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Anatomical terminology

Anatomical terminology is the terminology is used by [anatomists](#) and [zoologists](#), in [scientific journals](#), textbooks, and by doctors and other medical professionals. Anatomical terminology uses a variety of unique and possibly confusing terms to describe the anatomical location and action of different structures. By using this terminology, anatomists hope to be more precise and reduce errors and ambiguity. For example, is a scar "above the wrist" located on the forearm two or three inches away from the hand? Or is it at the base of the hand? Is it on the palm-side or back-side? By using precise anatomical terminology, ambiguity is eliminated.

Anatomical terms derive from [Ancient Greek](#) and [Latin](#) words, and because these languages are no longer used in everyday conversation, the meaning of their words does not change.^[1] The current international standard is the [Terminologia Anatomica](#).

Word formation

Anatomical terms are made up of [roots](#), [prefixes](#), and [suffixes](#). The root of a term often refers to an [organ](#), [tissue](#), or [condition](#), whereas the prefix or suffix often describes the root. For example, in the disorder [hypertension](#), the prefix "hyper-" means "high" or "over," and the root word "tension" refers to pressure, so the word "hypertension" refers to abnormally high blood pressure. The roots, prefixes and suffixes are often derived from [Greek](#) or [Latin](#), and often quite dissimilar from their English-language variants.^[2]

Latin names of structures such as [musculus biceps brachii](#) can be split up and refer to, *musculus* for muscle, *biceps* for "two-headed", *brachii* as in the brachial region of the arm. The first word tells us what we are speaking about, the second describes it, and the third points to location.

[*citation needed*]

When describing the position of anatomical structures, structures may be described according to the [anatomical landmark](#) they are near. These landmarks may include structures, such as the [umbilicus](#) or [sternum](#), or anatomical *lines*, such as the *midclavicular line* from the centre of the clavicle. The cephalon or cephalic region refers to the head. This area is further differentiated into the cranium (skull), facies (face), frons (forehead), oculus (eye area), auris (ear), bucca (cheek), nausus (nose), oris (mouth), and mentis (chin). The neck area is called the cervicis or cervical region. Examples of muscles named according to this include the [frontalis muscle](#), [submental lymph nodes](#), [buccal membrane](#) and [orbicularis oculi muscle](#).

Sometimes, unique terminology is used to reduce confusion in different parts of the body. For example, different terms are used when it comes to the skull in compliance with its [embryonic](#) origin and its tilted position compared to in other animals. Here, *Rostral* refers to proximity to the front of the nose, and is particularly used when describing the [skull](#).^{[3]:4} Similarly, in the arms, different terminology is often used in the arms, in part to reduce ambiguity as what is the "front", "back", "inner" and "outer" surfaces. For this reason, the terms below are used:

- *Radial* referring to the [radius](#) bone, seen laterally in the anatomical position.
- *Ulnar* referring to the [ulna](#) bone, medially positioned when in the anatomical position.

Other terms are also used to describe the movement and actions of the hands and feet, and other structures such as the eye.

History

Further information: [International scientific vocabulary](#) and [Medical terminology](#)

International morphological terminology is used by the [colleges](#) of [medicine](#) and [dentistry](#) and other areas of the [health sciences](#). It facilitates communication and exchanges between scientists from different countries of the world and it is used daily in the fields of [research](#), [teaching](#) and [medical care](#). The international morphological terminology refers to [morphological sciences](#) as a [biological sciences](#)' branch. In this field, the

form and structure are examined as well as the changes or developments in the organism. It is **descriptive** and **functional**. Basically, it covers the **gross anatomy** and the **microscopic** (**histology** and **cytology**) of living beings. It involves both **development anatomy** (**embryology**) and the anatomy of the adult. It also includes **comparative anatomy** between different species. The vocabulary is extensive, varied and complex, and requires a systematic presentation.

Within the **international** field, a group of experts reviews, analyzes and discusses the morphological terms of the structures of the **human body**, forming today's **Terminology Committee** (FICAT) from the **International Federation of Associations of Anatomists** (IFAA).^{[4][5]} It deals with the anatomical, histological and embryologic terminology.

In the **Latin American** field, there are meetings called **Iberian Latin American Symposium Terminology** (SILAT), where a group of experts of the **Pan American Association of Anatomy** (PAA)^[6] that speak **Spanish** and **Portuguese**, disseminates and studies the international morphological terminology.

The current international standard for human anatomical terminology is based on the **Terminologia Anatomica** (TA). It was developed by the **Federative Committee on Anatomical Terminology** (FCAT) and the **International Federation of Associations of Anatomists** (IFAA) and was released in 1998.^[7] It supersedes the previous standard, *Nomina Anatomica*.^[8] *Terminologia Anatomica* contains terminology for about 7500 human gross (macroscopic) anatomical structures.^[9] For microanatomy, known as **histology**, a similar standard exists in **Terminologica histologica**, and for embryology, the study of development, a standard exists in **Terminologia Embryologica**. These standards specify generally accepted names that can be used to refer to histological and embryological structures in journal articles, textbooks, and other areas.

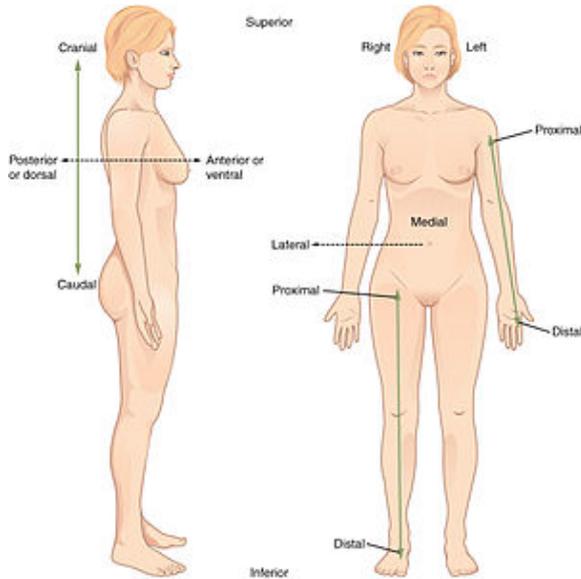
Location

Main article: Anatomical terms of location

Anatomical terminology is often chosen to highlight the relative location of body structures. For instance, an anatomist might describe one band of tissue as "inferior to" another or a physician might describe a tumor as

"superficial to" a deeper body structure.

Anatomical position



The [anatomical position](#), with terms of relative location noted.

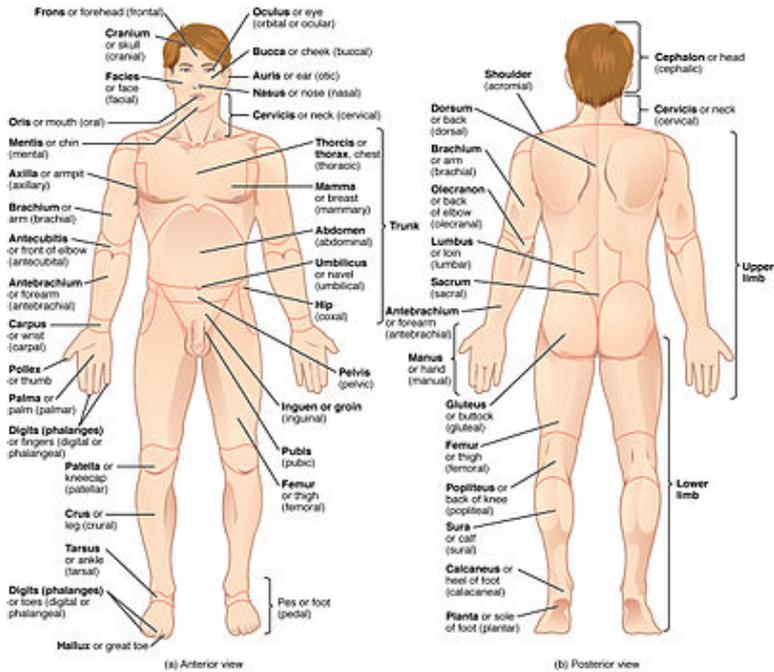
Anatomical terms used to describe location are based on a body positioned in what is called the *standard anatomical position*. This position is one in which a person is standing, feet apart, with palms forward and thumbs facing outwards.^[2] Just as maps are normally oriented with north at the top, the standard body "map," or anatomical position, is that of the body standing upright, with the feet at shoulder width and parallel, toes forward. The upper limbs are held out to each side, and the palms of the hands face forward.

Using the standard anatomical position reduces confusion. It means that regardless of the position of a body, the position of structures within it can be described without ambiguity.^[2]

Regions

Main article: [List of human anatomical regions](#)

Pthomegroup



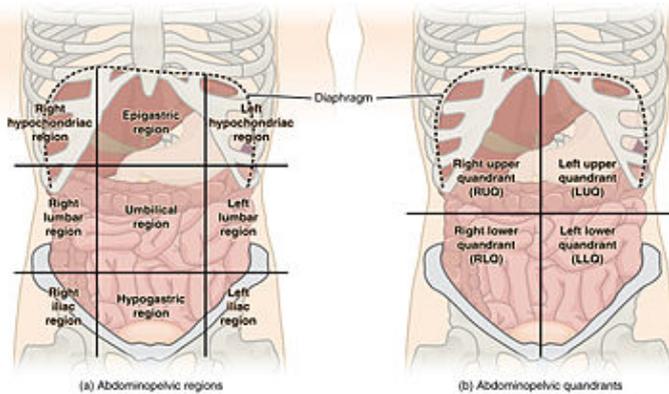
The human body is shown in anatomical position in an anterior view and a posterior view. The regions of the body are labeled in boldface.

In terms of anatomy, the body is divided into regions. In the front, the trunk is referred to as the "thorax" and "abdomen". The back as a general area is the **dorsum** or dorsal area, and the lower back as the lumbus or **lumbar region**. The shoulder blades are the **scapular** area and the breastbone is the **sternal** region. The **abdominal area** is the region between the chest and the **pelvis**. The breast is also called the mammary region, the armpit as the **axilla** and axillary, and the **navel** as the umbilicus and **umbilical**. The pelvis is the lower torso, between the abdomen and the **thighs**. The **groin**, where the thigh joins the trunk, are the inguen and inguinal area. The entire arm is referred to as the brachium and brachial, the front of the elbow as the antecubitis and **antecubital**, the back of the elbow as the **olecranon** or olecranal, the **forearm** as the antebrachium and antebrachial, the **wrist** as the **carpus** and carpal area, the **hand** as the manus and manual, the palm as the palma and palmar, the **thumb** as the pollex, and the **fingers** as the digits, **phalanges**, and phalangeal. The **buttocks** are the gluteus or gluteal region and the pubic area is the **pubis**.

Anatomists divide the lower limb into the thigh (the part of the limb between the **hip** and the **knee**) and the leg (which refers only to the area of the limb between the knee and the **ankle**). The thigh is the **femur** and the femoral region. The kneecap is the **patella** and patellar while the back of the knee is the popliteus and **popliteal** area. The leg (between the knee

and the ankle) is the crus and crural area, the lateral aspect of the leg is the **peroneal** area, and the calf is the sura and sural region. The ankle is the tarsus and tarsal, and the heel is the calcaneus or calcaneal. The foot is the pes and pedal region, and the sole of the foot the planta and plantar. As with the fingers, the toes are also called the digits, phalanges, and phalangeal area. The big toe is referred to as the hallux.

Abdomen



Abdominal regions are used for example to localize pain.

Main article: [Abdomen](#)

To promote clear communication, for instance about the location of a patient's abdominal pain or a suspicious mass, the abdominal cavity can be divided into either nine regions or four quadrants.^[2]

Quadrants

The abdomen may be divided into four quadrants, more commonly used in medicine, subdivides the cavity with one horizontal and one vertical line that intersect at the patient's umbilicus (navel). The right upper quadrant (RUQ) includes the lower right **ribs**, right side of the **liver**, and right side of the **transverse colon**. The left upper quadrant (LUQ) includes the lower left ribs, **stomach**, **spleen**, and upper left area of the **transverse colon**. The right lower quadrant (RLQ) includes the right half of the **small intestines**, **ascending colon**, right pelvic bone and upper right area of the **bladder**. The left lower quadrant (LLQ) contains the left half of the small intestine and left pelvic bone.^[2]

Regions

The more detailed regional approach subdivides the cavity with one horizontal line immediately inferior to the ribs and one immediately

superior to the pelvis, and two vertical lines drawn as if dropped from the midpoint of each **clavicle**, resulting in nine regions. The upper right square is the right hypochondriac region and contains the base of the right ribs. The upper left square is the left hypochondriac region and contains the base of the left ribs. The epigastric region is the upper central square and contains the bottom edge of the liver as well as the upper areas of the stomach. The diaphragm curves like an upside down U over these three regions. The central right region is called the right lumbar region and contains the ascending colon and the right edge of the small intestines. The central square contains the transverse colon and the upper regions of the small intestines. The left lumbar region contains the left edge of the transverse colon and the left edge of the small intestine. The lower right square is the right iliac region and contains the right pelvic bones and the ascending colon. The lower left square is the left iliac region and contains the left pelvic bone and the lower left regions of the small intestine. The lower central square contains the bottom of the pubic bones, upper regions of the bladder and the lower region of the small intestine.^[2]

Standard terms

When anatomists refer to the right and left of the body, it is in reference to the right and left of the subject, not the right and left of the observer.

When observing a body in the anatomical position, the left of the body is on the observer's right, and vice versa.

These standardized terms avoid confusion. Examples of terms include:^{[3]:4}

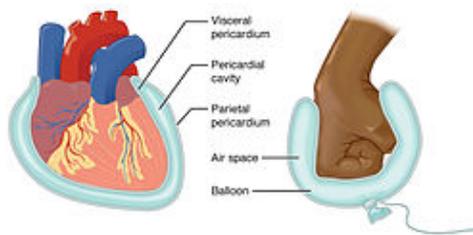
- **Anterior** and **posterior**, which describe structures at the front (anterior) and back (posterior) of the body. For example, the toes are anterior to the heel, and the popliteus is posterior to the patella.
- **Superior** and **inferior**, which describe a position above (superior) or below (inferior) another part of the body. For example, the orbits are superior to the oris, and the pelvis is inferior to the abdomen.
- **Proximal** and **distal**, which describe a position that is closer (proximal) or further (distal) from the trunk of the body. For example, the shoulder is proximal to the arm, and the foot is distal to the knee.
- **Superficial** and **deep**, which describe structures that are closer to (superficial) or further from (deep) the surface of the body. For example,

the skin is superficial to the bones, and the brain is deep to the skull. Sometimes *profound* is used synonymously with *deep*.

- *Medial* and *lateral*, which describe a position that is closer to (medial) or further from (lateral) the midline of the body. For example, the nose is medial to the eyes, and the thumb is lateral to the other fingers.
- *Ventral* and *Dorsal*, which describe structures derived from the front (ventral) and back (dorsal) of the **embryo**, before limb rotation.
- *Cranial* and *caudal*, which describe structures close to the top of the skull (cranial), and towards the bottom of the body (caudal).
- Occasionally, *sinister* for left, and *dexter* for right are used.^{[[citation needed](#)]}
- *Paired*, referring to a structure that is present on both sides of the body. For example, the hands are paired structures.

Membranes

Main article: [Serous membrane](#)



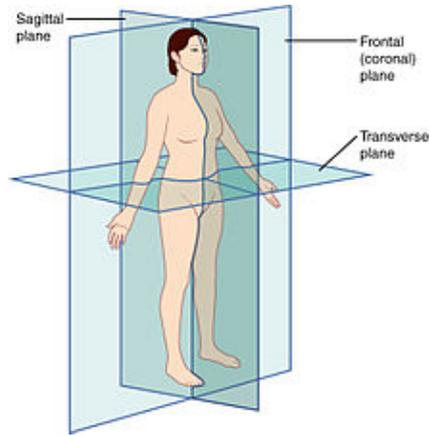
Serous membrane

A **serous membrane** (also referred to as a serosa) is a thin membrane that covers the walls of **organs** in the **thoracic** and **abdominal cavities**. The serous membranes have two layers; *parietal* and *visceral*, surrounding a fluid filled space.^[2] The visceral layer of the membrane covers the organ (the viscera), and the parietal layer lines the walls of the body cavity (pariet- refers to a cavity wall). Between the parietal and visceral layers is a very thin, fluid-filled serous space, or cavity.^[2] For example the **pericardium** is the serous cavity which surrounds the heart. ^[2]

- *Visceral* and *parietal* describe structures that relate to an **organ** (visceral), or the wall of the cavity that the organ is in (parietal). For example, the **parietal peritoneum** surrounds the abdominal cavity.

Planes

Main article: [Anatomical plane](#)



The three anatomical planes of the body: the sagittal, transverse (or horizontal), frontal planes.

Anatomy is often described in *planes*, referring to two-dimensional *sections* of the body. A *section* is a two-dimensional surface of a three-dimensional structure that has been cut. A plane is an imaginary two-dimensional surface that passes through the body. Three planes are commonly referred to in anatomy and medicine:^{[3]:4}

- The *sagittal plane* is the plane that divides the body or an organ vertically into right and left sides. If this vertical plane runs directly down the middle of the body, it is called the *midsagittal* or *median plane*. If it divides the body into unequal right and left sides, it is called a *parasagittal plane*, or less commonly a longitudinal section.
- The *frontal plane* is the plane that divides the body or an organ into an anterior (front) portion and a posterior (rear) portion. The frontal plane is often referred to as a *coronal plane*, following Latin *corona*, which means "crown".
- The *transverse plane* is the plane that divides the body or organ horizontally into upper and lower portions. Transverse planes produce images referred to as cross sections.

Functional state

Anatomical terms may be used to describe the functional state of an organ:^[citation needed]

- *Anastomoses* refers to the connection between two structures previously branched out, such as blood vessels or leaf veins.
- *Patent*, meaning a structure such as an *artery* or *vein* that abnormally

remains open, such as a [patent ductus arteriosus](#), referring to the [ductus arteriosus](#) which normally becomes [ligamentum arteriosum](#) within three weeks of birth.

- A [Plexus](#) refers to a net-like arrangement of a [nerve](#).

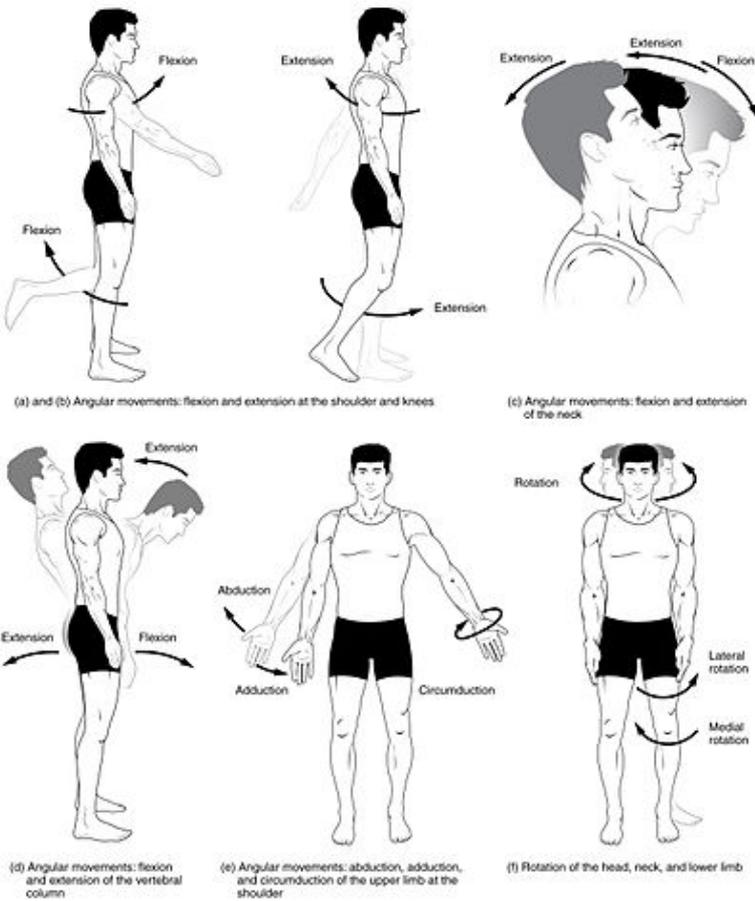
Anatomical variation

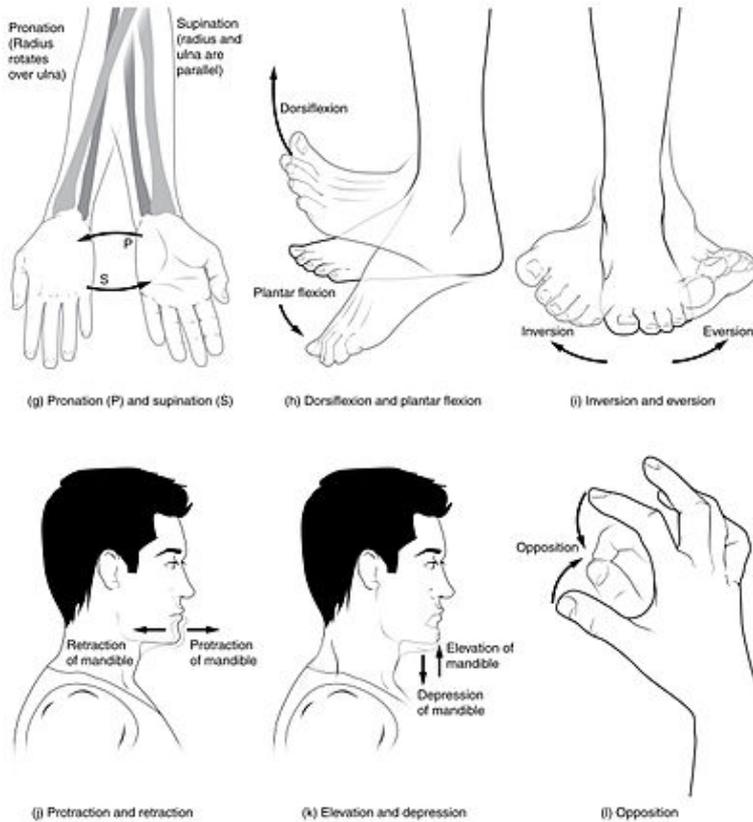
Main article: [Human body § Anatomical variations](#)

The term *anatomical variation* is used to refer to a difference in anatomical structures that is not regarded as a disease. Many structures vary slightly between people, for example muscles that attach in slightly different places. For example, the presence or absence of the [palmaris longus](#) tendon. Anatomical variation is unlike [congenital anomalies](#), which are considered a disorder.^{[[citation needed](#)]}

Movement

Main article: [Anatomical terms of motion](#)





Joints, especially **synovial joints** allow the body a tremendous range of movements. Each movement at a synovial joint results from the contraction or relaxation of the muscles that are attached to the bones on either side of the articulation. The type of movement that can be produced at a synovial joint is determined by its structural type.

Movement types are generally paired, with one being the opposite of the other. Body movements are always described in relation to the anatomical position of the body: upright stance, with upper limbs to the side of body and palms facing forward.^[2]

General motion

Terms describing motion in general include:

- **Flexion** and **Extension**, which refer to a movement that decreases (flexion) or increases (extension) the angle between body parts. For example, when standing up, the knees are extended.
- **Abduction** and **adduction** refers to a motion that pulls a structure away from (abduction) or towards (adduction) the midline of the body or limb. For example, a **star jump** requires the legs to be abducted.
- **Internal rotation** (or **medial rotation**) and **External rotation** (or **lateral**

rotation) refers to rotation towards (internal) or away from (external) the center of the body. For example, the **asana** posture in **yoga** requires the legs to be externally rotated.^[citation needed]

- **Elevation** and **Depression** refer to movement in a superior (elevation) or inferior (depression) direction. Primarily refers to movements involving the **scapula** and **mandible**.^[citation needed]

Special motions of the hands and feet

These terms refer to movements that are regarded as unique to the hands and feet:^{[10]:590–7}

- **Dorsiflexion** and **Plantarflexion** refers to flexion (dorsiflexion) or extension of the foot at the ankle. For example, plantarflexion occurs when pressing the **brake pedal** of a car.

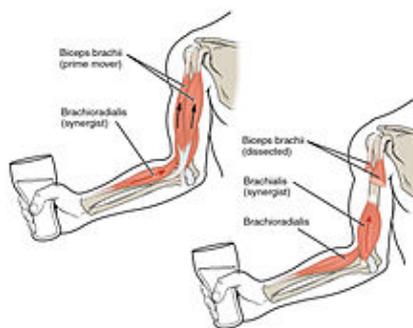
- **Palmarflexion** and dorsiflexion refer to movement of the flexion (palmarflexion) or extension (dorsiflexion) of the hand at the wrist. For example, **prayer** is often conducted with the hands dorsiflexed.

- **Pronation** and **Supination** refer to rotation of the forearm or foot so that in the **anatomical position** the palm or sole is facing anteriorly (supination) or posteriorly (pronation) rotation of the forearm. For example, a person **skiing** must pronate their arms in order to grasp the skis.

- **Eversion** and **Inversion** refer to movements that tilt the sole of the foot away from (eversion) or towards (inversion) the midline of the body.

Muscles

Main article: [Anatomical terms of muscle](#)



The biceps brachii flex the lower arm. The brachioradialis, in the forearm, and brachialis, located deep to the biceps in the upper arm, are both synergists that aid in this

motion.

Muscle action that moves the axial skeleton work over a [joint](#) with an [origin](#) and [insertion](#) of the muscle on respective side. The insertion is on the bone deemed to move towards the origin during muscle contraction. Muscles are often present that engage in several actions of the joint; able to perform for example both flexion and extension of the [forearm](#) as in the [biceps](#) and [triceps](#) respectively.^[2] This is not only to be able to revert actions of muscles, but also brings on stability of the actions though [muscle coactivation](#).^[citation needed]

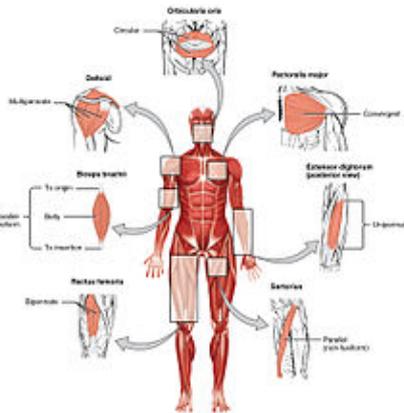
Agonist and antagonist muscles

Further information: [Agonist](#) and [Antagonist](#)

The muscle performing an action is the [agonist](#), while the muscle which contraction brings about an opposite action is the [antagonist](#). For example an extension of the lower arm is performed by the triceps as the agonist and the biceps as the antagonist (which contraction will perform flexion over the same joint). Muscles that work together to perform the same action are called [synergists](#). In the above example synergists to the biceps can be the [brachioradialis](#) and the [brachialis muscle](#).^[2]

Skeletal and smooth muscle

Main article: [Gross anatomy of muscles](#)



The skeletal muscles of the body typically come in seven different general shapes. This figure shows the human body with the major muscle groups labeled.

The gross anatomy of a muscle is the most important indicator of its role in the body. One particularly important aspect of gross anatomy of

muscles is [pennation](#) or lack thereof. In most muscles, all the fibers are oriented in the same direction, running in a line from the origin to the insertion. In pennate muscles, the individual fibers are oriented at an angle relative to the line of action, attaching to the origin and insertion tendons at each end. Because the contracting fibers are pulling at an angle to the overall action of the muscle, the change in length is smaller, but this same orientation allows for more fibers (thus more force) in a muscle of a given size. Pennate muscles are usually found where their length change is less important than maximum force, such as the rectus femoris.^[11]

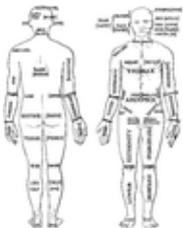
Skeletal muscle is arranged in discrete muscles, an example of which is the [biceps brachii](#). The tough, fibrous epimysium of skeletal muscle is both connected to and continuous with the [tendons](#). In turn, the tendons connect to the [periosteum](#) layer surrounding the bones, permitting the transfer of force from the muscles to the skeleton. Together, these fibrous layers, along with tendons and ligaments, constitute the [deep fascia](#) of the body.^[11]

Joints

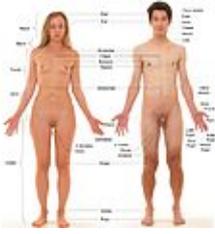
Main article: [Joint](#)

Movement is not limited to only synovial joints, although they allow for most freedom. Muscles also run over [symphysis](#), which allow for movement in for example the [vertebral column](#) by compression of the [intervertebral discs](#). Additionally, synovial joints can be divided into different types, depending on their axis of movement.^[*citation needed*]

Additional images



Older set of terminology shown in *Parts of the Human Body: Posterior and Anterior View* from the 1933 edition of [Sir Henry Morris' Human Anatomy](#). See also [List of human anatomical regions § Deprecated or older regions](#).



Labels of human body features displayed on images of actual human bodies, from which body hair and male facial hair has been removed.

Notes and references

This Wikipedia entry incorporates text from the freely licenced Connexions [1] edition of Anatomy & Physiology [2] text-book by OpenStax College.

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- Muscolino, Joseph E. (2005). *The Muscular System Manual: The Skeletal Muscles of the Human Body* (2nd ed.). C.V. Mosby. ISBN 0-323-02523-4.
- [Understanding Anatomical Latin](#) , explaining common medical/anatomical forms

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