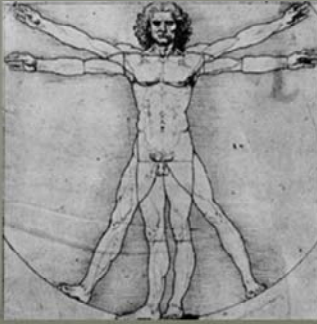


# Medical Terminology Anatomy and Physiology



## **Advance Preparation**

- Prepare lists of medical terms, including prefixes, roots, and suffixes.
- Prepare lists of common abbreviations and acronyms.
- Prepare anatomical models.
- Invite a model to demonstrate directional and positional terminology.

## Topics

- Medical Terminology
- Anatomy and Physiology
- Anatomical Terms
- Body Systems

**Planning Your Time:** Plan 90 minutes for this chapter.

- Medical Terminology (20 minutes)
- Anatomy and Physiology (10 minutes)
- Anatomical Terms (15 minutes)
- Body Systems (45 minutes)

Note: The total teaching time recommended is only a guideline.

# Medical Terminology

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## Components of Medical Terms

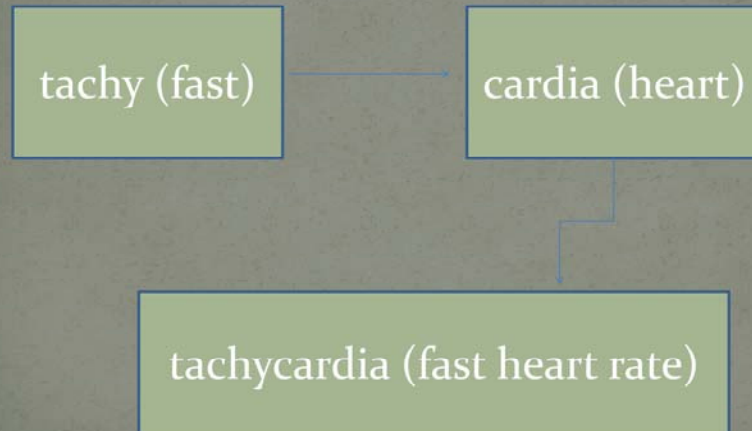
- Words made from parts
  - Root: *pnea*, *arthr*
  - Root with combining form: *therm-o* + *meter* = *thermometer*
  - Prefix: *dys-pnea*, *tachy-pnea*
  - Suffix: *arthr-itis*, *hemophil-iac*
- Compounds of two or more words: *smallpox*

**Talking Points:** When a vowel (such as *o*) is added to end of the root, it becomes a combining form which can be joined with other words or roots or suffixes. For example, *therm/o* and *meter* combine to form *thermometer*, an instrument for measuring heat or temperature. Prefixes modify the root's meaning, usually telling what kind, where, in what direction, or how many. For example, the root *pnea* relates to breathing. Adding the prefix *dys-* (painful; difficult) makes *dyspnea*, or difficult breathing. Adding the prefix *tachy-* (rapid; fast) creates *tachypnea*, or rapid breathing. A number of suffixes have specialized meanings. The suffix *-itis* means "inflammation" and the root *arthr* refers to a joint; thus, *arthritis* is inflammation of a joint. The suffix *-iac* forms a noun indicating a person afflicted with a certain disease: for example, a *hemophiliac* is a patient suffering from the bleeding disorder hemophilia. Sometimes medical words are *compounds*, made up of two or more whole words. For example, the word *small* is joined with the word *pox* to form the medical term *smallpox*, the name of a disease.

**Discussion Topics:** Explain how knowing various common roots, prefixes, and suffixes can help you identify unknown medical terms. List and define common medical roots, prefixes, and suffixes.

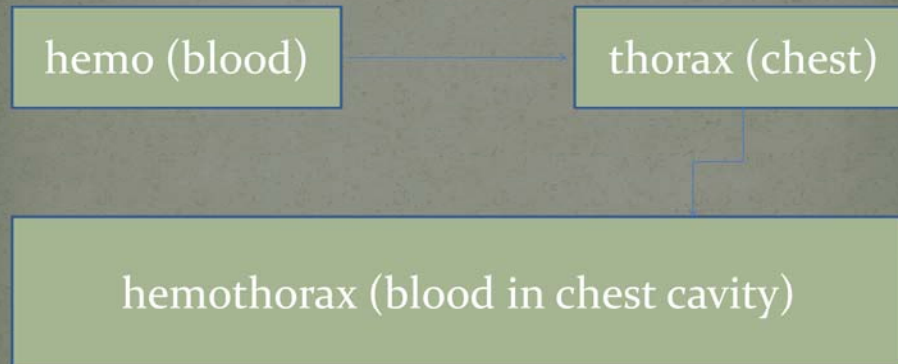
**Class Activity:** Everyone in the class must use medical terminology from this point forward. This activity will continue throughout the length of the entire course. Have students practice using the terminology.

## Word Component Example



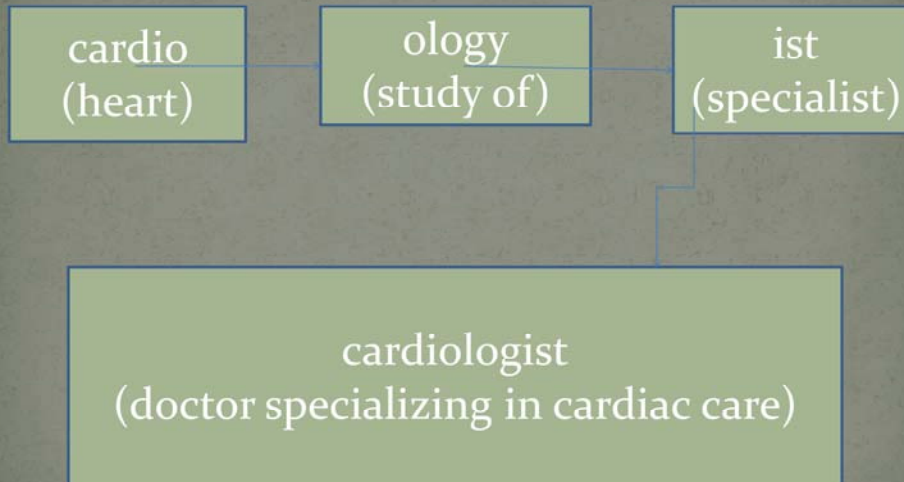
**Point to Emphasize:** Many medical terms can be broken down into roots, prefixes, and suffixes to identify their meaning.

## Word Component Example



**Point to Emphasize:** Learning to recognize common roots, prefixes, and suffixes will aid comprehension of unknown terms.

## Word Component Example



**Knowledge Application:** Assign homework. Provide students with a list of medical terms as well as a list of common roots, prefixes, and suffixes. Have students, using only these lists, define the medical terms. Discuss the results in class.

## Acronyms and Abbreviations

- Acronym: abbreviation made up of initials that can be pronounced as a word
  - CPAP (*see-pap*): Continuous Positive Airway Pressure
- Abbreviation: letters or symbols used in place of words or phrases
  - DNR: Do Not Resuscitate

**Point to Emphasize:** Abbreviations and acronyms can be helpful, but they often lead to ambiguity and imprecision.

**Talking Points:** Avoid using obscure medical terminology, jargon, abbreviations, or acronyms when talking to patients and families. For example, if you ask if a patient has ever had an “MI” (myocardial infarction, or heart attack), the patient might not be able to provide the correct answer because of the unfamiliar terminology. Resist the urge to use complex medical terminology—even correctly—when a simple, accurate term will do. The language of medicine, like any other language, must be applied appropriately and practically in any given situation.

**Discussion Topic:** Discuss why abbreviations and acronyms might lead to imprecise documentation.

**Critical Thinking:** Present two situations. First, describe a situation in which using precise medical terminology may not be the best course of action. Next, describe a situation in which the precision of medical terminology (compared to common language) might be necessary.

**Knowledge Application:** Use random and unknown abbreviations and acronyms in the instructions for a homework assignment. Discuss the ensuing confusion.

## Medical Term Components Video



Click [here](#) to view a video on the topic medical term components.

### **Video Clip**

#### ***Medical Term Components***

- Why should an EMT use proper medical terms when communicating with other medical professionals?
- What are the main components of a medical term?
- Why is it necessary to memorize common term meanings?
- What does the prefix in *pericarditis* mean?
- Why should an EMT avoid using large medical terms when communicating with a patient?

## Terms Involved With Medical Specialties Video



Click [here](#) to view a video on the topic of terms involved with medical specialties.

### Video

#### ***Terms Involved With Medical Specialties***

- What is a pediatrician?
- To what does the term *obstetrics* refer?
- Who specializes in the eye?
- What is a cardiologist's specialty?
- What is the definition of *surgery*?

# Anatomy and Physiology

- Anatomy—study of body structure
- Physiology—study of body function

**Talking Points:** A working knowledge of anatomy will help you understand where organs and organ systems are located and also how external injuries may impact internal systems. Knowing physiology will give you a baseline idea of how the body should work normally. Understanding this will help you identify abnormal function and predict the impact of challenges to normal function.

**Discussion Topic:** Define *anatomy* and *physiology*.

**Critical Thinking:** Why is understanding normal functions of the body so important? What help does it give us as EMTs?

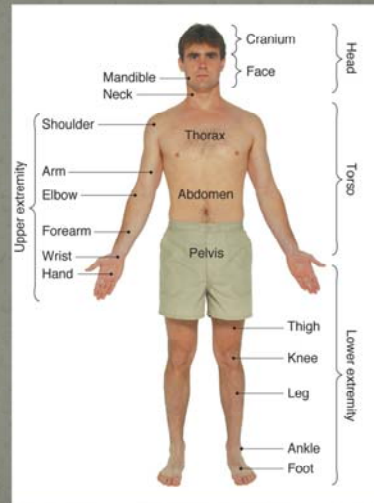
**Knowledge Application:** Explain why knowledge of anatomy and physiology might be helpful to you as an EMT in the areas of assessment and of treatment of your patients.

# Anatomical Terms

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# Anatomical Position

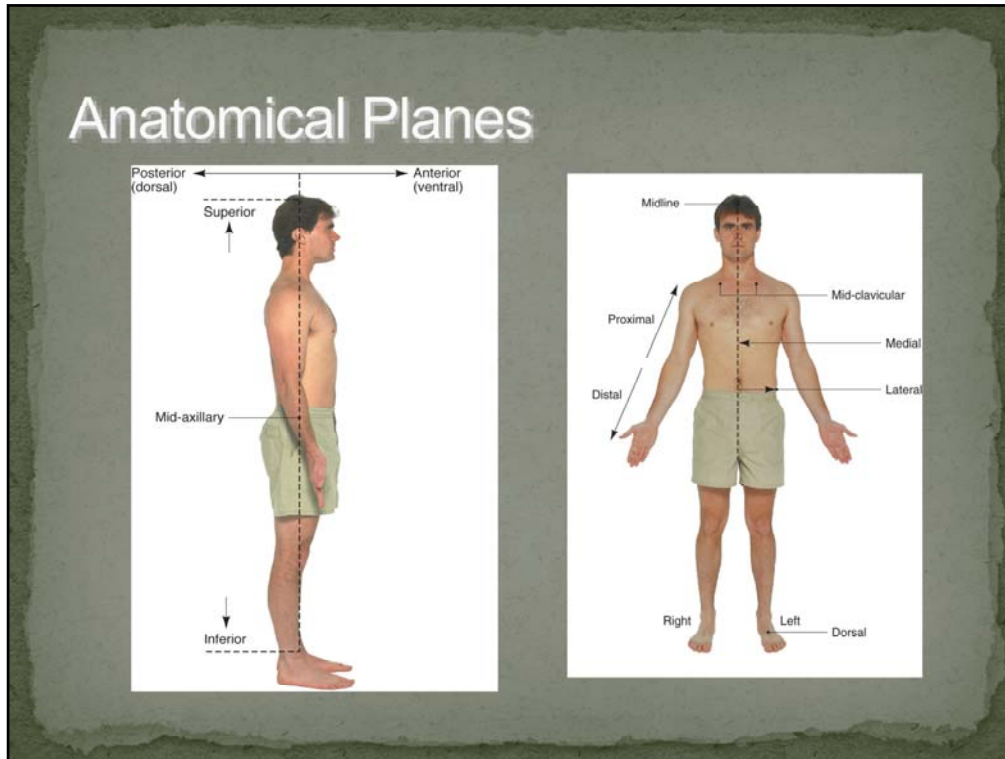
- Facing forward, hands at sides, palms facing forward



**Points to Emphasize:** Directional terms allow for precision of description. Anatomical position is the universal reference for directional terminology.

**Talking Points:** All descriptions of the body use anatomical position as their starting point. When describing locations on the body, use anatomical position as a reference even if the patient is not in this position. For example, the patient's face is referred to as *anterior* (at the front) because the face is anterior in anatomical position, even if the patient is lying face down. The importance of always using this standardized position is that all health care providers will use the same anatomical starting point and will understand each other's references.

**Discussion Topic:** Discuss how possessing a knowledge of external anatomy might assist you in locating internal structures.



**Talking Points:** For directional and spatial relationships, the body is divided into planes. A *plane* is a flat surface that would be formed if you sliced straight through an imaginary human body. Cutting from top to bottom, you could slice the body into right and left halves (sagittal or median planes) or into front and back halves (frontal or coronal planes). Slicing the body into top and bottom halves creates transverse or horizontal planes.

**Discussion Topic:** Discuss how using directional terms makes your descriptions more precise.

**Knowledge Application:** Have students work in small groups. Ask each group to provide directions for a simple task, using only anatomical directional terms. For example, one group might provide directions on how to walk to the bathroom; another might explain how to drink water from a cup.

## Abdominal Quadrants

- Horizontal and vertical lines through navel
- Right upper quadrant (RUQ)
- Left upper quadrant (LUQ)
- Right lower quadrant (RLQ)
- Left lower quadrant (LLQ)



**Talking Points:** It is important for the EMT to learn what organs are located in each quadrant to help in the assessment and treatment of the patient.

**Discussion Topic:** Discuss how possessing a knowledge of external anatomy might assist you in locating internal structures.

**Class Activity:** Have students, working with tape and a marker, use anatomical terms to label the student sitting next to them. (Do not allow this exercise to get out of hand or become inappropriate.)

**Critical Thinking:** How might using medical directional terms be confusing to your patient?

**Knowledge Application:** Use a skeleton or other anatomical model to demonstrate how external anatomy helps to identify internal structures.

## Positional Terms—Supine



**Point to Emphasize:** Positional terms allow for precise and universal description of the patient's position.

## Positional Terms—Prone



## Positional Terms— Recovery Position



**Talking Points:** This is the preferred position for the unconscious non-trauma patient, as it allows vomitus and secretions to drain from the mouth and reduces the risk of aspiration. It is also referred to as either left or right lateral recumbent, depending on which side the patient is on. This position is also used for the transport of women in late stages of pregnancy.

## Positional Terms— Fowler/Semi-Fowler Position



**Talking Points:** This is usually accomplished by raising the head end of the stretcher so the body is at a  $45^{\circ}$ – $60^{\circ}$  angle. The patient may be sitting straight up or leaning slightly back. If leaning back in a semi-sitting position, this is sometimes called *semi-Fowler*. In a Fowler position, the legs may be straight out or bent.

**Discussion Topic:** Explain the following positional terms: *supine*, *prone*, *semi-Fowler*, *lateral recumbent*.

## Positional Terms—Trendelenburg Position



**Talking Points:** In the Trendelenburg position, the patient is lying with the head slightly lower than the feet. This may be accomplished by having the patient lie flat and elevating the legs a few inches. This position is now seldom used. It was once used for patients with suspected shock without suspected spine injury, but is no longer recommended for shock.

**Knowledge Application:** Have a model assume various positions. Ask students to label those positions, using positional terms.

# Body Systems

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# Musculoskeletal System

- Gives body shape
- Protects body organs
- Allows for movement

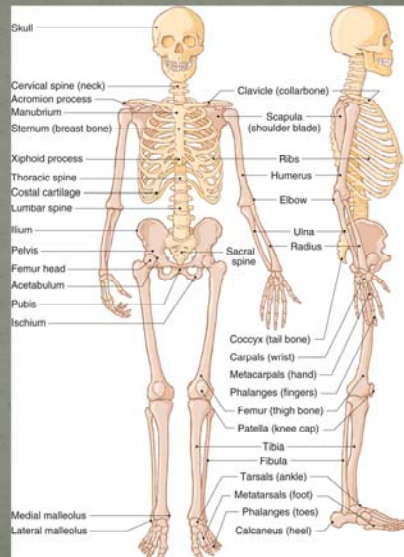
**Point to Emphasize:** The musculoskeletal system has three main functions: to give the body shape; to protect vital internal organs, and to provide for body movement.

**Class Activities:** Have small groups, using household items (bags, funnels, tubing, rubber bands, and so on), design models of a body system. Have them present and explain functions. Assign anatomical diagrams to be filled out as homework.

**Knowledge Application:** Conduct an A&P research project. Assign each student a specific body system. Have them research that body system and present their findings to the class.

## Skeletal System

- Extends into all parts of body
- Consists of skull and spine, ribs and sternum, shoulders and upper extremities, pelvis and lower extremities

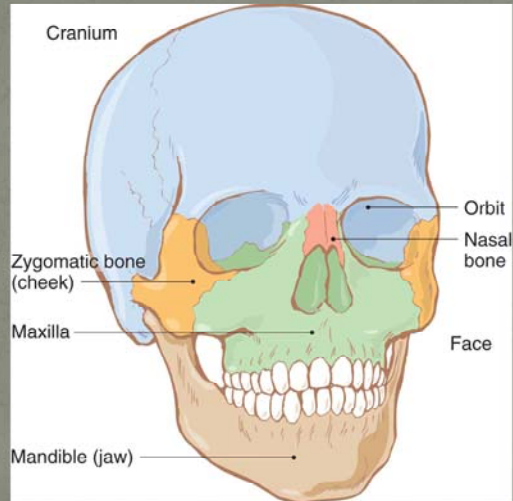


**Point to Emphasize:** The skeleton consists of the skull and spine, ribs and sternum, shoulders and upper extremities, and pelvis and lower extremities. Interacting with the skeletal system are muscles, ligaments, and tendons.

**Talking Points:** Interacting with the skeletal system are muscles, ligaments (which connect bone to bone), and tendons (which connect muscle to bone).

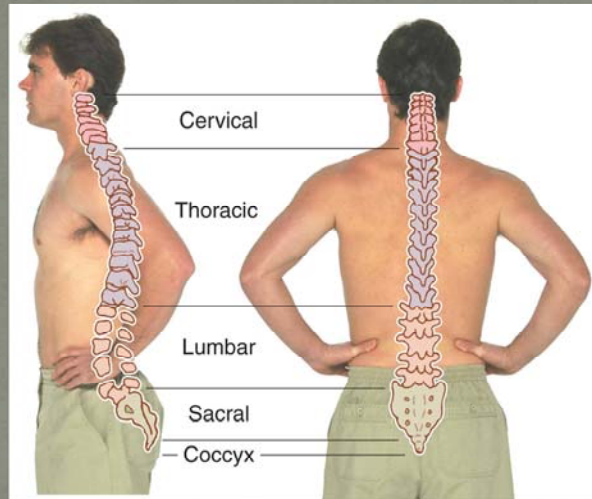
**Knowledge Application:** Assign a disease or injury (such as asthma) to each student. Have students research the disorder and then report on its relationship to the affected body system. How does the disorder interrupt function?

# Skull



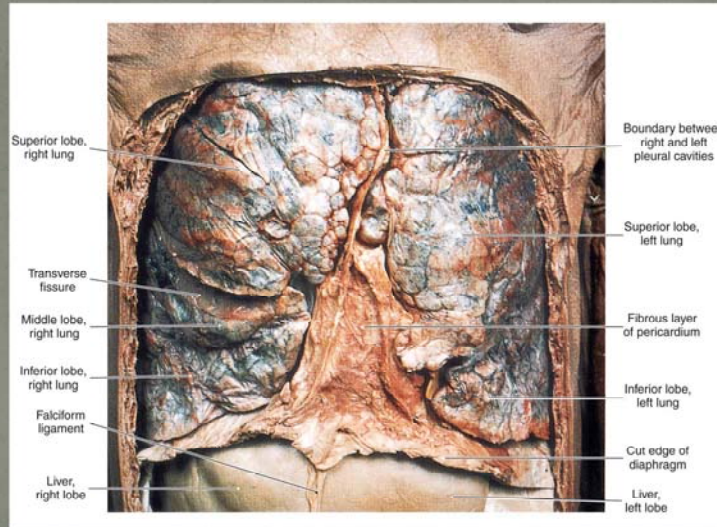
**Talking Points:** The skull is the bony structure of the head. A main function is to enclose and protect the brain. (If the brain is injured and begins to swell, there is little room inside the skull to expand. This can result in a serious situation for the patient.) The cranium consists of the top, back, and sides of the skull. The face is the front of the skull. The bones of the anterior cranium connect to facial bones, including the mandible, maxillae (fused bones of the upper jaw), and the nasal bones (which provide some of the structure of the nose). These bones form the facial structures. Some of these structures consist of multiple bones, such as the orbits, which surround the eyes, and the zygomatic arches, which form the structure of the cheeks.

# Spinal Column



**Talking Points:** Like building blocks, vertebrae are stacked one upon the other to form the spinal column. Vertebrae are open in the middle, somewhat like donuts, creating a hollow center for the spinal cord. Since the spinal cord is essential for movement, sensation, and vital functions, injuries to the spine have the potential to damage the cord, possibly resulting in paralysis or death. For this reason, you will see references to “taking spinal precautions” for some patients. The areas most commonly injured are the cervical and lumbar areas, since these have no supporting structure (like the ribs and pelvis) and so absorb more force in a traumatic injury.

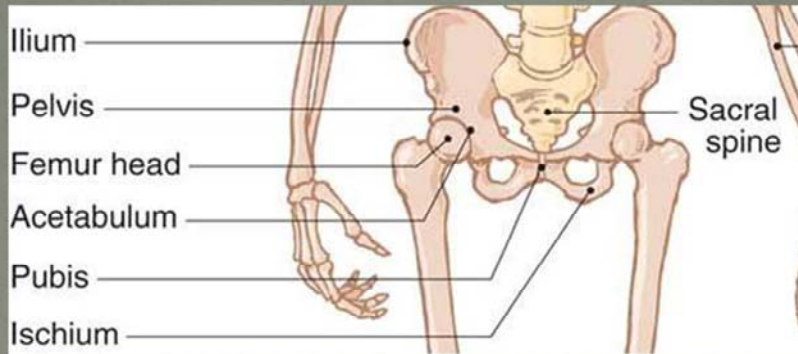
## Thoracic Cavity



**Talking Points:** The thorax is the chest. The bones of the thorax form an internal space called the thoracic cavity. This cavity contains the heart, lungs, and major blood vessels. An important function of the thorax is to protect these vital organs. This is accomplished by the 12 pairs of ribs that attach to the 12 thoracic vertebrae of the spine. In the front, 10 of these pairs of ribs are attached to the sternum (breastbone) and two are called floating ribs since they have no anterior attachment. The sternum is a flat bone divided into three sections: manubrium (superior portion), body (center portion), and xiphoid process (inferior tip).

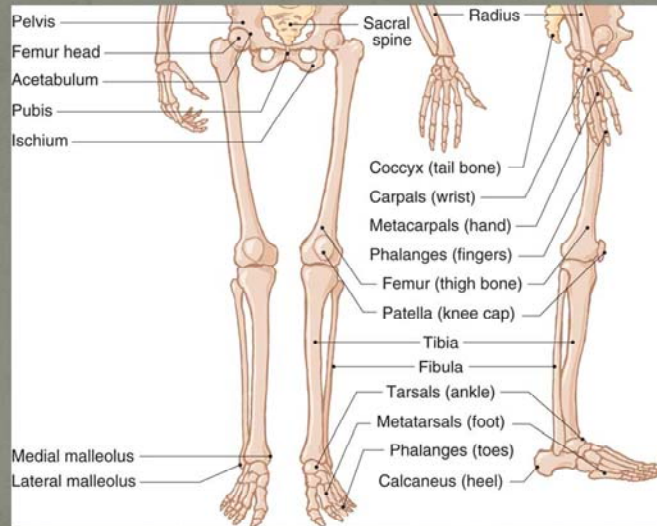
**Class Activity:** Assign an online scavenger hunt. Ask each student to find video graphics on a particular body system and present their findings to the class.

# Pelvis



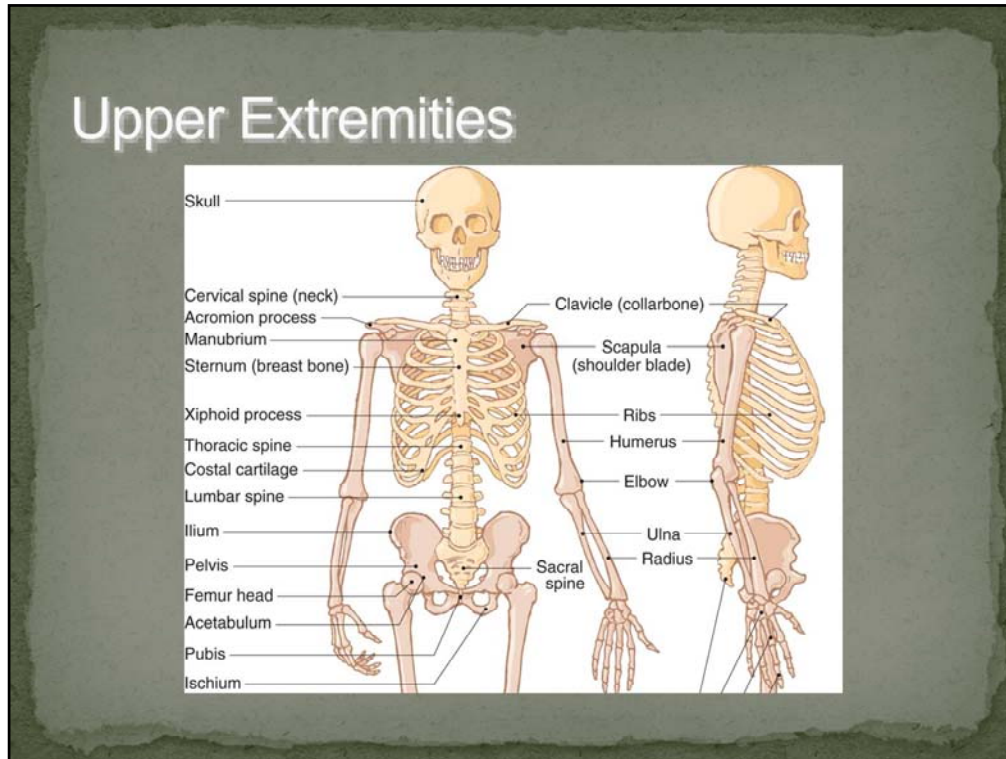
**Talking Points:** The pelvis is sometimes called the hip, although the hip is actually the joint where the femur (thigh bone) and pelvis join. The pelvis contains bones that are fused together. The ilium is the superior bone that contains the iliac crest, which is the wide bony wing that can be felt near the waist. The ischium is the inferior, posterior portion of the pelvis. The pubis is formed by the joining of the bones of the anterior pubis. The pelvis is joined posteriorly to the sacral spine. The hip joint consists of the acetabulum (the socket of the hip joint) and the ball at the proximal end of the femur.

## Lower Extremities



**Talking Points:** The pelvis and hip joint are part of the lower extremities. Moving downward from the hip, the large thigh bone is the femur. (It is the largest long bone in the body.) It has a slight bend at its proximal end where it attaches to the pelvis. This is a frequent site of fractures and is commonly involved when a patient “breaks a hip.” Progressing down the leg, the patella, or kneecap, sits anterior to the knee joint. The knee connects with the femur superiorly and with the bones of the lower leg, the tibia and fibula, inferiorly. The tibia (shin bone) is the medial and larger bone of the lower leg. The fibula is the lateral and smaller bone of the lower leg. The ankle connects the tibia and fibula with the foot. Two distinct landmarks are the malleolus at each side of the ankle: the lateral malleolus (lower end of the fibula), and the medial malleolus (lower end of the tibia). These are the protrusions seen on the lateral and medial aspects of the ankles. The ankle consists of bones called tarsals. The foot bones are metatarsals, the heel bone is the calcaneus, and the toe bones are phalanges.

## Upper Extremities



**Talking Points:** Each shoulder consists of several bones: clavicle (collarbone), scapula (shoulder blade), and proximal humerus. The clavicle is located anteriorly; the scapula is located posteriorly. The acromion process of the scapula is the highest portion of the shoulder. It forms the acromioclavicular joint with the clavicle and is a frequent area of shoulder injury. The upper arm and forearm consist of three bones connected at the elbow: the humerus (between the shoulder and the elbow) and the radius and ulna (between the elbow and the hand). The radius is the lateral bone of the forearm. It is always aligned with the thumb. (The radial pulse is taken over the radius.) The ulna is the medial forearm bone. The wrist consists of several bones called carpals. The bones of the hand are the metacarpals. The finger bones, like the toe bones, are phalanges.

## Joints



Ball-and-socket joint

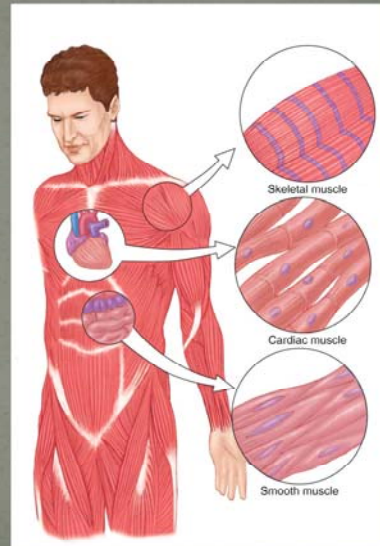


Hinge joint

**Talking Points:** Joints are formed when bones connect to other bones. There are several types of joints, including ball-and-socket joints and hinge joints. The hip is an example of a ball-and-socket joint, in which the ball of the femur rotates in a round socket in the pelvis. The elbow is an example of a hinge joint in which the angle between the humerus and ulna—which are connected by ligaments—bends and straightens, as the name suggests, like a hinge.

## Muscle

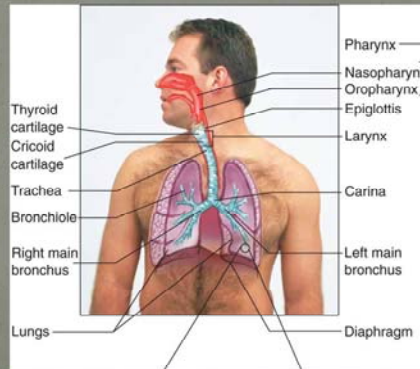
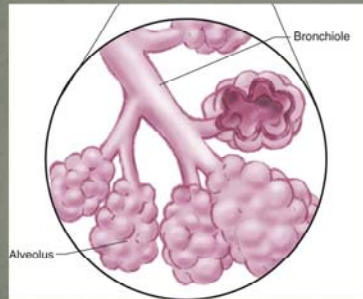
- Voluntary (skeletal)
- Involuntary (smooth)
- Cardiac



**Talking Points:** Attached to the bones, voluntary muscles form the major muscle mass of the body. Voluntary muscle can contract upon voluntary command. For example, if you want to, you can reach to pick up an item or walk away. Involuntary muscles respond automatically to orders from the brain. They are found in the GI system, lungs, blood vessels, and urinary system. You do not have to consciously think about using them to breathe, digest food, or perform other functions that occur under their control. In fact, you have no direct control over involuntary muscles. Involuntary muscles do respond to stimuli such as stretching, heat, and cold. Cardiac muscle is a specialized form of involuntary muscle found only in the heart. Cardiac muscle is extremely sensitive to decreased oxygen supply and can tolerate interruption of blood supply for only very short periods. The heart muscle has its own blood supply through the coronary artery system. The heart also has a property called automaticity: it has the ability to generate and conduct electrical impulses. The heartbeat (contraction) is controlled by these electrical impulses.

# Respiratory System

- Brings in oxygen via inhalation
- Excretes carbon dioxide via exhalation



**Point to Emphasize:** The purposes of the respiratory system are ventilation and oxygenation. Oxygen is moved into the bloodstream through inhalation, and carbon dioxide is picked up by the blood and excreted through exhalation.

**Talking Points:** Air enters the body through the mouth and nose. It moves through the pharynx, which includes the oropharynx (posterior to the mouth) and the nasopharynx (posterior to the nose). From the pharynx, air moves on a path to the lungs. A leaf-shaped structure called the epiglottis closes over the glottis, the opening to the trachea, to prevent foods and foreign objects from entering the trachea during swallowing. The larynx (voice box), contains the vocal cords. The ring-shaped cricoid cartilage forms the lower portion of the larynx. The trachea (windpipe) carries air from the larynx down to the lungs. This tube is formed and protected by 16 C-shaped (incomplete) rings of cartilage. The trachea splits (bifurcates) into two bronchi. One “mainstem” bronchus goes to each lung. Inside each lung, the bronchi branch and split (the branches are called bronchioles) and the passages get smaller. Each branch ends at a group of alveoli, the small sacs where gas exchange with the bloodstream takes place. The diaphragm divides the chest cavity from the abdominal cavity. It is a large muscle primarily controlled by the phrenic nerve. The diaphragm and other parts of the body allow the body to inhale and exhale.













































































