

Anatomic Concepts

2

Chapter Outline

Divisions of Anatomy

Gross Anatomy

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Anatomic Variation

Key Terms

Anterior and Posterior are the anatomic terms for “front” and “back.” Sometimes the terms ventral and dorsal are used to depict anterior and posterior, but these terms are usually applied to quadrupeds.

Anatomic Position is that position of the body (facing forward with palms forward) from which the position of all structures are described.

Cranial or Superior and Caudal or Inferior are terms applied to “headward” and “tailward.”

Horizontal or Transverse Plane is a plane at right angles to the sagittal plane.

Medial and Lateral are terms used to describe positions relative to the midline of the body. For example, a structure located closer to the midline than another structure is described as being medial to it or, if farther away, lateral to it.

Median Plane or Midsagittal Plane is a plane through the midline of the body from anterior to posterior. Any plane that passes parallel to this plane is called a sagittal plane.


Mesial and Distal are terms that relate to tooth locations that are described from the median plane. Thus, canine teeth are mesial to premolar teeth, whereas molar teeth are distal to premolar teeth.

Proximal and Distal are positions relative to the body. For example, the elbow is proximal to the wrist, whereas the fingers are distal to the wrist.

Superficial and Deep are self-explanatory (e.g., skin is **superficial** to muscle, whereas the heart is **deep** to the lungs). Alternate terms for superficial and deep are external and internal.


The word **anatomy**, which has been derived from the Greek words **ana** and **tomē**, literally means to “cut up” or dissect. The human body, therefore, is described in an anatomy text as if it were dissected layer by layer. Because the study of anatomy is a descriptive science and the descriptions are related spatially, a student of anatomy must become familiar with the language an anatomist uses in describing these spatial relationships. Without understanding the basic vocabulary, the student would be unable to learn the subject effectively and to communicate with peer professionals.

DIVISIONS OF ANATOMY

 **Summary Bite.** Four major categories of anatomy study include: developmental anatomy, neuroanatomy, microscopic anatomy, and macroscopic anatomy.


The science of human anatomy is generally divided into four major categories of study. **Developmental anatomy**, commonly referred to as human embryology, deals with the study of how the mature body is formed, beginning with a fertilized ovum. **Neuroanatomy** is the specialized study of the nervous system, including that of the brain and spinal cord. **Microscopic anatomy** is the division of anatomy that studies the fine details of the human body using the microscope. This division is more commonly referred to as **histology**, the study of tissues. **Macroscopic** or **gross anatomy**, on the other hand, is that division of anatomy that studies the human body with the unaided eye.

Gross Anatomy

 **Summary Bite.** Gross anatomy is the study of the human body with the unaided eye, and it may be studied systemically or regionally.

Gross anatomy of the human body may be studied from one of two approaches. **Systemic anatomy** is the approach that describes and discusses each system separately and in its entirety (e.g., studying all of the muscles of the body that compose the muscular system before discussing the components of any other system).


Regional Anatomy

 **Summary Bite.** Regional anatomy confines itself to a particular region of the body without extending the study outside the region.

Regional anatomy details a region of the body, such as the head and neck, studying all systems in that area as a complete, integrated unit.

The regional approach used in this text provides the student with a more comprehensive presentation of an anatomic region, thus enhancing an understanding of interrelationships between the various systems of the body.

DESCRIPTIVE ANATOMIC TERMS

 **Summary Bite.** Human anatomic terms are spatially related to the anatomic position defined as erect with the palms facing forward.

Human anatomic structures are described spatially relative to the anatomic position, defined for the human as an erect position with the palms of the hands facing forward (Fig. 2-1). Structures on the “front” side of the body are described as being **anterior**, whereas those on the “back” of the body are termed **posterior**. Occasionally, other terms may be used for anterior and posterior, such as **ventral** in place of anterior and **dorsal** in place of posterior (Fig. 2-2). The terms ventral and dorsal are perhaps more appropriate when related to quadrupeds, although embryologists and neuroanatomists prefer these terms.

Similarly, alternate terms may be used in referring to directions aimed at the head or tail. **Cranial** or **superior** means “toward the head,” whereas **caudal** or **inferior** refers to “tailward,” although neuroanatomists prefer the term **rostral** for cranial or superior. The terms **superficial** and **deep** are used to describe positions relative to the surface of the body from any aspect. The ribs are superficial to the lungs but deep to the skin. Alternate terms for superficial and deep are **external** and **internal**, respectively.

Proximal and **distal** are terms generally applied to positions close to or away from the body, respectively. For example, the wrist is proximal to the finger but distal to the elbow. The teeth are described as being either **mesial** or **distal** to each other in the dental arch from the median plane of the face. For example, the canine tooth is mesial to the first premolar and distal to the lateral incisor. **Medial** and **lateral** are terms applied in relationship to the midline of the body. A structure, A, located closer to the midline than another structure, B, is therefore medial to structure B.

An anatomy student must also learn to visualize several imaginary planes passing through the body serving to divide it in one way or another. The **median plane** passes vertically through the body from

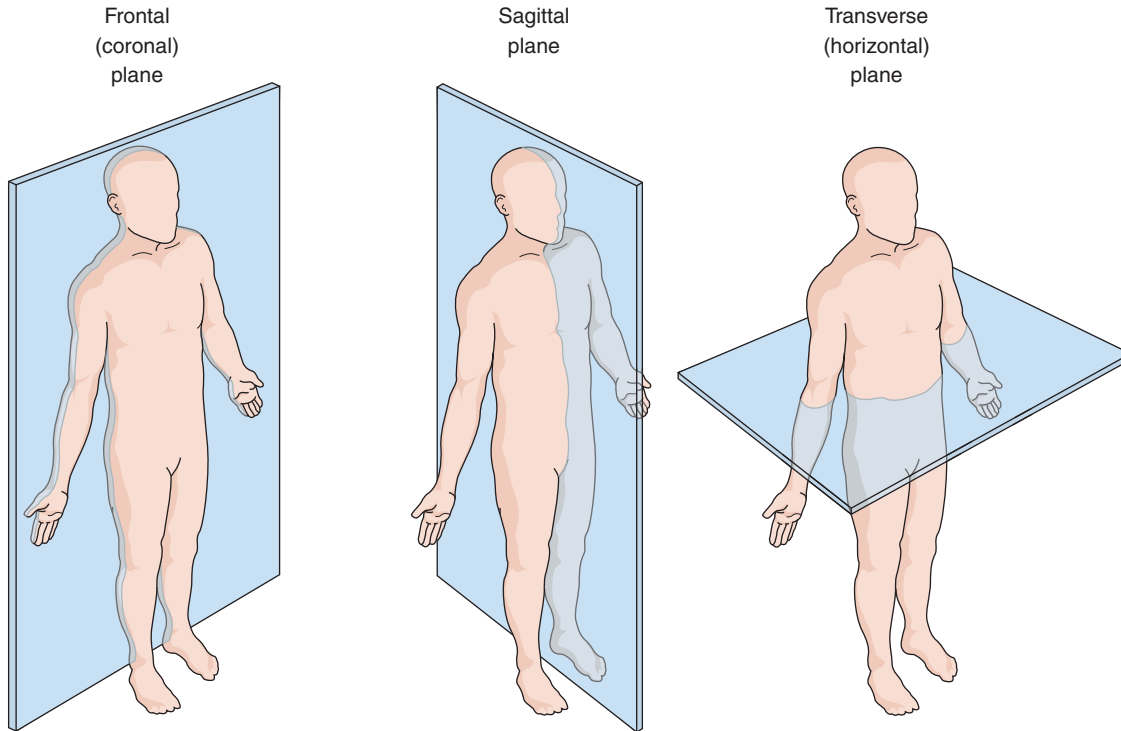


Figure 2-1. Human figure in the anatomic position (palms facing forward), illustrating frontal (coronal), sagittal, and transverse (horizontal) planes.

anterior to posterior at the midline. This plane divides the body into symmetric right and left halves, except for certain areas of the viscera. This plane may also be referred to as the **midsagittal plane**. Any plane parallel to this plane is simply a **sagittal plane**.

A plane through the body at right angles to the midsagittal plane is the **horizontal** or **transverse plane**, providing a cross section with superior and inferior parts. Another plane passes at right angles to the midsagittal plane, again in a vertical direction, and is the **frontal** or **coronal plane**, dividing the body into anterior and posterior sections (Fig. 2-3).

Although the previously described terms are applied to the entire body, they are also appropriately used in describing the structures in head and neck anatomy.

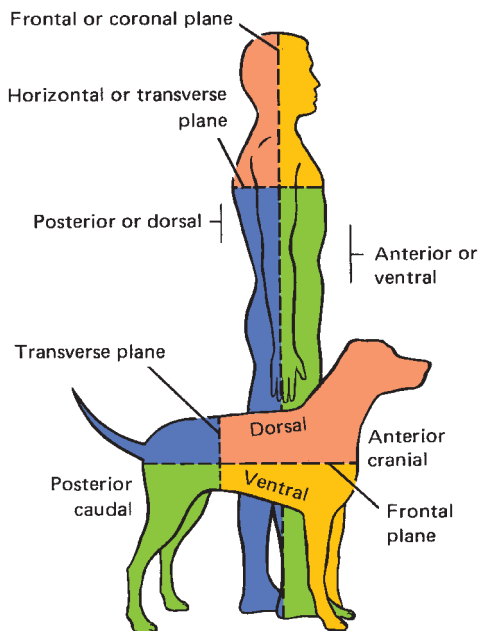


Figure 2-2. Human figure and a quadruped figure illustrating comparative planes and directional references with alternate terminology.

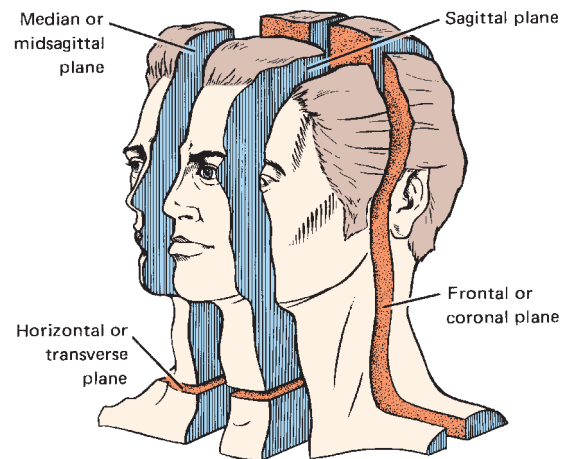


Figure 2-3. Planes of reference and alternate terminology in the anatomy of the head and neck.

ANATOMIC VARIATION



Summary Bite. Anatomic variation is often the rule rather than the exception and the student must learn to recognize and interpret its significance.

A student of anatomy must learn early that anatomic variation is frequently the rule rather than the exception. Structures observed in the cadaver often do not conform to the descriptions found in anatomy textbooks. The major structures might not vary so much but, as the finer details are studied, variations clearly emerge. For example, a student would not expect great variation in the number of bones present in a cadaver, and the variation is not great. However, the

individual processes on the bones and their relationships are not at all constant from one individual to another. Similarly, muscles might display slightly different origins, insertions, and tendons. Nerves might not arise from the segment as described. Variations in blood supply are common; thus, a particular region might be supplied from an entirely different source than that described.

It is important that the student learn to recognize anatomic variations as they exist, whether or not they are described. Furthermore, the student must learn to interpret logically the significance of these variations and perhaps to extrapolate their effects on the living individual. Mastering this diagnostic technique helps enable the professional to make rational decisions regarding anatomic variations observed in clinical practice.