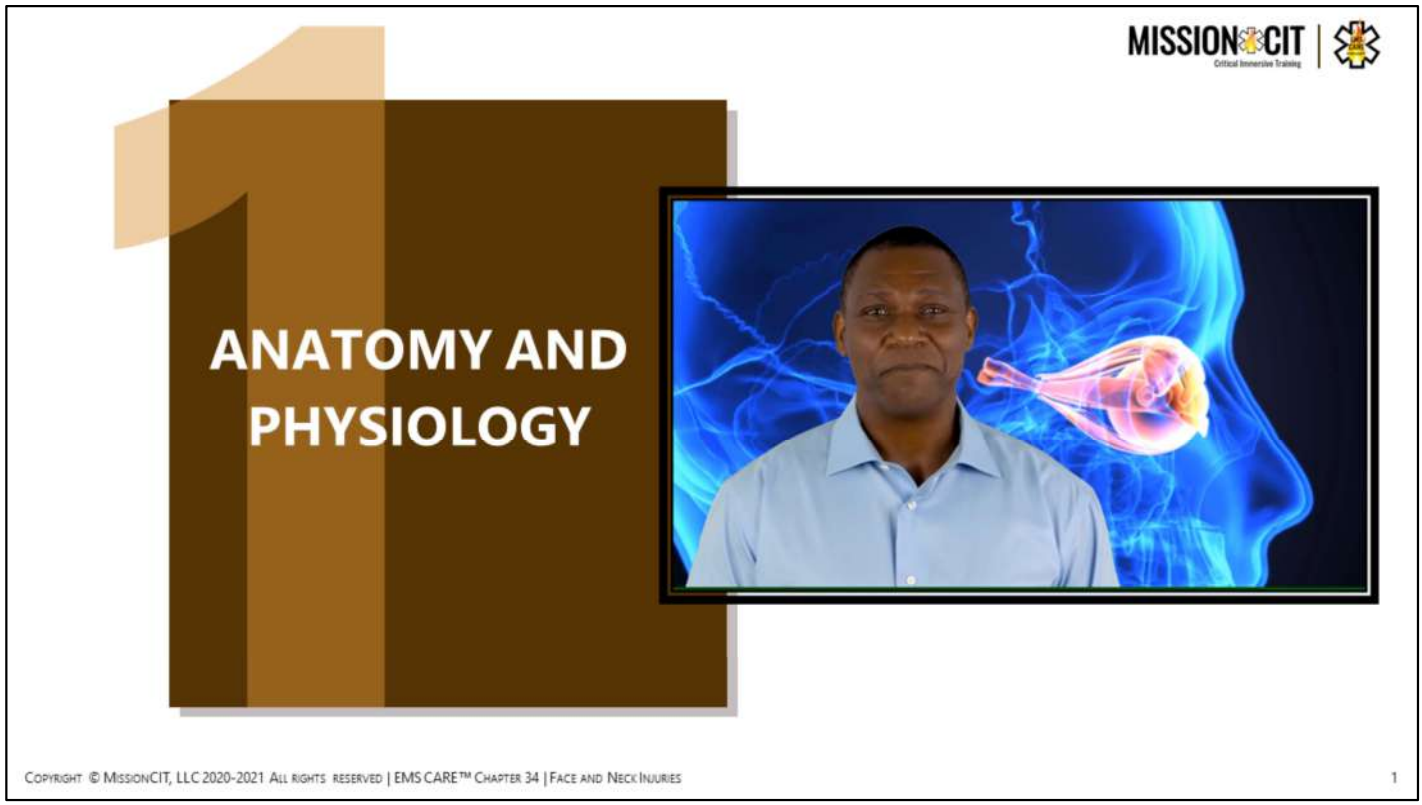
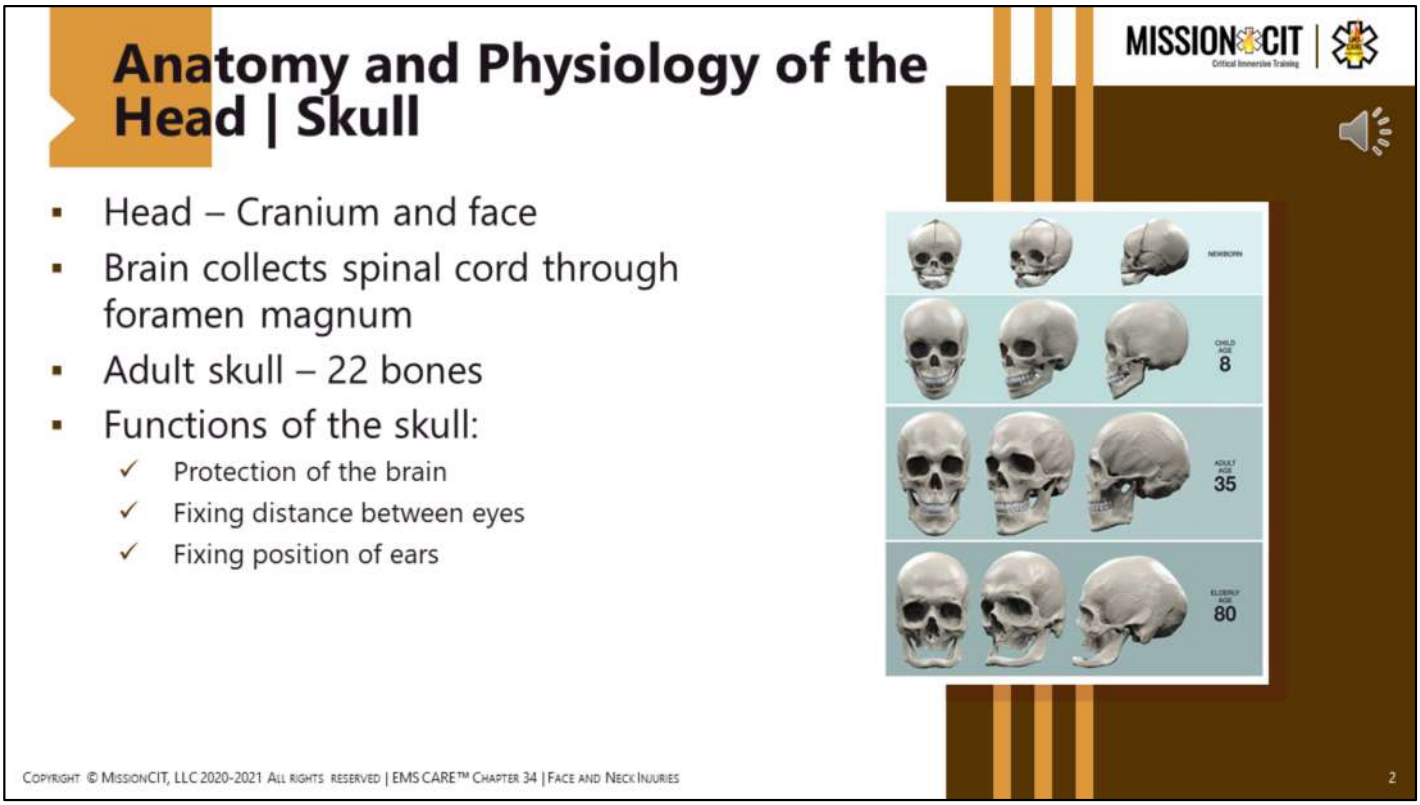


The head and neck are without doubt one of the more complex anatomical regions of the body. Welcome to the first lesson, here we will begin with the fascinating anatomy and physiology of the head, neck and eye.



The head is divided into the cranium and the face. The cranium also referred to as the skull is a strong, bony capsule that rests on the neck and encloses the brain.

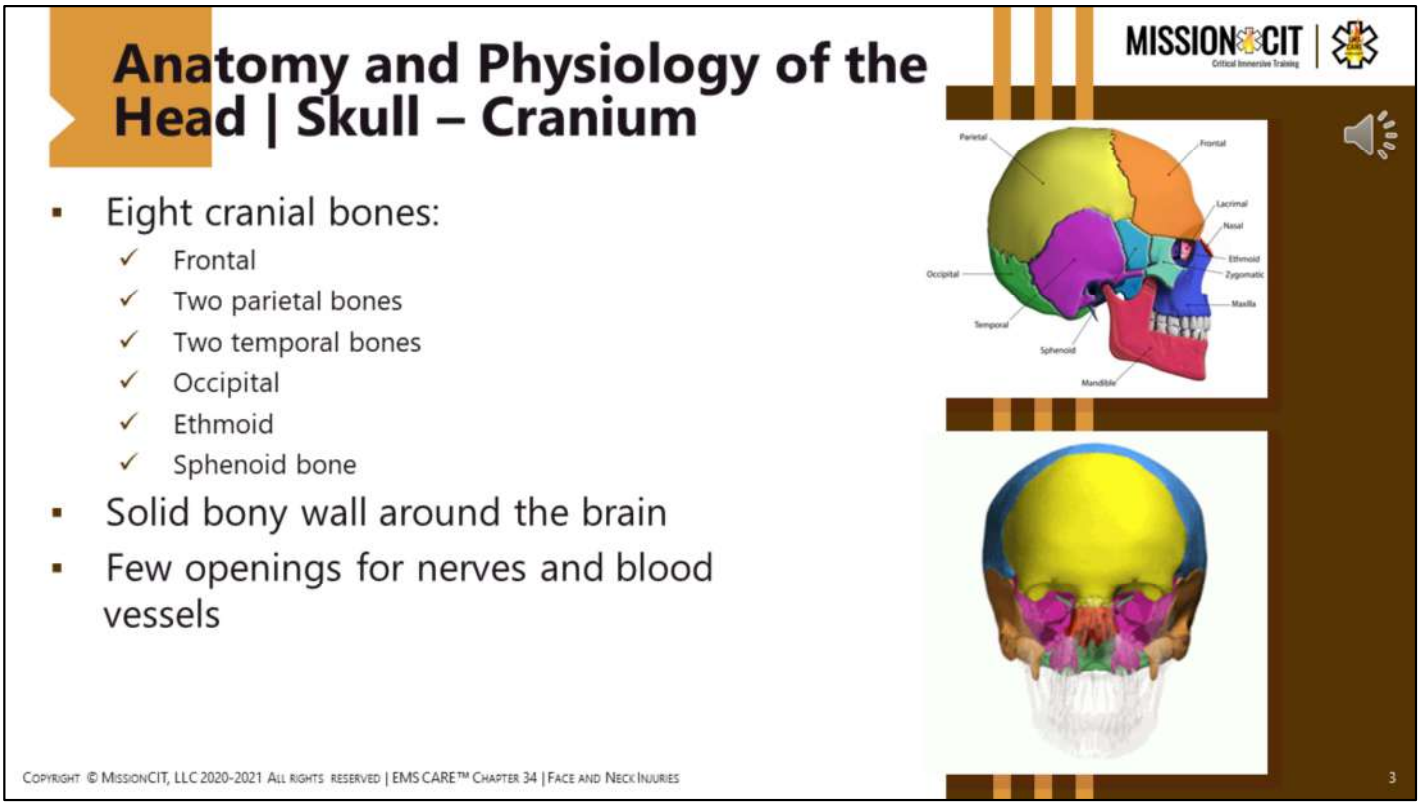
The skull is composed of the cranium, which protects the brain, and the facial bones. It supports and protects the face and the brain. The brain connects to the spinal cord through a large opening at the base of the skull called the foramen magnum.

The adult skull is a collection of 22 bones, protecting the brain and supporting the other soft tissues of the head. The only bone that remains separate from the rest of the skull is the mandible, or jawbone.

During fetal development, the bones of the skull form within tough, fibrous membranes in a fetus' head. Early separation of the bones provides the fetal skull with the flexibility necessary to pass through the tight confines of the birth canal.

During childhood development, the skull bones remain somewhat separated, allowing for growth of the brain and skull. As these bones grow throughout fetal and childhood development, they begin to fuse together, forming a single skull. Ultimately producing a rigid protective shell for the soft nervous tissue of our brain.

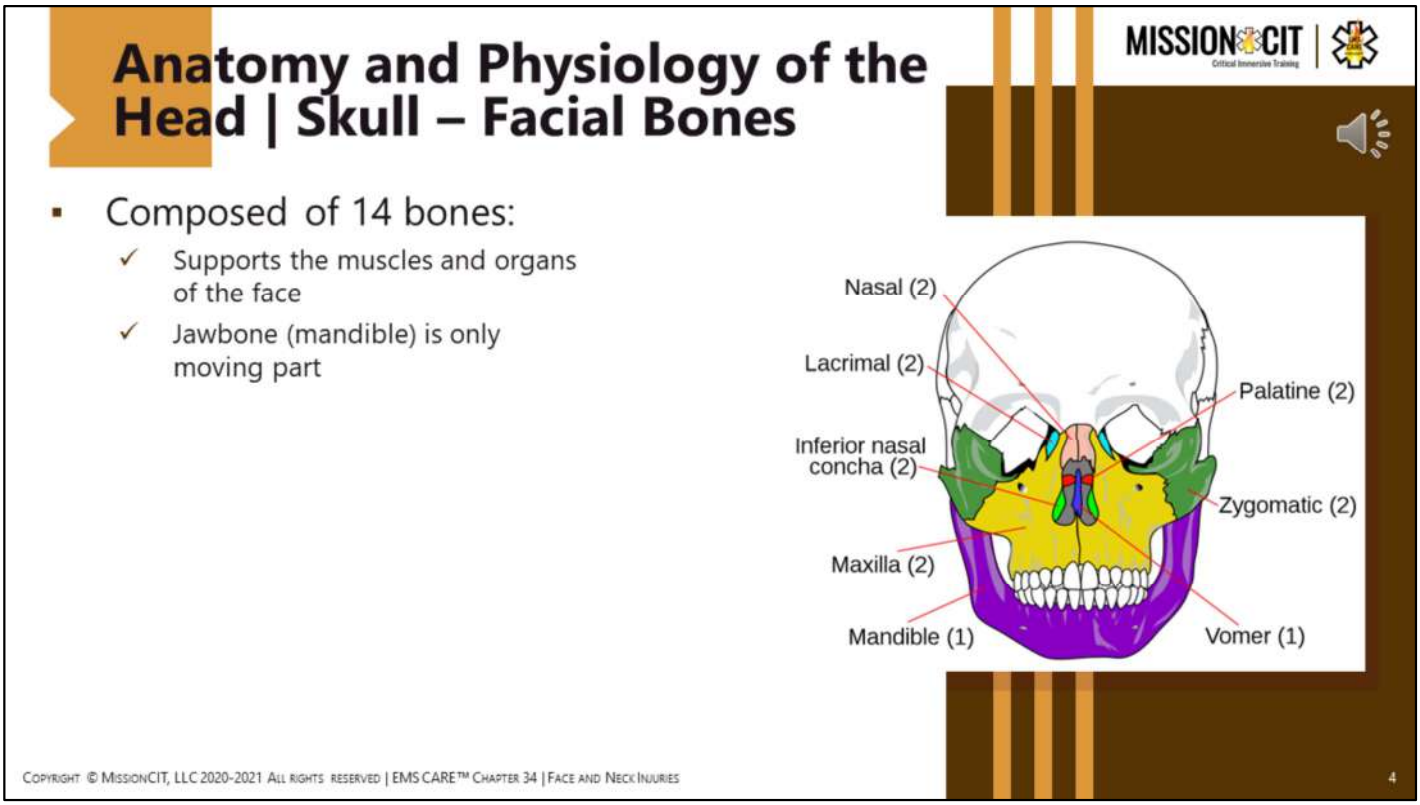
Functions of the skull include protection of the brain, fixing the distance between the eyes to allow stereoscopic vision, and fixing the position of the ears to enable sound localization of the direction and distance of sounds.



Surrounding the brain is a region of the skull known as the cranium. In this region, we have eight cranial bones: These bones are the frontal, two parietal bones, two temporal bones, occipital, ethmoid, and the sphenoid bone.

Collectively, these bones provide a solid bony wall around the brain, with only a few openings for nerves and blood vessels. Our occipital bone contains the foramen magnum, the hole through which the spinal cord enters the skull to attach to the brain. The occipital bone also forms the atlanto-occipital joint with the atlas (the first cervical vertebra in our spine).

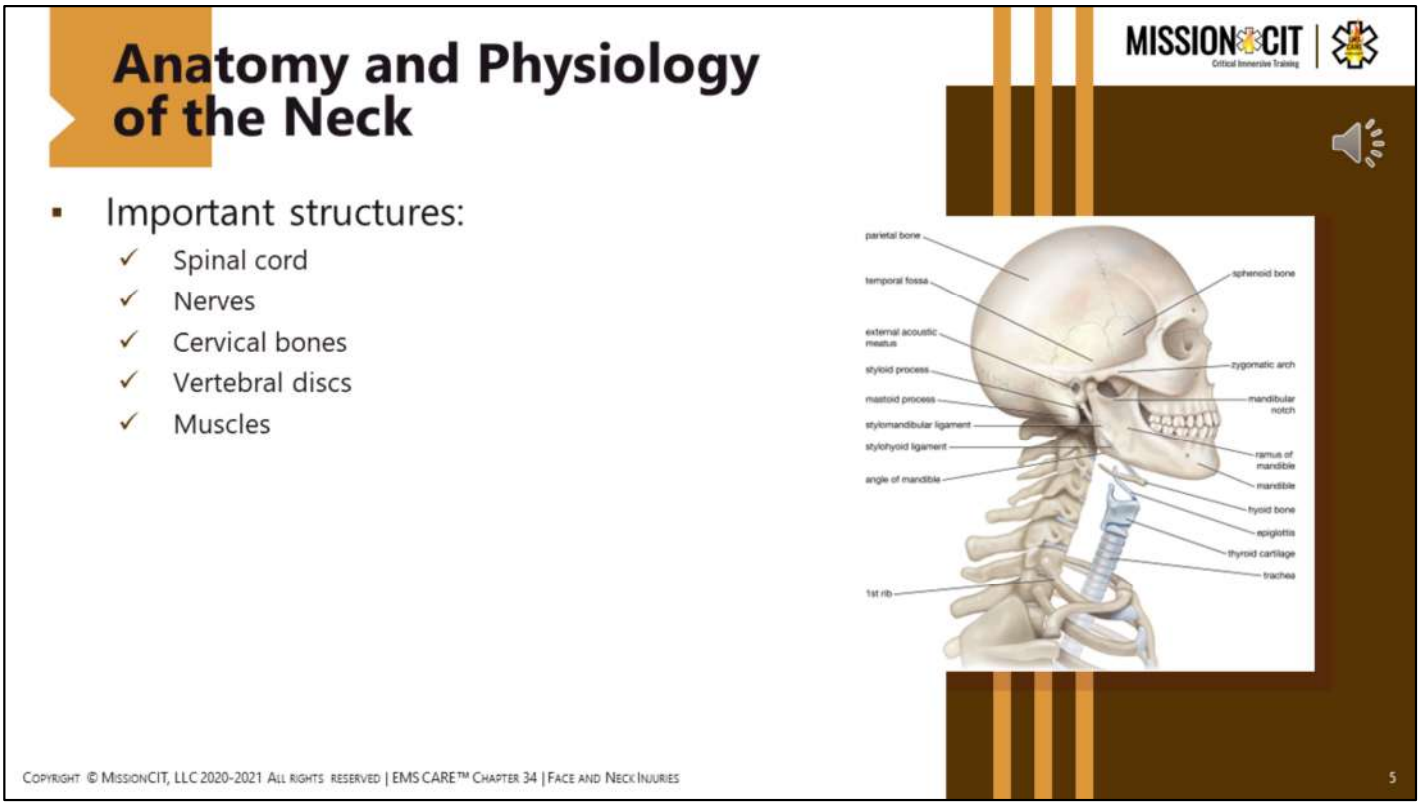
The frontal, ethmoid, and sphenoid bones contain small hollow spaces known as paranasal sinuses. The sinuses help to reduce the weight of these bones and increase the resonance of the voice during speech, singing and humming.



The 14 bones that support the muscles and organs of the face are collectively known as our facial bones. The facial bones consist of the:

- Mandible
- Two maxillae
- Vomer
- Two palatine bones
- Two nasal bones
- Two zygomatic bones
- Two nasal conchae, and
- Two lacrimal bones

The mandible, or jawbone, is the only movable bone of the skull, forming the temporomandibular joint with the temporal bone. The lower teeth are rooted into the mandible while the upper teeth are rooted in the two maxillae. The maxillae also contain paranasal sinuses like the frontal, ethmoid, and sphenoid bones of the cranium.



In basic terms, the neck joins the shoulders and chest to the head. The neck is one of the most complex and intricate structures in our body and includes the spinal cord, which sends messages from the brain to the rest of the body. The cervical spine is responsible for several crucial roles, including protecting the spinal cord, providing support to the head, and assisting the progress of blood flow to the brain. By understanding the anatomy of the neck and how each structure works, it's easier to understand the source of neck pain in your patients. The following are some of the most important structures in the neck:

Spinal Cord:

In the cervical spine, the spinal cord connects to the brain at the base of the skull. The cervical bones protect the spinal cord, a bundle of nerves, which relays messages from the brain to other areas of the body.

Nerves:

Nerve roots exit the spinal cord in the neck and provide control and sensation to different parts of the body based on the spinal level from where they exit, including signals for movement of the head, neck, arms and fingers, breathing, and skin sensation in the upper body.

Cervical Bones (Vertebrae):

The shape of each of seven cervical vertebrae allows the vertebral arteries to move blood to

the brain, protect the spinal cord, and allow the nerve roots to exit from the spinal cord. Additionally, the joints in the back of the cervical vertebrae (facets) are shaped to allow movement: rotation front-to-back, side-to-side, and left-to-right.

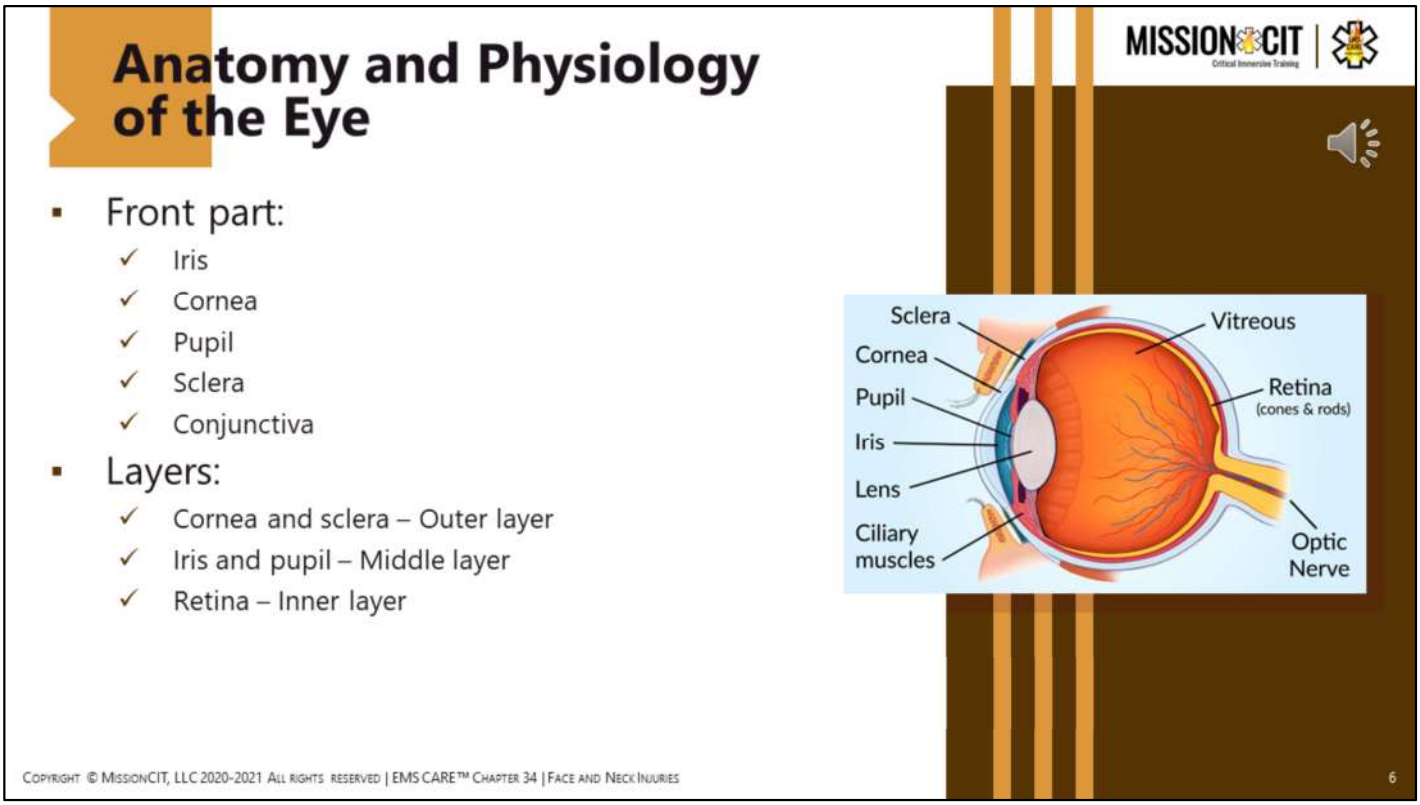
A major difference in the cervical vertebrae versus the other bones of the spine is that the cervical vertebrae have openings (foramen) for vertebral arteries to exit to bring blood to the brain.

Vertebral Discs:

Vertebral discs are located between each vertebra. The discs are responsible for absorbing pressure, while also enabling movement and flexibility in the neck.

Muscles:

The head is supported by several muscles in the neck, enabling movement.

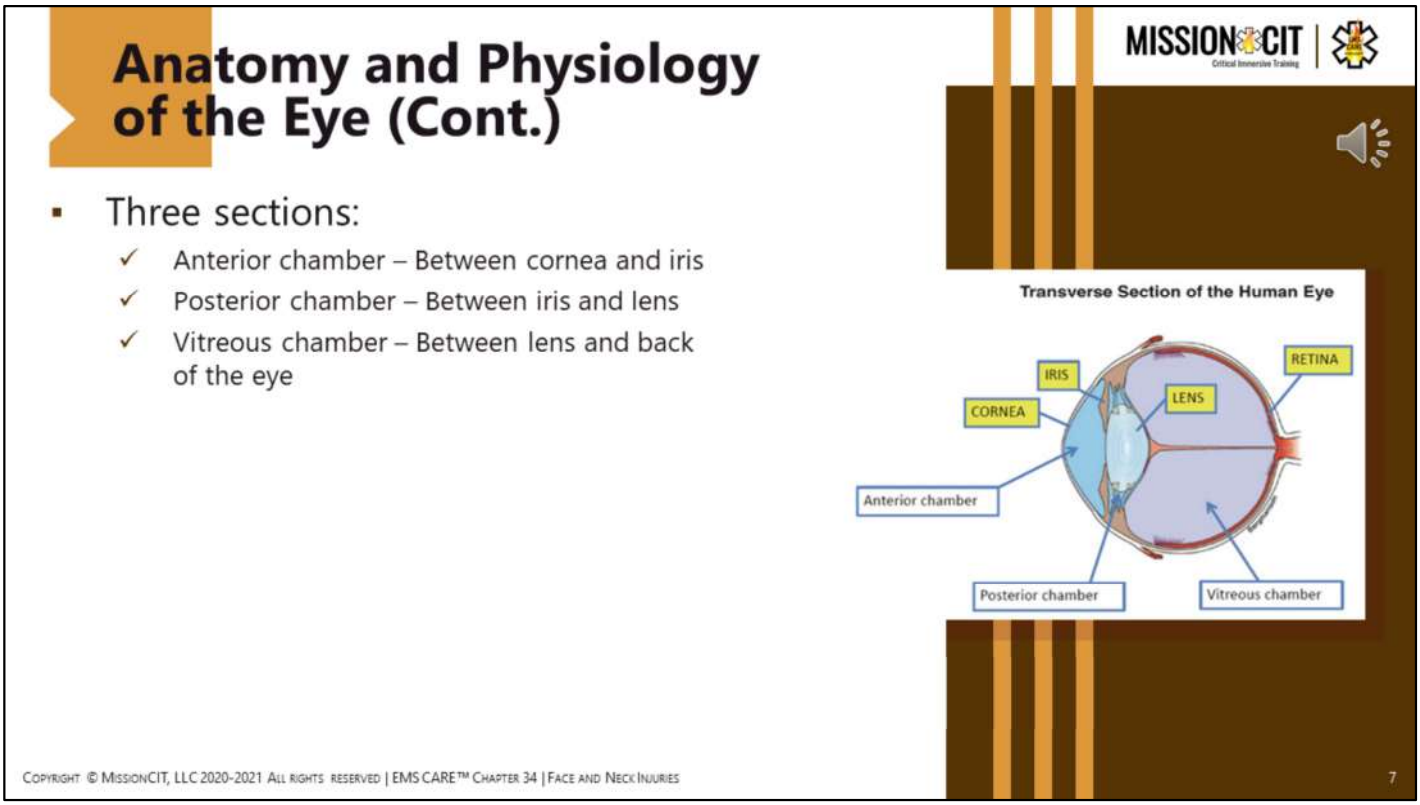


Your eye is a slightly asymmetrical globe, about an inch in diameter. The front part (what you see in the mirror) includes:

- Iris: The colored part
- Cornea: A clear dome over the iris
- Pupil: The black circular opening in the iris that lets light in
- Sclera: The white of your eye
- Conjunctiva: A thin layer of tissue that covers the entire front of your eye, except for the cornea

The eye has three main layers. These layers lie flat against each other and form the eyeball:

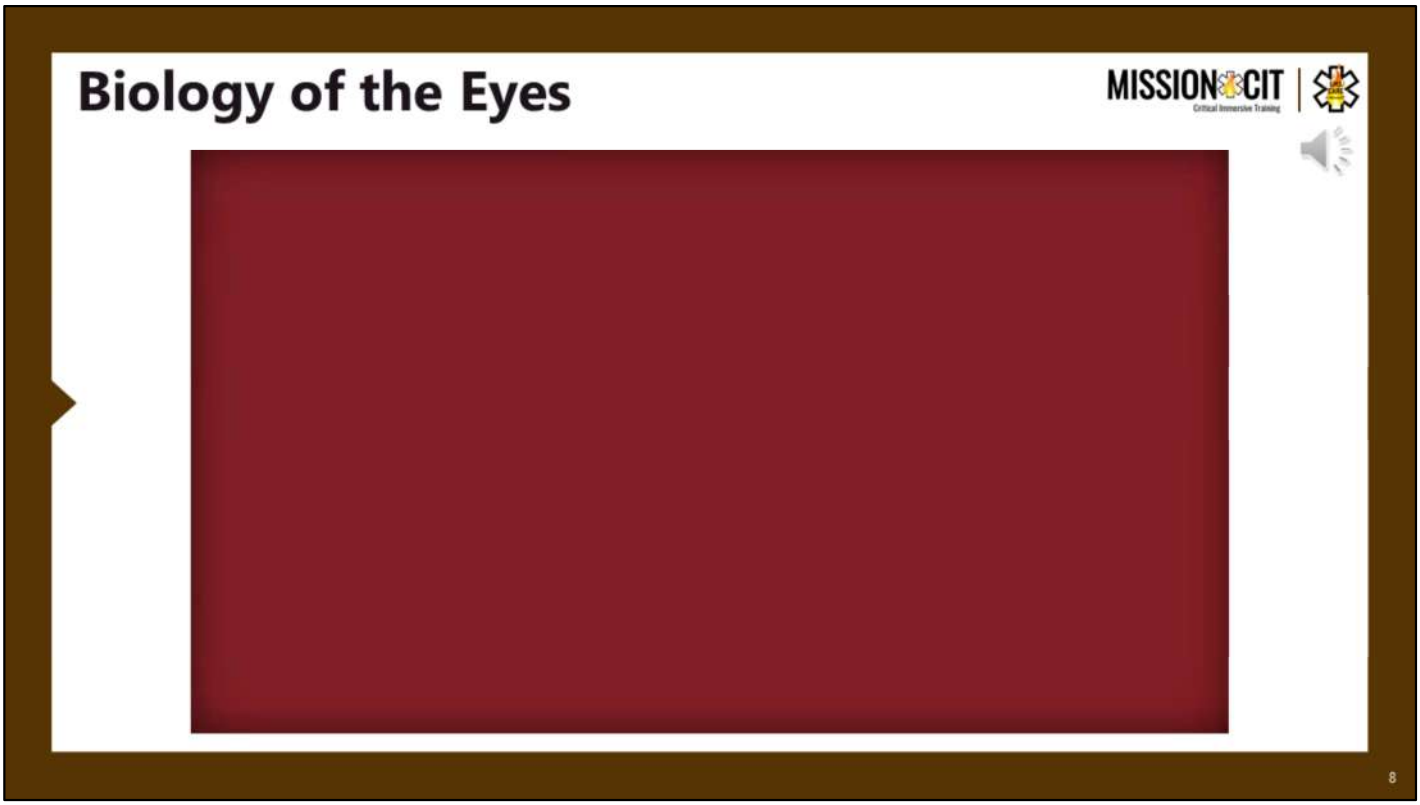
- Cornea and sclera together form the outer layer
- Iris and pupil form the middle layer of the eyeball
- The inner layer of the eye consists of the retina



The inside of the eye is divided into three sections called chambers.

- The anterior chamber is the front part of the eye between the cornea and iris
- The posterior chamber is between the iris and lens
- The vitreous chamber is between the lens and the back of the eye

Fluid fills most of the inside of the eye. The chambers in front of the lens (both the anterior and posterior chambers) are filled with a clear, watery fluid called aqueous humor. The large space behind the lens (the vitreous chamber) contains a thick, gel-like fluid called vitreous humor or vitreous gel. These two fluids press against the inside of the eyeball and help the eyeball keep its shape.



We will finish this lesson with a video on the biology of the eyes. After this video, Missah will next discuss the injuries to the neck and face.