COURSE CODE: ATM 218
COURSE TITLE: GENERAL HUMAN ANATOMY & ANATOMY OF THE UPPER & LOWER LIMBS & THORAX
NUMBER OF UNITS: 2 Units
COURSE DURATION: Two hours per week

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COURSE LECTURER: **TOPIC: ANATOMICAL NOMENCLATURE**

INTENDED LEARNING OUTCOMES

At the completion of this course, students are expected to:

1. Define the basic anatomy terminologies and give examples

RESOURCES

Å**Books:**
Title: *Moore Clinically Oriented AnatomyInternational Edition*
Authors: *Keith L. Moore, Arthur F. Dalley and Anne M. R. Agur.*
Publisher: Lippincott Williams & Wilkins 7th edition
ISBN: 978-1-4511-8447-1

Å**Internet**
The Clinically Oriented Anatomy website (http://thePoint.lww.com/COA6e)

LECTURE 1: BASICANATOMICALTERMINOLOGIES

Introduction

Anatomical terminologies introduce and make up a large part of medical terminology. The proper use of terms in the correct way is imperative when communicating anatomical information, to ensure understanding by healthcare professionals and scientists worldwide. Health professionals must also know the common and colloquial terms people are likely to use when they describe their complaints. Furthermore, common terms people will understand must be used when explaining their medical problems to them. It is therefore necessary that the common terms equivalent for anatomical terms be learn and used appropriately when

needed. *Terminologia Anatomica* (TA) lists anatomical terms both in Latin and as English equivalents (e.g., the common shoulder muscle is *musculus deltoideus* in Latin and *deltoid* in English). Unfortunately, the terminology commonly used in the clinical arena may differ from the official terminology. Because this discrepancy may be a source of confusion, many texts tend to clarify commonly confused terms by placing the unofficial designations in parentheses when the terms are first usedð for example, *pharyngotympanic tube* (auditory tube, eustachian tube) and *internal thoracic artery* (internal mammary artery).
Eponyms, terms incorporating the names of people, are not used in the new terminology because they give no clue about the type or location of the structures involved. Notwithstanding, commonly used eponyms appear in parentheses in some anatomy texts when these terms are first usedð such as *sternal angle* (angle of Louis).

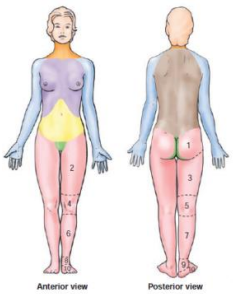
Structure of terms

Anatomy is a descriptive science and requires names for the many structures and processes of the body. Most terms employed are derived from Latin and Greek, thence medical language may seem difficult at first; however, as the origin of terms are reflected upon, the words make sense. For example, the term *gaster* is Latin for stomach or belly.
Many terms provide information about a structureôs shape, size, location, or function or about the resemblance of one structure to another. The *deltoid muscle,* which covers the point of the shoulder, is triangular, like the symbol for *delta,* the fourth letter of the Greek alphabet. The suffix *-oid* means ñlikeò; therefore, *deltoid* means like delta. *Biceps* means two-headed and *triceps* means three-headed. Some muscles are named according to their shapeð the *piriformis muscle,* for example, is pear shaped (L. *pirum,* pear + L. *forma,* shape or form). Other muscles are named according to their location. The *temporalmuscle* is in the temporal region (temple) of the cranium (skull). In some cases, actions are used to describe musclesð for example, the *levator scapulae* elevates the scapula (L. shoulder blade).

Abbreviations

Abbreviations of terms are used for brevity in medical histories and texts generally; such as in tables of muscles, arteries, and nerves. Clinical abbreviations are used in discussions and descriptions of signs and symptoms. Learning to use these abbreviations also speeds note taking. Common anatomical and clinical abbreviations are provided in the Clinically Oriented Anatomy website (http://thePoint.lww.com/COA6e).

Anatomical Position
All anatomical descriptions are expressed in relation to one consistent position, ensuring that descriptions are not ambiguous. One must visualize this position in the mind when describing patients (or cadavers), whether they are lying on their sides, supine (recumbent, lying on the back, face upward), or prone (lying on the abdomen, face downward).
The **anatomical position** refers to the body position as if the person were standing upright with the:
Åhead, gaze (eyes), and toes directed anteriorly (forward),
Åarms adjacent to the sides with the palms facing anteriorly, and
Ålower limbs close together with the feet parallel.
This position is adopted globally for anatomicomedical descriptions. By using this position and appropriate terminology, you can relate any part of the body precisely to any other part.



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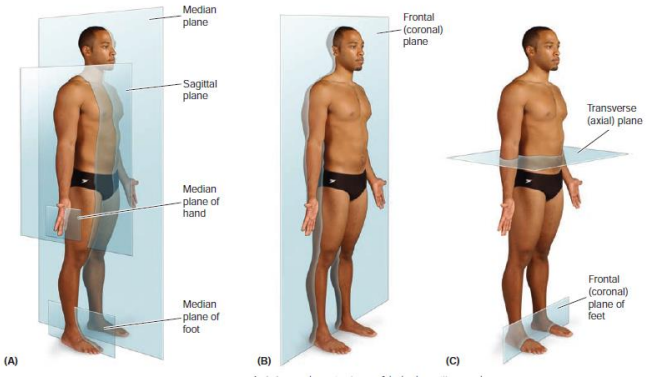
Anatomical Plane



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Anatomical descriptions are based on four imaginary planes (median, sagittal, frontal, and transverse) that intersect the body in the anatomical position:

ÅThe **median plane,** the vertical plane passing longitudinally through the body, divides the body into right and left halves. The plane defines the midline of the head, neck, and trunk where it intersects the surface of the body. *Midline* is often erroneously used as a synonym for the median plane.

Å**Sagittal planes** are vertical planes passing through the body *parallel to the median plane. Parasagittal* is commonly used but is unnecessary because any plane parallel to and on either side of the median plane is sagittal. However, a plane parallel and near to the median plane may be referred to as a *paramedian plane.*

Å**Frontal (coronal) planes** are vertical planes passing through the body *at right angles to the median plane,* dividing the body into anterior (front) and posterior (back) parts.

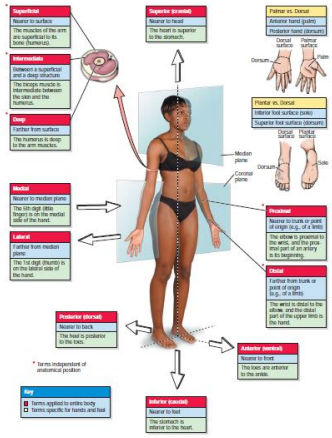
Å**Transverse planes** are horizontal planes passing through the body *at right angles to the median and frontal planes,* dividing the body into superior (upper) and inferior (lower) parts. Radiologists refer to transverse planes as *transaxial,* which is commonly shortened to *axial planes.* Since the number of sagittal, frontal, and transverse planes is unlimited, a reference point (usually a visible or palpable landmark or vertebral level) is necessary to identify the location or level of the plane, such as a ñtransverse plane through the umbilicusò. Sections of the head, neck, and trunk in precise frontal and transverse planes are symmetrical, passing through both the right and left members of paired structures, allowing some comparison. The main use of anatomical planes is to describe *sections*:

Å**Longitudinal sections** run lengthwise or parallel to the long axis of the body or of any of its parts, and the term applies regardless of the position of the body. Although median, sagittal, and frontal planes are the standard (most commonly used) longitudinal sections, there is a 180º range of possible longitudinal sections.

Å**Transverse sections,** or cross sections, are slices of the body or its parts that are cut at right angles to the longitudinal axis of the body or of any of its parts. Because the long axis of the foot runs horizontally, a transverse section of the foot lies in the frontal plane.
Å**Oblique sections** are slices of the body or any of its parts that are not cut along the previously listed anatomical planes.

Terms of Relationship and Comparison

Various adjectives, arranged as pairs of opposites, describe the relationship of parts of the body or compare the position of two structures relative to each other.



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Superior refers to a structure that is nearer the **vertex,** the topmost point of the cranium (Mediev. L., skull).
Cranial relates to the cranium and is a useful directional term, meaning toward the head or cranium.
Inferior refers to a structure that is situated nearer the sole of the foot.
Caudal (L. *cauda,* tail) is a useful directional term that means toward the feet or tail region, represented in humans by the coccyx (tail bone), the small bone at the inferior (caudal) end of the vertebral column.
Posterior (dorsal) denotes the back surface of the body or nearer to the back.
Anterior (ventral) denotes the front surface of the body. **Rostral** is often used instead of anterior when describing parts of the brain; it means toward the rostrum (L. for beak); however, in humans it denotes nearer the anterior part of the head (e.g., the frontal lobe of the brain is rostral to the cerebellum).
Medial is used to indicate that a structure is nearer to the median plane of the body. For example, the 5th digit of the hand (little finger) is medial to the other digits.
Lateral stipulates that a structure is farther away from the median plane. The 1st digit of the hand (thumb) is lateral to the other digits.
Dorsum usually refers to the superior aspect of any part that protrudes anteriorly from the body, such as the dorsum of the tongue, nose, penis, or foot. It is also used to describe the posterior surface of the hand, opposite the **palm.** The **sole** is the inferior aspect or bottom of the foot, opposite the dorsum, much of which is in contact with the ground when standing barefoot. The surface of the hands, the feet, and the digits of both corresponding to the dorsum is the **dorsal surface,** the surface of the hand and fingers corresponding to the palm is the **palmar surface,** and the surface of the foot and toes corresponding to the sole is the **plantar surface.**

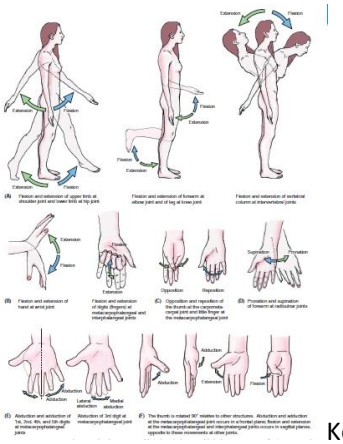
Combined terms
Combined termsdescribe intermediate positional arrangements:
Inferomedial means nearer to the feet and median planeð for example, the anterior parts of the ribs run inferomedially
Superolateral means nearer to the head and farther from the median plane.
Superficial, intermediate, and **deep** describe the position of structures relative to the surface of the body or the relationship of one structure to another underlying or overlying structure.
External means outside of or farther from the center of an organ or cavity, while **internal** means inside or closer to the center, independent of direction.
Proximal and **distal** are used when contrasting positions nearer to or farther from the attachment of a limb or the central aspect of a linear structure, respectively.

Terms of Laterality

Paired structures having right and left members (e.g., the kidneys) are **bilateral,** whereas those occurring on one side only (e.g., the spleen) are **unilateral.** Something occurring on the same side of the body as another structure is **ipsilateral;** the right thumb and right great (big) toe areipsilateral, for example. **Contralateral** means occurring on the opposite side of the body relative to another structure; the right hand is contralateral to the left hand.

Terms of Movement

Various terms describe movements of the limbs and other parts of the body. Most movements are defined in relationship to the anatomical position, with movements occurring within, and around axes aligned with, specific anatomical planes. Terms of movement may also be considered in pairs of opposing movements: Flexion and extension movements generally occur in sagittal planes around a transverse axis.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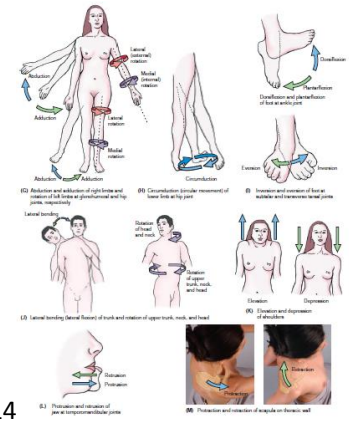
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Flexion indicates bending or decreasing the angle between the bones or parts of the body. For most joints (e.g., elbow), flexion involves movement in an anterior direction.
Extension indicates straightening or increasing the angle between the bones or parts of the body. Extension usually occurs in a posterior direction. The knee joint, rotated 180° to other joints, is exceptional in that flexion of the knee involves posterior movement and extension involves anterior movement.

Dorsiflexion describes flexion at the ankle joint, as occurs when walking uphill or lifting the front of the foot and toes off the ground.
Plantarflexion bends the foot and toes toward the ground, as when standing on your toes. Extension of a limb or part beyond the normal limitð **hyperextension** (overextension)ð can cause injury, such as ñwhiplashò (i.e., hyperextension of the neck during a rear-end automobile collision).
Abduction and adduction movements generally occur in a frontal plane around an anteroposterior axis. Except for the digits, **abduction** means moving away from the median plane (e.g., when moving an upper limb laterally away from the side of the body) and **adduction** means moving toward it. In *abduction of the digits* (fingers or toes), the term means spreading them apartð moving the other fingers away from the neutrally positioned 3rd (middle) finger or moving the other toes away from the neutrally positioned 2nd toe. The 3rd finger and 2nd toe *medially* or *laterally abduct* away from the neutral position. *Adduction of the digits* is the oppositeð bringing the spread fingers or toes together, towardthe neutrally positioned 3rd finger or 2nd toe. Right and left lateral flexion (lateral bending) are special forms of abduction for only the neck and trunk. The face and upper trunk are directed anteriorly as the head and/or shoulders tilt to the right or left side, causing the midline of the body itself to become bent sideways. This is a compound movement occurring between many adjacent vertebrae. As you can see by noticing the way the thumbnail faces (laterally instead of posteriorly in the anatomical position), the thumb is rotated 90° relative to the other digits. Therefore, the thumb flexes and extends in the frontal plane and abducts and adducts in the sagittal plane.
Circumduction is a circular movement that involves sequential flexion, abduction, extension, and adduction (or in the opposite order) in such a way that the distal end of the part moves in a circle. Circumduction can occur at any joint at which all the above-mentioned movements are possible (e.g., the shoulder and hip joints).
Rotation involves turning or revolving a part of the body around its longitudinal axis, such as turning oneôs head to face sideways. *Medial rotation* (internal rotation) brings the anterior surface of a limb closer to the median plane, whereas *lateral rotation* (external rotation) takes the anterior surface away from the median plane.
Pronation and supination are the rotational movements of the forearm and hand that swing the distal end of the radius (the lateral long bone of the forearm) medially and laterally around and across the anterior aspect of the ulna (the other long bone of the forearm) while the proximal end of the radius rotates in place.
Pronation rotates the radius medially so that the palm of the hand faces posteriorly, and its dorsum faces anteriorly.
Supination is the opposite rotational movement, rotating the radius laterally and uncrossing it from the ulna, returning the pronated forearm to the anatomical position.
Eversion moves the sole of the foot away from the median plane, turning the sole laterally. When the foot is fully everted, it is also dorsiflexed.
Inversion moves the sole of the foot toward the median plane (facingthe sole medially). When the foot is fully inverted it is also plantarflexed.
Opposition is the movement by which the pad of the 1st digit (thumb) is brought to another digit pad.
Reposition describes the movement of the 1st digit from the position of opposition back to its anatomical position.
Protrusion is a movement anteriorly (forward) as in protruding the mandible (chin), lips, or tongue.
Retrusion is a movement posteriorly (backward), as in retruding the mandible, lips, or tongue.

Protraction and **retraction** are used most commonly for anterolateral and posteromedial movements of the scapula on the thoracic wall, causing the shoulder region to move anteriorly and posteriorly.
Elevation raises or moves a part superiorly, as in elevating the shoulders when shrugging.
Depression lowers or moves a part inferiorly, as in depressing the shoulders when standing relaxed.