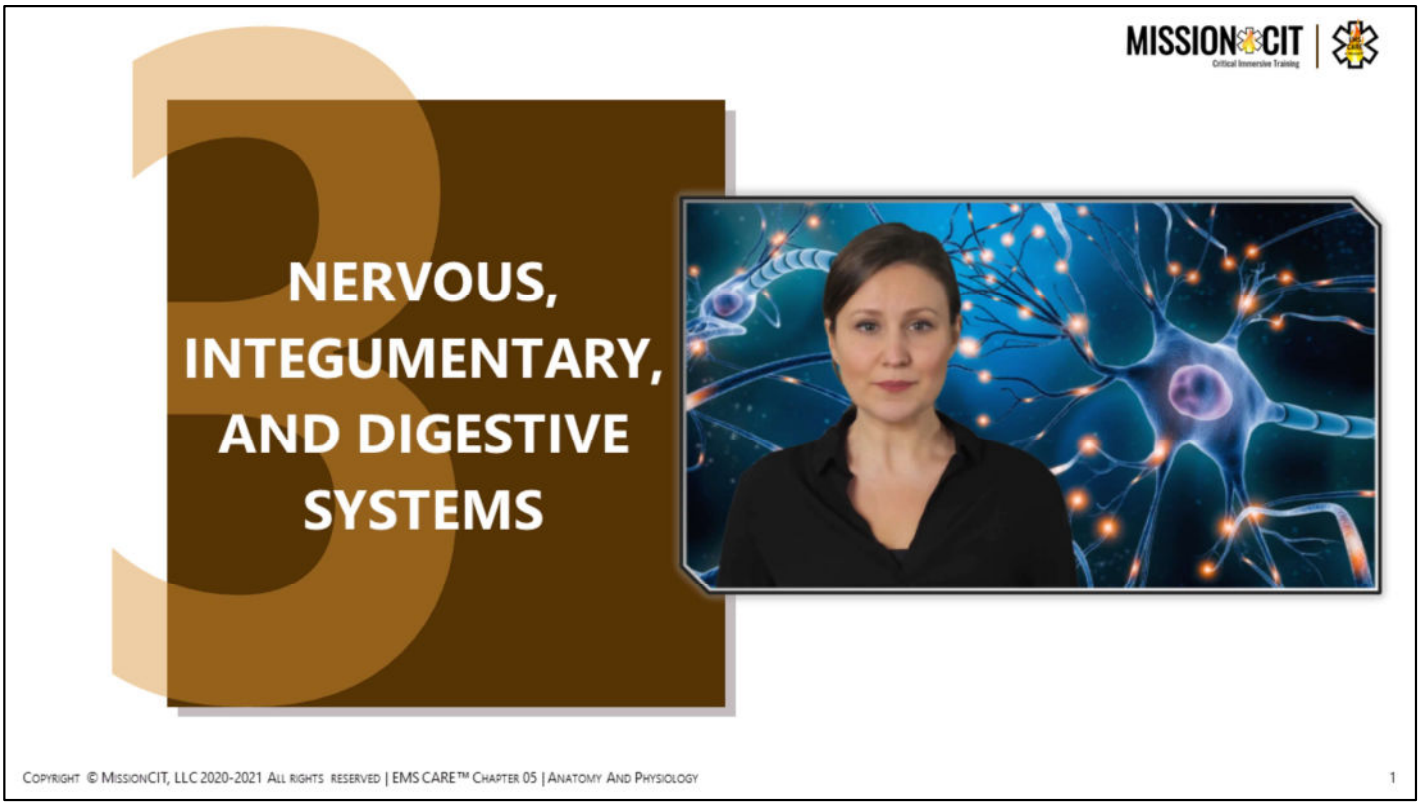
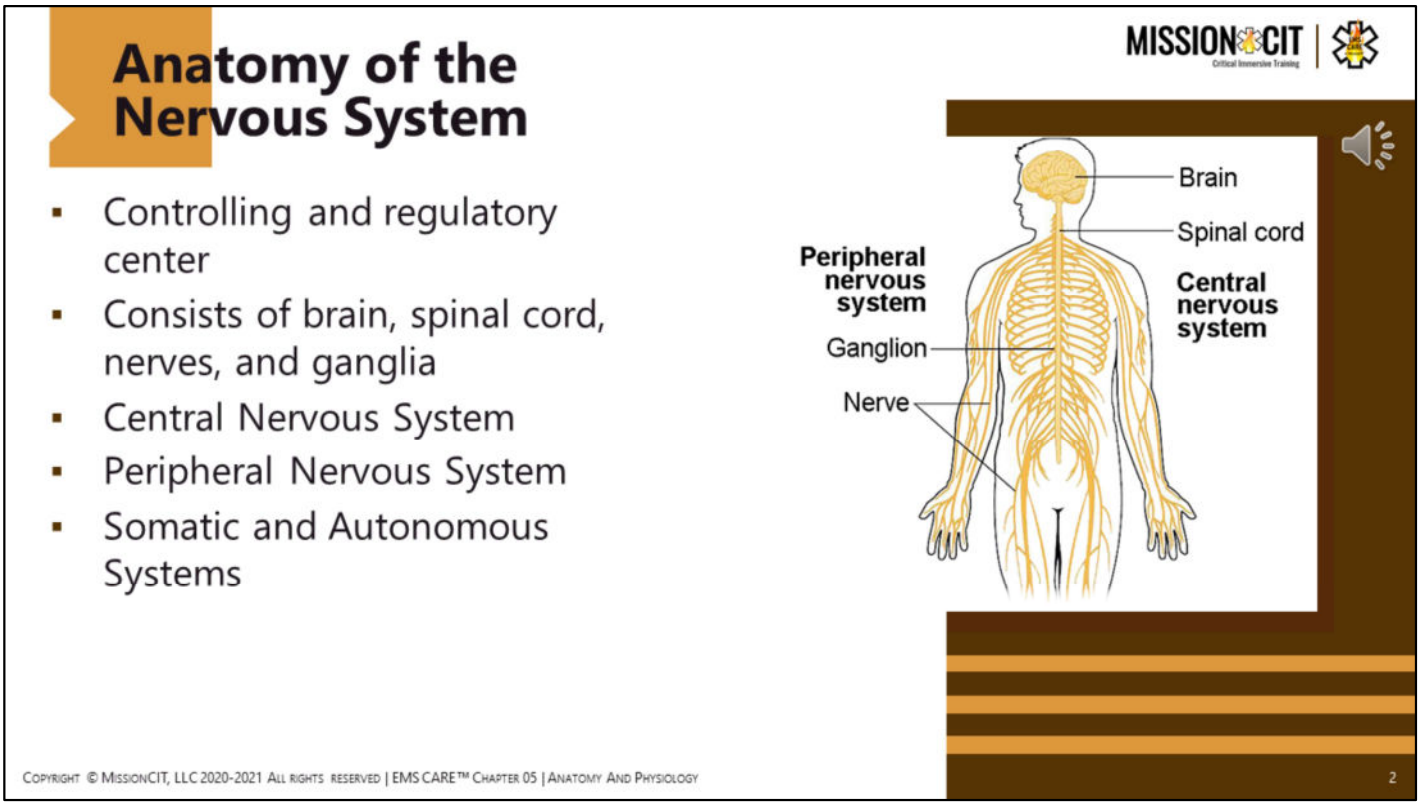


Thank you, Justin!

In this lesson, let's talk about the nervous and integumentary systems.

The nervous system is the most complex organ system in the body as it handles all-controlling, regulatory, and communications while the integumentary system comprises the skin and its layers. Finally, the digestive system is responsible for digesting the food we eat and provide energy from the same.

Sounds interesting? Let's delve into both these systems in this lesson.



The nervous system is the major controlling, regulatory, and communicating system in the body. It is the center of all mental activity including thought, learning, and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis. Through its receptors, the nervous system keeps us in touch with our environment, both external and internal.

Like other systems in the body, the nervous system is composed of organs, principally the brain, spinal cord, nerves, and ganglia. These, in turn, consist of various tissues, including nerve, blood, and connective tissue. Together these carry out the complex activities of the nervous system.

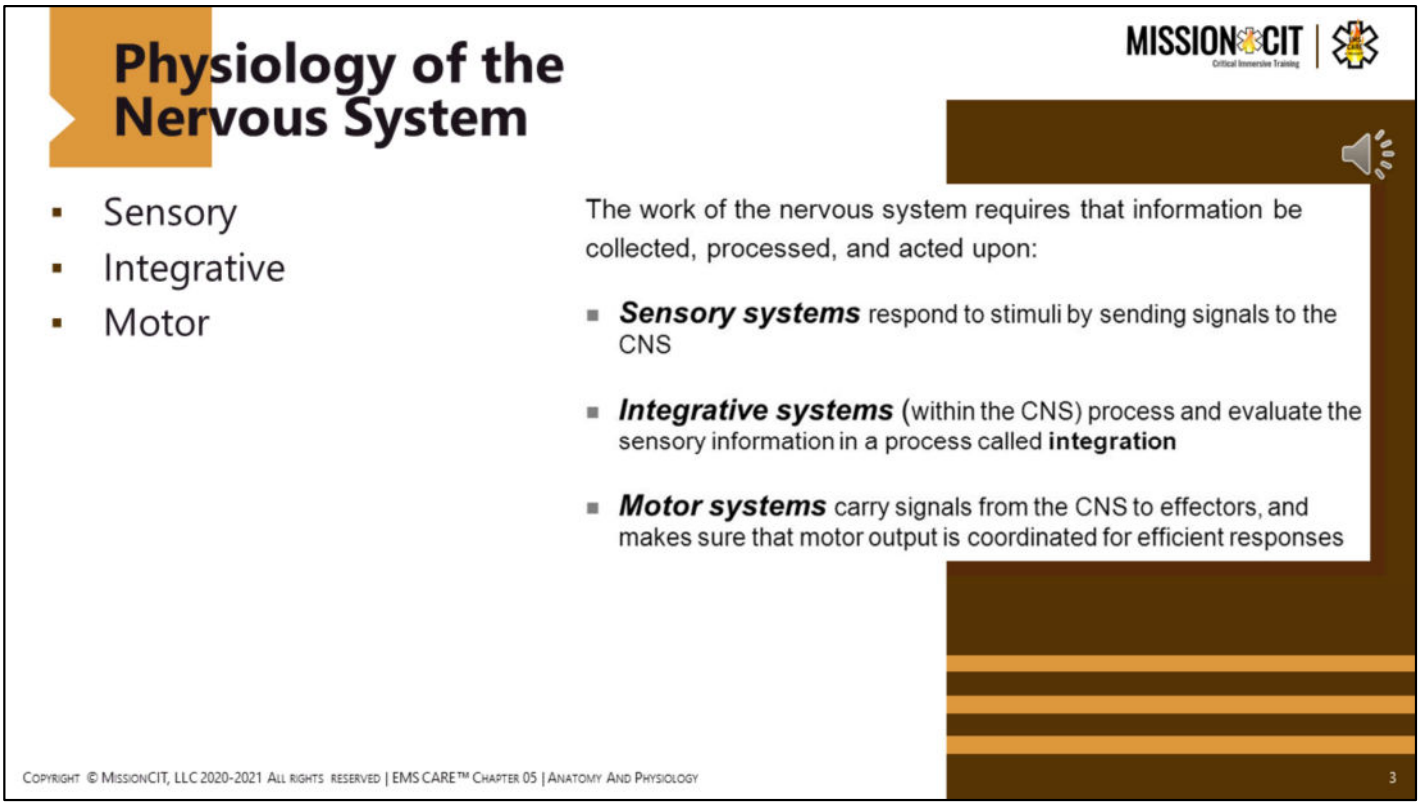
To carry out these activities, the nervous system can be divided into two main portions, namely, the Central Nervous System and the Peripheral Nervous System. The Central Nervous System comprises the brain and the spinal cord while the peripheral system includes the sensory and motor nerves.

The brain is the controlling organ of the body and is divided into the cerebrum, cerebellum, and the brain stem or the medulla oblongata. The spinal cord is a continuation of the brain, and it is responsible for transmitting messages between the brain and the body.

The peripheral nervous system includes the somatic and autonomic nervous systems. The somatic nervous is responsible for transmitting signals from the brain to voluntary muscles while the autonomic nervous system is responsible for the involuntary actions and is further

divided into the sympathetic nervous system that is responsible for the fight or flight response and the parasympathetic nervous system that slows down the body's metabolism when needed.

Two types of nerves carry out the activities of the peripheral nervous system and they are the sensory nerves that carry information from the body to the CNS and the motor nerves that carry information from the CNS to the muscles.



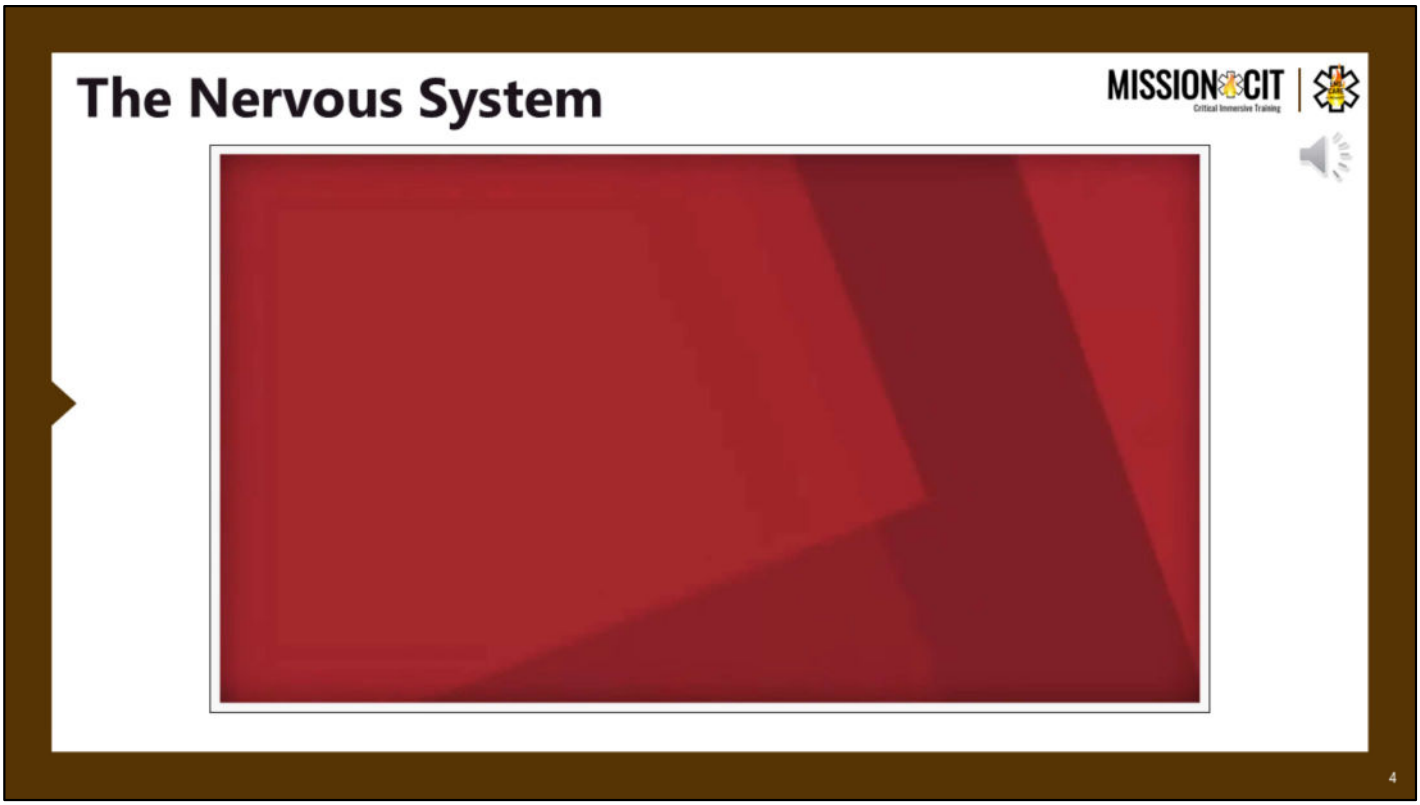
The various activities of the nervous system can be grouped as three overlapping functions:

- Sensory
- Integrative, and
- Motor

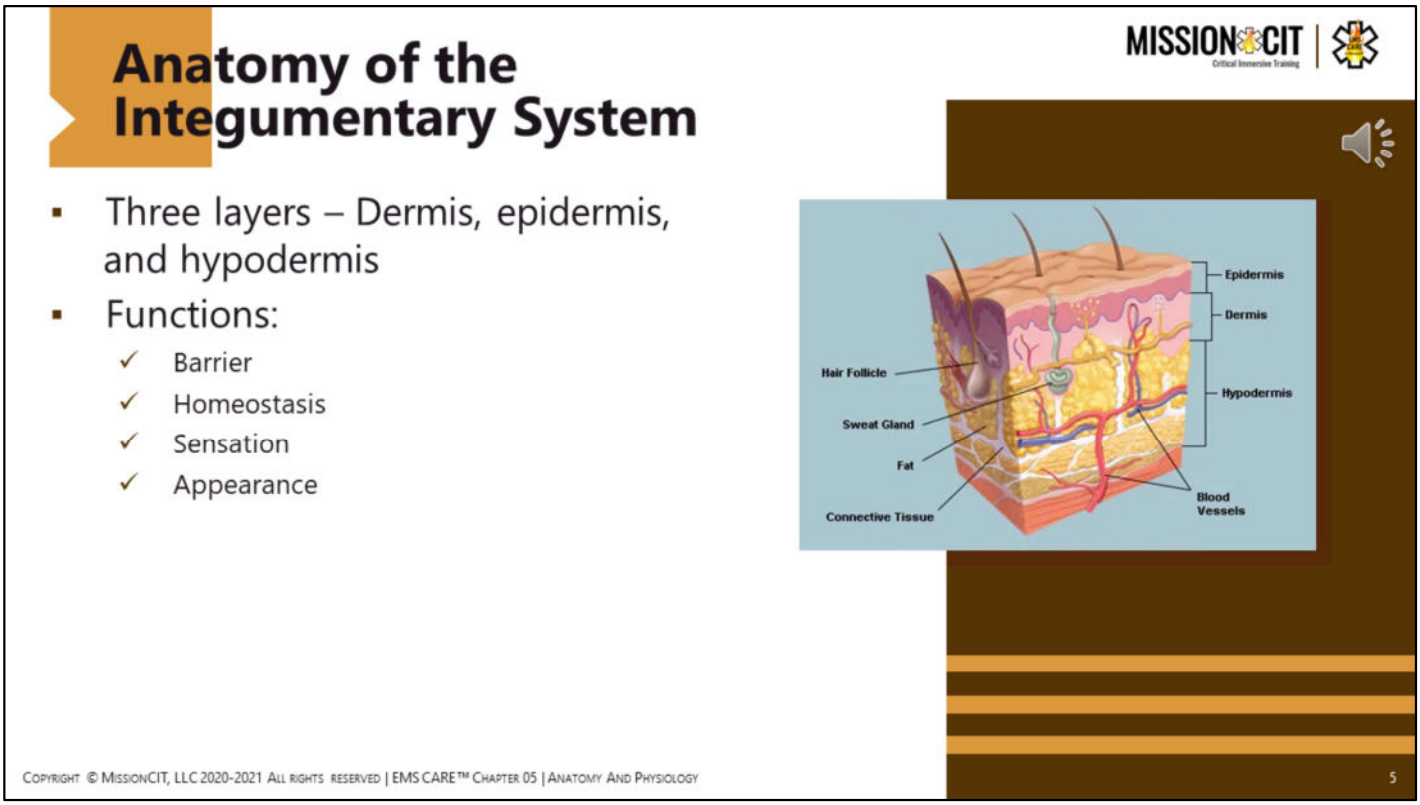
Millions of sensory receptors detect changes, called stimuli, which occur inside and outside the body. They monitor such things as temperature, light, and sound from the external environment. Inside the body, the internal environment, receptors detect variations in pressure, pH, carbon dioxide concentration, and the levels of various electrolytes. All of this gathered information is called sensory input.

Sensory input is converted into electrical signals called nerve impulses that are transmitted to the brain. There the signals are brought together to create sensations, to produce thoughts, or to add to memory; decisions are made each moment based on the sensory input. This is integration.

Based on the sensory input and integration, the nervous system responds by sending signals to muscles, causing them to contract, or to glands, causing them to produce secretions. Muscles and glands are called effectors because they cause an effect in response to directions from the nervous system. This is the motor output or motor function.



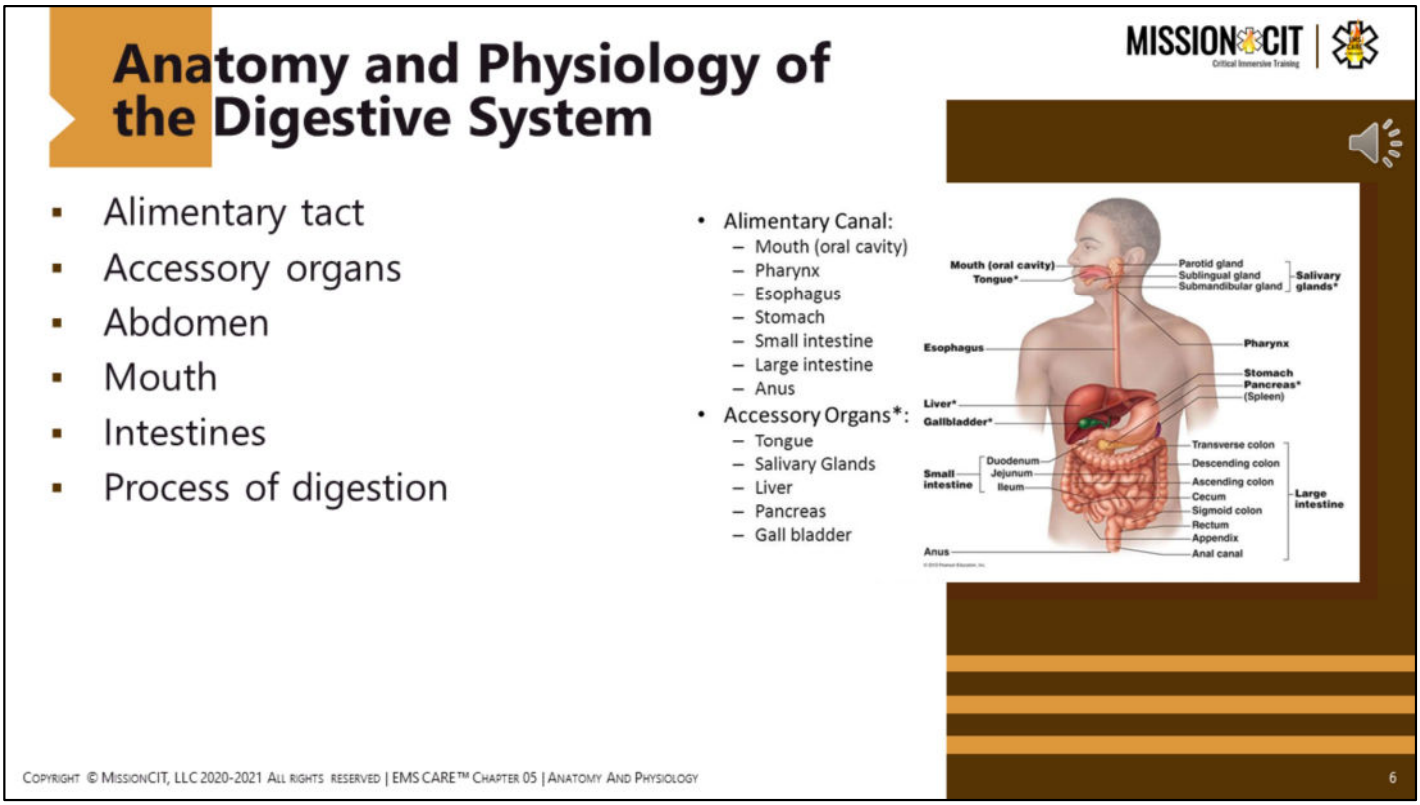
The nervous system includes the brain, spinal cord (which transmits signals between the brain and the body), and the peripheral nerves (which transmit signals between the body and spinal cord). Brain structures include various lobes of the large cerebrum (responsible for higher brain functions such as thinking and some others) and the cerebellum (responsible for coordination and balance). Nerve cells in the nervous system communicate using chemicals called neurotransmitters. In multiple sclerosis, the body's immune system attacks myelin, a fatty substance forming a sheath around nerves.



Skin is the largest organ in the body and covers the body's entire external surface. It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in their anatomy and function. The skin's structure is made up of an intricate network that serves as the body's initial barrier against pathogens, UV light, and chemicals, and mechanical injury. It also regulates temperature and the amount of water released into the environment.

The skin has many functions.

- It serves as a barrier to water, invasion by microorganisms, mechanical and chemical trauma, and damage from UV light.
- Skin is the first site of immunological defense.
- It preserves homeostasis by regulating temperature and water loss, while also serving both endocrine and exocrine functions. The endocrine functions include the production of vitamin D with the assistance of UV light from the sun.
- Another important role of the skin is a sensation to touch, heat, cold, and pain by the actions of the receptors present in it.
- The general appearance, turgor, and other qualities also give insight into the general health of the body.



At its simplest, the digestive system is a tube running from mouth to anus. Its chief goal is to break down huge macromolecules such as proteins, fats, and starch, which cannot be absorbed intact, into smaller molecules such as amino acids, fatty acids, and glucose respectively that can be absorbed across the wall of the tube, and into the circulatory system for dissemination throughout the body.

Regions of the digestive system can be divided into two main parts: the alimentary tract and accessory organs. The alimentary tract of the digestive system is composed of the mouth, pharynx, esophagus, stomach, small and large intestines, rectum, and anus. Associated with the alimentary tract are the following accessory organs: salivary glands, liver, gallbladder, and pancreas.

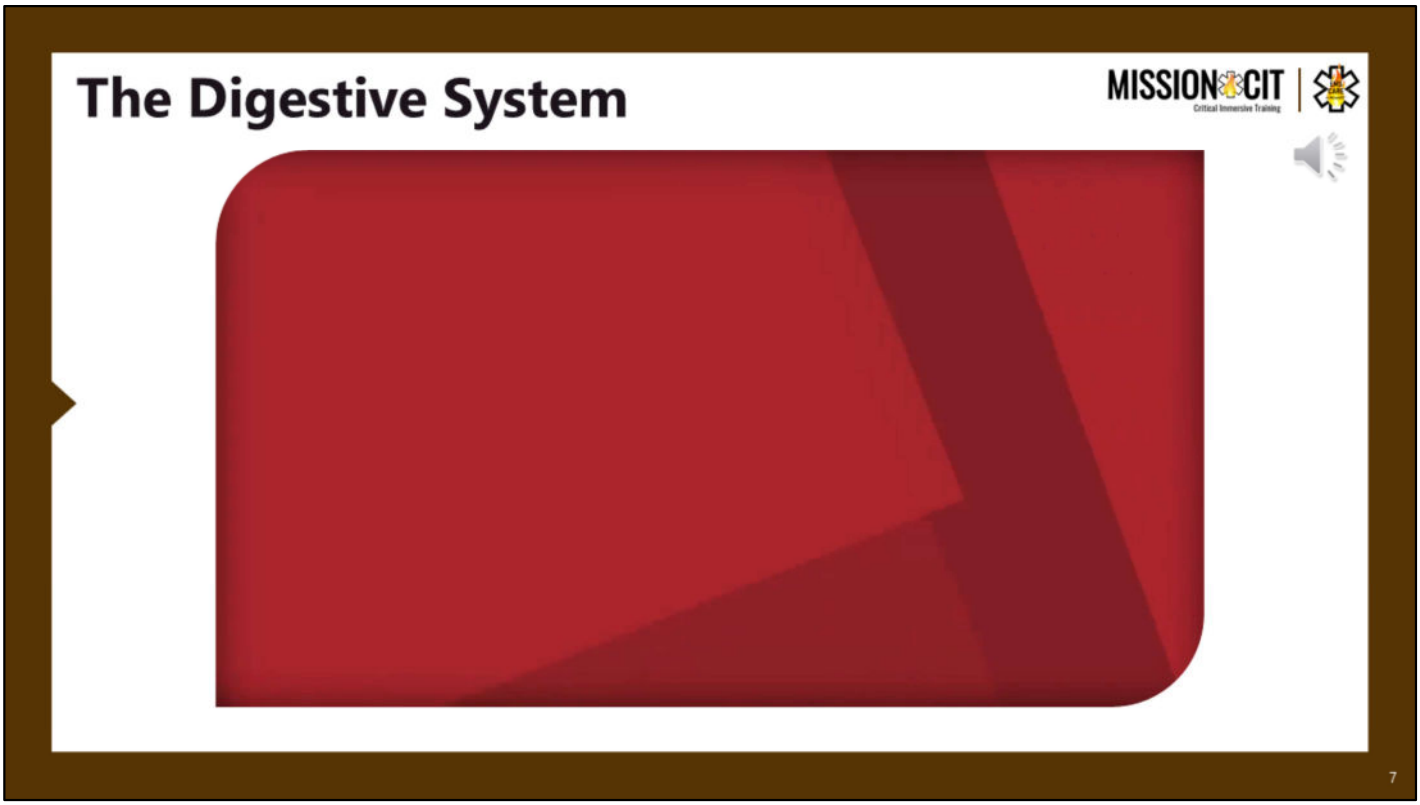
The abdomen is the large cavity that houses these organs of digestion and excretion. It is the second-largest cavity of the body and is divided into four quadrants for easy understanding and identification.

The mouth, or oral cavity, is the first part of the digestive tract. It is adapted to receive food by ingestion, break it into small particles by mastication, and mix it with saliva. The lips, cheeks, and palate form the boundaries. The oral cavity contains the teeth and tongue and receives the secretions from the salivary glands.

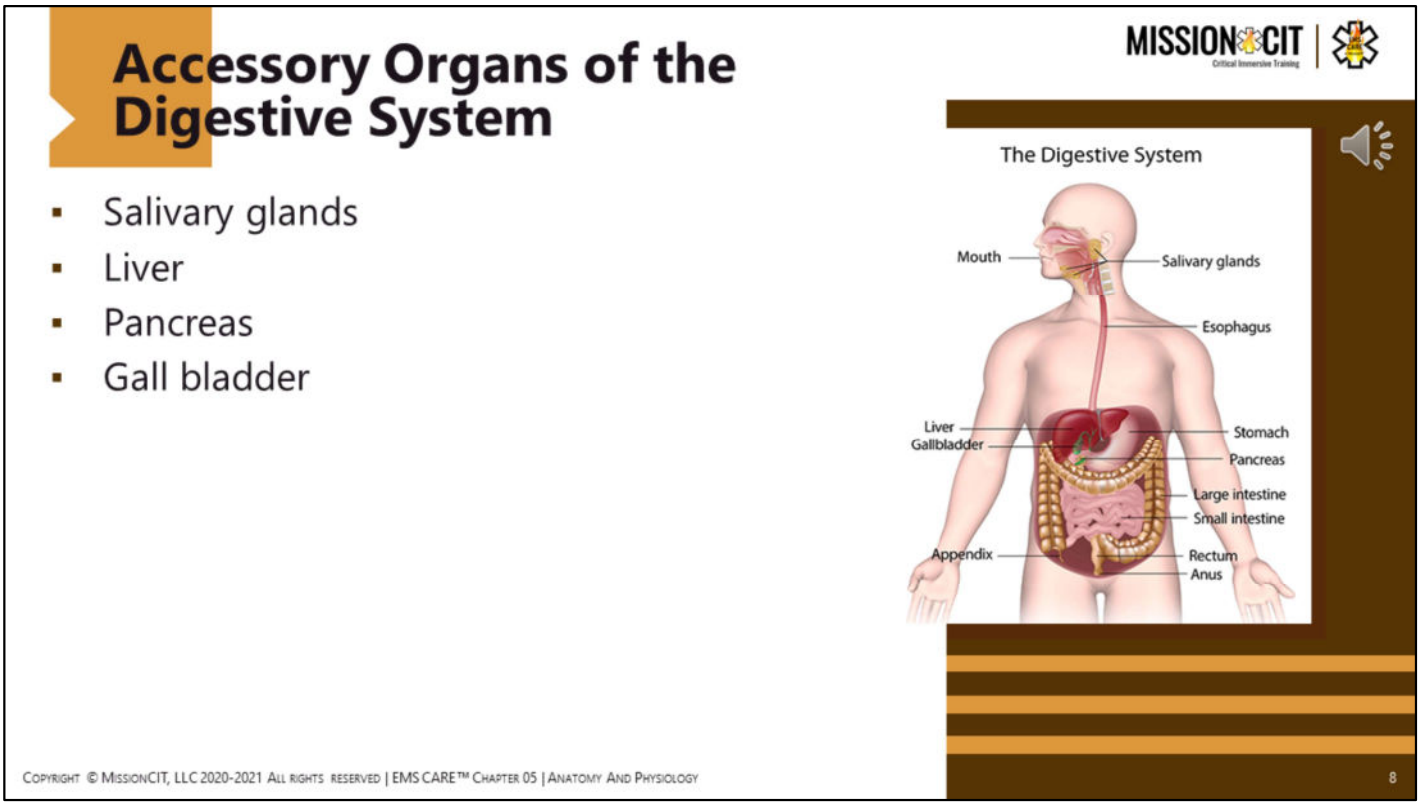
Food is forced into the pharynx by the tongue and the esophagus is a collapsible muscular tube that serves as a passageway between the pharynx and stomach.

The stomach is responsible for receiving the food and mixing it with gastric juices present in it. The small intestine finishes the process of digestion, absorbs the nutrients, and passes the residue on to the large intestine. The liver, gallbladder, and pancreas are accessory organs of the digestive system that are closely associated with the small intestine.

Unlike the small intestine, the large intestine produces no digestive enzymes. Chemical digestion is completed in the small intestine and the large intestine is responsible for the absorption of water and electrolytes and the elimination of feces. The last 2 to 3 cm of the digestive tract is the anal canal, which continues from the rectum and opens to the outside at the anus.



The digestive system includes the gastrointestinal tract (the organs through which food and drink pass, from the mouth to the anus), liver, pancreas, and gallbladder. Acid helps the stomach break down foods into nutrients, which are absorbed mostly in the small intestine. After passing through the large intestine, the remains of food are passed from the rectum. The liver produces bile, a substance that helps absorb fats, into the gallbladder. Bile passes from the gallbladder into the intestine. The pancreas produces enzymes that aid in digestion and insulin.



The digestive system has four accessory organs as mentioned earlier and they are salivary glands, liver, gallbladder, and pancreas.

The salivary gland produces saliva that in turn,

- Has a cleansing action on the teeth.
- Moistens and lubricates food during mastication and swallowing.
- Dissolves certain molecules so that food can be tasted.
- Begins the chemical digestion of starches through the action of amylase, which breaks down polysaccharides into disaccharides.

The liver is the largest gland in the body and is divided into two major and minor lobes. Liver functions include the following:

- Secretion
- Synthesis of bile salts
- Synthesis of plasma protein
- Storage
- Detoxification

- Excretion
- Carbohydrate metabolism
- Lipid metabolism
- Protein metabolism, and
- Filtering

The gallbladder is a pear-shaped sac that is attached to the visceral surface of the liver by the cystic duct. The principal function of the gallbladder is to serve as a storage reservoir for bile, a yellowish-green fluid produced by liver cells, and it is responsible for breaking down the food.

The pancreas has both endocrine and exocrine functions. The endocrine portion consists of the scattered islets of Langerhans, which secrete the hormones insulin and glucagon into the blood. The exocrine portion is a major part and consists of pancreatic acinar cells that secrete digestive enzymes to break down the food.

With this, we come to the end of this lesson, and next, Justin will talk about the remaining body systems.