UNIT 6: PHYSIOLOGY
Chapter 29: Nervous and Endocrine Systems

I. How Organ Systems Communicate (29.1)

A. The body’s communication system help maintain __________

B. Homeostasis depends on ability of different systems in body to ______________ with one another

1. ______________ must be generated, delivered, interpreted, and acted upon by your body

2. Two systems serve as ______________ network
   a. ______________ system- connected network of cells, tissues, and organs
   b. Endocrine system- collection of physically disconnected __________ that help control growth, development, and response to environment

3. Both systems allow you to respond to ______________ in your environment
   a. Stimulus- something that causes a _________.
   b. Changes can be chemical, cellular, or behavioral

C. The nervous and endocrine systems have different methods and __________ of communication

1. Nervous system- ________ acting and “hard wired”
   a. __________ Nervous System (CNS)- brain and spinal cord- interprets messages and stores some messages for later use
   b. ______________ Nervous System (PNS)- network of nerves that transmit messages to CNS and from CNS to other organs in body

2. Endocrine system- __________ acting chemical signals carried in your bloodstream throughout the body
   a. Control process that occur over _____ periods of time (hair growth, aging, sleep patterns, etc.)
   b. Helps regulate homeostatic functions (body _______________, blood chemistry, etc.)
II. Neurons (29.2)

A. Neurons are highly specialized cells

1. **Neuron**—specialized cell that stores information and carries messages (most have _______ parts)

   a. _______ body—contains nucleus and organelles

   b. ______________—branchlike extensions that receive messages

   c. ___________—long extension that carries electrical messages away from cell body to other cells

![Neuron Diagram](image)

2. **Three types of neurons**

   a. ___________ neurons—detect stimuli and transmit signals to brain and spinal cord

   b. ________________—make up brain and spinal cord and receive and process information

   c. ___________ neurons—pass messages from nervous system to organs and muscles

B. Neurons ____________ and ____________ signals

1. Neurons transmit information in form of ____________ and ______________ impulses

   a. When stimulated, produces **electrical impulse** that travels along ______________

   b. Moves to next cell as a ____________ signal

2. __________ Potential—unequal concentrations of ions inside and outside neuron contains potential energy

   a. Unequal _____________ of ions main reason for resting potential

   b. **Sodium-potassium pump**—keeps unequal concentration of ions and maintains ____________ potential
3. Transmission within a neuron

a. **Action potential**—moving electrical ______________ created by stimulus

b. **Channels** for ions open and close causing moving area of ______________ charged membrane to move down axon

4. Transmission between neurons

a. Signal must cross tiny _______ between neurons called a ______________

b. Chemical filled vesicles at end of _______ (axon terminal) release chemicals in synapse

c. ______________________ - chemical signals that travel across **synapse** and cause adjacent neuron to generate **action potential**

III. The Senses (29.3)

A. The **senses** help to ______________ **homeostasis**

1. **Sensory organs** collect information about the world around you and ______________ response to maintain homeostasis
2. Also influence your _______________ (protective mechanism to help maintain homeostasis)

B. The senses detect ___________ and _____________ stimuli

1. Humans have **highly specialized sensory organs**

2. _____ main senses: vision, hearing, touch, taste, smell
   
a. **Vision**- most important sense. Contains _________________ (rods and cones)

b. **Hearing**- the ear collects ______________ (sound waves) with **mechanoreceptors** and converts them into nerve impulses and interpreted in brain

c. **Smell** and **taste**- contain _________________ that detect molecules that are dissolved in liquid.

d. **Touch, temperature, and pain**
   
   1). __________ - uses two types of **mechanoreceptors** (light and heavy pressure

   2). **Temperature and pain** - sensed by _________________ and **pain receptors**

IV. Central and Peripheral Nervous Systems (29.4)

A. The nervous system’s _______ parts work together

   1. **CNS** includes brain and spinal cord composed of _________________

   2. **PNS** is collection of __________ that connects the CNS to all of your organ systems

B. The CNS processes information

   1. The **interneurons** of brain and spinal cord are arranged in a particular way

      a. All **cell bodies** clustered together on outside (called _______ matter)

      b. All **axons** clustered together on inside (_______ matter)

   2. The **Brain**- contains over a 100 ___________ neurons
a. Protected by three layers of connective tissue (called _____________)

b. **Fluid** found between layers that help _____________ brain

c. Brain has _________ main structures

1). _____________ - part of brain that interprets signals from your body and forms responses

   a). Has right and left ______________

   b). Outer layer called cerebral _____________

   c). different areas (__________) responsible for different functions

2). **Cerebellum** - coordinates _____________

3). **Brain stem** - connects brain to spinal cord and controls most basic activities required for _____ (breathing and heartbeat)

3. The Spinal Cord

   a. **Spinal column** consists of vertebrae, fluid, meninges, and the **spinal cord**

   b. Connects brain to the nerves throughout your _________

   c. **Reflex** _________ - involuntary movements allowing you to react quickly

      1). Important role in _____________ your body from injury

      2). Signal travels to spinal cord and back to create _____________ response
C. The PNS links the ______ to muscles and other organs

1. PNS includes **12 pair** of nerves in your ______ and **31 pairs** of ___________ nerves

2. PNS made up of ___________ (senses) and ___________ system (response)

3. Broken down into ___________ (voluntary control) and ___________ (involuntary response-automatic) systems

4. Autonomic broken down into **sympathetic (action and stress)** and **parasympathetic (calm and relaxation)** systems

V. Brain Function and Chemistry (29.5)

A. New techniques improve our understanding of the brain

1. New imaging technologies (CT, MRI, and PET scans)

2. Can study brain in living patients without __________

B. Change in brain chemistry can cause __________

1. Levels of **neurotransmitters** can ______ brain function

2. Abnormal levels of __________ can cause Parkinson’s disease and schizophrenia

3. **Depression** linked to low levels of _______________
C. Drugs alter brain chemistry

1. Many _________ affect amount of neurotransmitters in synapses (increase or decrease amount)

2. Some drugs cause _____________ (physiological need for a substance)
   a. Increased levels of neurotransmitters cause brain cells to become desensitized and can lead to building up a _______________ to drug (need larger doses to create same effect)
   b. Sensitization can occur when low amounts of neurotransmitters are in ____________

3. How drugs work (change in number of ___________ potentials your neurons generate)
   a. Stimulants- increase number of action potentials by increasing amounts of ______________ in synapses
   b. Depressants- reduce ability of neurons to generate ______________

VI. The Endocrine System and Hormones (29.6)

A. Hormones influence a cell’s activities by entering the cell or ____________ to its membrane

1. Endocrine system makes chemical signals that help body grow, develop, and maintain ________________
   a. ________________- chemicals produced by endocrine glands
   b. ____________- organs that release hormones into bloodstream

B. Endocrine glands secrete _______________ that act throughout the body

1. hormones travel in the ____________ to all areas of body to find ____________ cells

2. Endocrine system consists of _____ major glands
   a. Hypothalamus- makes hormones to stimulate _______________ gland to release hormones
b. **Pituitary gland** - Can stimulate other endocrine glands. Produces ___________ hormones

c. **Thyroid gland** - regulate ___________ , growth, and development

d. **Thymus** - causes ___________ blood cells to mature and help fight infection

e. **Adrenal glands** - secrete hormone (adrenaline - epinephrine) that control “_______ or _______” response

f. **Pancreas** - makes digestive enzymes and produces ___________ to help regulate sugar levels in bloodstream

g. _______ - ovaries in **women** and **testes** in **men**

C. The **hypothalamus** interacts with the ___________ and ___________ systems

1. Nervous and endocrine systems connect to each other at the ________ of the brain
2. The hypothalamus acts as part of both systems
   a. As part of ______ it receives, sorts, and interprets information from sensory organs
   b. As part of endocrine system, the hypothalamus produces __________________ hormones that affect tissues and other endocrine glands to release hormones

D. Hormonal imbalances can cause severe _______

1. Too much or too little hormones can affect the entire body
2. _________________ - pancreas not making proper amount of insulin and glucagons
3. Many hormonal imbalances can be treated with __________ or ___________