

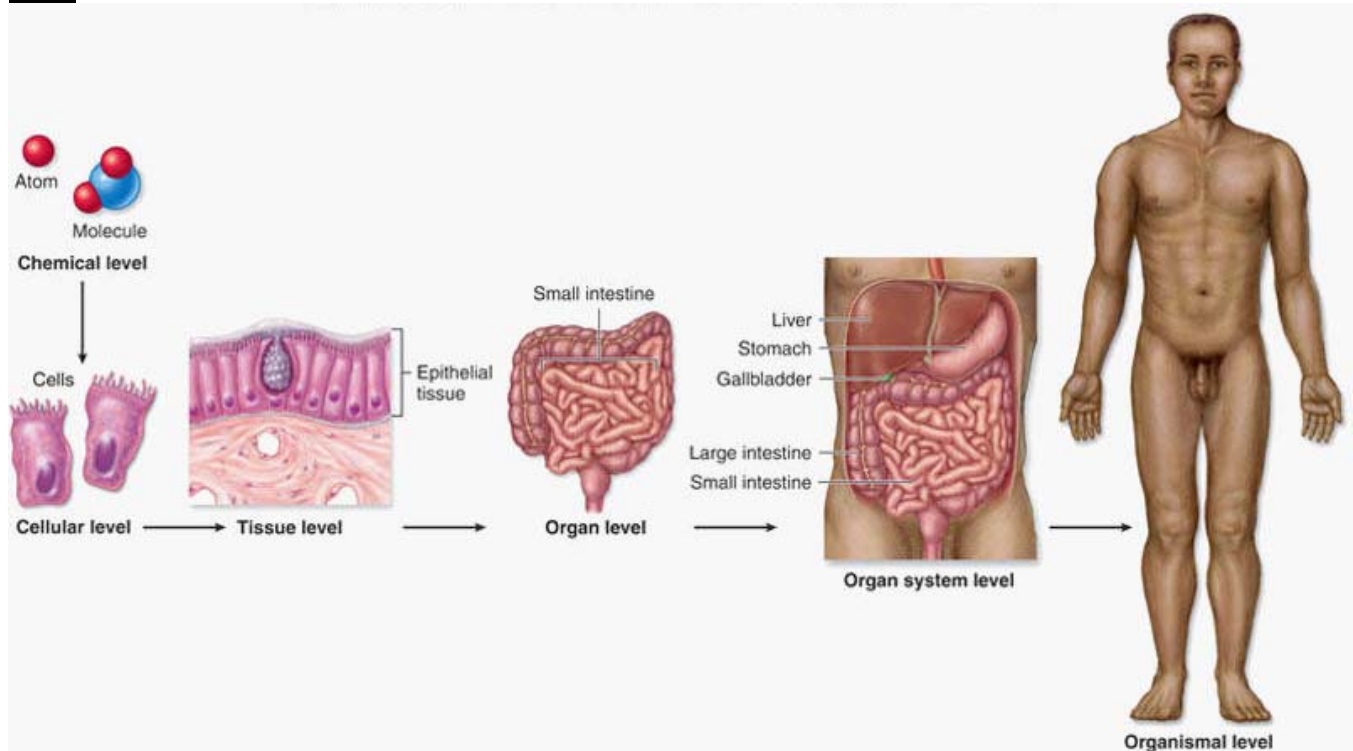
Overview of Anatomy and Physiology

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Part I



Definition

- **Anatomy** – the study of the **structure** of body parts and their relationships to one another
 - Gross or macroscopic
 - Microscopic
 - Developmental
- **Physiology** – the study of the **function** of the body's structural machinery

The body is a chemical and physical machine, the overall coordination.

- As such, it is subject to certain laws.
- These are sometimes called natural laws.
- Each part of the body is engineered to do a particular job.
- These jobs are functions.
- For each job or body function, there is a particular structure engineered to do it.

ORGANIZATION OF THE HUMAN BODY

The human body is organized into cells, tissues, organs, organ systems, and the total organism.

- a. **Cells** are the smallest living unit of body construction.
- b. **A tissue** is a grouping of like cells working together. Examples are muscle tissue and nervous tissue.
- c. **An organ** is a structure composed of several different tissues performing a particular function. Examples include the lungs and the heart.
- d. **Organ systems** are groups of organs that together perform an overall function. Examples are the respiratory system and the digestive system.
- e. **The total organism** is the individual human being. You are a total organism.

Anatomy

- **Gross Anatomy**

- **Regional** – all structures in one part of the body (such as the abdomen or leg)
- **Systemic** – gross anatomy of the body studied by system
- **Surface** – study of internal structures as they relate to the overlying skin.

- **Microscopic Anatomy**

- **Cytology** – study of the cell
- **Histology** – study of tissues

- **Developmental Anatomy**

- Traces structural changes throughout life
- **Embryology** – study of developmental changes of the body before birth

- **Specialized Branches of Anatomy**

- **Pathological anatomy** – study of structural changes caused by disease
- **Radiographic anatomy** – study of internal structures visualized by specialized scanning procedures such as X-ray, MRI, and CT scans
- **Molecular biology** – study of anatomical structures at a subcellular level.

PHYSIOLOGY

- **Physiology**

- Considers the operation of specific organ systems
 - Renal – kidney function
 - Neurophysiology – workings of the nervous system
 - Cardiovascular – operation of the heart and blood vessels
- Focuses on the functions of the body, often at the cellular or molecular level
- Understanding physiology also requires a knowledge of physics, which explains
 - Electrical currents
 - Blood pressure
 - The way muscle uses bone for movement

Principle of Complementarity

- Function always reflects structure
- What a structure can do depends on its specific form
- IF A STRUCTURE IS NOT USED IT ATROPHY [SHRINK AND DISAPPEAR WITH EVOLUTION]

Levels of Structural Organization

- **Chemical** – atoms combined to form molecules
- **Cellular** – cells are made of molecules
- **Tissue** – consists of similar types of cells
- **Organ** – made up of different types of tissues
- **Organ system** – consists of different organs that work closely together
- **Organismal** – made up of the organ systems

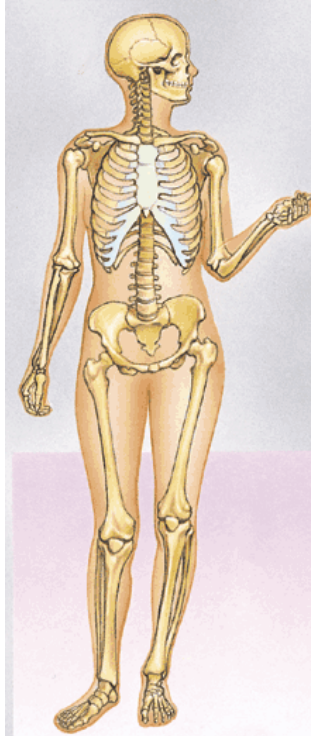
Integumentary System

- Forms the external body covering
- Composed of the ***skin, sweat glands, oil glands, hair, and nails***
- Protects deep tissues from injury and synthesizes vitamin D



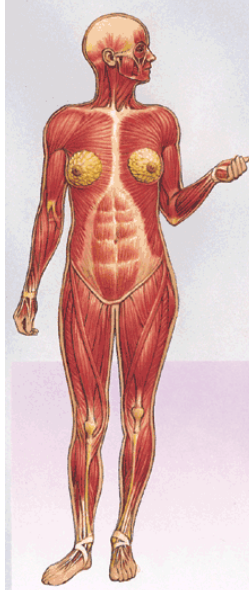
Skeletal System

- Composed of **bone, cartilage, and ligaments**
- Protects and supports body organs
- Provides the framework for muscles
- Site of blood cell formation
- Stores minerals



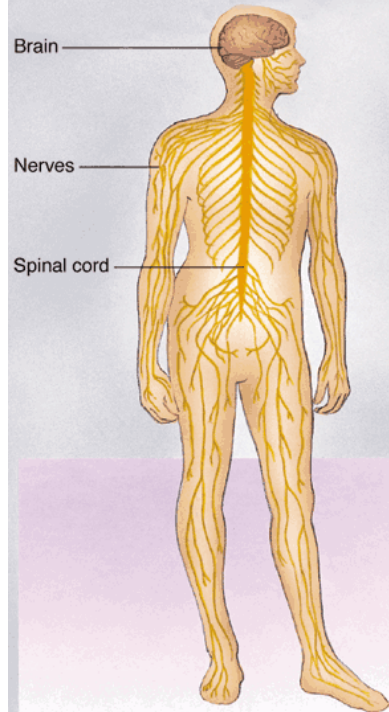
Muscular System

- Composed of muscles and tendons
- Allows manipulation of the environment, locomotion, and facial expression
- Maintains posture
- Produces heat



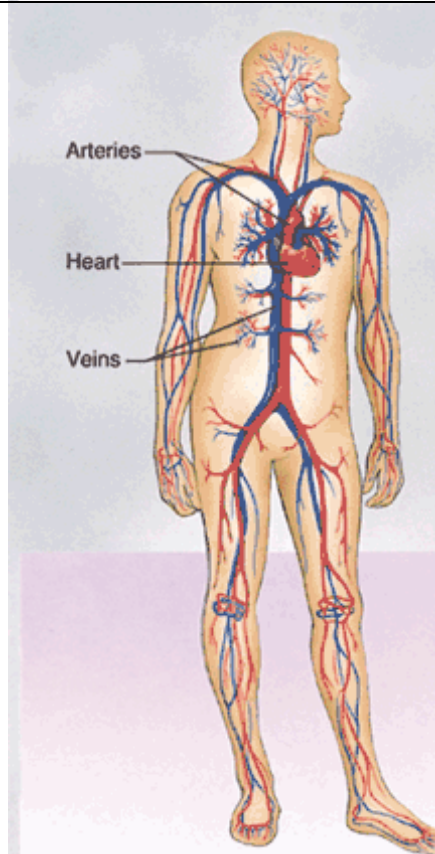
Nervous System

- Composed of the ***brain, spinal column, and nerves***
- Is the fast-acting control system of the body
- Responds to stimuli by activating muscles and glands



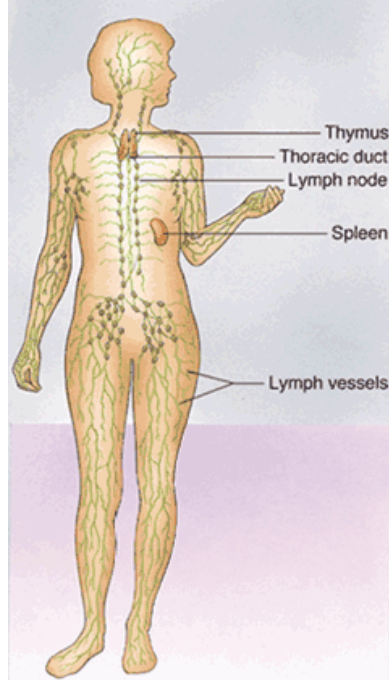
Cardiovascular System

- Composed of the heart and blood vessels
- The heart pumps blood
- The blood vessels transport blood throughout the body



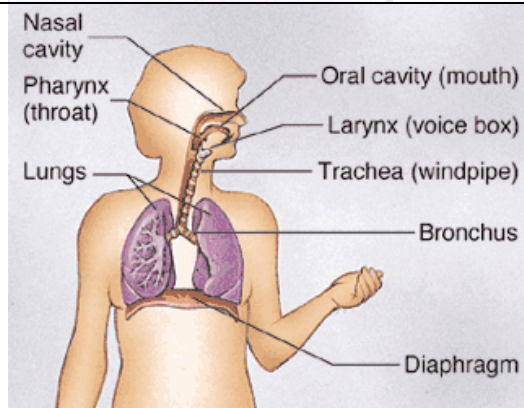
Lymphatic System

- Composed of **red bone marrow, thymus, spleen, lymph nodes, and lymphatic vessels**
- Picks up fluid leaked from blood vessels and returns it to blood
- Disposes of debris in the lymphatic stream
- Houses white blood cells involved with immunity



Respiratory System

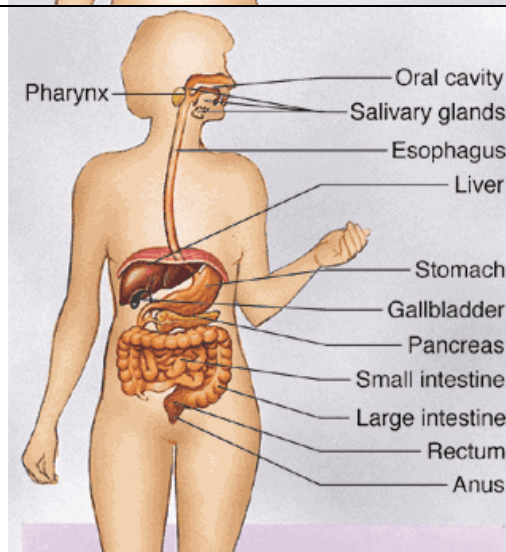
- Composed of **the nasal cavity, pharynx, trachea, bronchi, and lungs**
- Keeps blood supplied with oxygen and removes carbon dioxide



Digestive System

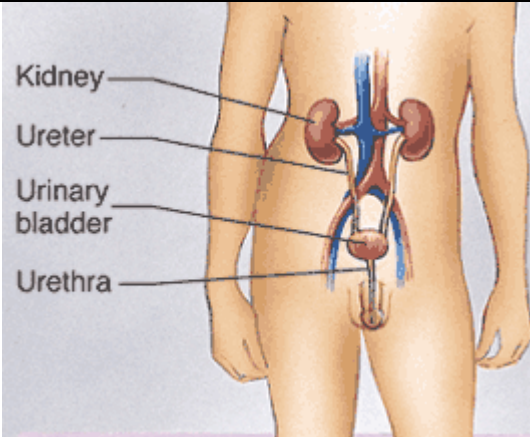
Composed of Organs of the digestive system that work together include the:

- Mouth
- **Salivary glands**
- **Esophagus**
- Stomach
- **Small intestine**
- Parts of the pancreas
- **Liver**
- **Gallbladder**
- **Large intestine**
- Breaks down food into absorbable units that enter the blood
- Eliminates indigestible foodstuffs as feces



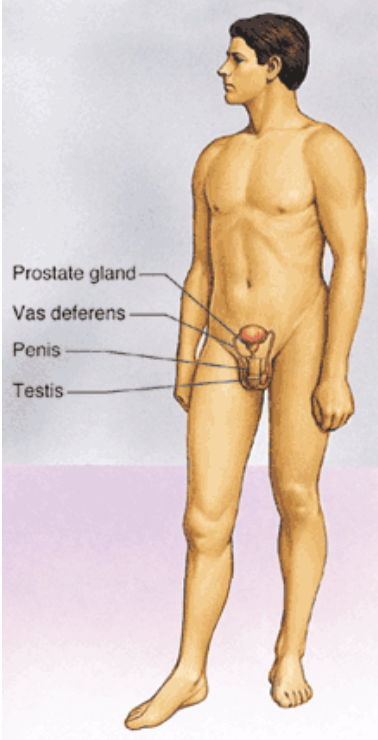
Urinary System

- Composed of ***kidneys, ureters, urinary bladder, and urethra***
- Eliminates nitrogenous wastes from the body
- Regulates water, electrolyte, and pH balance of the blood



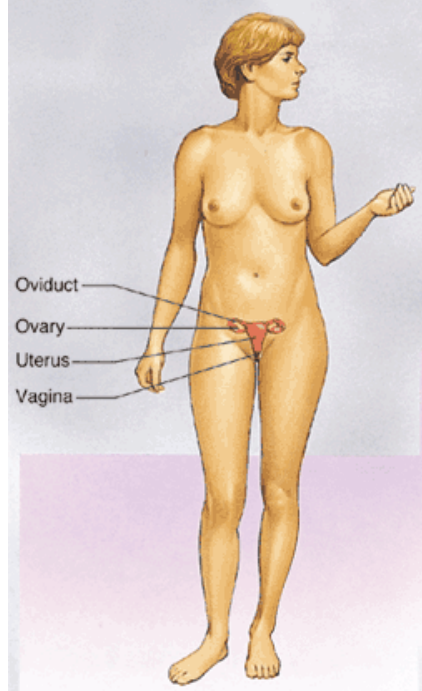
Male Reproductive System

- Composed of ***prostate gland, penis, testes, scrotum, and ductus deferens***
- Main function is the production of offspring
- Testes produce sperm and male sex hormones
- Ducts and glands deliver sperm to the female reproductive tract



Female Reproductive System

- Composed of ***mammary glands, ovaries, uterine tubes, uterus, and vagina***
- Main function is the production of offspring
- Ovaries produce eggs and female sex hormones
- Remaining structures serve as sites for fertilization and development of the fetus
- Mammary glands produce milk to nourish the newborn



Organ Systems Interrelationships

- The integumentary system protects the body from the external environment
- Digestive and respiratory systems, in contact with the external environment, take in nutrients and oxygen
- Nutrients and oxygen are distributed by the blood
- Metabolic wastes are eliminated by the urinary and respiratory systems

Necessary Life Functions

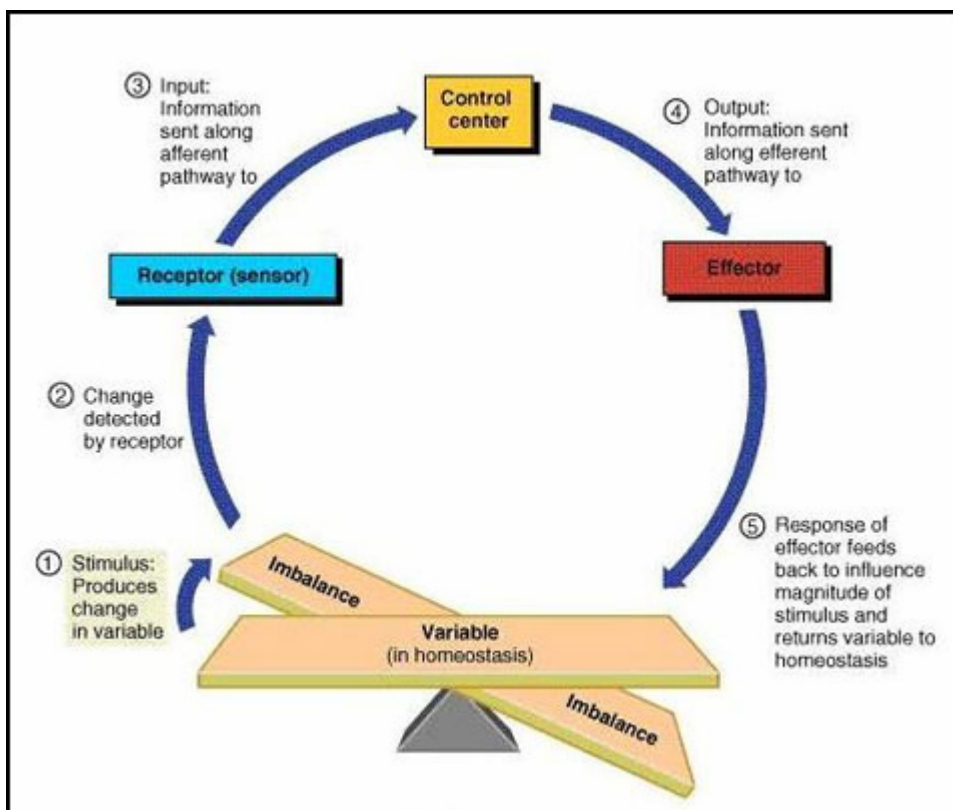
- Maintaining boundaries – the internal environment remains distinct from the external environment
 - **Cellular level** – accomplished by plasma membranes
 - **Organismal level** – accomplished by the skin
- **Movement** – locomotion, propulsion (peristalsis), and contractility
- **Responsiveness** – ability to sense changes in the environment and respond to them
- **Digestion** – breakdown of ingested foodstuffs
- **Metabolism** – all the chemical reactions that occur in the body
- **Excretion** – removal of wastes from the body
- **Reproduction** – cellular and organismal levels
 - **Cellular** – an original cell divides and produces two identical daughter cells
 - **Organismal** – sperm and egg unite to make a whole new person
- **Growth** – increase in size of a body part or of the organism

Survival Needs

- Nutrients – needed for energy and cell building
- Oxygen – necessary for metabolic reactions
- Water – provides the necessary environment for chemical reactions
- Normal body temperature – necessary for chemical reactions to occur at life-sustaining rates
- Atmospheric pressure – required for proper breathing and gas exchange in the lungs

Homeostasis

- Homeostasis – ability to maintain a relatively stable internal environment in an ever-changing outside world
- The internal environment of the body is in a dynamic state of equilibrium
- Chemical, thermal, and neural factors interact to maintain homeostasis



Single-celled organisms are surrounded by their external environment.

Multicellular organisms have most of their cells protected from the external environment, having them surrounded by an aqueous internal environment.

This internal environment, specifically the composition, temperature, and volume of extracellular fluid, must be maintained in such a state as to allow maximum efficiency. The ultimate control of homeostasis is done by the nervous system or the endocrine system. This type of control system is referred to as extrinsic control..

Often this control is in the form of negative feedback loops. Heat control is a major function of homeostatic conditions that involves the integration of skin, muscular, nervous, and circulatory systems.

Homeostatic Control Mechanisms

- Variables produce a change in the body
- The three interdependent components of control mechanisms:
 - **Receptor** – *monitors the environments and responds to changes (stimuli)*
 - **Control center** – *determines the set point at which the variable is maintained*
 - **Effector** – *provides the means to respond to stimuli*

Negative Feedback

- In negative feedback systems, the output shuts off the original stimulus
- Example: Regulation of room temperature

Positive Feedback

- In positive feedback systems, the output enhances or exaggerates the original stimulus
- Example: Regulation of blood clotting

Homeostatic Imbalance

- Disturbance of homeostasis or the body's normal equilibrium
- Overwhelming the usual negative feedback mechanisms allows destructive positive feedback mechanisms to take over

Homeostasis has survival value because it means an animal can adapt to a changing environment. It can deal with the temperature difference you face when you step your front door.

The body will attempt to maintain a norm, the desired level of a factor to achieve homeostasis. However, it can only work within tolerable limits, where extreme conditions can disable the negative feedback mechanism

In these instances, death can result, unless medical treatment is executed to bring about the natural occurrence of these feedback mechanisms

A. Some aspects of the internal environment that are homeostatically controlled

1. Temperature – normally 36 to 38 ° C
2. Fluid Volume – varies with individual body size
3. Glucose concentration – normally 75-95 mg/dL
4. Sodium concentration – normally 138-145 mmol/L
5. pH – normally 7.35-7.45
6. Oxygen tension – normally 95-105 mmHg at sea level
7. Carbon dioxide tension – normally 35-45 mmHg

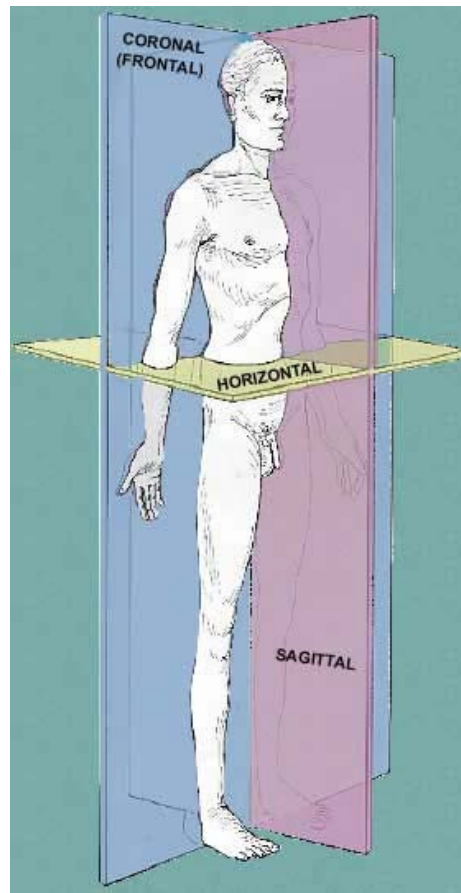
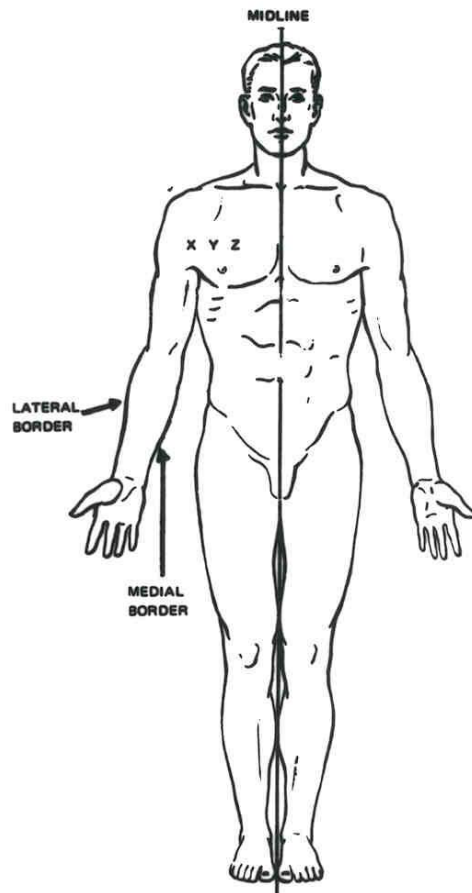
B. Exercise-Induced Disturbances to Homeostasis

1. Increased energy requirement – high glucose use
2. Increased heat generation
3. Increased oxygen use
4. Increased carbon dioxide production
5. Increased lactic acid production Fluid loss due to sweating

Part II

Anatomical Position

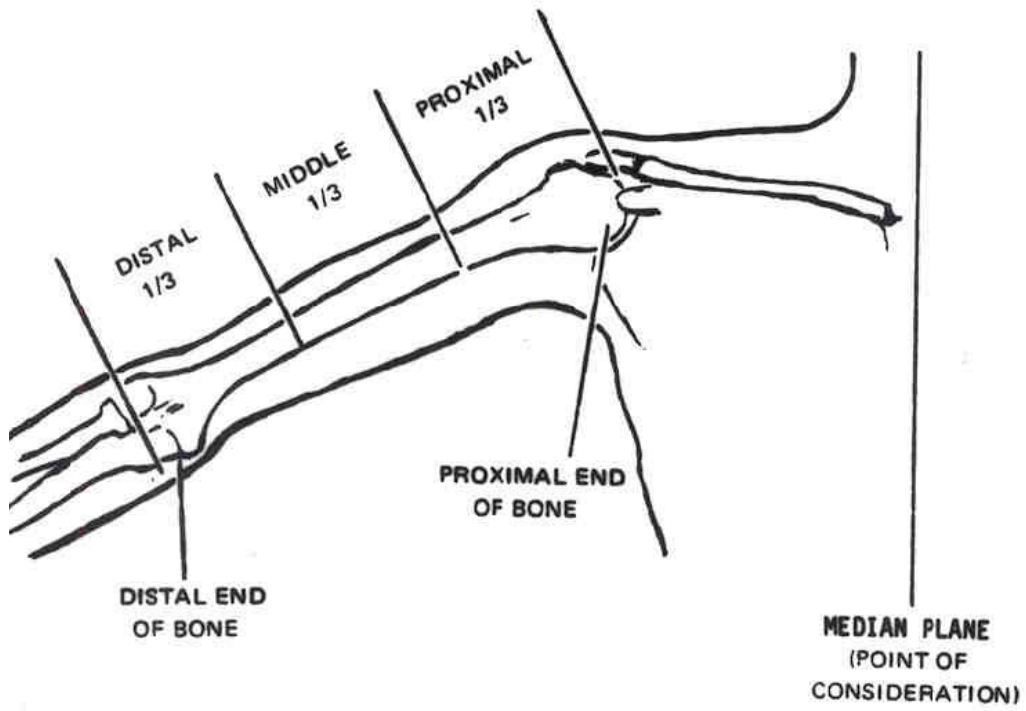
- Body erect, feet slightly apart, palms facing forward, thumbs point away from body



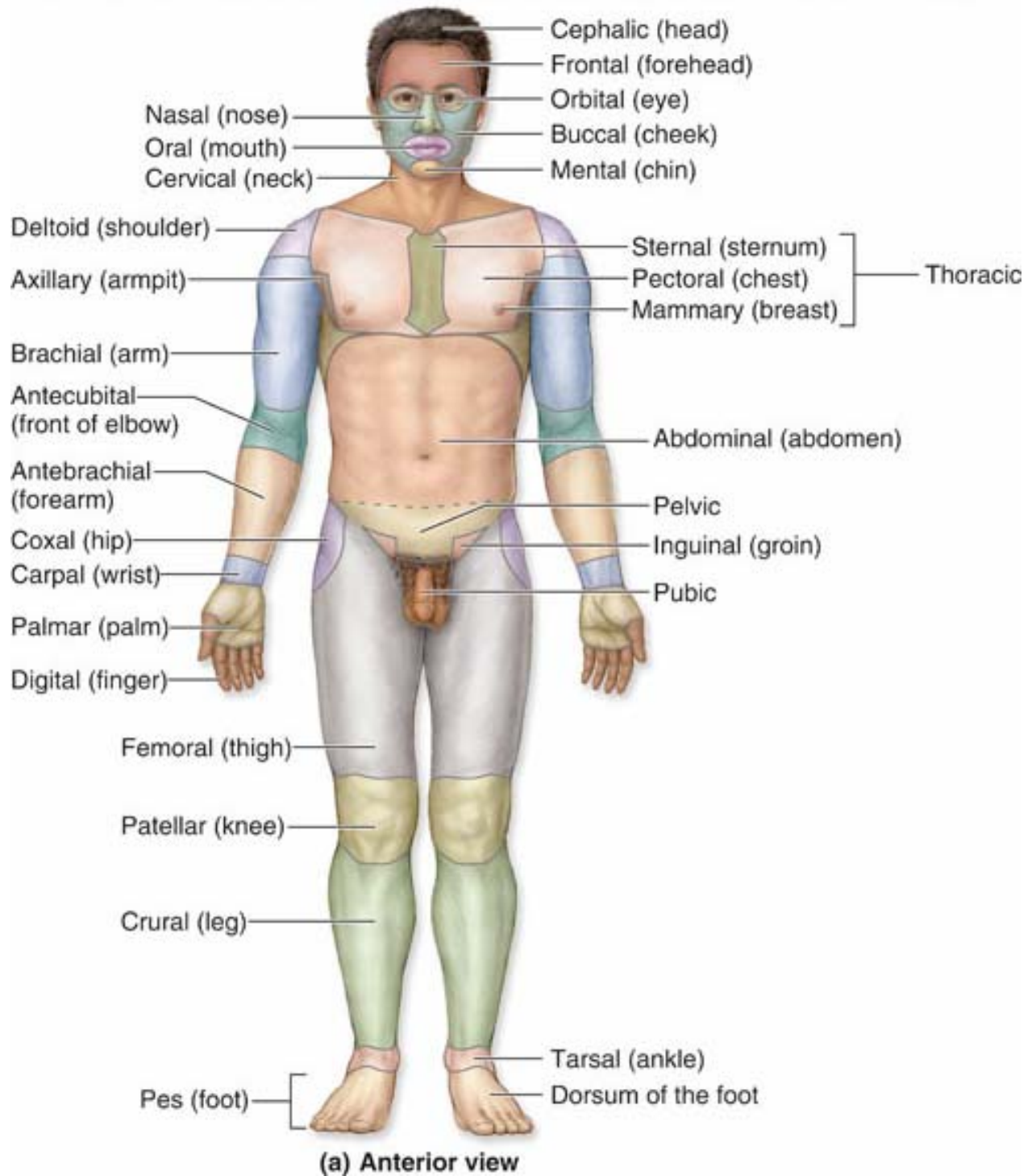
Medial–lateral relationships.

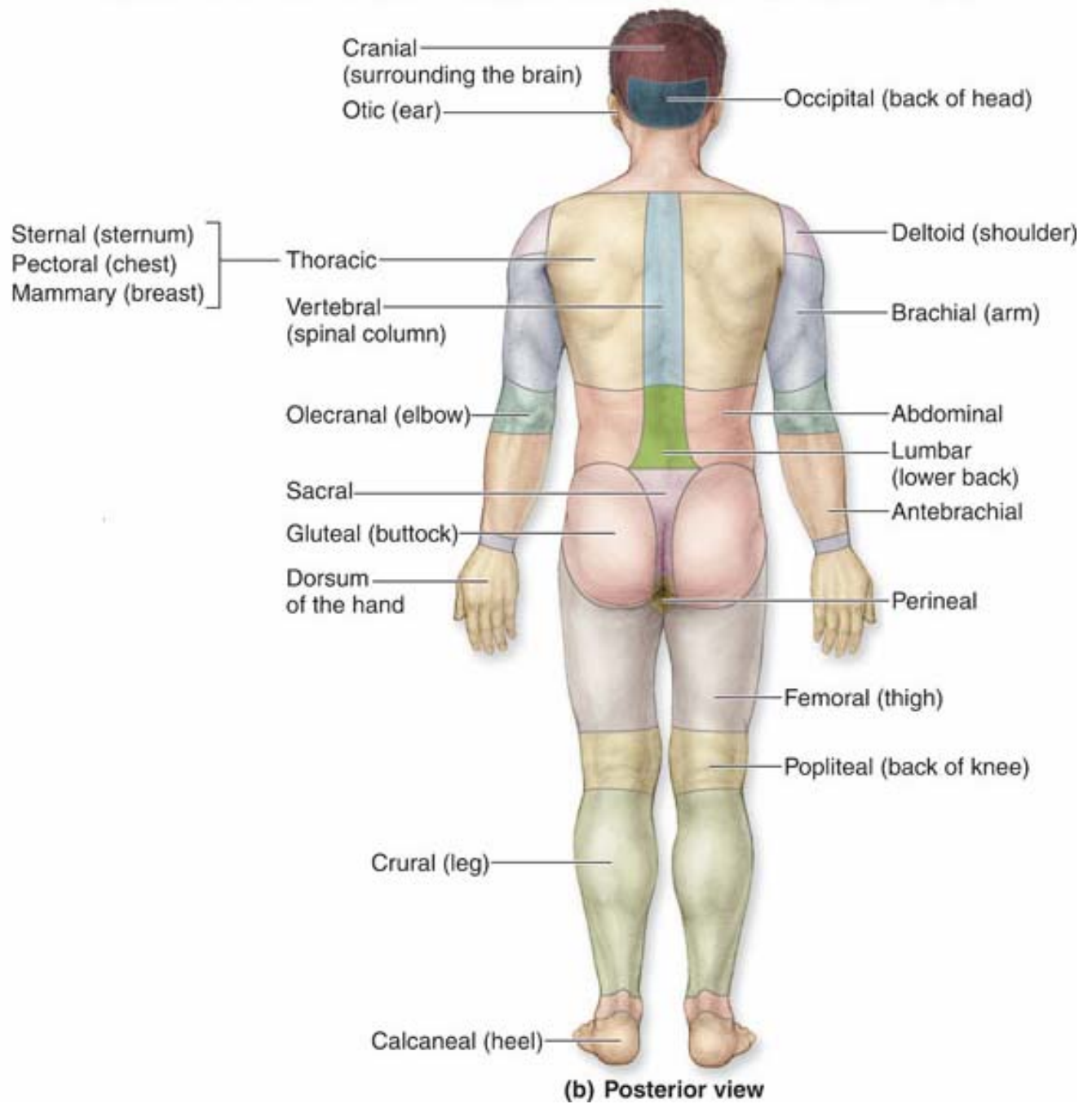
Directional Terms

- **Superior and inferior** – toward and away from the head, respectively
- **Anterior and posterior** – toward the front and back of the body
- **Medial, lateral, and intermediate** – toward the midline, away from the midline, and between a more medial and lateral structure
- **Proximal and distal** – closer to and farther from the origin of the body part
- **Superficial and deep** – toward and away from the body surface



Proximal–distal relationships.





A. ANTERIOR, FRONTAL, OR VENTRAL: REFERS TO THE FRONT SIDE OF THE BODY OR TOWARD THE FRONT.

B. POSTERIOR OR DORSAL: REFERS TO THE BACK OR TOWARD THE BACK OF THE BODY.

C. MEDIAL: TOWARD OR NEARER THE MIDLINE OF THE BODY

D. LATERAL: AWAY FROM THE MIDLINE OR TOWARD THE SIDE OF THE BODY.

E. PROXIMAL: NEAREST TO A POINT UNDER CONSIDERATION OR THE POINT OF ORIGIN. IN THE CASE OF THE EXTREMITIES, THE ARTICULATIONS (JOINTS) ARE CONSIDERED POINTS OF ORIGIN

F. DISTAL: REMOTENESS FROM A POINT UNDER CONSIDERATION OR THE POINT OF ORIGIN; THE OPPOSITE OF PROXIMAL

G. SUPERIOR: ABOVE.

H. INFERIOR: BELOW.

I. CEPHALAD: TOWARD THE HEAD.

J. CAUDAD: TOWARD THE FEET.

Terms of relation or position

superior (<i>closer to the head</i>)	inferior (<i>closer to the feet</i>)	reference point -- horizontal plane
posterior (dorsal) closer to the posterior surface of the body	anterior (ventral) closer to the anterior surface of the body	reference point -- frontal or coronal plane
medial (<i>lying closer to the midline</i>)	lateral (<i>lying further away from the midline</i>)	reference point -- sagittal plane
proximal closer to the origin of a structure	distal further away from the origin of a structure	reference point -- the origin of a structure
superficial	deep	reference point -- surface of body or organ
median		reference point -- along the midsagittal or median plane
intermediate		between two other structures
external	internal	refers to a hollow structure (external being outside and internal being inside)
supine	prone	face or palm up when lying on back, face or palm down when lying on anterior surface of body
cephalad	caudad	toward the head, toward the tail (feet)

Body Planes

- **Sagittal** – divides the body into right and left parts
- **Midsagittal or medial** – sagittal plane that lies on the midline
- **Frontal or coronal** – divides the body into anterior and posterior parts
- **Transverse or horizontal (cross section)** – divides the body into superior and inferior parts
- **Oblique section** – cuts made diagonally

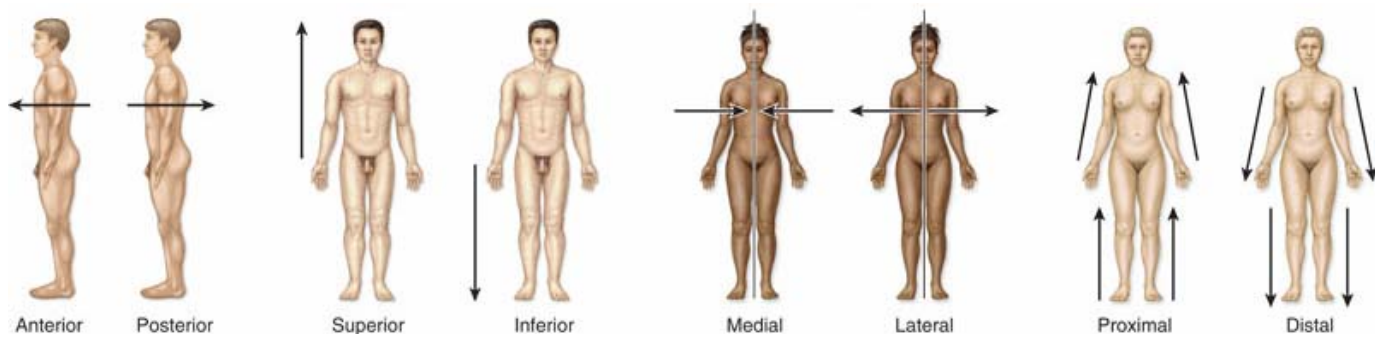
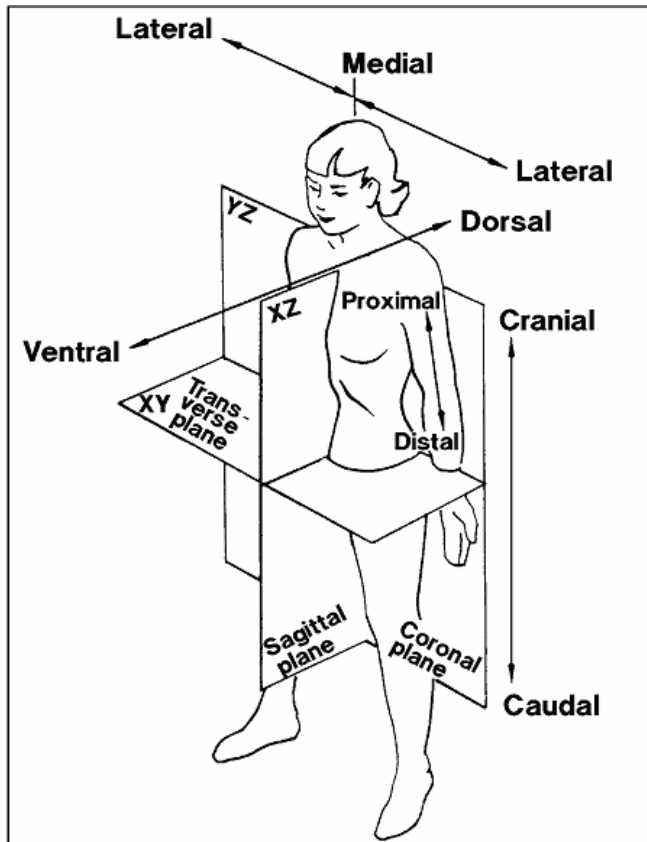


TABLE 1.1 Orientation and Directional Terms

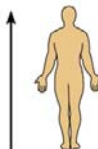
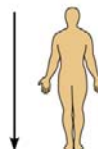


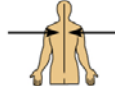
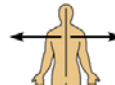



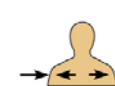

TERM	DEFINITION	EXAMPLE
Superior (cranial)	Toward the head end or upper part of a structure or the body; above	 The head is superior to the abdomen
Inferior (caudal)	Away from the head end or toward the lower part of a structure or the body; below	 The navel is inferior to the chin
Ventral (anterior)*	Toward or at the front of the body; in front of	 The breastbone is anterior to the spine
Dorsal (posterior)*	Toward or at the back of the body; behind	 The heart is posterior to the breastbone
Medial	Toward or at the midline of the body; on the inner side of	 The heart is medial to the arm
Lateral	Away from the midline of the body; on the outer side of	 The arms are lateral to the chest
Intermediate	Between a more medial and a more lateral structure	 The collarbone is intermediate between the breastbone and shoulder

TABLE 1.1 Orientation and Directional Terms

TERM	DEFINITION	EXAMPLE
Proximal	Closer to the origin of the body part or the point of attachment of a limb to the body trunk	 The elbow is proximal to the wrist
Distal	Farther from the origin of a body part or the point of attachment of a limb to the body trunk	 The knee is distal to the thigh
Superficial (external)	Toward or at the body surface	 The skin is superficial to the skeletal muscles
Deep (internal)	Away from the body surface; more internal	 The lungs are deep to the skin

*The terms *ventral* and *anterior* are synonymous in humans, but this is not the case in four-legged animals. Whereas *anterior* refers to the leading portion of the body (abdominal surface in humans, head in a cat), *ventral* specifically refers to the "belly" of a vertebrate animal and thus is the inferior surface of four-legged animals. Likewise, although the dorsal and posterior surfaces are the same in humans, the term *dorsal* specifically refers to an animal's back. Thus, the dorsal surface of four-legged animals is their superior surface.

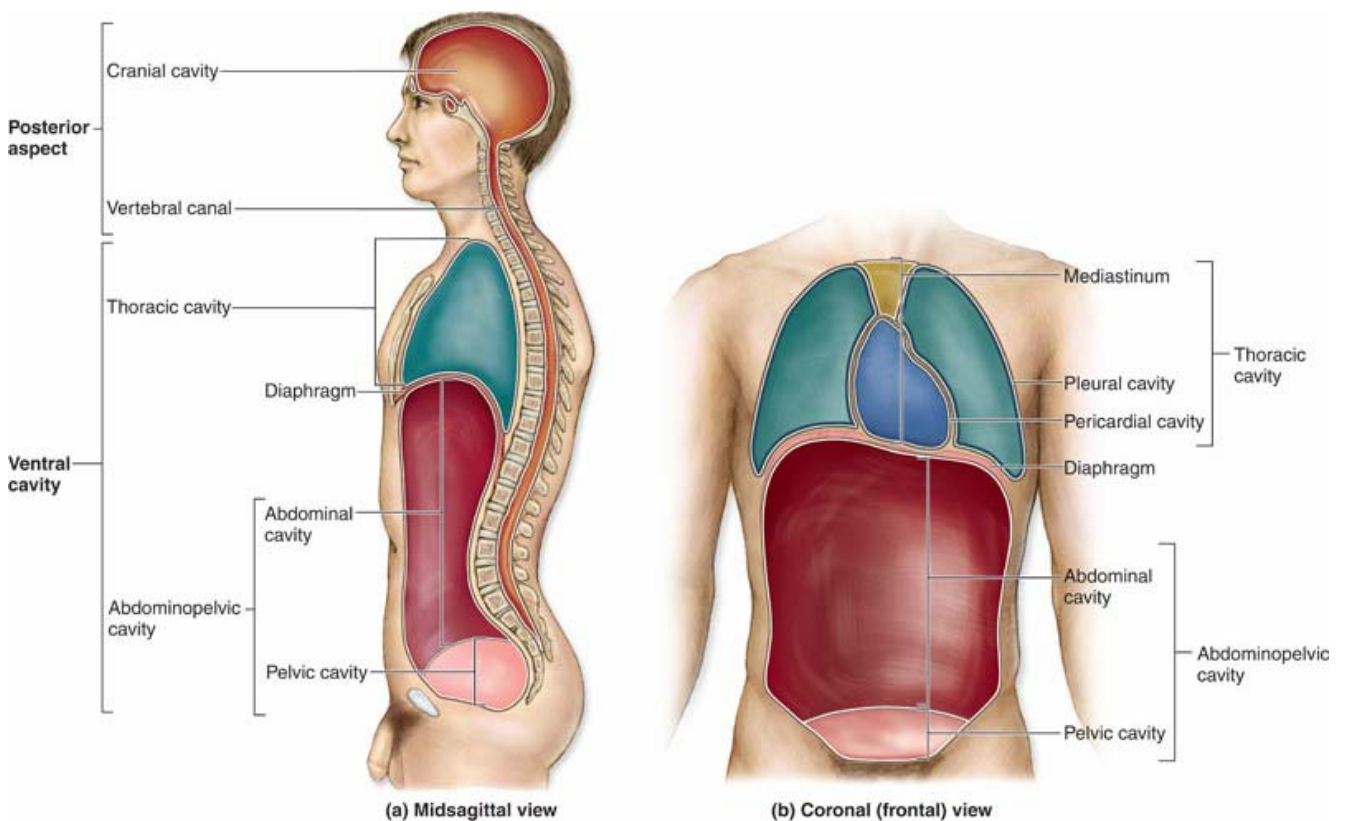
Body Planes

Anatomical Variability

- Humans vary slightly in both external and internal anatomy
- Over 90% of all anatomical structures match textbook descriptions, but:
 - Nerves or blood vessels may be somewhat out of place
 - Small muscles may be missing
- Extreme anatomical variations are seldom seen

Part III.

Body Cavities



- **Dorsal cavity** protects the nervous system, and is divided into two subdivisions
 - **Cranial cavity** – *within the skull; encases the brain*
 - **Vertebral cavity** – *runs within the vertebral column; encases the spinal cord*
- **Ventral cavity** houses the internal organs (viscera), and is divided into two subdivisions
 - **Thoracic**
 - **Abdominopelvic**

1. **Thoracic cavity** is subdivided into two pleural cavities, the mediastinum, and the pericardial cavity
 - Pleural cavities – each houses a lung
 - Mediastinum – contains the pericardial cavity; surrounds the remaining thoracic organs
 - Pericardial cavity – encloses the heart

2. **The abdominopelvic cavity** is separated from the superior thoracic cavity by the dome-shaped diaphragm
 - It is composed of two subdivisions
 - **Abdominal cavity** – contains the stomach, intestines, spleen, liver, and other organs
 - **Pelvic cavity** – lies within the pelvis and contains the bladder, reproductive organs, and rectum

Ventral Body Cavity Membranes

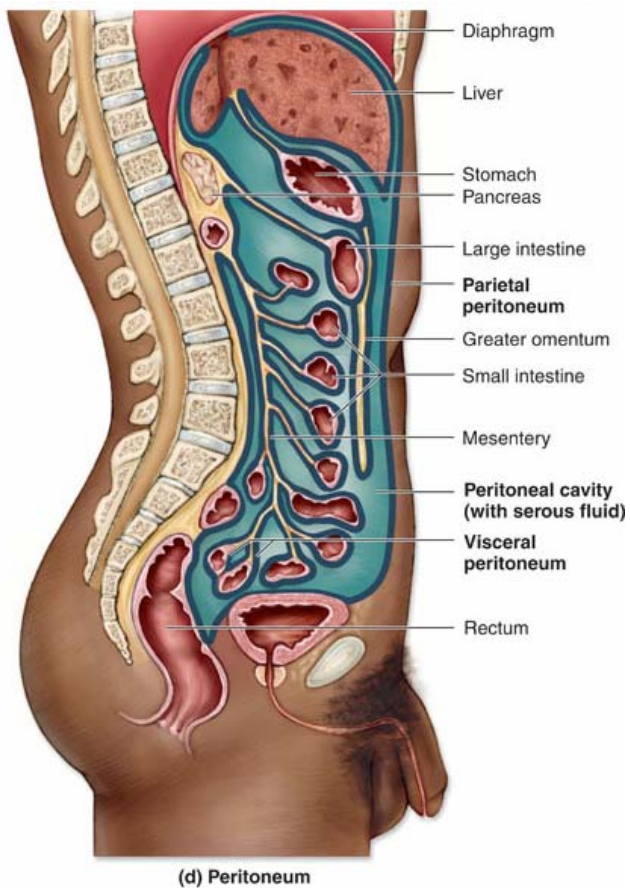
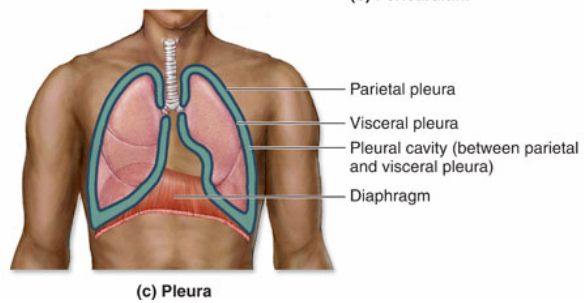
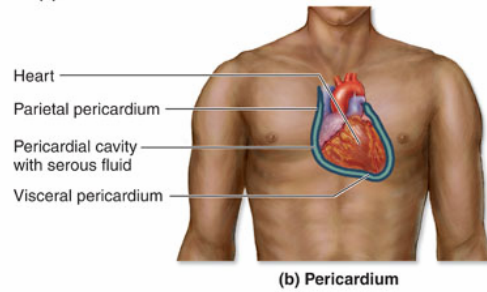
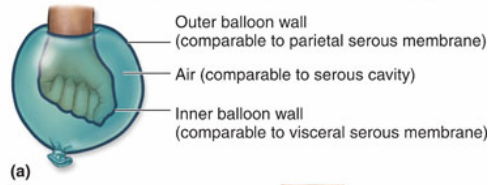
- Parietal serosa lines internal body walls
- Visceral serosa covers the internal organs
- Serous fluid separates the serosae

Serous Membrane Relationship

Heart Serosae

Other Body Cavities

- Oral and digestive – mouth and cavities of the digestive organs
- Nasal –located within and posterior to the nose
- Orbital – house the eyes
- Middle ear – contains bones (ossicles) that transmit sound vibrations
- Synovial – joint cavities

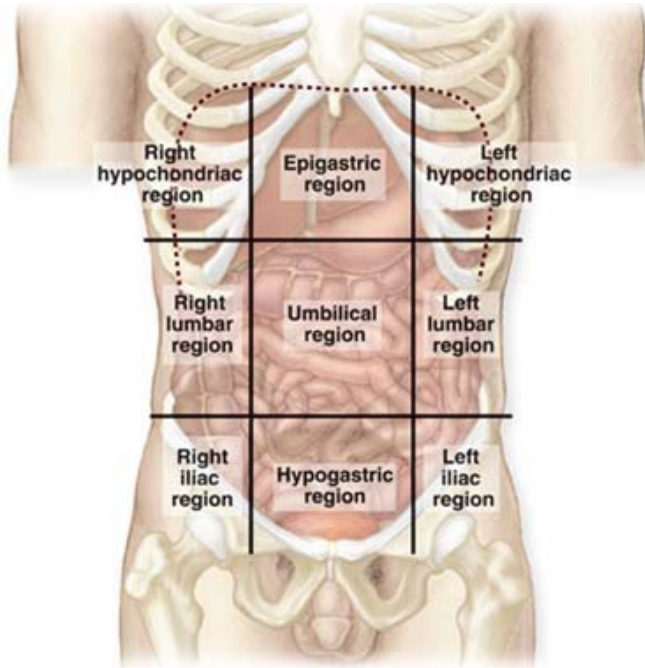


Abdominopelvic Regions

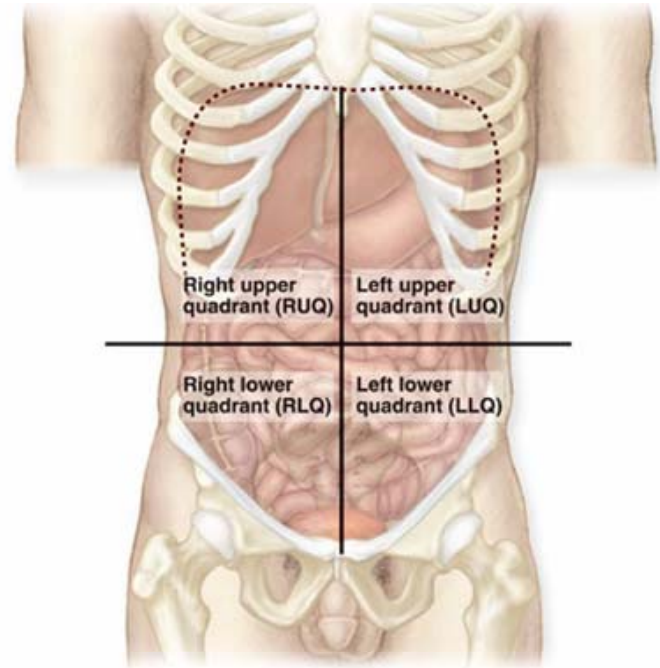
Organs of the Abdominopelvic Regions

Abdominopelvic Quadrants

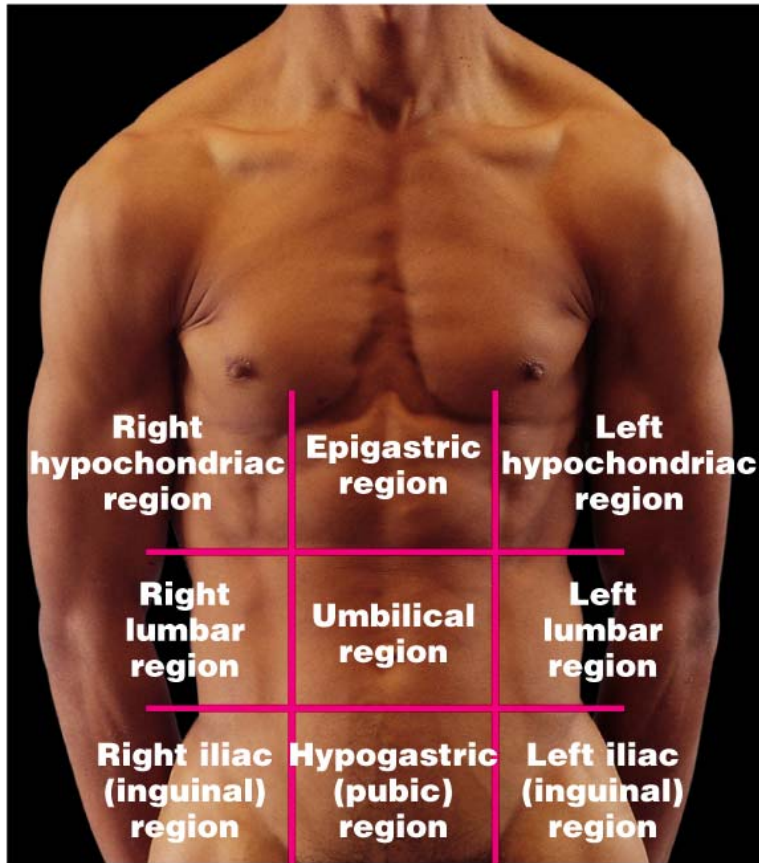
- Right upper
- Left upper
- Right lower
- Left lower



(a) Abdominopelvic regions



(b) Abdominopelvic quadrants



(a)

Type	Study Area
Microscopic Anatomy — Structures not visible to the unaided eye	
Cytology	Cells of the body and their internal structure
Histology	Tissues formed by cells and cell products
Gross (Macroscopic) Anatomy — Body structures observable by the unaided eye	
Developmental anatomy	Structural changes in the body between conception and maturation
Embryology	Origin and development of the organism from fertilization of the oocyte until birth.
Pathologic anatomy	Characteristic changes that occur during illness
Radiographic anatomy	Anatomic structures or features observed by noninvasive procedures, such as ultrasound or x-ray
Regional anatomy	Gross anatomy of all structures, external and internal, in one region of the body, such as an upper limb
Surface anatomy	Superficial anatomic markings and gross anatomy of internal structures relative to overlying skin surface
Surgical anatomy	Anatomic landmarks used prior to surgery
Systemic anatomy	Gross anatomy of all the components of an organ system

Terms of movement

flexion	extension	increasing angle with frontal plane decreasing angle with frontal plane
abduction	adduction	moving away from or toward the sagittal plane
protraction	retraction	moving forward or backward along a surface
elevation	depression	raising or lowering a structure
medial rotation	lateral rotation	movement around an axis of a bone
pronation	supination	placing palm backward or forward (in anatomical position)
circumduction		combined movements of flexion, extension, abduction, adduction medial and lateral rotation circumscribe a cone
opposition		bringing tips of fingers and thumb together as in picking something up

Table of Frequently Used Terms in Anatomy

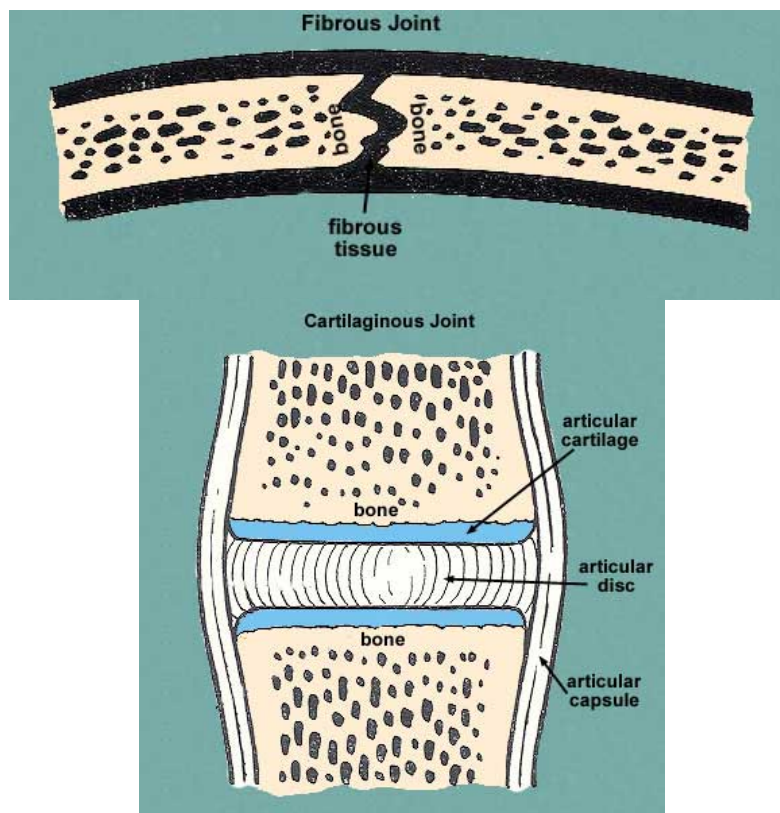
Aditus	an entrance or opening
Ala	a wing-like process
Alveolus	a deep narrow pit, such as a tooth-socket
Ampulla	used to describe the dilated part of a duct.
Ansa	a loop, usually referring to a nerve
Antrum	a cavity
Aponeurosis	a glistening sheet of fibrous connective tissue from which muscle fibers arise or into which they run
Artery	a blood vessel which conducts blood from the heart
Bone	a special form of connective tissue in which calcium salts are deposited and which provides a framework, or skeleton, for the other tissues of the body.
Bursa	a membranous sac containing a small amount of viscous fluid. A bursa is usually found in tissues where friction develops, such as where a tendon crosses a bony prominence. A bursa may form synovial sheaths to surround tendons as they cross other tendons or bone.
Canal	a tubular and relatively narrow channel, or tunnel, often through a bone. A canaliculus is a smaller canal.
Capsule	a fibrous or membranous envelope surrounding an organ. An articular capsule surrounds each synovial joint, being attached to the bones just beyond the limits of the joint cavity.
Cartilage	a firm white tissue, from which most parts of the bony skeleton are formed and which persists to protect the surfaces of bones and joints.
Caruncle	a small fleshy eminence
Cauda	tail

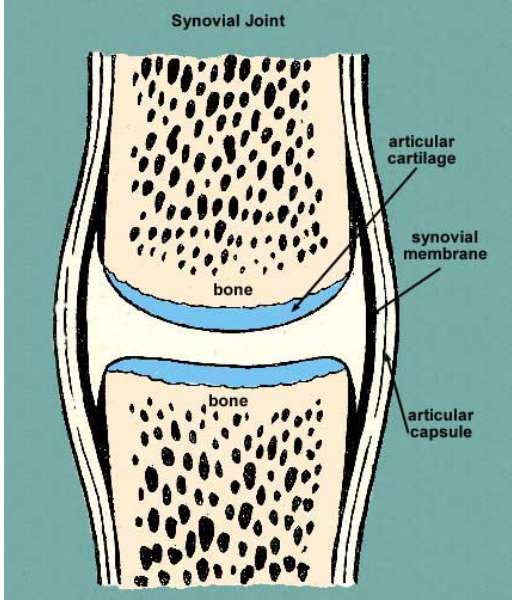
Cavity	a hollow space (or potential space) within the body or its organs.
Cervix	means neck and is applied to the neck like portion of an organ (e.g. cervix of uterus)
Chiasma	a crossing of fibers in the form of an X. Used primarily to describe nerve fibers.
Commissure	a band of fibers which join corresponding right and left parts of a structure across the median plane.
Corpus	means body
Cortex	outer part, or rind, or some organs as distinguished from their inner part, or core usually called a medulla.
Crest	a projecting ridge, especially one which on a bone
Crus	means a leg and is applied to a structure that resembles a leg or stalk
Decussation	same as a chiasma. A crossing of fibers in the form of an X.
Digitation	a finger like process of a muscle
Disc	a flat round structure usually applied to plates of cartilage in joints.
Duct	a tube for the passage of fluid, especially secretions of glands. A ductule is a small duct.
Epithelium	a layer of cells which forms the external surface of the skin, or which lines the cavities of the digestive, respiratory and urogenital organs, serous cavities, inner coats of blood and lymphatic vessels, gland and cavities within the brain. The epithelium of the skin is the epidermis . The epithelium of the digestive, respiratory and urogenital organs is moistened by a film of mucus and is known as the mucous coat . The epithelium lining bloods vessels is known as the endothelium. Serous cavities are lined by epithelium called mesothelium .
Fascia	tissue which lies immediately deep to the skin known as subcutaneous tissue. It usually consists of a layer of connective tissue which contains fat, and of a deep and more fibrous layer which adheres to the surface of the underlying muscle and vessels. These layers are known as superficial and deep fascia respectively. Fascia surrounds every muscle, organ, vessel and nerve in the body.
Fasciculus	a small bundle. A term that is usually applied to collections of nerve fibers.
Filum	literally mean a "thread". This name is given to several thread-like structures such as the filum terminale , the lower extension of the pia mater of the spinal cord.
Fold	a ridge formed where a membrane doubles back on itself
Folium	mean leaf. The plural "folia" is applied to the folds of the cortex of the cerebellum.
Foramen	a hole, often in a bone or between adjacent bones.
Fossa	a "ditch", usually referring to a shallow depression or cavity.
Fovea	a small pit or fossa
Frenulum	a small fold of the mucous coat which limits the movement of the structure to which it is attached
Fundus	used to denote the widest part of a hollow organ
Ganglion	a swelling on the course of a nerve. Usually corresponds to a collection of nerve cells.

Genu	mean knee. Geniculum is sometimes applied to a bent part of a structure.
Gyrus	a fold or convolution of the cerebral cortex.
Hilum	a depression or notch where blood vessels enter or leave an organ.
Humor	applied to fluids of the eye
Infundibulum	a funnel-shaped passage
Interdigitate	an interlocking of structures by finger-like processes, as when the fingers of the two hands are interposed.
Invaginate	a process when part of a wall of a structure is pushed inwards to that the structure which invaginates the membrane becomes partly ensheathed by it.
Isthmus	a narrow part of a duct or other passage, or a narrow strip of tissue connecting two wider parts of an organ

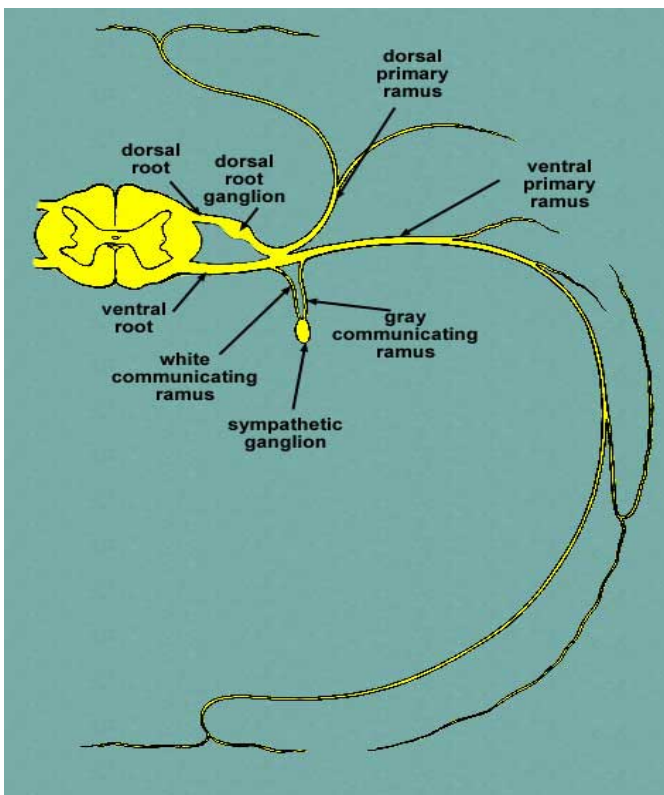
Joints

places where bones meet each other (articulate). Where bones are connected by fibrous tissue, the joint is known as a **fibrous joint** (i.e. suture of skull). Where bones are united by cartilaginous tissue, the joint is known as a **cartilaginous joint** (i.e. symphysis pubis). Where a space intervenes between the articulating ends of bones, the joint is called a **synovial joint** (i.e. most of the joints of the body). In these joints, there is an **articular capsule** the encloses the joint. This capsule is lined by a **synovial membrane** which secretes a lubricating fluid.



	 <p>The diagram illustrates a synovial joint between two bones. The bones are shown in cross-section with a porous, trabecular internal structure. They are separated by a thin layer of articular cartilage. The joint is enclosed within a synovial membrane, which is further surrounded by a thick, fibrous articular capsule. Labels with leader lines identify the 'Synovial Joint' at the top, 'articular cartilage' on the joint surface, 'synovial membrane' lining the joint, 'bone' for both the upper and lower bones, and 'articular capsule' on the outer side.</p>
Labium	lip
Lamina	A thin plate of bone or cartilage or a thin layer of softer tissues. A stratum is also used to denote a layer
Ligament	a band of fibrous connective tissue by which bones are connected to each other. Sometimes bands of connective tissue which support the viscera or the thorax or abdomen are also known as ligaments.
Lobe	a part of an organ, often separated from the rest by a fissure. A lobule is a small lobe
Meatus	a passage or opening
Muscle	these structures vary in shape and size, but always consist of masses of special contractile cells which are under nervous control. It is usual to describe a muscle as possessing an origin and insertion , in the sense that when the muscle contracts, the insertion moves toward the origin. It is probably more useful to regard a muscle as possessing attachments which are approximated when the whole muscle contracts. The original of a muscle is sometimes called the head and the contractile part the belly .

Nerves the nerves of the body can be divided into twelve pairs of **cranial nerves**, which arise from the brain and brainstem, 31-33 pairs of **spinal nerves** which arise from the spinal cord in segmental series (8 cervical, 12 thoracic, 5 lumbar, 5 sacral and 1-3 coccygeal). The spinal nerves emerge from the **intervertebral foramina** which lie along side of adjacent vertebrae. They pass laterally into the neck or trunk. A typical spinal nerve is formed by the union of a **dorsal root**, which arises from the dorsal aspect of the spinal cord and a **ventral root** which arises from the ventral aspect of the spinal cord. The dorsal root consists of sensory (afferent) fibers and contains a swelling called the **dorsal root ganglion**. This ganglion contains the cell bodies of the sensory nerve fibers. The ventral root consists of motor (efferent) nerve fibers. The nerve trunk formed by the merger of the two roots splits immediately into a **dorsal ramus** and a **ventral ramus**. The dorsal ramus supplies the deeper muscles



of the back the their overlying skin. The ventral ramus supplies muscles and skin on the lateral and ventral aspects of the body. The nerve supply of the limbs is derived entirely from the ventral rami of the spinal nerves.	
Sympathetic nerves	Just at the point where the 12 thoracic and first 2 lumbar spinal nerve trunks split into a dorsal and ventral ramus, two branches leave the trunk that connect to the sympathetic chain ganglia , and these are called the communicating rami . The gray communicating ramus usually comes off first and connects to the ganglion in the sympathetic chain. It carries post ganglionic neurons from the ganglion back to the spinal nerve trunk and thence to its branches. The white communicating ramus arises a little more distal than the gray one and also connects to the sympathetic chain and its ganglia. This connection carries pre ganglionic neurons from the spinal cord to the sympathetic chain where synapses may occur at that level or past the sympathetic ganglia into other sympathetic ganglia.
Neuron	The neuron or nerve cell is the functional unit of the nervous system. Each is composed of a cell body (perikaryon) where the nucleus of the cell is located, and one or more processes. One of the processes, called the axon , is different from the others, which are called dendrites . The dendrites and body are the receiving part of the neuron and the axon is the distribution part of the neuron.
Node	a swelling or protuberance. A nodule is a small node.
Notch	an indentation or depression, usually on the border of a bone.
Nucleus	literally means a kernel or nut. In anatomy, nucleus is most often used to describe an aggregation or cluster of nerve cells.
Papilla	a small nipple-shaped elevation
Periosteum	the fibrous covering of a bone.
Plexus	a network of nerve or vessel processes
Pouch	pockets of peritoneum in the abdomen
Process	an appendage or projection from the main part of a bone or organ
Punctum	a minute opening
Ramus	a branch, which, when translated, is used to describe smaller arteries, veins and nerves arising from their parent vessels or nerves.
Raphe	a seam where two similar sheets of tissue unite.
Rete	a network, used to describe plexuses of small canals, nerves or vessels
Retinaculum	a band of connective tissue, usually connected at both ends to bone, which keeps tendons or other structures in place
Rima	a cleft or fissure that refers to a narrow oval or oblong opening
Root	the part of a nerve or organ which arises from another structure
Sac	a bag-like cavity or pouch

Septum	a dividing wall or partition
Sinus	a recess, a cavity or hollow space, a dilated channel for venous blood or a small tunnel
Space	a clearly demarcated segment of tissue or potential cavity
Spine	a small, sharp-pointed projection from a bone
Stria	a streak or stripe, sometimes slightly elevated
Stroma	supporting fibrous framework of tissue
Substantia	means substance or matter
Sulcus	a groove
Taenia	a flat band or tape, applied to a narrow strip of muscle
Tegmen	roof
Tela	means a web and describes a thin web-like membrane. Loosely translated, it can mean tissue
Tendon	a cord of connective tissue into which muscles fibers end by which a muscle is attached to bone or other structures
Trabecula	means a beam or bar.
Tract	a bundle of fibers, often nerve fibers, having similar origins and terminations
Trigonum	a triangular space or area
Trochlea	pulley
Tuber	an enlargement or swelling
Tubercle	an eminence on a bone, usually smoother than a tuberosity
Tuberosity	a rough eminence on a bone
Tunica	a covering or coat around muscle or hollow viscera
Uvula	means little grape, usually referring to the small fleshy appendage that hangs from the soft palate.
Vallecula	a wide depression, furrow or valley
Valve	a fold in an artery, vein or duct which prevents reflux of its contents
Vas	a tubular structure
Velum	means a veil or curtain.
Veins	vessels that return blood from capillaries to the heart
Viscus	any organ of the digestive, respiratory or urogenital systems, or ductless gland. Viscera is the plural.