**INTRODUCTION TO ANATOMY**

**HUMAN ANATOMY**

This is the study of structure of human body. It deals with the organization of body parts and their relationships to each other.

It can be subdivided into:

1. Gross anatomy (Macro-anatomy) — the examination of structures of the human that can be seen without a microscope
2. Histology (Micro-anatomy) — the study of body tissues and cells, and how they are arranged to constitute organs
3. Embryology(Developmental anatomy) — the study of human development.

**APPROACHES TO STUDYING ANATOMY**

There are three major approaches in studying anatomy:

1. Regional anatomy
2. Systemic anatomy
3. Clinical anatomy

**Regional anatomy:** this approach involves studying human body in segment or major parts. The body consists of the following major parts or segment:

1. Head
2. Neck
3. Trunk - thorax, abdomen, pelvis and perineum and back
4. Upper limbs
5. Lower limbs

In regional anatomy, all these major parts are studied separately and in relation to adjacent segment in sequential order.

**Systemic anatomy:** this is the study of human body’s organs and how they form a complex system. For instance, the heart, arteries, veins, arterioles and venules make up the cardiovascular or circulatory system, which carry out the blood supply in the body.

The systems in humane body will be further discussed.

**TERMINOLOGIES IN ANATOMY**

**Anatomical position**: The anatomical position refers to the body position as if the person were standing upright with the:

• head, gaze (eyes), and toes directed anteriorly (forward),

• arms adjacent to the sides with the palms facing anteriorly, and

• lower limbs close together with the feet parallel.

**Anatomical planes:**

• **The median plane** (median sagittal 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.

• **Sagittal planes** are vertical planes passing through the body parallel to the median plane. However, a plane parallel and near to the median plane may be referred to as a paramedian plane.

• **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.

• **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.

The main use of anatomical planes is to describe sections :

• **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 180° range of possible longitudinal sections.

• **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 (Fig. I.2C).

• **Oblique sections** are slices of the body or any of its parts that are not cut along the previously listed anatomical planes. In practice, many radiographic images and anatomical sections do not lie precisely in sagittal, frontal, or transverse planes; often they are slightly oblique.

**TERMS OR RELATIONSHIP AND COMPARISON**

**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.

Conversely, **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. Because the term dorsum may refer to both superior and posterior surfaces in humans, the term is easier to understand if one thinks of a quadripedal plantigrade animal that walks on its palms and soles, such as a bear. 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.

**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**. Designating whether you are referring specifically to the right or left member of bilateral structures can be critical, and is a good habit to begin at the outset of one’s training to

become a health professional. Something occurring on the same side of the body as another structure is **ipsilateral**; the right thumb and right great (big) toe are **ipsilateral**, 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.

**SYSTEMS IN HUMAN BODY**

• **The integumentary system** (dermatology) consists of the skin (L. integumentum, a covering) and its appendages—hairs, nails, and sweat glands, for example—and the subcutaneous tissue just beneath it. The skin, an extensive sensory organ, is the largest organ that forms the body’s outer, protective covering and container.

• **The skeletal system** (osteology) consists of bones and cartilage; it provides our basic shape and support for the body and is what the muscular system acts on to produce movement. It also protects vital organs such as the heart, lungs, and pelvic organs.

• **The articular system** (arthrology) consists of joints and their associated ligaments, connecting the bony parts of the skeletal system and providing the sites at which movements occur.

• **The muscular system** (myology) consists of skeletal muscles that act (contract) to move or position parts of the body (e.g., the bones that articulate at joints), or smooth and cardiac muscle that propels, expels, or controls the flow of fluids and contained substance.

• **The nervous system** (neurology) consists of the **central nervous system** (brain and spinal cord) and the **peripheral nervous system** (nerves and ganglia, together with their motor and sensory endings). The nervous system controls and coordinates the functions of the organ systems, enabling the body’s responses to and activities within its environment. The sense organs, including the olfactory organ (sense of smell), eye or visual system (ophthalmology), ear (sense of hearing and balance —otology), and gustatory organ (sense of taste), are often considered with the nervous system in systemic anatomy.

• **The circulatory system** (angiology) consists of the **cardiovascular** and **lymphatic** systems, which function in parallel to transport the body’s fluids.

• The **cardiovascular system** (cardiology) consists of the heart and blood vessels that propel and conduct blood through the body, delivering oxygen, nutrients, and hormones to cells and removing their waste products.

• The **lymphatic system** is a network of lymphatic vessels that withdraws excess tissue fluid (lymph) from the body’s interstitial (intercellular) fluid compartment, filters it through lymph nodes, and returns it to the bloodstream.

• **The alimentary or digestive system** (gastroenterology) consists of the digestive tract from the mouth to the anus, with all its associated organs and glands that function in ingestion, mastication (chewing), deglutition (swallowing), digestion, and absorption of food and the elimination of the solid waste (feces) remaining after the nutrients have been absorbed.

• **The respiratory system** (pulmonology) consists of the air passages and lungs that supply oxygen to the blood for cellular respiration and eliminate carbon dioxide from it. The diaphragm and larynx control the flow of air through the system, which may also produce tone in the larynx that is further modified by the tongue, teeth, and lips into speech.

• **The urinary system** (urology) consists of the kidneys, ureters, urinary bladder, and urethra, which filter blood and subsequently produce, transport, store, and intermittently excrete urine (liquid waste).

• **The genital (reproductive) system** (**gynecology** for females; **andrology** for males) consists of the gonads (ovaries and testes) that produce oocytes (eggs) and sperms, the ducts that transport them, and the genitalia that enable their union. After conception, the female reproductive tract nourishes and delivers the fetus.

• **The endocrine system** (endocrinology) consists of specialized structures that secrete hormones, including discrete ductless endocrine glands (such as the thyroid gland), isolated and clustered cells of the gut and blood vessel walls, and specialized nerve endings. Hormones are organic molecules that are carried by the circulatory system to distant effector cells in all parts of the body. The influence of the endocrine system is thus as broadly distributed as that of the nervous system. Hormones

influence metabolism and other processes, such as the menstrual cycle, pregnancy, and parturition (childbirth).

**MEDICAL IMAGING TECHNIQUES**

**Radiologic anatomy** is the study of the structure and function of the body using medical imaging techniques. It is an important part of clinical anatomy and is the anatomic basis of radiology, the branch of medical science dealing with the use of radiant energy in the diagnosis and treatment of disease.

The most commonly used medical imaging techniques are

• Conventional radiography (X-ray images).

• Computerized tomography (CT).

• Ultrasonography/Ultrasound (US).

• Magnetic resonance imaging (MRI).

• Nuclear medicine imaging.