

Dr Keith L Moore - Anatomy

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Medicine - eng

OVERVIEW 3

Decidua, used to describe the endometrium (G. *endon*, within + *metra*, uterus) or *lining of the uterus during pregnancy*, is from Latin and means "a falling off." This is an appropriate term because this layer "falls off" or is shed after the baby is born, just as the leaves of deciduous trees fall off after the summer.

DESCRIPTIVE TERMS

To describe the body and to indicate the position of its parts and organs relative to each other, *anatomists around the world have agreed to use several terms of position and direction and various planes of the body*. Because clinicians also use these terms, it is important for you to take time at the beginning of your professional career to learn them well. Practice using them so that it will be clear what you mean when you describe parts of the body in patients' histories or during discussion of patients with your clinical colleagues.

Eponyms should not be used in Anatomy because they give no clue to the structure involved. Who would ever guess that *Wharton's duct* is the submandibular duct, the duct of the submandibular salivary gland? In addition, some eponyms are historically inaccurate. *Poupart* was not the first person to describe the inguinal ligament (*Poupart's ligament*).

Correct terminology will also be required when you write reports for medical and other journals. Persons who examine your reports weeks, months, or years later should be able to understand the description clearly *e.g.*, the exact site of a fracture.

3.1 THE ANATOMICAL POSITION p3

All descriptions of the human body are based on the assumption that the person is in the anatomical position (Figs. 1 and 2). *This position of the body is adopted worldwide for giving anatomical descriptions and must be understood*. By using this position, any part of the body can be related to any other part of it.

A person in the anatomical position is standing erect with the head, eyes, and toes directed forward, the heels and toes together, and the upper limbs hanging by the sides with the palms facing anteriorly. You must always visualize the anatomical position when describing patients (or cadavers) lying on their backs (recumbent or supine position), sides, or fronts (prone position). Otherwise, confusion as to the meaning of your description will exist and *serious consequences could result*.

Because the anatomical position is not the natural way of standing and is different from the military position of attention, special effort should be made to learn how the body is positioned. In Figures 1 and 2 observe that:

1. *The palms of the hands face anteriorly (forward) because the forearms and hands are supinated:*

Ch. 3. THE BASIS OF MEDICAL LANGUAGE
p 3-15, read 2-f subheadings

Anatomy is the basis of the language of medicine and dentistry. The first book, "On the Naming of the Parts of the Body" was written by Rufus of Ephesus (ca. A.D. 50). Anatomy students learn a new language consisting of at least 4500 words. When you learn these words you will be able to speak the anatomical language fluently. You will feel at ease talking to your clinical colleagues because *the anatomical language constitutes most of the words making up the medical language*. To describe the relationship of one structure to another, *anatomical nomenclature should be used*.

To be understood you must express yourself clearly, using the official terms in the correct way. Many anatomical terms are derived from Latin, Greek, and Arabic. Terms are derived from *Greek* because of the studies of Hippocrates, Aristotle, and Galen, famous Greek physicians. Similarly, many terms come from *Latin* because of the influence of Galen, a Greek physician who moved to Rome, and Vesalius (1514-1564), a great Flemish anatomist who was the Professor of Anatomy at the University of Padua in Italy for many years.

The study of the derivation of words (*etymology*) can help you remember anatomy and, at the same time, you are likely to find the process enjoyable. The following are good examples.

The term *cecum* is from the Latin word *caecus* meaning "blind." Your cecum is a blind pouch lying inferior to the terminal portion of your ileum (from a Latin verb meaning "to roll up or twist"). The ileum is a highly coiled or rolled up part of the small intestines.

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4 CLINICALLY ORIENTED ANATOMY

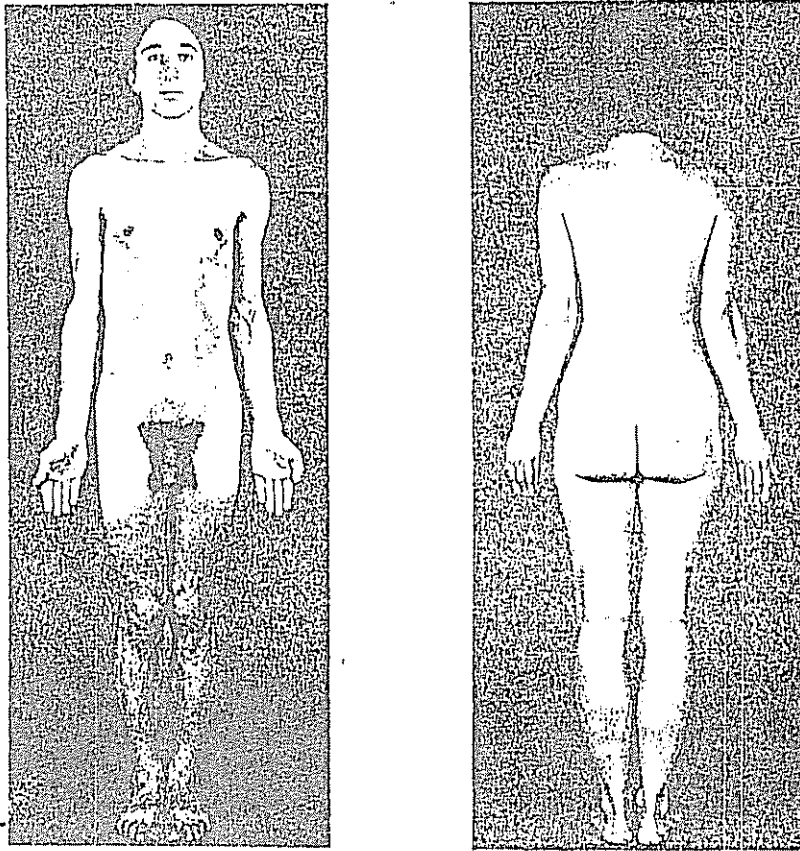


Figure 1. Photographs of a man and woman standing in the anatomical position. A, anterior view of a male. Note particularly the bony landmarks formed by his clavicles (collar bones) and the position of his hands and feet. B, posterior view of a female. Note the effect ultraviolet has had on the areas of exposed skin in these persons. Sunlight darkens the pigment melanin in the skin and activates the cells (melanocytes) to produce more pigment.

i.e., they have been rotated laterally, away from the median plane of the body. When you stand casually your forearms are partly pronated; *i.e.*, the palms almost face posteriorly (backward).

2. *The great toes touch.* In the usual stance, the heels are together but the great toes are directed anterolaterally (toward the front and sides).

3. 2 PLANES OF THE BODY p 4

Many descriptions are made using *imaginary planes* passing through the body in the anatomical position. There are median, sagittal, coronal, and horizontal planes.

The Median Plane (Fig. 3): This is the vertical plane passing lengthwise through the midline of the body from front to back, *dividing it into right and left halves*, except for such internal organs as the heart and liver that do not lie in the midline.

The Sagittal Planes (Fig. 3): These are any ver-

tical planes passing through the body parallel to the median plane. The sagittal plane that passes through the median plane of the body is called the median sagittal plane or **midsagittal plane**. It is in the same plane as the **sagittal suture**, an arrow-like (*L. sagitta*, arrow) fibrous joint between the parietal bones of the skull (Fig. 33A).

The sagittal planes that divide the body into right and left portions but do not pass through the median plane of the body are sometimes referred to as **paramedian** or **parasagittal planes** (*G. para*, beside).

You are certain to hear neurologists, neurosurgeons, and neuroradiologists refer to **parasagittal tumors** (*i.e.*, tumors that are near the midsagittal or median plane). It is always helpful to give a point of reference, *e.g.*, a sagittal plane passing through the midpoint of the clavicle.¹

The Coronal Planes (Fig. 4): These are any *vertical planes passing through the body at right angles to*

median plane, dividing it into anterior (front) and posterior (back) portions.

The coronal suture of the skull is in a coronal plane (Fig 33A). The coronal planes of the body pass through the ankles. Hence, the coronal planes of the anterior parts of the feet do not pass through the trunk of the body (Fig 4).

It is common to hear the coronal plane referred to as the *frontal plane*, probably because several of them pass through the forehead (L *frons*).

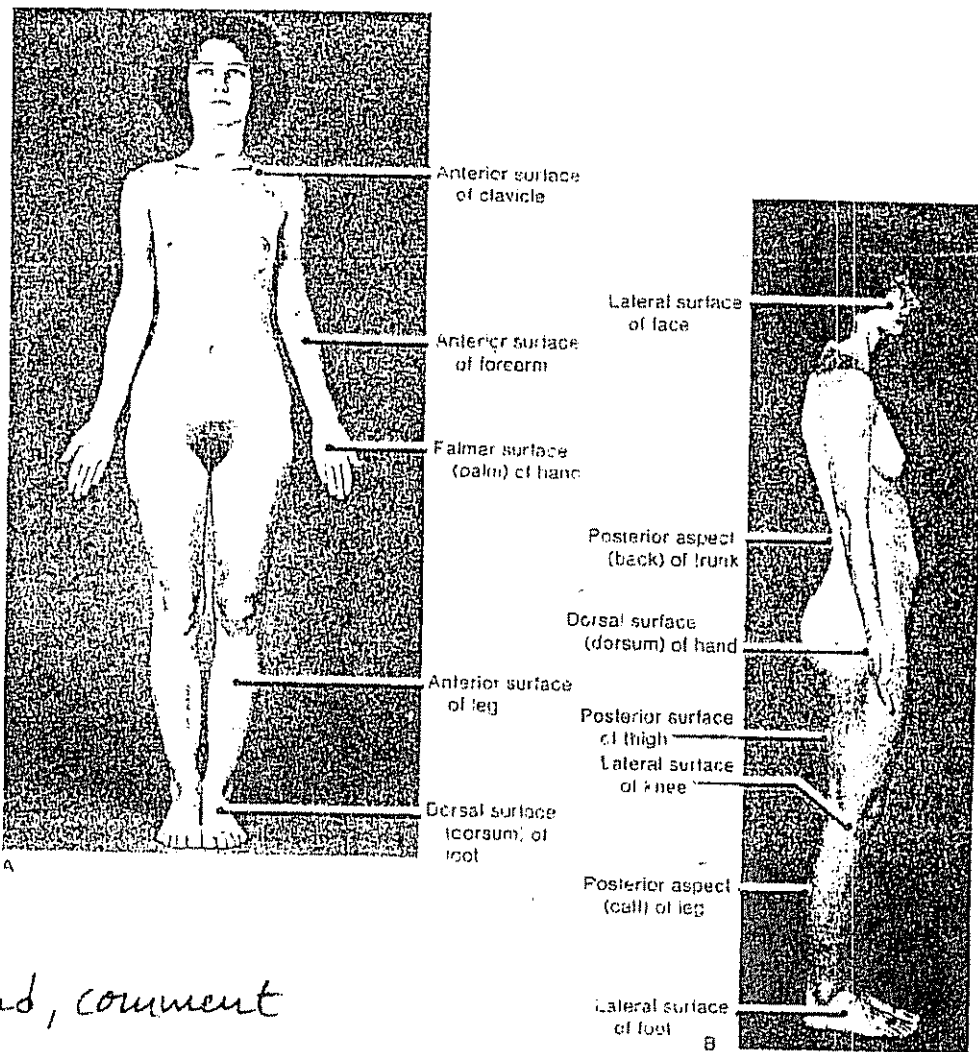
The Horizontal Planes (Fig 4). These are any planes passing through the body at right angles to both the median and coronal planes. A horizontal plane divides the body into superior (upper) and inferior (lower) portions. Again it is always helpful to give a reference point, e.g., a horizontal plane passing through the umbilicus (navel).

It is common to hear the horizontal plane referred to as the *transverse plane*, but it may be erroneous. Note that a transverse section of the hand is in the horizontal plane, but a transverse section of the foot is in the coronal plane (Fig 4).

⊗ figure 3 (p 7)

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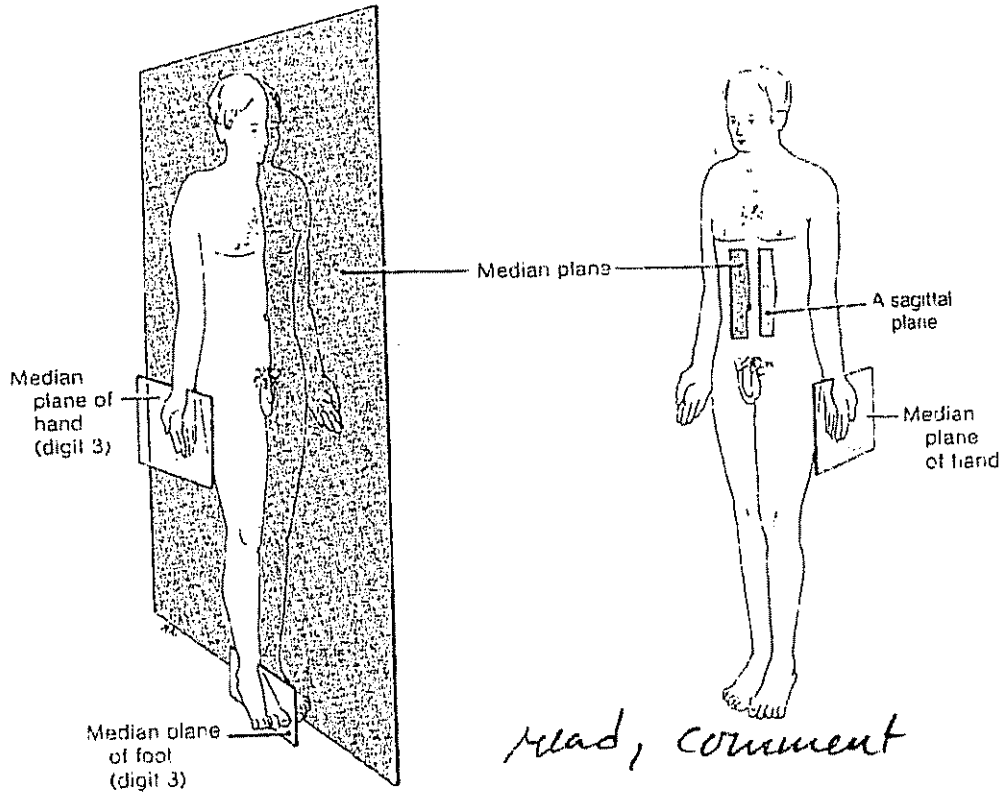
6 CLINICALLY ORIENTED ANATOMY



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Figure 2. Photographs of a 27-year-old woman demonstrating the anatomical position and some anatomical terms. A, anterior view. B, lateral view. Note: (1) she is standing erect; (2) her face and eyes are directed forward; (3) her hands are by her sides with the palms directed anteriorly; (4) her heels are together; (5) her toes are pointed anteriorly, and (6) her great toes are touching. Owing to rotation of the lower limbs during the embryonic period, the superior (upper) surface of the foot is called the dorsal surface or dorsum.

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Figure 3. Drawings illustrating the median and sagittal planes of the body, two of the four anatomical planes. Observe that the median plane is a vertical plane passing through the body from front to back, dividing it into equal and superficially symmetrical right and left halves. Understand that there are many sagittal planes, because a sagittal plane is any vertical plane passing through the body parallel to the median plane. The sagittal plane that passes through the median plane is also called the midsagittal plane. It is a common error to refer to the "midline" of the body when the median plane is meant.

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may be involved in cancer involving this region of a lung. This produces hoarseness by paralyzing the vocal folds.

The left recurrent laryngeal nerve passes around the arch of the aorta to the left of the *ligamentum arteriosum*, the adult derivative of the ductus arteriosus, and then passes superiorly. Although more superior, the right recurrent laryngeal nerve passes around the right subclavian artery and is closely related to the apex of the right lung and the cervical pleura (Fig. 1-63).

If tumors of the apices of the lungs invade locally, there may be involvement of the superior thoracic nerves, the thoracic sympathetic chain, and the stellate ganglion. If this occurs, there is likely to be pain in the shoulder and axilla and signs of the *Horner syndrome* (a drooping eyelid or *ptosis miosis*, or pupillary constriction; *anhidrosis* or absence of sweating; and slight *enophthalmos* or recession of the eyeball).

Involvement of the hilar and mediastinal lymph nodes occurs by lymphogenous dissemination. The lymph vessels of the lungs originate in superficial and deep plexuses, accompanying small blood vessels. Lymph then drains into bronchopulmonary lymph nodes in the hilum (Fig. 1-40), which are often referred to clinically as *hilar nodes*. As these nodes enlarge, they increase the size of the hilum of the lung, giving it a lumpy appearance.

The bronchopulmonary lymph nodes drain into inferior and superior groups of tracheobronchial nodes that lie in the angles between the trachea and bronchi (Fig. 1-63). They form part of the mediastinal group of lymph nodes that are scattered throughout the mediastinum.

Clinically, the inferior group of tracheobronchial nodes are commonly referred to as *carinal nodes* because of their relationship to the *carina*, the ridge separating the right and left principal bronchi at their junction with the trachea (Fig. 1-11). Splaying and fixation of the *carina* of the trachea may be associated with cancer of a bronchus when it has metastasized to the carinal nodes. These abnormalities can be seen bronchoscopically and radiologically.

Enlarged mediastinal lymph nodes may indent the esophagus which can be observed radiologically as the patient swallows a barium sulfate emulsion.

As lymph from vessels in the costal parietal pleura reaches the parasternal lymph nodes (Fig. 1-16) via intercostal lymph vessels, lymphogenous metastatic spread of cancer may involve these nodes also.

Lymph from the entire right lung drains into tracheobronchial nodes on the right side, and most lymph from the left lung drains into nodes on the left side, but some lymph from the inferior lobe of the left lung also drains into nodes on the right side. Thus, tumor cells in tracheobronchial lymph nodes on the right

Case 1-2 p 143-144

In view of the anatomical relations of the lung, some cancers of this organ extend directly into the thoracic wall, the diaphragm, or the mediastinum and its contents.

Involvement of a phrenic nerve in the mediastinum results in paralysis of half of the diaphragm. Direct infiltration of the pleura produces pleural effusion (escape of fluid from the pleural blood and lymphatic vessels) into the pleural cavity. This pleural exudate may be bloody (*sanguinous*) and may contain exfoliated malignant cells.

Because of the close relationship of the recurrent laryngeal nerves to the apices of the lungs, they

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side may spread by lymphogenous dissemination from the inferior lobe of the left lung.

The right and left bronchomediastinal trunks, drain lymph from the thoracic viscera and lymph nodes. The right bronchomediastinal trunk may join the right lymphatic duct and the left trunk may join the thoracic duct (Fig. 1-42), but more commonly they open independently into the junction of the internal jugular and subclavian veins of their own side.

Thus, lymph from the lungs and pleurae containing tumor cells soon enters the venous system and heart. After passing through the pulmonary circulation, the blood returns to the heart for distribution to the body.

Common sites of hematogenous metastasis from bronchogenic carcinoma are the brain, bones, lungs, and suprarenal glands.

Often the medial supraclavicular lymph nodes, particularly on the left side, are enlarged and hard because they are tumorous when there is carcinoma of the bronchus, stomach, or occasionally other abdominal organs. For this reason, these lymph nodes are often referred to as sentinel nodes because enlargement of them alerts the examiner to the possibility of malignant disease from the thoracic and/or abdominal organs.

The anatomical basis for involvement of the sentinel lymph nodes is that lymph passes cranially from the thoracic and abdominal viscera via the bronchomediastinal trunks and the thoracic duct to reach the venous system (Fig. 1-42).

Backflow of lymph from the thoracic duct can pass into the deep supraclavicular nodes, posterior to the sternocleidomastoid muscles. This is probably the reason why nodes on the left side are most commonly involved.

The brain is a common site for hematogenous spread of bronchogenic carcinoma. Tumor cells probably enter the blood through the wall of a capillary or venule in the lung and are transported to the brain via the internal carotid artery and vertebral artery systems (see Chap. 7). Once in the brain, the tumor cells probably pass between the endothelial cells of the capillaries and enter the brain.

Although most cancer cells from the lung are likely transported to the brain via the arterial system, others may be carried by the venous system. It has been suggested that constant coughing and enlarged mediastinal lymph nodes compress the superior and inferior venae cavae, causing the blood draining the bronchi to reverse its flow and pass via the bronchial veins into the azygos venous system (Fig. 1-80).

The azygos system of veins drains primarily the thoracic wall. From here, blood and tumor cells pass to the extradural vertebral plexus of veins around the spinal dura mater (Fig. 5-58). As this plexus communicates with the cranial venous sinuses, tumor cells can be transported to the brain

when the patient is lying down. In this position, the normal negative pressure in the cranial dural venous sinuses becomes equal to the pressure in the vertebral plexus of veins. From the dural venous sinuses tumor cells pass into the cerebral veins and through their walls into the brain where they establish secondary tumors (metastases).

The passage of tumor cells to the veins of the vertebral column also explains the frequency of metastases of tumor cells to vertebrae.