UNIT 6: PHYSIOLOGY
Chapter 29: Nervous and Endocrine Systems

I. How Organ Systems Communicate (29.1)

A. The body’s communication system help maintain homeostasis

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 communication network

   a. _______________ system- connected network of cells, tissues, and organs

   b. _______________ system- collection of physically disconnected organs 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 rates of _________________

   1. Nervous system- __________ acting and “hard wired”

      a. Central Nervous System (CNS)- __________

         and _______________ cord- interprets messages and stores some messages for later use

      b. Peripheral Nervous System (PNS)- network of _______________ 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 _______________ homeostatic functions (body temperature, blood chemistry, etc.)
II. Neurons (29.2)

A. Neurons are highly specialized cells

1. ______________ - specialized cell that stores information and carries messages (most have three parts)
   a. **Cell _______** - contains nucleus and organelles
   b. ______________ - branchlike extensions that receive messages
   c. ____________ - long extension that carries electrical messages away from cell body to other cells

2. ______________ 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 receive and transmit signals

1. Neurons transmit information in form of __________ and ______________ impulses
   a. When stimulated, produces **electrical impulse** that travels along neuron
   b. Moves to next cell as a ______________ signal

2. ______________ Potential - unequal concentrations of ions inside and outside neuron contains potential energy
   a. Unequal diffusion of ions main reason for resting potential
   b. **Sodium-potassium** ____________ - keeps unequal concentration of ions and maintains resting potential
3. Transmission within a neuron

a. **action potential** - moving electrical impulse created by stimulus

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

4. Transmission between neurons

a. Signal must cross tiny gap between neurons called a **synapse**

b. Chemical filled vesicles at end of axon (axon terminal) release **neurotransmitter** in synapse

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

III. The Senses (29.3)

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

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

B. The senses detect physical and chemical stimuli

1. Humans have highly specialized sensory organs

2. Five main senses: vision, hearing, touch, taste, smell

   a. Vision - most important sense. Contains ________________ (rods and cones)

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

   c. Smell and taste - contain chemoreceptors that ___________ molecules that are dissolved in liquid.

   d. Touch, temperature, and pain

      1). Touch - uses two types of mechanoreceptors (light and heavy pressure

      2). Temperature and pain - sensed by thermoreceptors and pain receptors

IV. Central and Peripheral Nervous Systems (29.4)

A. The nervous system’s two parts work together

   1. CNS includes _____________ and _____________ cord composed of interneurons

   2. PNS is collection of nerves that connects the ________ to all of your organ systems

B. The CNS ____________________ 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 _____________ - contains over a 100 billion neurons
a. Protected by three layers of connective tissue (called ________________)

b. ________________ found between layers that help cushion brain

c. Brain has three main structures

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

2). ________________ - coordinates movements

3). ________________ - connects brain to spinal cord and controls most basic activities required for life (breathing and heartbeat)

3. The Spinal Cord

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

b. Connects ________________ to the nerves throughout your body

c. ________________ __________ - involuntary movements allowing you to react quickly

   1). Important role in protecting your body from ________________

   2). Signal travels to spinal cord and back to create ________________ response

C. The PNS links the CNS to muscles and other organs

VI. The Endocrine System and Hormones (29.6)

A. ________________ influence a cell’s activities by entering the cell or binding to its membrane

   1. **Endocrine system** makes ________________ signals that help body grow, develop, and maintain homeostasis

      a. ________________ - chemicals produced by endocrine glands

      b. ________________ - organs that release
B. Endocrine glands secrete hormones that act throughout the body

1. **hormones** travel in the **bloodstream** to all areas of body to find ______________ cells

2. Endocrine system consists of 7 major glands
   a. **Hypothalamus** - makes hormones to stimulate pituitary 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 (__________________ - epinephrine) that control “fight or flight” response
   f. **Pancreas** - makes digestive enzymes and produces ____________ to help regulate sugar levels in bloodstream
   g. **gonads** - ovaries in **women** and **testes** in **men**

C. The _________________ interacts with the **nervous** and **endocrine** systems

1. Nervous and endocrine systems ________________ to each other at the base of the brain

2. The hypothalamus acts as part of _________ systems

D. Hormonal imbalances can cause severe illness

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 **surgery** or **medicines**