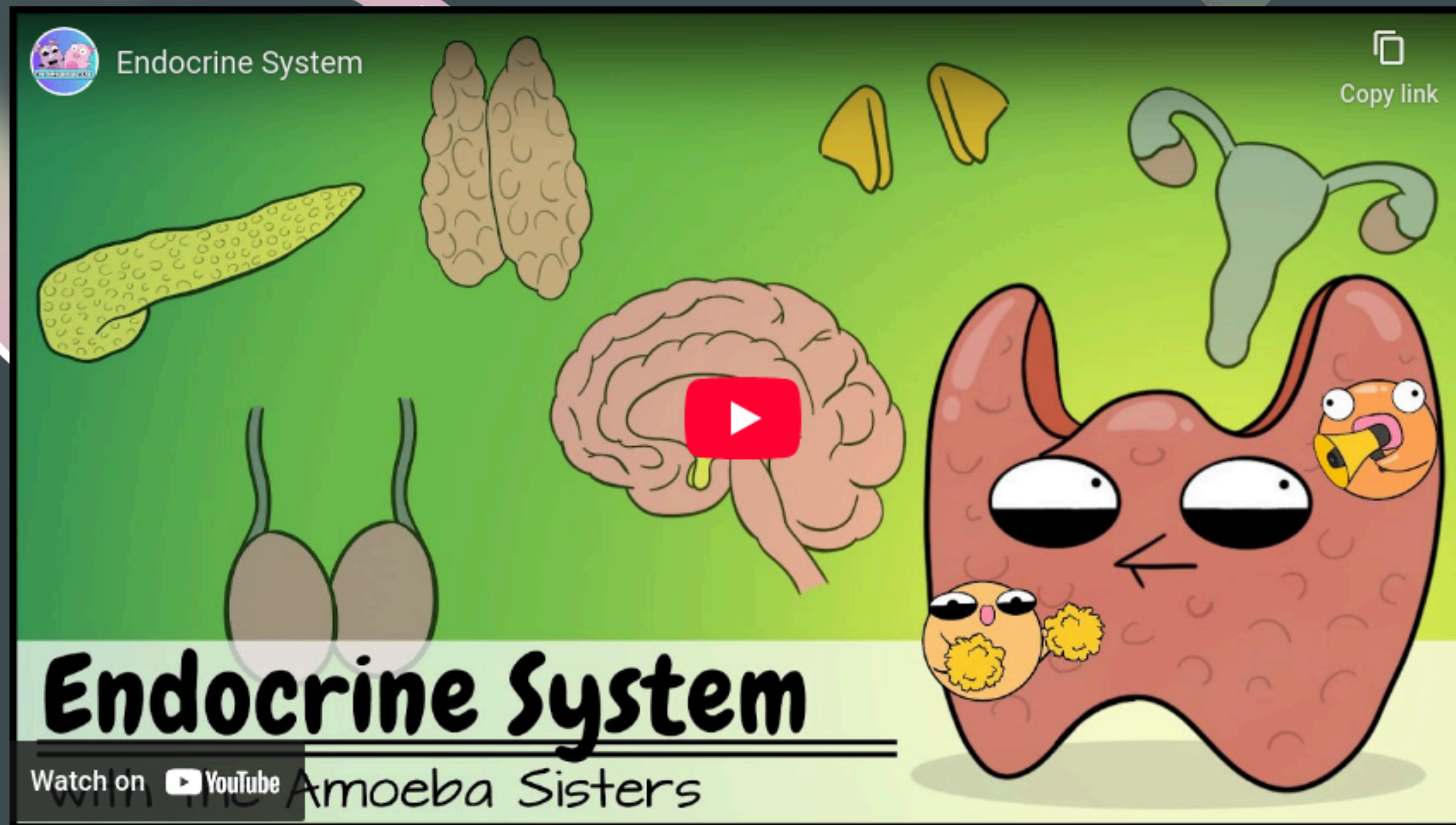
Both systems possess unique characteristics. The nervous system, quick and agile, responds instantaneously, while the endocrine system is slower but more enduring through hormones.

In this symphony, the interaction between these systems is like a perfect dance. The immediate responses of the nervous system are complemented by the long-term adjustments of the endocrine system.

The perfect coordination between these systems not only defines our biology but also our ability to create and sustain life.



Check out this awesome  
video about the endocrine  
system







Any questions?