



ANALYZER

9D-NLB-A Illustrated Glossary with Definitions



The information contained in this document, is not intended or implied to be a substitute for professional medical advice, diagnosis or treatment. All content, including text, graphics, images and information, contained in this site is for general information purposes only.

Innergy Development, or any of its affiliates makes no representation and assumes no responsibility for the accuracy of the information contained on this site.

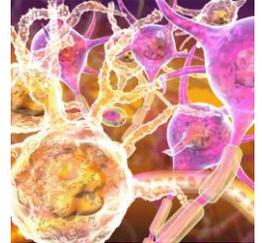
You are encouraged to confirm any information obtained from or through this site with other sources, and review all information regarding any medical condition or treatment with your physician.



9D-NLB-A Illustrated GLOSSARY with Definitions

Astrocytes

- Also known collectively as **astroglia**, are characteristic star-shaped **glial cells** in the **brain** and **spinal cord**. They perform many functions, including biochemical support of **endothelial cells** that form the **blood–brain barrier**, provision of nutrients to the nervous tissue, maintenance of extracellular ion balance, and a role in the repair and scarring process of the brain and spinal cord following traumatic injuries.



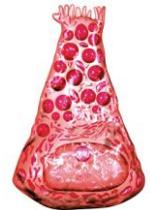
A- Cells Pancreatic Islets

- The alpha cells of the islets of Langerhans produce an opposing hormone, **glucagon**, which releases **glucose** from the liver and fatty acids from fat tissue. In turn, **glucose** and free fatty acids favour **insulin** release and inhibit **glucagon** release.



Acitinic Insular Cells of Pancreas

- Acino-insular cells are a distinct type of pancreatic cells sharing structural and functional features of both acinar and islet cells. They synthesize and secrete digestive enzymes and hormones.



Acoustic Organ

- The auditory periphery, starting with the **ear**, is the first stage of the **transduction** of **sound** in a hearing organism. While not part of the **nervous system**, its components feed directly into the nervous system, performing **mechanoelctrical transduction** of **sound pressure** waves into neural **action potentials**. This sound information travels down the **vestibulocochlear nerve**, through intermediate stations such as the **cochlear nuclei** and **superior olivary complex** of the **brainstem** and the **inferior colliculus** of the **midbrain**, being further processed at each waypoint. The information eventually reaches the **thalamus**, and from there it is relayed to the cortex. In the **human brain**, the **primary auditory cortex** is located in the **temporal lobe**.



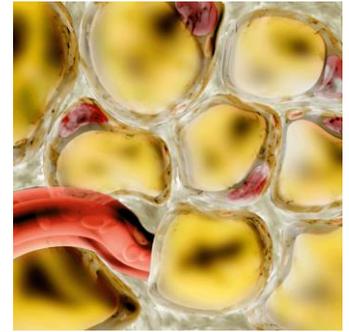
Acupuncture points of the Foot and Wrist by folle

- Acupressure points on the legs and feet are used for a very wide range of conditions including digestive problems, stress and anxiety, insomnia, hot flashes, headaches, PMS, and more.



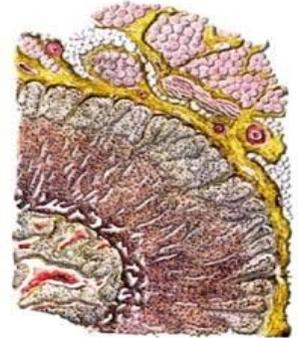
Adipose Tissue

- Its main role is to store energy in the form of **lipids**, although it also cushions and **insulates** the body. The two types of adipose tissue are **white adipose tissue** (WAT), which stores energy, and **brown adipose tissue** (BAT), which generates body heat. Far from hormonally inert, adipose tissue has, in recent years, been recognized as a major **endocrine** organ,^[1] as it produces **hormones** such as **leptin**, **estrogen**, **resistin**, and the **cytokine TNF α** . Moreover, adipose tissue can affect other organ systems of the body and may lead to disease



Adrenal, Left & Right

- The Adrenal Glands function together, but you have two Adrenal Glands and this is the Left Adrenal Gland. In **mammals**, the adrenal glands (also known as suprarenal glands) are **endocrine glands** that sit at the top of the **kidneys**; in humans, the right adrenal gland is triangular shaped, while the left adrenal gland is semilunar shaped. They are chiefly responsible for releasing **hormones** in response to **stress** through the **synthesis** of **corticosteroids** such as **cortisol** and **catecholamines** such as **epinephrine** (adrenaline) and **norepinephrine**. These endocrine glands also produce **androgens** in their innermost cortical layer. The adrenal glands affect kidney function through the secretion of **aldosterone**, and recent data (1998) suggest that adrenocortical cells under **pathological** as well as under **physiological** conditions show **neuroendocrine** properties; within the normal adrenal, this neuroendocrine differentiation seems to be restricted to cells of the **zona glomerulosa** and might be important for an **autocrine** regulation of adrenocortical function.¹



Adrenalin

- Is a hormone and neurotransmitter also known as epinephrine, which is a **hormone** and a **neurotransmitter**. The word adrenaline is used in common parlance to denote increased activation of the sympathetic system associated with the energy and excitement of the **fight-or-flight response**. The major physiologic triggers of adrenaline release center upon **stresses**, such as physical threat, excitement, noise, bright lights, and high ambient temperature. All of these stimuli are processed in the **central nervous system**.



Adrenals

- The **adrenal glands** (also known as **suprarenal glands**) are **endocrine glands** that produce a wide variety of hormones.^[1] They are found on the top of the **kidneys** and consist of a number of different layers that directly influence the structure and function of the glands. Each gland has an outer **cortex** made of **steroid**-producing cells surrounding a core of **medulla**, formed by **chromaffin cells** in direct relationship with the **sympathetic nervous system**



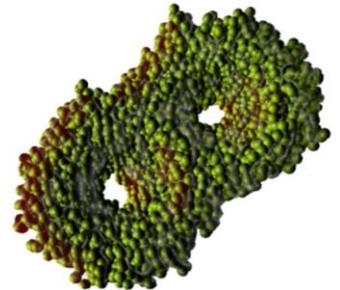
Adrenocorticotropocyte

- Also known as **corticotropin** ([INN](#), [BAN](#)) (brand names **Acortan**, **ACTH**, **Acthar**, **Acton**, **Cortigel**, **Trofocortina**),^{[1][2]} is a [polypeptide tropic hormone](#) produced and secreted by the [anterior pituitary gland](#).^[3] It is an important component of the [hypothalamic-pituitary-adrenal axis](#) and is often produced in response to biological stress (along with its precursor [corticotropin-releasing hormone](#) from the [hypothalamus](#)). Its principal effects are increased production and release of [cortisol](#). Primary adrenal insufficiency, also called [Addison's disease](#), occurs when adrenal gland production of [cortisol](#) is chronically deficient, resulting in chronically elevated ACTH levels; when a pituitary tumor is the cause of elevated ACTH (from the anterior pituitary) this is known as Cushing's disease and the constellation of signs and symptoms of the excess cortisol (hypercortisolism) is known as [Cushing's syndrome](#). A deficiency of ACTH is a cause of secondary [adrenal insufficiency](#). ACTH is also related to the [circadian rhythm](#) in many organisms.^[4]



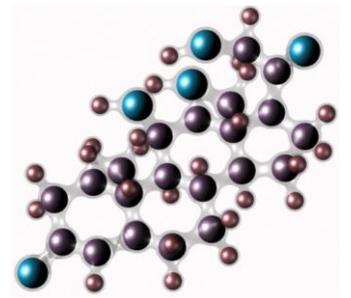
Alcohol Dehydrogenase

- In **humans** and many other **animals**, these enzymes serve to break down alcohols that otherwise are toxic, and they also participate in generation of useful aldehyde, ketone, or alcohol groups during biosynthesis of various **metabolites**. In **yeast**, plants, and many **bacteria**, some alcohol dehydrogenases **catalyze** the opposite reaction as part of **fermentation** to ensure a constant supply of NAD^+ . **Alcohol dehydrogenase** is our primary defense against **alcohol**, a toxic molecule that compromises the function of our nervous system. The high levels of **alcohol dehydrogenase** in our liver and stomach detoxify about one stiff drink each hour.



Aldosteronum

- A **steroid hormone** (**mineralocorticoid** family) produced by the outer section (**zona glomerulosa**) of the **adrenal cortex** in the **adrenal gland**.^{[1][2]} It plays a central role in the regulation of blood pressure mainly by acting on the **distal tubules** and **collecting ducts** of the **nephron**, increasing reabsorption of ions and water in the **kidney**, to cause the conservation of **sodium**, secretion of **potassium**, increase in water retention, and increase in **blood pressure** and blood volume.^[1] When dysregulated, aldosterone is pathogenic and contributes to the development and progression of cardiovascular and renal disease.¹



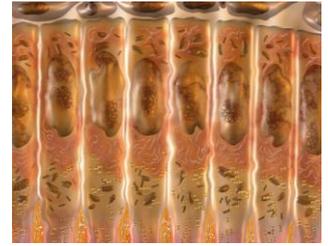
Alveolocyte

- A subsidiary cell of the pulmonary immune response



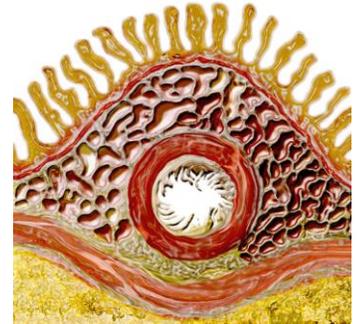
Ameloblasts

- are [cells](#) present only during tooth development that deposit [tooth enamel](#), which is the hard outermost layer of the tooth forming the surface of the crown.



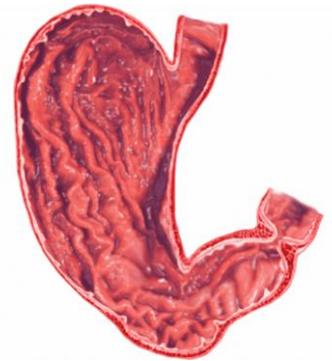
Ampulla of Vater Duct

- The ampulla of Vater is an important landmark, halfway along the second part of the **duodenum** that marks the anatomical transition from **foregut** to **midgut**, and hence the point where the **celiac trunk** stops supplying the gut and the **superior mesenteric artery** takes over. The pancreatic duct delivers substances such as **bicarbonate** and **digestive enzymes** to the duodenum.



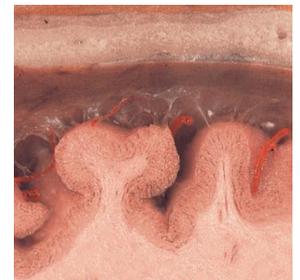
Anterior Wall of Stomach

- the part of the gastric wall that faces the peritoneal cavity. This shows an in depth look at the back wall of the stomach. The stomach is a [muscular](#), hollow, dilated part of the [digestion system](#) which functions as an important [organ](#) of the digestive tract in some [animals](#), including [vertebrates](#), [echinoderms](#), [insects](#) (mid-gut), and [molluscs](#). It is involved in the second phase of [digestion](#), following [mastication](#) (chewing). The stomach is located between the [esophagus](#) and the [small intestine](#). It secretes protein-digesting [enzymes](#) called [proteases](#) and strong [acids](#) to aid in food digestion, (sent to it via [esophageal peristalsis](#)) through [smooth muscular](#) contortions (called segmentation) before sending partially digested food ([chyme](#)) to the small intestines.



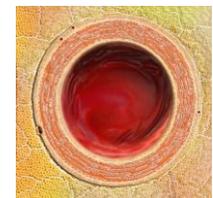
Arachnoid Membrane

- the delicate membrane interposed between the dura mater and the pia mater, and with them constituting the meninges



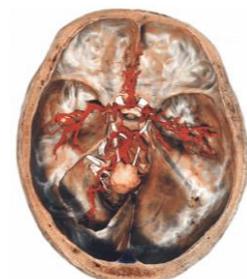
Arteria

- a blood vessel that carries blood from the heart to the body



Arterial Willis ring

- a **circulatory anastomosis** that supplies **blood** to the **brain** and surrounding structures. The arrangement of the brain's arteries into the circle of Willis creates redundancies or **collaterals** in the cerebral circulation. If one part of the circle becomes blocked or narrowed (**stenosed**) or one of the arteries supplying the circle is blocked or narrowed, blood flow from the other **blood vessels** can often preserve the cerebral perfusion well enough to avoid the symptoms of **ischemia**.^[4]



Arteries of Cerebrum from above

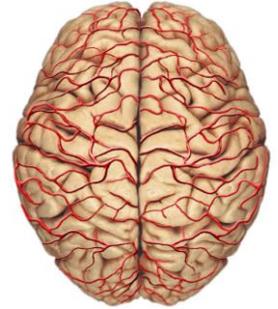
-**Cerebral arteries** describe three main pairs of arteries and their branches, which irrigate the [cerebrum](#) of the [brain](#). The three main arteries consist of the:

- [Anterior cerebral artery](#) (ACA)
- [Middle cerebral artery](#) (MCA)
- [Posterior cerebral artery](#) (PCA)

Both the ACA and MCA originate from the [cerebral portion of internal carotid artery](#), while PCA branches from the intersection of the [posterior communicating artery](#) and the anterior portion of the [basilar artery](#). The three pairs of arteries are linked via the [anterior communicating artery](#) and the [posterior communicating arteries](#).

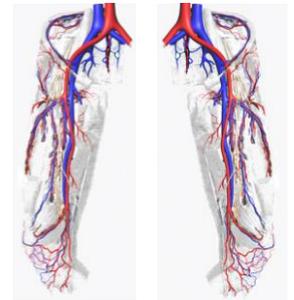
All three arteries send out arteries that perforate brain in the medial central portions prior to branching and bifurcating further.

The arteries are usually divided into different segments from 1-4 or 5 to denote how far the level of the branch with the lower numbers denoting vessels closer to the source artery. Even though the arteries branching off these vessels retain some aspect of constancy in terms of size and position, a great amount of variety in topography, position, source and prominence nevertheless exists. ^{[1][2]}



Arteries and Veins of the Femur, Left and Right

In the **human body**, the **femoral vein** is a blood vessel that accompanies the **femoral artery** in the **femoral sheath**. It begins at the **adductor canal** (also known as *Hunter's canal*) and is a continuation of the **popliteal vein**. It ends at the inferior margin of the **inguinal ligament**, where it becomes the **external iliac vein**. The **femoral artery** (**Latin**: *arteria femoralis*) is a large **artery** in the thigh and the main arterial supply to the lower limb.



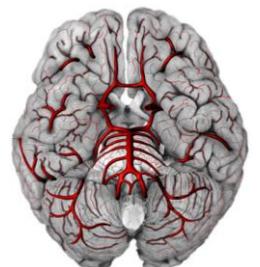
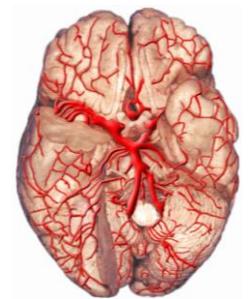
Arteries of the Brain from Below

Cerebral arteries describe three main pairs of arteries and their branches, which irrigate the [cerebrum](#) of the [brain](#). The three main arteries consist of the:

- [Anterior cerebral artery](#) (ACA)
- [Middle cerebral artery](#) (MCA)
- [Posterior cerebral artery](#) (PCA)

Both the ACA and MCA originate from the [cerebral portion of internal carotid artery](#), while PCA branches from the intersection of the [posterior communicating artery](#) and the anterior portion of the [basilar artery](#). The three pairs of arteries are linked via the [anterior communicating artery](#) and the [posterior communicating arteries](#). All three arteries send out arteries that perforate brain in the medial central portions prior to branching and bifurcating further.

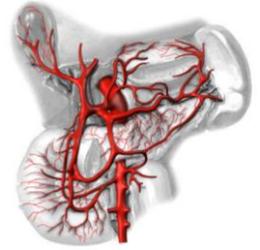
The arteries are usually divided into different segments from 1-4 or 5 to denote how far the level of the branch with the lower numbers denoting vessels closer to the source artery. Even though the arteries branching off these vessels retain some aspect of constancy in terms of size and position, a great amount of variety in topography, position, source and prominence nevertheless exists. ^{[1][2]}



Arteries of Duodenum and Pancreas

- arteries that supplies **blood** to the **duodenum** and **pancreas**

Arteries of Foot: The **dorsal digital arteries of foot** are small arteries which supply the **toes**.



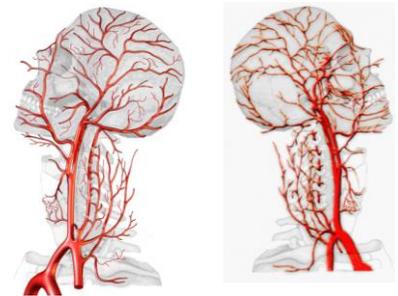
Arteries of the Foot, Left and Right

– are small arteries which supply the **toes**



Arteries of Head and Neck

-The cardiovascular system of the head and neck includes the vital arteries that provide oxygenated blood to the brain and organs of the head, including the mouth and eyes. It also includes the veins that return deoxygenated blood from these organs to the heart. Among these blood vessels are several unique and important structures that have evolved to help maintain the continuous flow of blood to the brain.



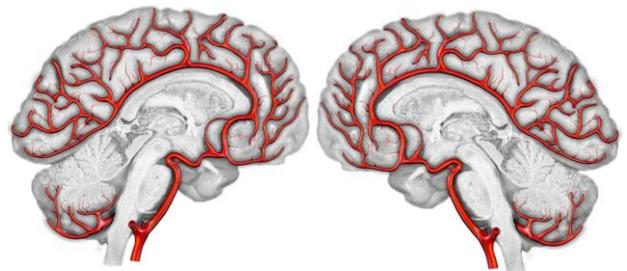
Arteries of the Shank

– the artery network between the thigh and the ankle.



Arteries of the Medial Surface of Cerebrum, Left and Right

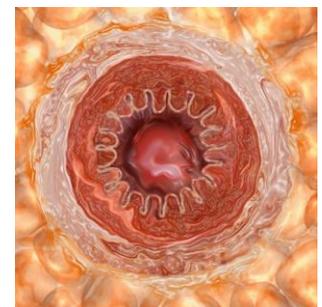
- The **middle cerebral artery (MCA)** is one of the three major paired **arteries** that supply **blood** to the **cerebrum**. The MCA arises from the **internal carotid** and continues into the **lateral sulcus** where it then branches and projects to many parts of the lateral cerebral cortex. It also supplies blood to the anterior **temporal lobes** and the **insular cortices**.



Arteriola

- An **arteriole** [/ar'tɪəri.oʊl/](#) is a small diameter [blood vessel](#) in the [microcirculation](#) that extends and branches out from an [artery](#) and leads to [capillaries](#).^[1]

Arterioles have [muscular](#) walls (usually only one to two layers of [smooth muscle](#)) and are the primary site of [vascular resistance](#). The greatest change in blood pressure and velocity of blood flow occurs at the transition of arterioles to capillaries. The decreased velocity of flow in the capillaries reduces the pressure and increases exchange of gas and nutrients. Arterioles receive [autonomic nervous system](#) innervation and respond to various circulating [hormones](#) in order to regulate their diameter.



Artery Left/ Right Hand

- There are two arteries entering the hand and these are the:

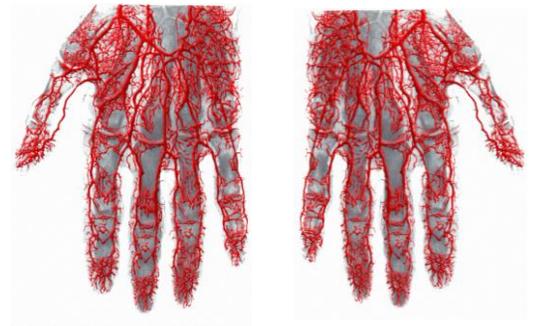
1. radial
2. ulnar.

Together, the branches of these arteries form two arterial arches:

1. superficial
2. deep.

The superficial arterial arch is formed mainly from the ulnar artery and is completed by the superficial branch of the radial. This completion is not always present or may be extremely small.

The deep arterial arch is formed mainly by the deep branch of the radial artery and is finished by the deep branch of the ulnar artery.



Articular Ligaments of the Left and Right Foot

- Ligaments are strong connective tissue composed of fibrous tissues. They connect bones to other bones, and are extremely important in stabilizing joints.

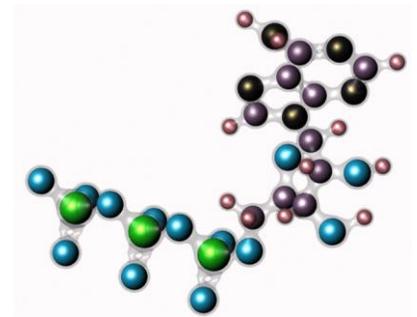
- The Lisfranc Ligaments
- The Intermetatarsal Ligaments
- The joint capsule of the Great Toe



ATP

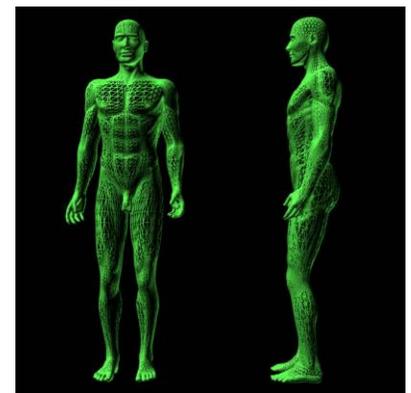
- a [nucleoside triphosphate](#) used in [cells](#) as a [coenzyme](#), often called the "[molecular](#) unit of [currency](#)" of intracellular [energy transfer](#).^[1]

ATP transports chemical energy within [cells](#) for [metabolism](#). It is one of the end products of [photophosphorylation](#), [cellular respiration](#), and [fermentation](#) and used by [enzymes](#) and [structural proteins](#) in many cellular processes, including [biosynthetic reactions](#), [motility](#), and [cell division](#)



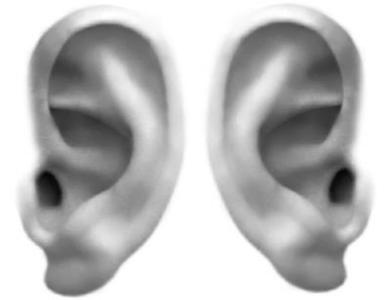
Aura Man

- the electromagnetic energy field emanating from the surface of a person or object.



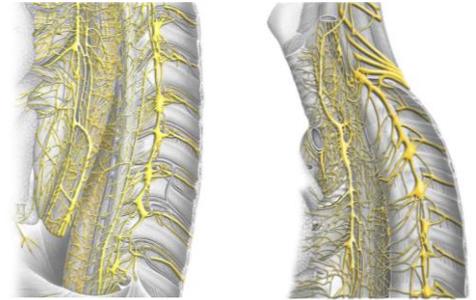
Auricle Left and Right

- the **ear** is a microsystem which reflects the entire body, represented on the **auricle**, the outer portion of the ear. Conditions affecting the physical, mental or emotional health of the patient are assumed to be treatable by stimulation of the surface of the ear exclusively. Similar mappings are used in many areas of the body, including the practices of **reflexology** and **iridology**.



Autonomic Nervous System

- the part of the nervous system responsible for control of the bodily functions not consciously directed, such as breathing, the heartbeat, and digestive processes.



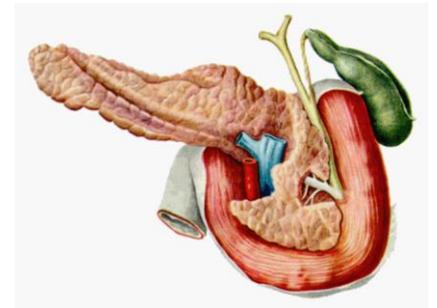
Axial Section Through The Left and Right Elbow, Bottom View

- This is a skeletal view of the left elbow. In [primates](#), including humans, the elbow joint is the [synovial hinge joint](#) between the [humerus](#) in the [upper arm](#) and the [radius](#) and [ulna](#) in the [forearm](#) which allows the hand to be moved towards and away from the body. The [superior radioulnar joint](#) shares joint capsule with the elbow joint but plays no functional role at the elbow. The elbow region includes prominent landmarks such as the [olecranon](#) (the bony prominence at the very tip of the elbow), the [elbow pit](#), and the [lateral](#) and [medial epicondyles](#).



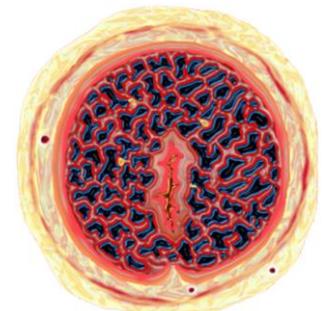
Back of the Pancreatic-Duodenal Area

- Because of their close functional and spatial relationships, as well as a shared blood supply, it is logical to consider the duodenum and the pancreas together. The [duodenum](#) (Latin, [duodeni = 12 each](#)) ([N268](#), [TG5-01](#)) is the connecting pipe between the stomach and the small intestine. The pancreas (Greek, [pankreas = sweetbread](#)) is an accessory digestive organ. It is retroperitoneal, except for its tail. It makes enzymes that aid in chemical digestion of food. (This is its "exocrine" role. The pancreas also has an "endocrine" role with insulin, glucagon, and all that business.)



Balanus Cut

- Cross section of the penis.



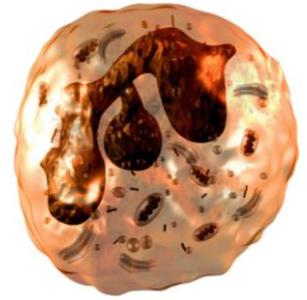
Bale Left/ and Right Forearm, Hand and Fingers

- Terminal part of the forearm with a tactile and prehensile function and a thumb opposable to the other fingers. The skeleton of the hand has 27 bones.



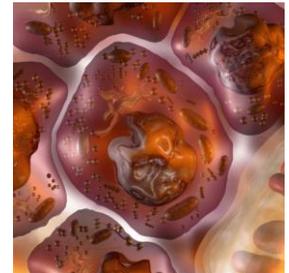
Basophilic Leukocyte

- a type of blood cell that lacks hemoglobin and is therefore colorless. Leukocytes are larger in size and fewer in number than **ERYTHROCYTES**; normally the blood has about 8000 of them per mm^3 . In contrast to erythrocytes, leukocytes can move about under their own power with **ameboid MOVEMENT**. Their chief functions are to act as scavengers and to help fight infections. Called also white cell or **corpuscle** and white blood cell or **corpuscle**. adj., *adj* leukocyt'ic.



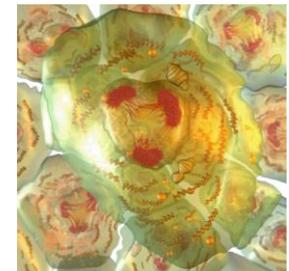
B- Cells of Pancreatic Islets

- **Beta cells (β cells)** are a type of **cell** in the **pancreas** located in the **islets of Langerhans**. They make up 65-80% of the cells in the islets. The primary function of a beta cell is to store and release **insulin**. Insulin is a **hormone** that brings about effects which reduce blood glucose concentration. Beta cells can respond quickly to spikes in blood glucose concentrations by secreting some of their stored insulin while simultaneously producing more.



Blast cell

- **Blast cells** are immature **cells** found in bone marrow. They are not fully developed, and therefore, do not yet carry out any particular function within the body. In normal humans, up to five percent of the **cells** found in bone marrow are **blast cells**.



Blood Cells

- A **blood cell**, also called a **hematocyte**, is a **cell** produced by **hematopoiesis** and is normally found in **blood**. In **mammals**, these fall into three general categories:

- **Red blood cells** – Erythrocytes
- **White blood cells** – Leukocytes
- **Platelets** – Thrombocytes.

Together, these three kinds of blood cells add up to a total 45% of the blood tissue by volume, with the remaining 55% of the volume composed of **plasma**, the liquid component of blood.^[1] This volume percentage **hematocrit** is measured by **centrifuge** or **flow cytometry** and is 45% of cells to total volume in males and 40% in females.^[2]

Haemoglobin (the main component of red blood cells) is an **iron**-containing protein that facilitates transportation of **oxygen** from the **lungs** to tissues and **carbon dioxide** from tissues to the lungs.



Blood Vessels and Nerves of the Neck

- Anatomically, the root of the neck is the area where the neck attaches to the thorax (the part of the trunk between the neck and the abdomen, including the chest). It's home to several important nerves and blood vessels that pass between the head, neck, thorax, and upper extremities.

Nerves

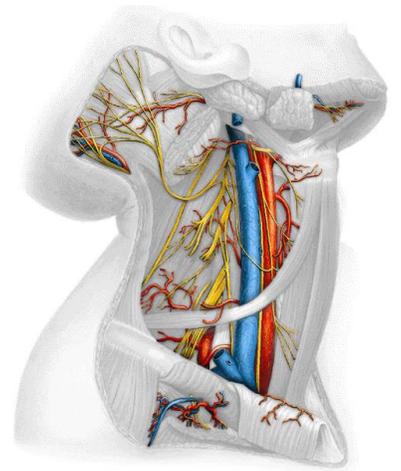
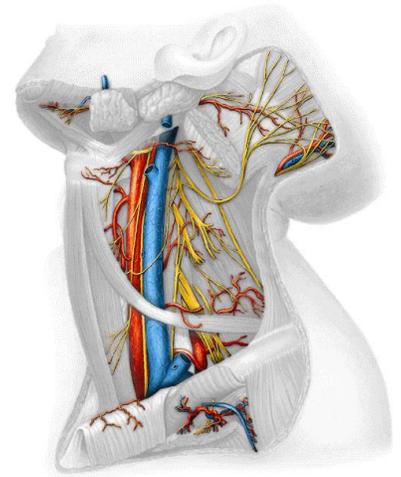
Quite a few nerves reside in the root of the neck:

- **Vagus nerves:** These cranial nerves travel in the carotid sheath with the internal jugular vein and common carotid arteries before moving into the thorax.
- **Phrenic nerves:** These nerves arise from the 3rd, 4th, and 5th cervical nerves and descend into the thorax to innervate the diaphragm.
- **Cervical portion of the sympathetic trunks:** These trunks are located to the front and sides of the cervical vertebrae. They contain the superior, middle, and inferior cervical sympathetic ganglia.

Blood vessels

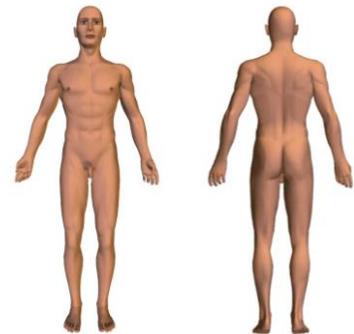
Here are the main arteries in the root of the neck:

- **Brachiocephalic trunk:** This artery branches off the arch of the aorta just behind the manubrium. It moves to the right and divides into the right common carotid and right subclavian arteries.
- **Right and left subclavian arteries:** The right subclavian branches off the brachiocephalic trunk, and the left subclavian starts from the arch of the aorta



Body of a man

- General Overview of entire physique



Body of Man

- The view of the main organs of the man.



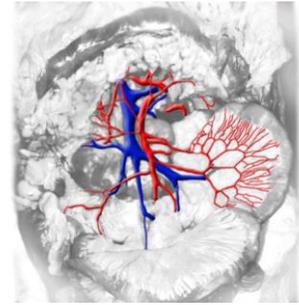
Bone of Upper Arm , Left and Right

- The humerus is the (upper) arm bone. It joins with the scapula above at the shoulder joint (or glenohumeral joint) and with the ulna and radius below at the elbow joint.



Branches of Superior Mesenteric Artery and Portal Vein

- is a **blood vessel** that drains **blood** from the **small intestine** (**jejunum** and **ileum**). At its termination behind the neck of the **pancreas**, the SMV combines with the **splenic vein** to form the **hepatic portal vein**. The SMV lies to the anatomical left of the similarly named artery, the **superior mesenteric artery**, which originates from the **abdominal aorta**.



Breast

- The **breast** is one of two **mammary glands** on the upper **ventral** region of a **female primate's torso** that can secrete **milk** and feed **infants**.^[2] Both **men** and **women** develop breasts from the same **embryological** tissues. At **puberty**, the female **sex hormone estrogen**, in conjunction with **growth hormone**, promote breast development. Men do not develop breasts because their bodies produce lower levels of estrogen and higher levels of **androgen**, including **testosterone**, which inhibit estrogen's action in developing breast tissue.



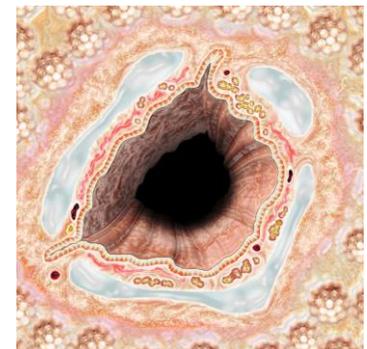
Bronchiolar Epithelium

- The respiratory mucosa is made up of the epithelium and supporting lamina propria). The epithelium is tall columnar pseudostratified with cilia and goblet cells. The supporting lamina propria underneath the epithelium contains elastin, that plays a role in the elastic recoil of the trachea during inspiration and expiration, together with blood vessels that warm the air.



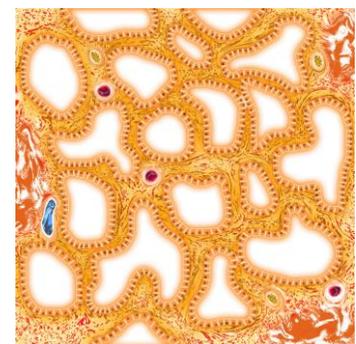
Bronchus Cut

- The **bronchioles** or **bronchioli** are the passageways by which air passes through the **nose** or **mouth** to the **alveoli** (air sacs) of the lungs, in which branches no longer contain **cartilage** or **glands** in their **submucosa**. They are branches of the **bronchi**, and are part of the **conducting zone** of the **respiratory system**. The bronchioles divide further into smaller **terminal** bronchioles which are still in the conducting zone and these then divide into the smaller **respiratory** bronchioles which mark the beginning of the respiratory region.



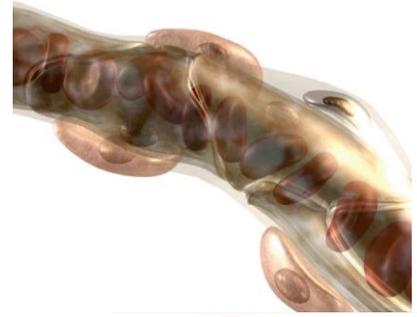
Bulbourethral glands

- The **bulbourethral glands** are part of the male reproductive system. They may also be referred to as the Cowper's **glands** since they were first documented by anatomist William Cowper in the late 1600s. The paired **bulbourethral glands** are roughly the size of a pea and are located in the deep perineal pouch.



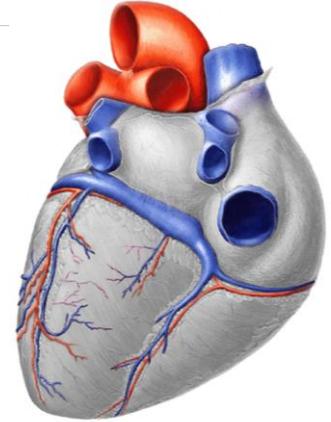
Capillar

- the smallest of a body's **blood vessels** (and **lymph vessels**) that make up the **microcirculation**. Their **endothelial linings** are only one cell layer thick. These microvessels, measuring around 5 to 10 **micrometres** (μm) in diameter, connect **arterioles** and **venules**, and they help to enable the exchange of water, **oxygen**, **carbon dioxide**, and many other **nutrients** and waste substances between the **blood** and the **tissues**^[3] surrounding them. **Lymph capillaries** connect with larger lymph vessels to drain **lymph** collected in the microcirculation.



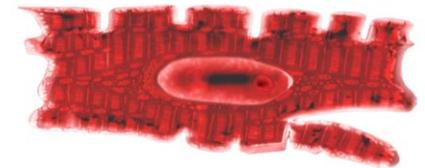
Cardiac Veins

- Function: The cardiac veins returns deoxygenated blood (containing metabolic waste products) from the myocardium to the right atrium. This blood then flows back to the lungs for reoxygenation and removal of carbon dioxide.



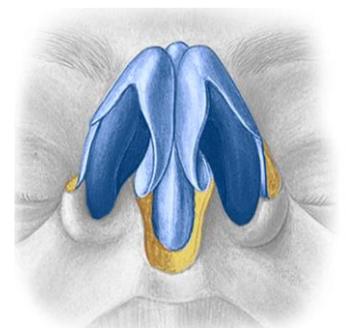
Cardiomyocyte

- the muscle cells (**myocytes**) that make up the **cardiac muscle**. Each myocardial cell contains **myofibrils**, which are specialized organelles consisting of long chains of sarcomeres, the fundamental contractile units of muscle cells. Cardiomyocytes show striations similar to those on skeletal muscle cells, but unlike multinucleated skeletal cells, they contain only one nucleus. Cardiomyocytes have a high **mitochondrial** density, which allows them to produce **adenosine triphosphate** (ATP) quickly, making them highly resistant to fatigue.



Cartilages of Nose

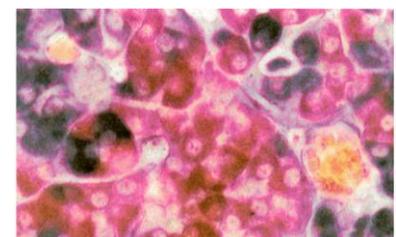
- The **nasal cartilages** are structures in the nose that provide form and support.



Cell Adenohypophysis #MC

- The adenohypophysis contains a number of different cell types that produce hormones.

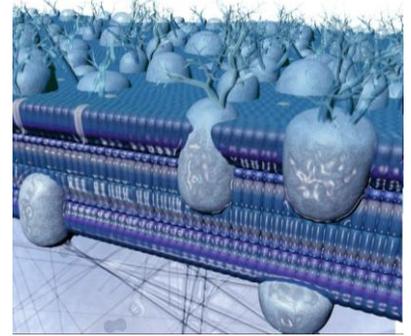
The upper part of the adenohypophysis, which wraps around the infundibulum, is known as the pars tuberalis. The most significant and largest part of the adenohypophysis is known as the pars distalis. The blood supply originates from the superior hypophysial arteries, and arrives at the anterior pituitary via the hypothalamo-hypophysial portal system.



Cell Membrane C

- There is a very large transmembrane [electrochemical gradient](#) of Ca^{2+} driving the entry of the [ion](#) into cells, yet it is very important for cells to maintain low [concentrations](#) of Ca^{2+} for proper [cell signalling](#); thus it is necessary for the cell to employ [ion pumps](#) to remove the Ca^{2+} .^[1]

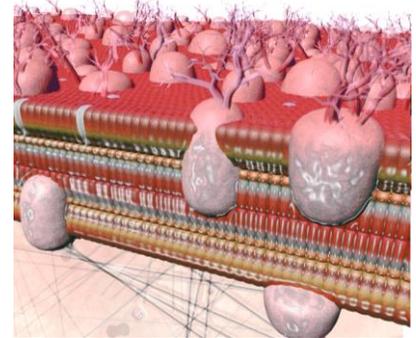
The [PMCA](#) and the [sodium calcium exchanger](#) (NCX) are together the main regulators of [intracellular](#) Ca^{2+} concentrations.^[2]



Cell Membrane K

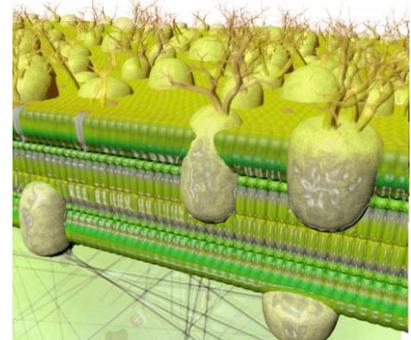
- is an **antiporter-like enzyme (EC 3.6.3.9)** (an electrogenic **transmembrane ATPase**) located in the **plasma membrane** of all **animal** cells. The **Na⁺/K⁺**

-ATPase enzyme pumps sodium out of cells, while pumping potassium into cells. It has antiporter-like activity but is not actually an antiporter since both molecules are moving against their concentration gradient.



Cell Membrane Z

- **Ion channels** are pore-forming **membrane proteins** whose functions include establishing a **resting membrane potential**, shaping **action potentials** and other electrical signals by **gating** the flow of **ions** across the cell membrane, controlling the flow of ions across **secretory** and **epithelial cells**, and regulating cell volume. Ion channels are present in the **membranes** of all cells. Ion channels are considered to be one of the two traditional classes of **ionophoric** proteins, with the other class known as **ion transporters** (including the **sodium-potassium pump**, **sodium-calcium exchanger**, and **sodium-glucose transport proteins**, amongst others).^[1]



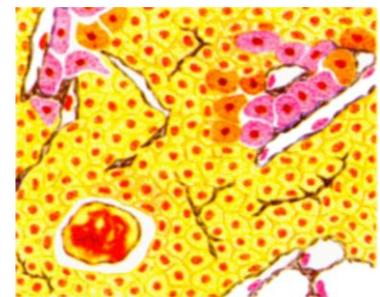
Cell of Conductive System

- The normal electrical conduction in the **heart** allows the impulse that is generated by the **sinoatrial node** (SA node) of the **heart** to be propagated to, and stimulate, the **cardiac muscle** (myocardium). The myocardium contracts after stimulation. It is the ordered, rhythmic stimulation of the myocardium during the **cardiac cycle** that allows efficient contraction of the heart, thereby allowing **blood** to be pumped throughout the body.



Cell Parathyroid #MC

- [Cells](#) in the [parathyroid glands](#) which produce [parathyroid hormone](#). The end result of increased secretion by the [chief cells](#) of a parathyroid gland is an increase in the [serum](#) level of [Calcium](#). Parathyroid chief cells constitute one of the few cell types of the body that regulate intracellular calcium levels as a consequence of extracellular (or serum) changes in calcium concentration. The [calcium-sensing receptor](#) (CaSR) is sensitive to an increase in serum calcium, and stimulates the uptake of calcium by the parathyroid chief cell. This mechanism is critically



important, as it describes a physiological feed-back loop by which parathyroid hormone secretion is down-regulated in response to a restoration of serum calcium.

Cells of Fascicular Region

- **Extraglomerular mesangial cells** (also known as **Lacis cells**, **Goormaghtigh cells**, or **Polkissen cells**) are light-staining [pericytes](#) in the [kidney](#) found outside the [glomerulus](#), near the [vascular pole](#). They resemble smooth muscle cells and play a role in [renal autoregulation](#) of blood flow to the kidney and regulation of systemic [blood pressure](#) through the [Renin-Angiotensin-Aldosterone system](#). Extraglomerular mesangial cells are part of the [juxtaglomerular apparatus](#), along with the [macula densa](#) cells of the [distal convoluted tubule](#) and the [juxtaglomerular cells](#) of the [afferent arteriole](#).

The specific function of extraglomerular mesangial cells is not well understood, although it has been associated with the secretion of [erythropoietin](#).^[1] They are distinguished from [intraglomerular mesangial cells](#), which are situated between the basement membrane and the epithelial cells within the [glomerulus](#).



Cells of the Glomerular Region

- The glomerulus is a tuft of small blood vessels called [capillaries](#) located within [Bowman's capsule](#) within the [kidney](#).^[1] Between the capillaries and Bowman's capsule lies [mesangium](#). Blood enters the capillaries of the glomerulus by a single arteriole called an [afferent arteriole](#) and leaves by an [efferent arteriole](#).^[2] The capillaries are lined by a layer of cells (an [endothelium](#)) that has a unique structure, allowing blood components to be filtered, and resulting ultimately in the formation of [urine](#).



Cells of Reticular Region

- A [reticular cell](#) is a type of [fibroblast](#) that synthesizes [type III collagen](#) and uses it to produce [reticular fibers](#). The cell surrounds the fibers with its [cytoplasm](#), isolating it from other tissue components and cells.^[1]

Reticular cells are found in many tissues including the [spleen](#), [lymph nodes](#) and lymph nodules. They also direct [B cells](#) and [T cells](#) to specific regions within the lymphatic tissue.



Central Endocrine Cell

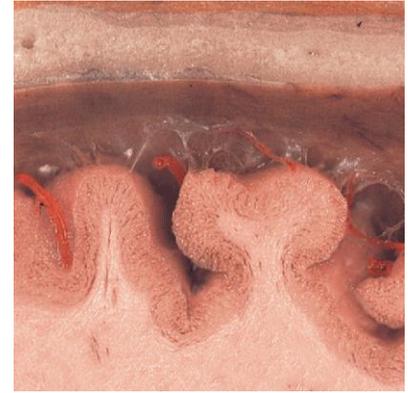
- are cells that receive neuronal input ([neurotransmitters](#) released by nerve cells or neurosecretory cells) and, as a consequence of this input, release message molecules ([hormones](#)) to the blood. In this way they bring about an integration between the [nervous system](#) and the [endocrine system](#), a process known as **neuroendocrine integration**. An example of a neuroendocrine cell is a cell of the [adrenal medulla](#) (innermost part of the [adrenal gland](#)), which releases [adrenaline](#) to the blood. The adrenal medullary cells are controlled by the [sympathetic division](#) of the [autonomic nervous system](#). These cells are modified [postganglionic neurons](#). Autonomic nerve fibers lead directly to them from the central nervous system.



The adrenal medullary hormones are kept in vesicles much in the same way neurotransmitters are kept in neuronal vesicles. Hormonal effects can last up to ten times longer than those of neurotransmitters^[citation needed]. Sympathetic [nerve](#) fiber impulses stimulate the release of adrenal medullary hormones. In this way the sympathetic division of the autonomic nervous system and the medullary secretions function together. The major center of neuroendocrine integration in the body is found in the [hypothalamus](#) and the [pituitary gland](#). Here hypothalamic neurosecretory cells release factors to the blood. Some of these factors ([releasing hormones](#)), released at the hypothalamic [median eminence](#), control the secretion of pituitary hormones, while others (the hormones [oxytocin](#) and [vasopressin](#)) are released directly into the blood.

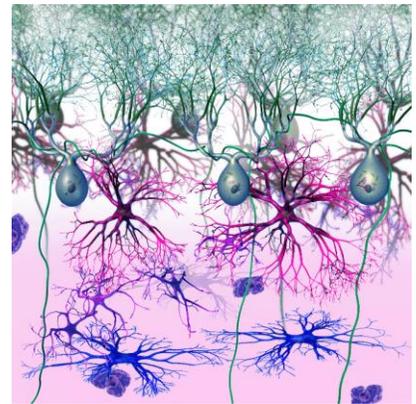
Cerebellum Membrane:

- The [tentorium cerebelli](#) or [cerebellar tentorium](#) (**Latin**: "tent or membrane of the [cerebellum](#)") is an extension of the [dura mater](#) that separates the cerebellum from the inferior portion of the [occipital lobes](#).



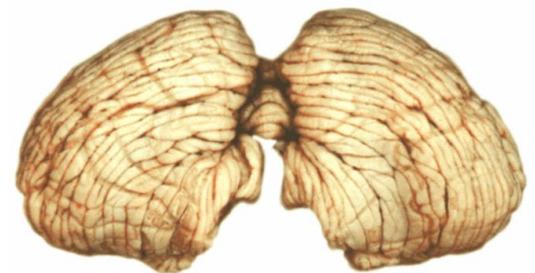
Cerebellum Tissue:

- At the level of [gross anatomy](#), the cerebellum consists of a tightly folded layer of [cortex](#), with [white matter](#) underneath and a fluid-filled [ventricle](#) at the base. At the microscopic level, there are four [deep nuclei](#) embedded in the white matter. Each part of the cortex consists of the same small set of neuronal elements, laid out in a highly stereotyped geometry. At an intermediate level, the cerebellum and its auxiliary structures can be separated into several hundred or thousand independently functioning modules called "microzones" or "microcompartments".



Cerebellum (Back and Button view)

- The **cerebellum** (Latin for "little brain") is a region of the **brain** that plays an important role in **motor control**. It may also be involved in some **cognitive functions** such as **attention** and **language**, and in regulating fear and pleasure responses,^[1] but its movement-related functions are the most solidly established. The cerebellum does not initiate movement, but it contributes to **coordination**, precision, and accurate timing. It receives input from **sensory systems** of the **spinal cord** and from other parts of the **brain**, and integrates these inputs to fine-tune motor activity.^[2] Cerebellar damage produces disorders in **fine movement**, **equilibrium**, **posture**, and **motor learning**.



Cerebral Pia Matter

- **Pia mater** (/ˈpaɪ.əˈmeɪtər/ or /ˈpiː.əˈmɑːtər/^[1]) often referred to as simply the pia, is the delicate innermost layer of the **meninges**, the membranes surrounding the **brain** and **spinal cord**. Pia mater is medieval Latin meaning "tender mother." The other two meningeal membranes are the **dura mater** and the **arachnoid mater**. Pia mater is a thin **fibrous tissue** that is impermeable to fluid. This allows the pia mater to enclose **cerebrospinal fluid**. By containing this fluid the pia mater works with the other meningeal layers to protect and cushion the brain. The pia mater allows blood vessels to pass through and nourish the brain. The perivascular space created between blood vessels and pia mater functions as a **lymphatic system** for the brain. When the pia mater becomes irritated and inflamed the result is **meningitis**.¹

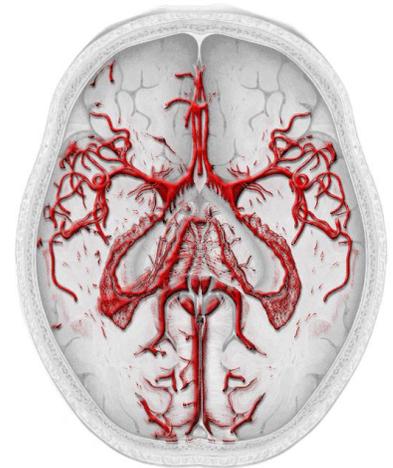


Cerebral Arteries and Veins

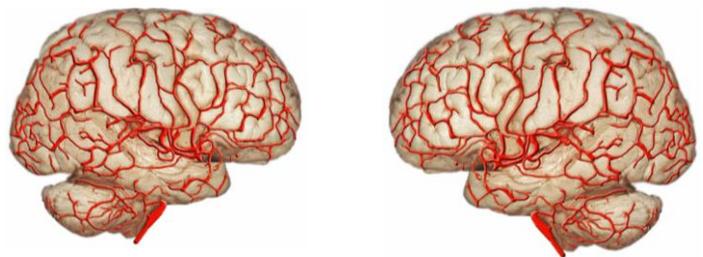
- **Cerebral arteries** describe three main pairs of arteries and their branches, which irrigate the **cerebrum** of the **brain**. The three main arteries consist of the:

- [Anterior cerebral artery](#) (ACA)
- [Middle cerebral artery](#) (MCA)
- [Posterior cerebral artery](#) (PCA)

Both the ACA and MCA originate from the [cerebral portion of internal carotid artery](#), while PCA branches from the intersection of the [posterior communicating artery](#) and the anterior portion of the [basilar artery](#). The three pairs of arteries are linked via the [anterior communicating artery](#) and the [posterior communicating arteries](#). All three arteries send out arteries that perforate brain in the medial central portions prior to branching and bifurcating further.



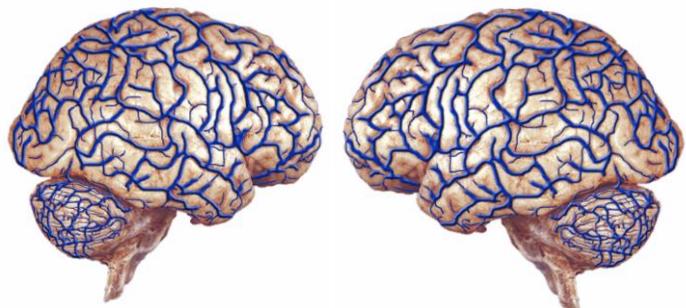
Cerebral Arteries: (same as above)



Cerebral Veins

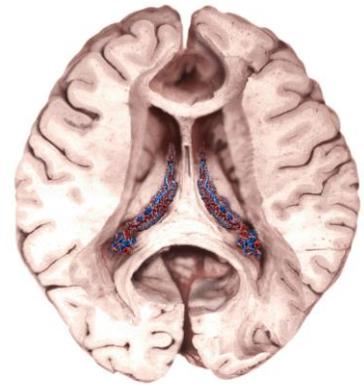
- The **cerebral veins** are divisible into *external* and *internal* ([internal cerebral veins](#)) groups according to the outer surfaces or the inner parts of the hemispheres they drain into.

The external veins are the [superior cerebral veins](#), [inferior cerebral veins](#), and [middle cerebral vein](#).



Cerebral Ventricles

- The ventricles of the brain are a communicating network of cavities filled with cerebrospinal fluid (CSF) and located within the brain parenchyma. The ventricular system is composed of 2 lateral ventricles, the third ventricle, the cerebral aqueduct, and the fourth ventricle (see the following images). The choroid plexuses located in the ventricles produce CSF, which fills the ventricles and subarachnoid space, following a cycle of constant production and reabsorption



Cerebrum, Left, Right and Top View

- the principal and most anterior part of the brain in vertebrates, located in the front area of the skull and consisting of two hemispheres, left and right, separated by a fissure. It is responsible for the integration of complex sensory and neural functions and the initiation and coordination of voluntary activity in the body.



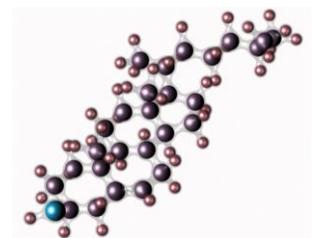
Cervical Sector of Vertebral Column

-those **vertebrae** immediately below the **skull**. In humans, cervical vertebrae are the smallest of the true vertebrae, and can be readily distinguished from those of the thoracic or lumbar regions by the presence of a **foramen** (hole) in each **transverse process**, through which passes the **vertebral artery**.



Cholesterin

- A white, fatty, crystalline substance, tasteless and odorless, found in animal and plant products and tissue, and especially in nerve tissue, in the bile, and in gallstones.



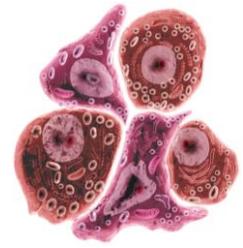
Chondrocyte

- the only cells found in healthy cartilage. They produce and maintain the cartilaginous matrix, which consists mainly of collagen and proteoglycans.



Chromophile Adenocyte

- A secretory cell of a gland



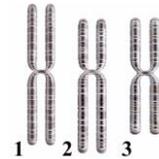
Chromophilic Cells of Adrenal Medulla

- The adrenal medulla (**Latin:** *medulla glandulae suprarenalis*) is part of the adrenal gland. It is located at the center of the gland, being surrounded by the adrenal cortex. It is the innermost part of the adrenal gland, consisting of cells that secrete epinephrine (adrenaline), norepinephrine (noradrenaline), and a small amount of dopamine in response to stimulation by sympathetic preganglionic neurons.



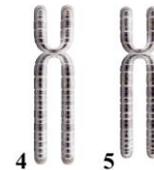
Chromosome Group A (1, 2 & 3)

- An in-depth look at Chromosomes 1, 2 & 3.



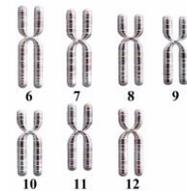
Chromosome Group B (4 & 5)

- An in-depth look at Chromosomes 4 & 5.



Chromosome Group C (6, 7, 8, 9, 10, 11 & 12)

- An in-depth look at Chromosomes 6 - 12.



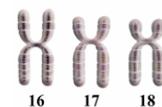
Chromosome Group D (13, 14 & 15)

- An in-depth look at Chromosomes 13, 14 & 15.



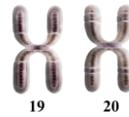
Chromosome Group E (16, 17 & 18)

- An in-depth look at Chromosomes 16, 17 & 18.



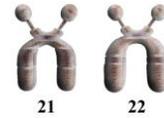
Chromosome Group F (19 & 20)

– An in-depth look at Chromosomes 19 & 20.



Chromosome Group G (21 & 22)

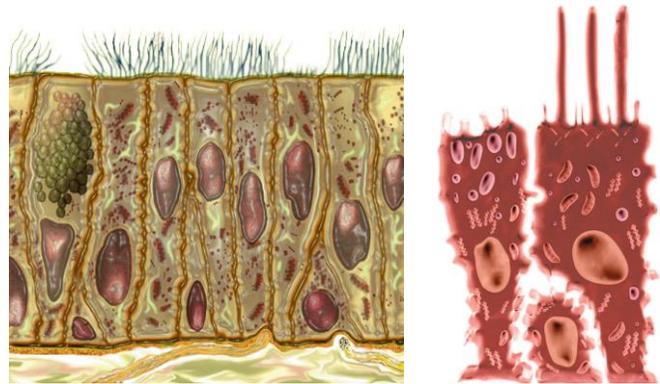
– An in-depth look at Chromosomes 21 & 22.



For an in depth look in to the individual Chromosomes see Appendix A

Ciliated Epithelial Cell

- **ciliated epithelium** A region of [epithelium](#) consisting of columnar or cuboidal cells bearing hairlike appendages (see [cilium](#)) that are capable of beating rapidly. Ciliated epithelium performs the function of moving particles or fluid over the epithelial surface in such structures as the trachea, bronchial tubes, and nasal cavities. It often occurs in the vicinity of mucus-secreting [goblet cells](#).



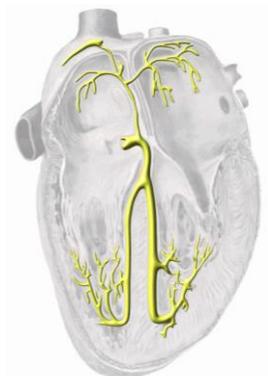
Collagen

- is the main structural protein of the various connective tissues in animals. As the main component of connective tissue, it is the most abundant protein in mammals, making up from 25% to 35% of the whole-body protein content.



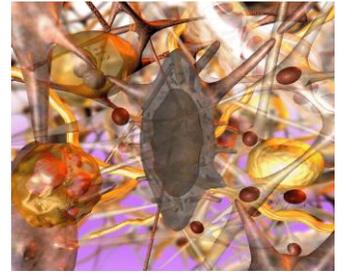
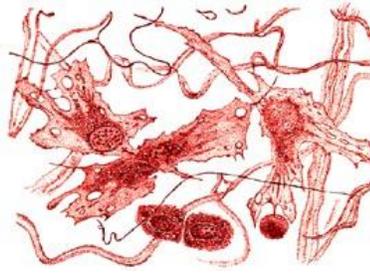
Conductive Heart System

- The cardiac conduction system is a group of specialized cardiac muscle cells in the walls of the heart that send signals to the heart muscle causing it to contract. The main components of the cardiac conduction system are the SA node, AV node, bundle of His, bundle branches, and Purkinje fibers. The SA node (anatomical pacemaker) starts the sequence by causing the atrial muscles to contract. From there, the signal travels to the AV node, through the bundle of His, down the bundle branches, and through the Purkinje fibers, causing the ventricles to contract. This signal creates an electrical current that can be seen on a graph called an Electrocardiogram (EKG or ECG). Doctors use an EKG to monitor the cardiac conduction system's electrical activity in the heart.



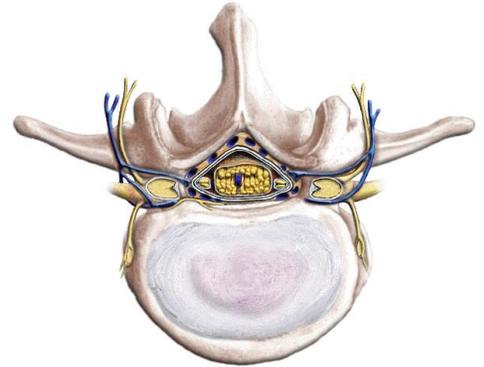
Connective Tissue

- tissue that connects, supports, binds, or separates other tissues or organs, typically having relatively few cells embedded in an amorphous matrix, often with collagen or other fibers, and including cartilaginous, fatty, and elastic tissues.



Content of the Spinal Cord

- The spinal cord functions primarily in the transmission of neural signals between the **brain** and the rest of the body but also contains **neural circuits** that can independently control numerous **reflexes** and **central pattern generators**. The spinal cord has three major functions: as a conduit for motor information, which travels down the spinal cord, as a conduit for sensory information in the reverse direction, and finally as a center for coordinating certain reflexes.



Coronary Section Larynx and Trachea

– A look at the area of the Larynx and Trachea. The larynx [/ˈlærɪŋks/](#) (plural *larynges*), commonly called the voice box, is an [organ](#) in the [neck](#) of [amphibians](#), [reptiles](#), and [mammals](#) involved in breathing, sound production, and protecting the [trachea](#) against food aspiration. It manipulates [pitch](#) and [volume](#). The larynx houses the [vocal folds](#) (vocal cords), which are essential for [phonation](#). The vocal folds are situated just below where the tract of the [pharynx](#) splits into the [trachea](#) and the [esophagus](#).

Trachea is an anatomical structure used for breathing: [Vertebrate trachea](#), or windpipe, in terrestrial vertebrates



Coronary Section Left and Right Feet

– A look at the feet. The foot (plural feet) is an [anatomical](#) structure found in many [vertebrates](#). It is the terminal portion of a limb which bears weight and allows [locomotion](#). In many animals with feet, the foot is a separate organ at the terminal part of the [leg](#) made up of one or more segments or bones, generally including claws or nails.



Coronal Incision of the Left Wrist

- the **wrist** is variously defined as 1) the **carpus** or carpal bones, the complex of eight bones forming the proximal skeletal segment of the hand;^{[1][2]} (2) the **wrist joint** or **radiocarpal joint**, the joint between the **radius** and the carpus;^[2] and (3) the anatomical region surrounding the carpus including the distal parts of the bones of the forearm and the proximal parts of the **metacarpus** or five metacarpal bones and the series of joints between these bones, thus referred to as *wrist joints*.^{[3][4]} This region also includes the **carpal tunnel**, the **anatomical snuff box**, the **flexor retinaculum**, and the **extensor retinaculum**.

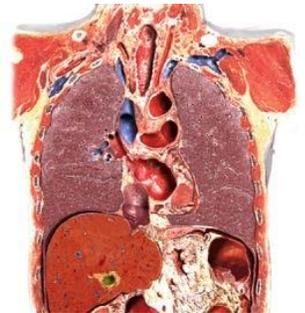
Coronal Incision of the Hand

- The human hand has 27 bones, not including the **sesamoid bone**, the number of which varies between people,^[2] 14 of which are the **phalanges (proximal, intermediate and distal)** of the **fingers**. The **metacarpals** are the bones that connect the fingers and the **wrist**. Each human hand has five metacarpals^[3] and 8 **carpal bones**. Fingers are some of the densest areas of nerve endings on the body, are the richest source of **tactile** feedback, and have the greatest positioning capability of the body; thus the **sense of touch** is intimately associated with hands. Like other paired organs (eyes, feet, legs), each hand is dominantly controlled by the opposing **brain hemisphere**, so that **handedness**, or the preferred hand choice for single-handed activities such as writing with a pencil, reflects individual brain functioning.



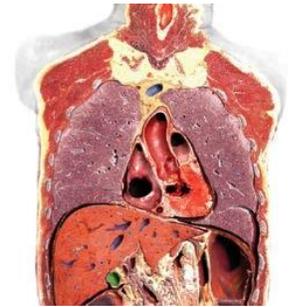
Coronary Section Chest at Hollow Vein, Front View

– A front view look at the chest in the area of the Hollow Vein. The thoracic cavity (or chest cavity) is the **chamber** of the human body (and other animal bodies) that is protected by the **thoracic wall (thoracic cage and associated skin, muscle, and fascia)**. The thoracic area includes the tendons as well as the **cardiovascular system** which could be damaged from injury to the back, spine or the neck.



Coronary Section Chest at the Level of the Ascending Aorta Front View

– A front view look at the chest in the area of the Aorta. The thoracic cavity (or chest cavity) is the **chamber** of the human body (and other animal bodies) that is protected by the **thoracic wall (thoracic cage and associated skin, muscle, and fascia)**. The thoracic area includes the tendons as well as the **cardiovascular system** which could be damaged from injury to the back, spine or the neck.



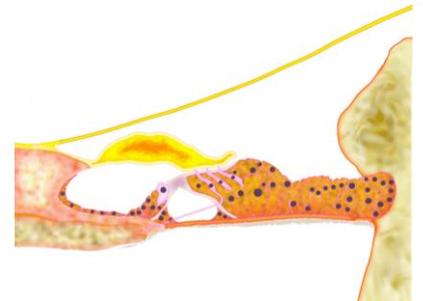
Corpus Callosum

- also known as the callosal **commissure**, is a wide, flat bundle of neural fibers beneath the **cortex** in the **eutherian brain** at the **longitudinal fissure**. It connects the left and right **cerebral hemispheres** and facilitates interhemispheric communication. It is the largest **white matter** structure in the brain, consisting of 200–250 million **contralateral axonal** projections



Corti's Organ

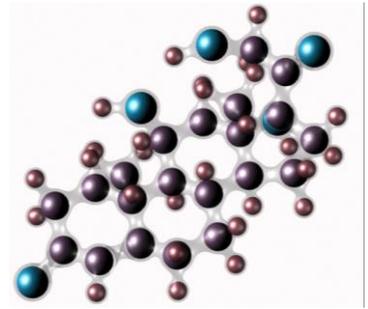
- is the receptor organ for hearing and is located in the mammalian **cochlea**. Described as "a masterpiece of cellular micro-architecture",^[1] this highly varied strip of **epithelial cells** allows for transduction of auditory signals into nerve impulses' **action potential**.^[2] Transduction occurs through vibrations of structures in the inner ear causing displacement of cochlear fluid and movement of **hair cells** at the organ of Corti to produce electrochemical signals.



Cortisol

- is a [steroid hormone](#), in the [glucocorticoid](#) class of hormones, and is produced in humans by the [zona fasciculata](#) of the [adrenal cortex](#) within the [adrenal gland](#).^[1] It is released in response to [stress](#) and low [blood glucose](#).

It functions to increase [blood sugar](#) through [gluconeogenesis](#), to suppress the [immune system](#), and to aid in the [metabolism](#) of [fat](#), [protein](#), and [carbohydrate](#).^[2] It also decreases bone formation.^[3]



Cranium; Front View

- the part of the skull enclosing the brain



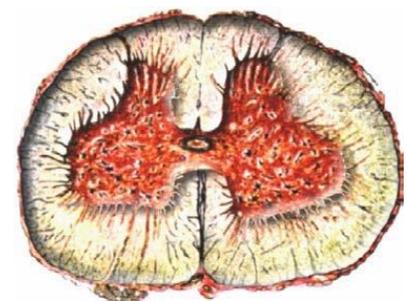
Cross Section of the Neck

– Cross section look at the neck joint. The neck is the part of the [body](#), on many terrestrial or secondarily aquatic [vertebrates](#), that distinguishes the [head](#) from the [torso](#) or trunk. The [adjective](#) (from Latin) signifying "of the neck" is cervical (though this more frequently used to describe the [cervix](#)).



Cross Section of the Spinal Cord

– Cross section look of the spinal cord. The [spinal cord](#) is a long, thin, tubular bundle of [nervous tissue](#) and [support cells](#) that extends from the [brain](#) (the [medulla oblongata](#) specifically). The brain and [spinal cord](#) together make up the [central nervous system](#) (CNS). The [spinal cord](#) begins at the [occipital bone](#) and extends down to the space between the first and second [lumbar vertebrae](#); it does not extend the entire length of the [vertebral column](#). It is around 45 cm (18 in) in men and around 43 cm (17 in) long in women. Also, the spinal cord has a varying width, ranging from 1/2 inch thick in the cervical and lumbar regions to 1/4 inch thick in the thoracic area. The enclosing bony [vertebral column](#) protects the relatively shorter spinal cord. The spinal cord functions primarily in the transmission of neural signals between the [brain](#) and the rest of the body but also contains [neural circuits](#) that can independently control numerous [reflexes](#) and [central pattern generators](#). The spinal cord has three major functions: as a conduit for motor information, which travels down the spinal cord, as a conduit for sensory information in the reverse direction, and finally as a center for coordinating certain reflexes.



Cross- Striated Muscle

- In contrast to smooth muscle, cardiac and skeletal muscle types possess an internal ultrastructure of highly organized contractile myofilaments. Actin and myosin myofilaments are stacked and overlapped in regular repeating arrays to form **sarcomeres**



Cross Section of Abdominal Cavity at the 1st Lumbar Vertebra

– Cross section look at the 1st lumbar joint. The abdominal cavity is the largest [body cavity](#) of the human body (and animal bodies) that holds the bulk of the [viscera](#). It is located below (or [inferior](#) to) the [thoracic cavity](#), and above the [pelvic cavity](#). Its [dome](#)-shaped roof is the [thoracic diaphragm](#) (a thin sheet of muscle under the lungs), and its oblique floor is the [pelvic inlet](#) (the superior opening of the [pelvis](#)). It is a part of the [abdominopelvic cavity](#). It is well connected with the [pleural \(thoracic\) cavity](#). Organs of the abdominal cavity include the [stomach](#), [liver](#), [gallbladder](#), [spleen](#), [pancreas](#), [small intestine](#), [kidneys](#), [large intestine](#), and [adrenal glands](#).



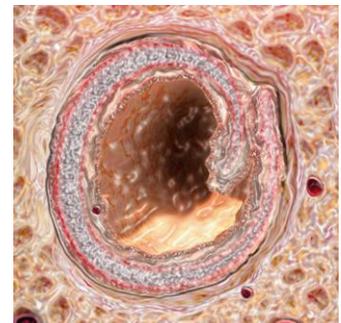
Cross Section of the Brain; at the Level of the Spine

– Cross section look at the area of the joint connecting the brain and spine. The brain is the center of the [nervous system](#) in all [vertebrate](#) and most [invertebrate](#) animals— only a few invertebrates such as [sponges](#), [jellyfish](#), adult [sea squirts](#) and [starfish](#) do not have one, even if diffuse [neural tissue](#) is present. It is located in the head, usually close to the primary sensory organs for such [senses](#) as [vision](#), [hearing](#), [balance](#), [taste](#), a is estimated to contain 15–33 billion neurons, each connected by synapses to several thousand other neurons. These neurons communicate with one another by means of long protoplasmic fibers called axons, which carry trains of signal pulses called action potentials to distant parts of the brain or body targeting specific recipient cells and smell. The brain is the most complex organ in a vertebrate's body.



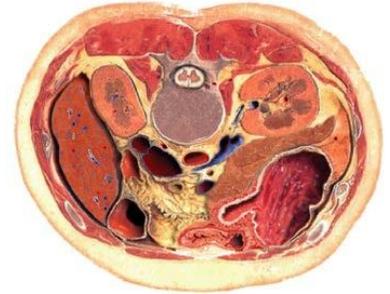
Cross- Section of Large Bronchus

- A **bronchus**, also known as a main or primary bronchus, is a passage of airway in the **respiratory tract** that conducts air into the **lungs**. There is a right bronchus and a left bronchus and these bronchi branch into smaller secondary and tertiary bronchi which branch into smaller tubes, known as **bronchioles**



Cross Section of Abdomen at the Level of The 2nd Lumbar Vertebra

– A cross section look at the joint of the 2nd Lumbar Vertebra. In human anatomy, the lumbar vertebrae are the five vertebrae between the rib cage and the pelvis. They are the largest segments of the vertebral column and are characterized by the absence of the foramen transversarium within the transverse process, and by the absence of facets on the sides of the body. They are designated L1 to L5, starting at the top. The lumbar vertebrae help support the weight of the body, and permit movement.



Cross- Section through Basic Helix of Cochlea

- The **helix** is the prominent rim of the **auricle**. Where the helix turns downwards **posteriorly**, a small tubercle is sometimes seen, namely the *auricular tubercle of Darwin*.



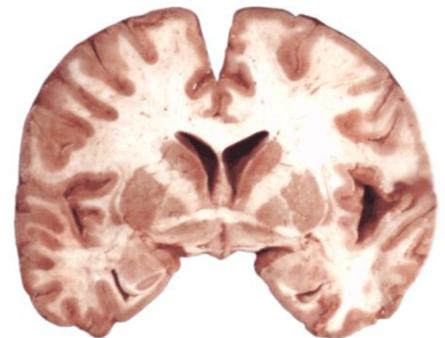
Cross-Section through Hairy Part of Head Skin and Meninx's

- View of hair, scalp, skull, and meninges. The meninges is the three membranes (the dura mater, arachnoid, and pia mater) that line the skull and vertebral canal and enclose the brain and spinal cord. Crown section of encephalon at front commissure level.



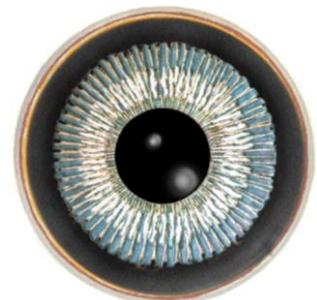
Crown Section of Encephalon at Front

- The area of **central nervous system** that includes all higher nervous centers, enclosed within the skull and continuous with the **spinal cord**; the **brain**.



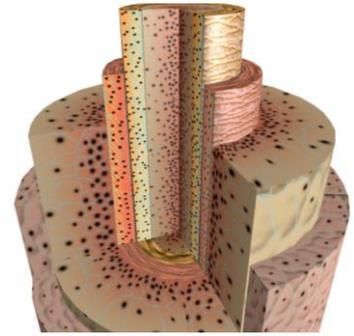
Crystalline Lens of the Eye

- The crystalline lens is suspended within the eye behind the coloured **iris**. It acts to fine-tune the focusing of the eye to form a picture of the world on the retina. In contrast to the cornea, the lens is normally flexible and by changing shape allows for clear vision at a range of distances.



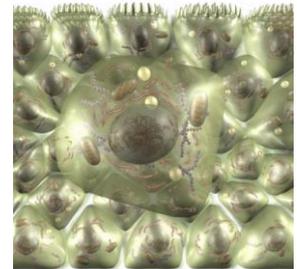
Cuticle of Hair

- The **hair** cuticle is the outermost part of the **hair shaft**.^[1] It is a hard shingle-like layer of overlapping cells, some five to twelve deep. It is formed from dead cells which form scales that gives the hair shaft strength and do the best job of providing protection for it.^[2] The hair cuticle is the first line of defense against all forms of damage; it acts as a protective barrier for the softer inner structure including the **medulla** and **cortex**. The cuticle is responsible for much of the mechanical strength of the hair fiber.



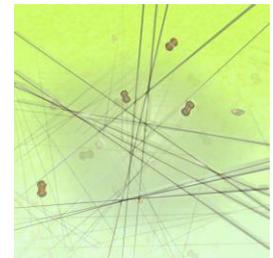
Cylindrical Multilayer Epithelium

- **Columnar epithelia** are **epithelial cells** whose height are at least four times their width. Columnar epithelia are divided into simple (or unilayered), and stratified (or multi-layered). These cells are tall and are arranged like pillars. They are found in the inner lining of the intestine. They secrete digestive enzymes and absorb digested food. Form follows function in biology, and columnar morphology hints at the functions of the cell.



Cytoplasm

- **Cytoplasm** is a thick solution that fills each cell and is enclosed by the cell membrane. It is mainly composed of water, salts, and proteins. In eukaryotic cells, the **cytoplasm** includes all of the material inside the cell and outside of the nucleus.



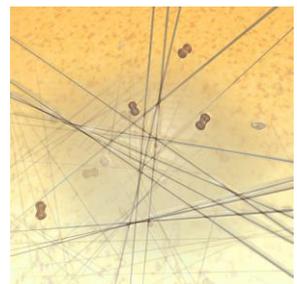
Cytoplasm C

- **Calcium** ions are important for cellular signalling, as once they enter the cytoplasm they exert allosteric regulatory effects on many enzymes and proteins. Calcium can act in **signal transduction** resulting from activation of **ion channels** or as a second messenger caused by indirect signal transduction pathways such as **G protein-coupled receptors**. Movement of calcium ions from the extracellular compartment to the intracellular compartment alters membrane potential. This is seen in the heart, during the plateau phase of ventricular contraction. In this example, calcium acts to maintain depolarization of the heart. Calcium signaling through ion channels is also important in neuronal **synaptic transmission**.



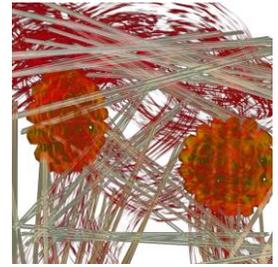
Cytoplasm K

- In contrast to extracellular fluid, cytosol has a high concentration of **potassium** ions and a low concentration of **sodium** ions.^[21] This difference in ion concentrations is critical for **osmoregulation**, since if the ion levels were the same inside a cell as outside, water would enter constantly by **osmosis** - since the levels of **macromolecules** inside cells are higher than their levels outside. Instead, sodium ions are expelled and potassium ions taken up by the **Na⁺/K⁺-ATPase**, potassium ions then flow down their concentration gradient through potassium-selection ion channels, this loss of positive charge creates a negative **membrane potential**. To balance this **potential difference**, negative chloride ions also exit the cell, through selective chloride channels. The loss of sodium and chloride ions compensates for the osmotic effect of the higher concentration of organic molecules inside the cell.



Cytoskeleton

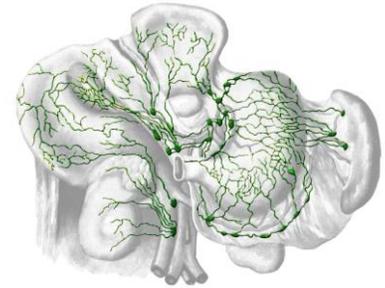
- The **cytoskeleton** is a series of intercellular proteins that help a cell with shape, support, and movement. **Cytoskeleton** has three main structural components: microfilaments, intermediate filaments, and microtubules.



D- Pancreatic Islets: (See: Islets of Langerhans)

Deep Lymphatic Vessels of the Right Leg

- The **deep lymphatic vessels** are few in number, and accompany the deep bloodvessels. In the leg, they consist of three sets, the anterior tibial, posterior tibial, and peroneal, which accompany the corresponding bloodvessels, two or three with each artery; they enter the popliteal lymph glands.



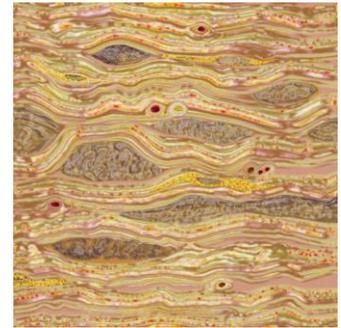
Dense Non-Formed Connective Tissue

- **Dense irregular connective tissue** has fibers that are not arranged in parallel bundles as in **dense regular connective tissue**. This tissue comprises a large portion of the [dermis](#).^[1] This type of tissue is also in the protective white layer of the eyeball and in the deeper skin layers.

It also makes up [submucosa](#) of the digestive tract, [fibrous capsules](#), and some types of [fascia](#).^[2] Other examples include [periosteum](#) and [perichondrium](#) and tunica albugenia.

Dense irregular tissues have fibroblasts and matrix fibers (mostly collagen) that are oriented differently, i.e., not oriented in a parallel fashion. This tissue is present in the skin.

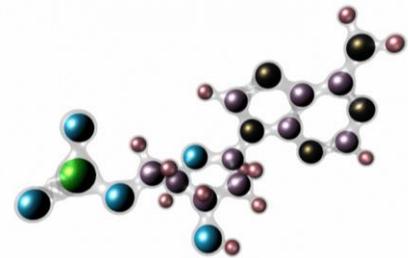
It consists primarily of [collagenous fibers](#),^[3] but fibroblasts and ground substance are also present.



Deoxycytidine

- **Deoxycytidine** is a [deoxyribonucleoside](#), a component of [deoxyribonucleic acid](#). It is similar to the [ribonucleoside cytidine](#), but with one [hydroxyl](#) group removed from the 2' position.

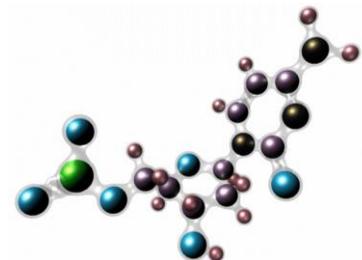
Deoxycytidine can be [phosphorylated](#) by [deoxycytidine kinase](#) (DCK).



Deoxyadenosine

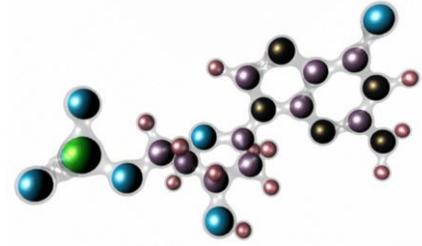
- **Deoxyadenosine** is a **deoxyribonucleoside**. It is a **derivative** of the **nucleoside adenosine**, differing from the latter by the replacement of a **hydroxyl** group (-OH) by hydrogen (-H) at the 2' position of its **ribose** sugar moiety. Deoxyadenosine is the DNA nucleoside A, which pairs with **deoxythymidine** (T) in double-stranded DNA. In absence of **adenosine deaminase** (ADA) it accumulates in T lymphocytes and kills these cells

resulting in a genetic disorder known as adenosine deaminase severe combined immunodeficiency disease (ADA-SCID).



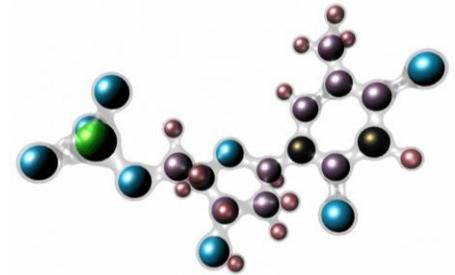
Deoxyguanosine

- **Deoxyguanosine** is composed of the **purine nucleobase guanine** linked by its N9 nitrogen to the C1 carbon of deoxyribose. It is similar to **guanosine**, but with one **hydroxyl group** removed from the 2' position of the **ribose sugar** (making it **deoxyribose**). If a phosphate group is attached at the 5' position, it becomes **deoxyguanosine monophosphate**.



Deoxthymidine

- **Thymidine (deoxythymidine; other names deoxyribosylthymine, thymine deoxyriboside)** is a **pyrimidine deoxynucleoside**. Deoxythymidine is the **DNA nucleoside T**, which pairs with **deoxyadenosine (A)** in double-stranded DNA. In cell biology it is used to **synchronize** the cells in S phase. Before the boom in thymidine use caused by the need for thymidine for the production of the **antiretroviral drug azidothymidine (AZT)**, much of the world's thymidine production came from **herring sperm**.^[1] Thymidine occurs almost exclusively in DNA but also occurs in the **T-loop** of **tRNA**.

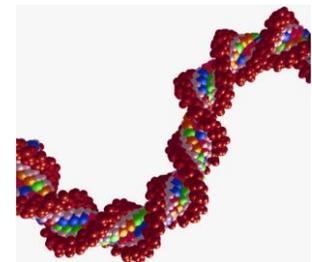


DNA

- a **molecule** that carries most of the **genetic** instructions used in the development and functioning of all known living **organisms** and many **viruses**.

DNA Fragment

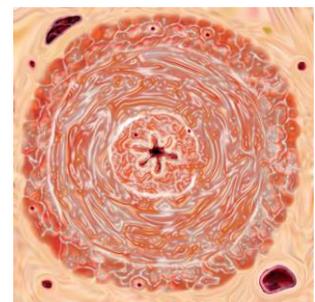
- DNA fragmentation is the separation or breaking of **DNA** strands into pieces. It can be done intentionally by laboratory personnel or by cells, or can occur spontaneously. Spontaneous or accidental DNA fragmentation is fragmentation that gradually accumulates in a cell. It can be measured by e.g. the **Comet assay**. The degree of DNA fragmentation can predict outcomes for **in vitro fertilization**^[1] (IVF) and its expansion **intracytoplasmic sperm injection**^[2] (ICSI). The **sperm chromatin dispersion** test (SCD) and **TUNEL assay** are both effective in detecting sperm DNA damage.^[3] Using **bright-field microscopy**, the SCD test appears to be more sensitive than the TUNEL assay.^[3]



For an in depth look in to the DNA see Appendix B

Ductus Deferens

- is part of the **male reproductive system** of many **vertebrates**; these vasa transport **sperm** from the **epididymis** to the **ejaculatory ducts** in anticipation of **ejaculation**.



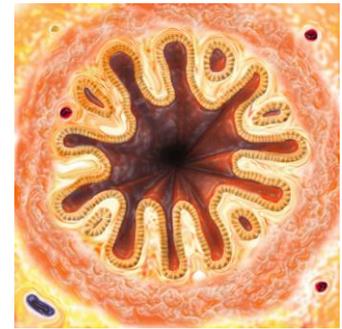
Eighth Thoracic Vertebra

- The T8 vertebra is toward the lower (caudal) end of the twelve (12) thoracic vertebrae within the central, torso section of the spine. Like the other similar T2-9 thoracic vertebrae, the T8 consists of a larger, heart-shaped centrum (ventral body) and an increasingly large vertebral arch.



Ejaculatory Duct

- Each **ejaculatory duct** is about two centimeters in length and is created when the seminal vesicle's **duct** merges with the vas deferens. At this point, these **ducts** travel through the prostate and, at its far end, drain into the colliculus seminalis's urethra.



Elbow Joint, Left and Right

-In [primates](#), including humans, the elbow joint is the [synovial hinge joint](#) between the [humerus](#) in the [upper arm](#) and the [radius](#) and [ulna](#) in the [forearm](#) which allows the hand to be moved towards and away from the body. The [superior radioulnar joint](#) shares joint capsule with the elbow joint but plays no functional role at the elbow. The elbow region includes prominent landmarks such as the [olecranon](#) (the bony prominence at the very tip of the elbow), the [elbow pit](#), and the [lateral](#) and [medial epicondyles](#).



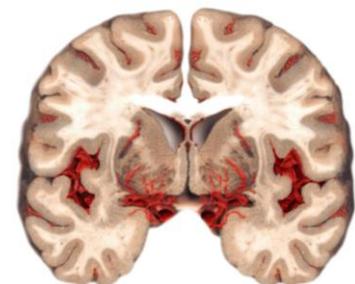
Eleventh Thoracic Vertebra

- The T11 vertebra is the second lowest of the twelve (12) thoracic vertebrae of the human torso making up the central part of the spine. The thoracic vertebrae become larger toward the caudal end and the circular vertebral foramina smaller, which holds true for the T11 vertebra.



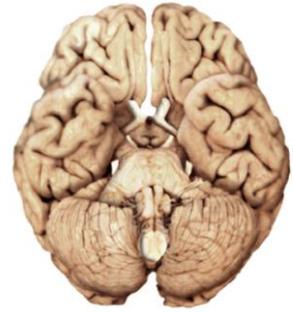
Encephalon Arteries; Crown Section

- that part of the central nervous system that includes all the higher nervous centers; enclosed within the skull; continuous with the spinal cord.



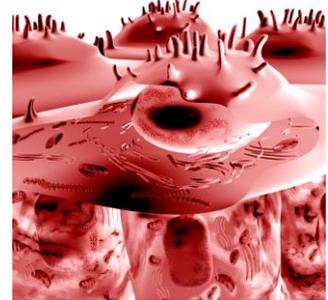
Encephalon, Bottom View, Cranial Nerves

- that part of the central nervous system that includes all the higher nervous centers; enclosed within the skull; continuous with the spinal cord.



Endothelial Cells

- The **endothelium** is the thin layer of simple squamous **cells** that lines the interior surface of blood vessels and lymphatic vessels, forming an interface between circulating blood or lymph in the lumen and the rest of the vessel wall. The **cells** that form the **endothelium** are called **endothelial cells**.



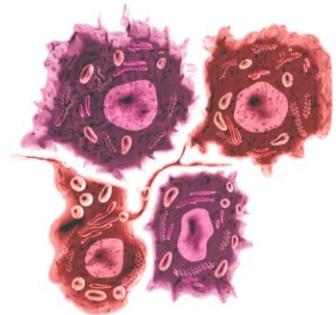
Eosinophil

– A look at the cell. Eosinophil **granulocytes**, usually called eosinophils or eosinophiles (or, less commonly, acidophils), are **white blood cells** and one of the **immune system** components responsible for combating multicellular **parasites** and certain **infections** in **vertebrates**. Along with **mast cells**, they also control mechanisms associated with **allergy** and **asthma**. They are **granulocytes** that develop during **hematopoiesis** in the **bone marrow** before migrating into blood.



Epidermis Cells

– *The epidermis is composed of the outermost layers of **cells** in the **skin**, "epi" in **Greek** meaning "over" or "upon", which together with the **dermis** forms the **cutis**. The epidermis is a stratified **squamous epithelium**, composed of **proliferating** basal and **differentiated** suprabasal **keratinocytes** which acts as the body's major barrier against an inhospitable **environment**, by preventing **pathogens** from entering, making the **skin** a natural barrier to **infection**. It also regulates the amount of **water** released from the **body** into the **atmosphere** through **transepidermal water loss** (TEWL). In **humans**, it is thinnest on the **eyelids** at 0.05 mm (0.0020 in) and thickest on the **palms** and **soles** at 1.5 mm (0.059 in). It is **ectodermal** in origin.*



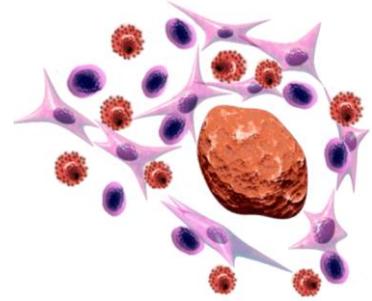
Epinephros

- a flattened, roughly triangular body positioned in relation to the superior end of each kidney but attached primarily to the diaphragmatic crura; it is one of the endocrine (ductless) glands furnishing internal secretions (epinephrine and norepinephrine from the medulla and steroid hormones from the cortex).



Epiphysis

- The **epiphysis** (/ɛˈpɪfɪsɪs/) is the rounded end of a long bone, at its joint with adjacent bone(s). Between the **epiphysis** and diaphysis (the long midsection of the long bone) lies the metaphysis, including the epiphyseal plate (growth plate).



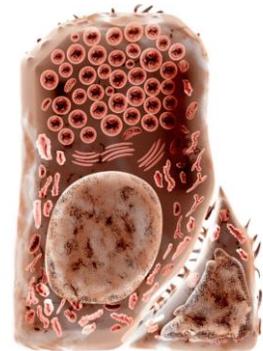
Epithelial Cell of Intestine

- The **intestinal epithelium** is the **epithelium** that covers the **small** and **large intestine**. It is **simple columnar** and **nonciliated**. They primarily take part in the **digestive system**. However, they also express **TLR 4** receptors,^[1] and are thus a part of the **immune system**, both as a barrier and as a first-line pathogen recognition system. The mammalian intestine is covered by a single layer of epithelial cells that is renewed every 4–5 days.



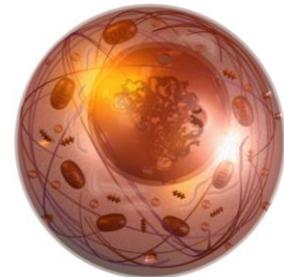
Epithelium of Prostate Gland

- The glands are lined by two cell layers: an outer low cuboidal layer and an inner layer of tall columnar mucin-secreting epithelium. These cells project inward as papillary projections. The fibromuscular stroma between the glands accounts for about half of the volume of the prostate.



Erythroblast

- an immature erythrocyte containing a nucleus.



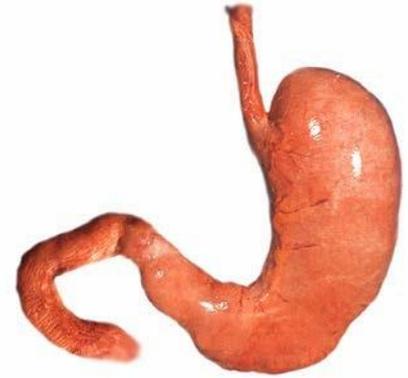
Erythrocytes

- A cell that contains hemoglobin and can carry oxygen to the body. Also called a red blood cell (RBC). The reddish color is due to the hemoglobin.



Esophagus, Stomach, 12 – Duodenum, Front View

– A look at the Esophagus, Stomach, and Duodenum from the front. The duodenum is the first section of the small intestine in most higher vertebrates, including mammals, reptiles, and birds. In fish, the divisions of the small intestine are not as clear, and the terms anterior intestine or proximal intestine may be used instead of duodenum. In mammals the duodenum may be the principal site for iron absorption. The duodenum precedes the jejunum and ileum and is the shortest part of the small intestine, where most chemical digestion takes place. The name duodenum is from the Latin duodenum digitorum, or "twelve fingers' breadth".



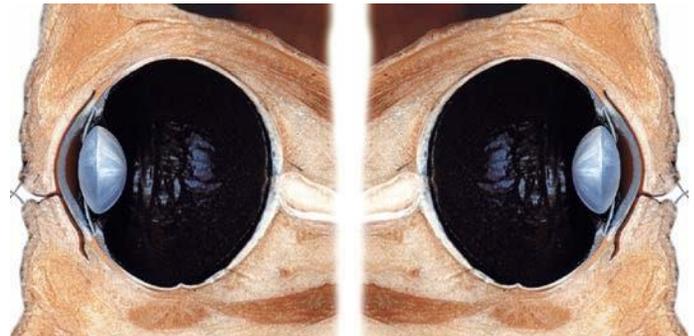
Esophagus Front

– A view of the Esophagus from the front. The esophagus (oesophagus, commonly known as the gullet) is an organ in vertebrates which consists of a muscular tube through which food passes from the pharynx to the stomach. During swallowing, food passes from the mouth through the pharynx into the esophagus and travels via peristalsis to the stomach. The word esophagus is derived from the Latin oesophagus, which derives from the Greek word oisophagos, lit. "entrance for eating." In humans the esophagus is continuous with the laryngeal part of the pharynx at the level of the C6 vertebra. The esophagus passes through posterior mediastinum in the thorax and enters abdomen through a hole in the diaphragm at the level of the tenth thoracic vertebrae (T10).



Eyeball; Left and Right

– A look at the left eyeball. Eyes are organs that detect light and convert it into electro-chemical impulses in neurons. The simplest photoreceptor cells in conscious vision connect light to movement. In higher organisms the eye is a complex optical system which collects light from the surrounding environment, regulates its intensity through a diaphragm, focuses it through an adjustable assembly of lenses to form an image, converts this image into a set of electrical signals, and transmits these signals to the brain through complex neural pathways that connect the eye via the optic nerve to the visual cortex and other areas of the brain. Eyes with resolving power have come in ten fundamentally different forms, and 96% of animal species possess a complex optical system. Image-resolving eyes are present in molluscs, chordates and arthropods.



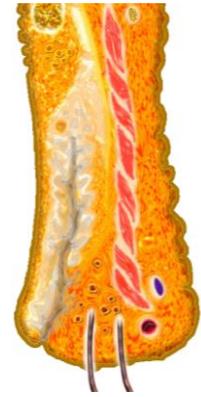
Eyeground; from the Left and Right

- The fundus of the left eye as visualized using the ophthalmoscope.



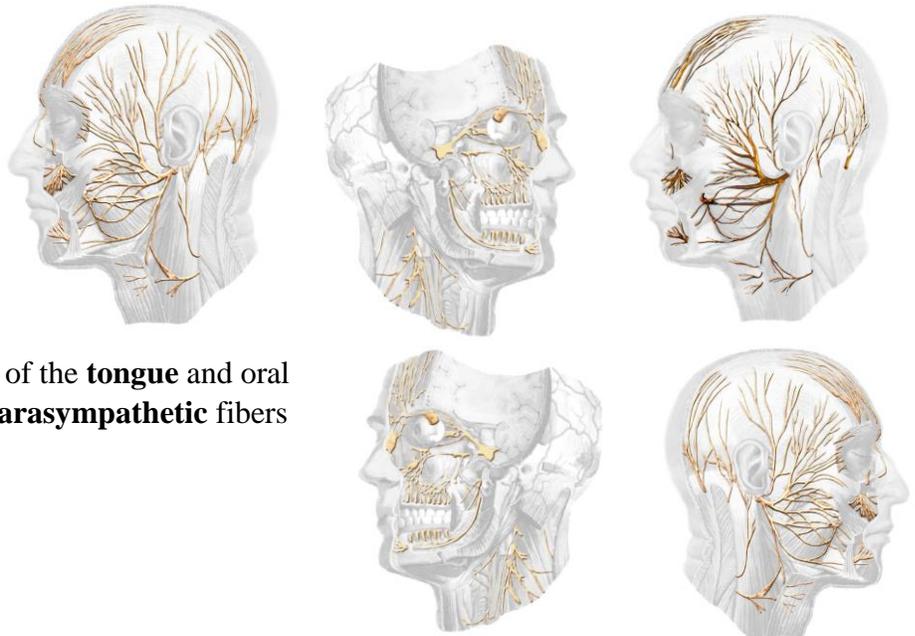
Eyelid

- An **eyelid** is a thin fold of skin that covers and protects the eye. With the exception of the prepuce and the labia minora, it has the thinnest skin of the whole body ^[citation needed]. The levator palpebrae superioris muscle retracts the **eyelid** to "open" the eye. This can be either voluntarily or involuntarily.



Facial Nerve

- The **facial nerve** is the **seventh cranial nerve**, or simply cranial nerve **VII**. It emerges from the brainstem between the **pons** and the **medulla**, controls the muscles of facial expression, and functions in the conveyance of **taste** sensations from the anterior two-thirds of the **tongue** and oral cavity. It also supplies preganglionic **parasympathetic** fibers to several head and neck **ganglia**.



Femur; Left and Right

-The femur (pl. *femurs* or *femora*), or thigh bone, is the most **proximal** (closest to the center of the body) **bone** of the **leg** in **tetrapod vertebrates** capable of **walking** or **jumping**, such as most land **mammals**, **birds**, many **reptiles** such as **lizards**, and **amphibians** such as **frogs**. In vertebrates with four legs such as **dogs** and **horses**, the femur is found only in the **rear legs**. The **head of the femur** articulates with the **acetabulum** in the **pelvic bone** forming the **hip joint**, while the **distal part of the femur** articulates with the **tibia** and **patella** forming the **knee joint**. By most measures the femur is the strongest bone in the body.



Fibroblasts

- A fibroblast is a type of **cell** that synthesizes the **extracellular matrix** and **collagen**, the structural framework (**stroma**) for animal tissues, and plays a critical role in **wound healing**. Fibroblasts are the most common cells of **connective tissue** in animals.



Fifth Lumbar Vertebra

- The fifth lumbar vertebra (or the L5 vertebra) is the largest and most inferior of the lumbar vertebrae. As the last of the lumbar vertebrae, the L5 vertebra bears more body weight than any of the other 23 vertebrae that sit atop it in the vertebral column. Thus the L5 is the largest and strongest lumbar vertebra, but is also the most susceptible to stress-related injuries.



Fifth Neck (cervical) Vertebra

-If the spinal cord is severely injured and this injury is at or above the fifth cervical vertebra (C5), then breathing may be effected and the person may die from asphyxiation. In order to help someone breath, a hole is cut into the windpipe (trachea), and a tube inserted which is connected to a ventilator to supply the lungs with oxygen.



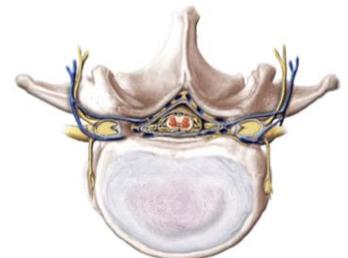
Fifth Thoracic Vertebra

- The T5 vertebra is the fifth of the twelve (12) thoracic vertebrae from the top of this central section of the spinal column. It has a large centrum in a heart-like shape with superior and inferior costal demi-facets above and below on the exterior that - with like costal facets on the transverse processes - make an articular space for the heads of the ribs that connect with the T5 vertebra.



First Lumbar Vertebra

- The L1 vertebra (1st lumbar vertebra) is the smallest and most superior of the lumbar vertebrae. As the first vertebra in the lumbar region, the L1 vertebra bears the weight of the upper body and acts as a transition between the thoracic and lumbar vertebrae.



First Neck-Bone

- The 7 **cervical vertebrae** form the bones of the neck that support the **skull** and organs of the head. The first cervical **vertebra** (atlas) supports and balances the head.



First Thoracic Vertebra

- The T1 vertebra is the first (uppermost) of the twelve (12) thoracic vertebrae that make up the central and largest section of the spinal column between the lumbar vertebrae below and the cervical vertebrae above. While larger than the C7 vertebra above it, the T1 is the smallest of the thoracic vertebrae. It makes the transition from the cervical vertebrae of the neck to the thoracic vertebrae of the torso.



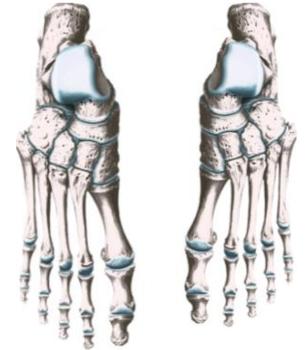
Foot Cut

-The human foot and ankle is a strong and complex mechanical structure containing **26 bones**, **33 joints** (20 of which are actively articulated), and more than a hundred **muscles**, **tendons**, and **ligaments**.



Foot Joint

- Muscles and tendons also support the joints and provide the strength to make them move. The joints of the **ankle**, midfoot, and **big toe** are commonly affected by **arthritis**. **Ligaments** and tendons connect the bones to each other and to the surrounding muscles of the lower leg.



Forearm Bones

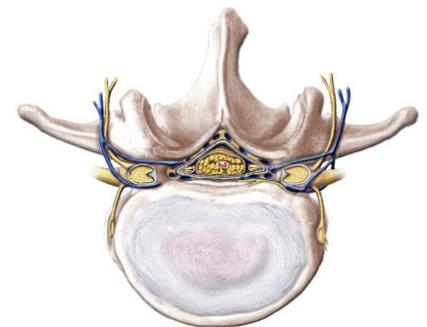
- The forearm is the structure and distal region of the upper limb, between the elbow and the wrist. The term forearm is used in anatomy to distinguish it from the arm, a word which is most often used to describe the entire appendage of the upper limb, but in anatomy, technically, it means only the region of the upper arm, whereas the lower "arm" is called the forearm. It is homologous to the region of the leg that lies between the knee and the ankle joints. The forearm contains two long bones, the radius and the ulna, forming the radioulnar joint. The interosseous membrane connects these bones.



Ultimately, the forearm is covered by skin, the anterior surface usually being less hairy than the posterior surface. The forearm contains many muscles, including the flexors and extensors of the digits, a flexor of the elbow (brachioradialis), and pronators and supinators that turn the hand to face down or upwards, respectively. In cross-section the forearm can be divided into two fascial compartments. The posterior compartment contains the extensors of the hands, which are supplied by the radial nerve. The anterior compartment contains the flexors, and is mainly supplied by the median nerve. The ulnar nerve also runs the length of the forearm. The radial and ulnar arteries, and their branches, supply the blood to the forearm. These usually run on the anterior face of the radius and ulna down the whole forearm. The main superficial veins of the forearm are the cephalic, median antebraichial and the basilic vein. These veins can be used for cannularisation or venipuncture, although the cubital fossa is a preferred site for getting blood.

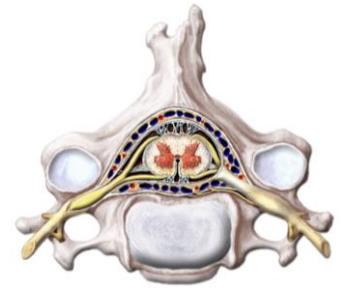
Fourth Lumbar Vertebra: 4th Lumbar Vertebra)

-The L4 vertebra is the penultimate of the five (5) lumbar vertebrae, located just above the fixed vertebrae of the sacrum and thus one of the last of the true vertebrae or movable vertebrae in the spinal column. Like the other lumbar vertebrae, the L4 is very large in both the cylindrical centrum (vertebral body) and the vertebral arch in order to support the weight of the body and handle the vertical compression of the spine above it.



Fourth Thoracic Vertebra

- The T4 vertebra is the fourth uppermost of the twelve (12) thoracic vertebrae at the center of the spinal column, located within the torso and supporting the rib cage. As with the other T2-9 thoracic vertebrae, the heads of the ribs fit into an articular space made by demi-facets on the upper and lower exterior of the ventral body or centrum and by facets on the transverse processes.



Frontal Cross-Section of the Head

– A look at the front section of the skull. The frontal lobe is an area in the brain of mammals, located at the front of each cerebral hemisphere and positioned anterior to (in front of) the parietal lobe and superior and anterior to the temporal lobes. It is separated from the parietal lobe by a space between tissues called the central sulcus, and from the temporal lobe by a deep fold called the lateral (Sylvian) sulcus. The precentral gyrus, forming the posterior border of the frontal lobe, contains the primary motor cortex, which controls voluntary



movements of specific body parts. The frontal lobe contains most of the dopamine- sensitive neurons in the cerebral cortex. The dopamine system is associated with reward, attention, short-term memory tasks, planning, and motivation. Dopamine tends to limit and select sensory information arriving from the thalamus to the fore-brain. A report from the National Institute of Mental Health says a gene variant that reduces dopamine activity in the prefrontal cortex is related to poorer performance and inefficient functioning of that brain region during working memory tasks, and to slightly increased risk for schizophrenia.

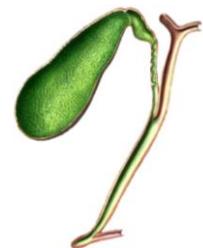
Frontal Medial Meridian

- Gastric Glands: Any of the branched tubular glands in the **mucosa** of the **fundus** and body of the **stomach**, containing **parietal cells** that secrete hydrochloric acid and **zymogenic cells** that produce pepsin. Also called **fundus gland** , gastric **follicle** .



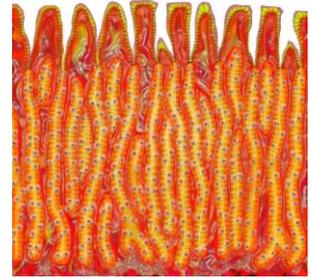
Gall Bladder

– A three dimensional look at the gall-bladder. The gallbladder is a hollow system that sits just beneath the [liver](#). In adults, the gallbladder measures approximately 8 centimetres (3.1 in) in length and 4 centimetres (1.6 in) in diameter when fully distended. It is divided into three sections: [fundus](#), [body](#) and [neck](#). The neck tapers and connects to the [biliary tree](#) via the [cystic duct](#), which then joins the [common hepatic duct](#) to become the [common bile duct](#). At the neck of the gallbladder is a mucosal fold called [Hartmann's pouch](#), where [gallstones](#) commonly get stuck. The angle of the gallbladder is located between the [costal margin](#) and the lateral margin of the [rectus abdominis muscle](#).



Gastric Glands

- The gastric glands are located in different regions of the stomach. These are the fundic glands, the cardiac glands, and the pyloric glands. The glands are found in the gastric pits of the stomach lining. The various cells of the glands secrete mucus, pepsinogen, hydrochloric acid, intrinsic factor, gastrin, histamine and bicarbonate. The three types of glands are all located in gastric pits within the gastric mucosa—the mucous membrane of the stomach. The gastric mucosa is pitted with innumerable gastric pits which house the gastric glands.



1. The **Cardiac Glands** are found in the cardia of the stomach which is the part nearest to the heart, enclosing the opening where the oesophagus joins to the stomach. Only cardiac glands are found here and they primarily secrete mucus.[1] They are fewer in number than the other gastric glands and are more shallowly positioned in the mucosa. There are two kinds - either simple tubular with short ducts or compound racemose resembling the duodenal Brunner's glands
2. The **Fundic Glands** (or oxyntic glands), are found in the fundus and body of the stomach. They are simple almost straight tubes, two or more of which open into a single duct. Oxyntic means acid-secreting and they secrete hydrochloric acid (HCl) and intrinsic factor.[1]
3. The **Pyloric Glands** are located in the antrum of the pylorus. They secrete gastrin produced by their G cells.

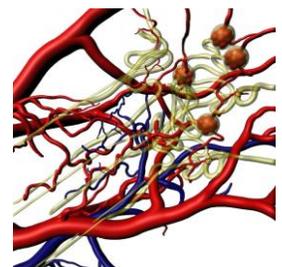
Gastrointestinal Endocrine Cell

– A look at the cell of the Gastrointestines. The human gastrointestinal tract is the stomach and intestine, sometimes including all the structures from the mouth to the anus. (The "digestive system" is a broader term that includes other structures, including the accessory organs of digestion). In an adult male human, the gastrointestinal (GI) tract is 5 metres (20 ft) long in a live subject, or up to 9 metres (30 ft) without the effect of muscle tone, and consists of the upper and lower GI tracts. The tract may also be divided into foregut, midgut, and hindgut, reflecting the embryological origin of each segment of the tract. The GI tract always releases hormones to help regulate the digestive process. These hormones, including gastrin, secretin, cholecystokinin, and ghrelin, are mediated through either intracrine or autocrine mechanisms, indicating that the cells releasing these hormones are conserved structures throughout evolution.



Glomerules and Incoming Arteries

– In the kidney, a tubular structure called the nephron filters blood to form urine. At the beginning of the nephron, the glomerulus /glɒˈmɛrələs/ is a network (tuft) of capillaries that performs the first step of filtering blood. The glomerulus is surrounded by Bowman's capsule. The blood plasma is filtered through the capillaries of the glomerulus into the Bowman's capsule. The Bowman's capsule empties the filtrate into a tubule that is also part of the nephron.

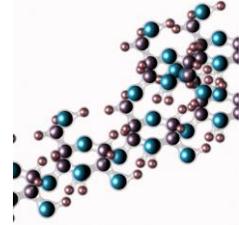


A glomerulus receives its blood supply from an afferent arteriole of the renal circulation. Unlike

most other capillary beds, the glomerulus drains into an efferent arteriole rather than a venule. The resistance of these arterioles results in high pressure within the glomerulus, aiding the process of ultrafiltration, where fluids and soluble materials in the blood are forced out of the capillaries and into Bowman's capsule.

Glycogen

- Glycogen is a multi branched polysaccharide of glucose that serves as a form of energy storage in animals and fungi. The polysaccharide structure represents the main storage form of glucose in the body.



Goblet Cell

- A **goblet cell** is a glandular, modified simple columnar epithelial **cell** whose function is to secrete gel-forming mucins, the major components of mucus.



Goldzhi Complex

- Part of the cellular **endomembrane system**, the Golgi apparatus packages proteins into membrane-bound **vesicles** inside the cell before the vesicles are sent to their destination. The Golgi apparatus resides at the intersection of the secretory, lysosomal, and endocytic pathways. It is of particular importance in processing **proteins** for **secretion**, containing a set of **glycosylation enzymes** that attach various sugar monomers to proteins as the proteins move through the apparatus.



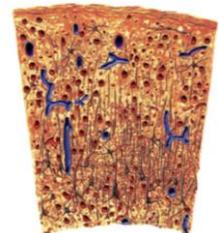
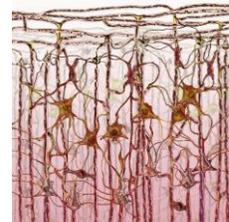
Granular Luteal Cells

– The cells surrounding the **graafian follicle** and forming the **stratum granulosum** and **cumulus oophorus**, after **ovulation** they become **lutein cells**. The **Lutein cells** of the **corpus luteum** are derived from **granulosa cells**.



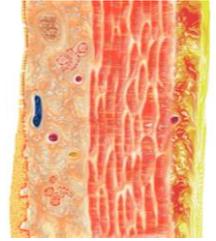
Gray Matter of Cerebrum

- Is a major component of the **central nervous system**, consisting of **neuronal cell bodies**, **neuropil** (**dendrites** and **myelinated** as well as **unmyelinated axons**), **glial cells** (**astroglia** and **oligodendrocytes**), **synapses**, and **capillaries**. Grey matter is distinguished from **white matter**, in that grey matter contains numerous cell bodies and relatively few myelinated axons, while white matter is composed chiefly of long-range myelinated axon tracts and contains relatively very few cell bodies.



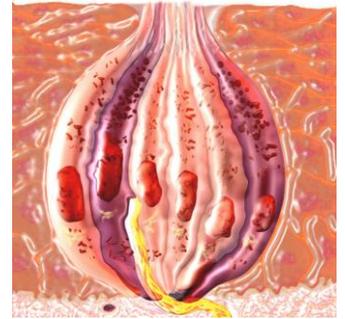
Gullet Cut

- the passage by which food passes from the mouth to the stomach; the esophagus.



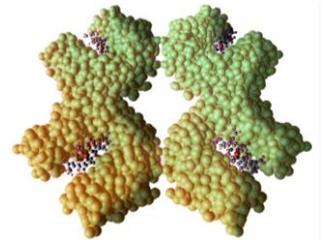
Gustatory Bud

- Contain the receptors for **taste**. They are located around the small structures on the upper surface of the **tongue**, **soft palate**, upper **esophagus**, the **cheek**, **epiglottis**, which are called papillae.^[1] These structures are involved in detecting the five elements of taste perception: **salty**, **sour**, **bitter**, **sweet** and **umami**; through the combination of these elements we detect "flavors." A popular myth assigns these different tastes to **different regions of the tongue**; in reality these tastes can be detected by any area of the tongue. Via small openings in the tongue epithelium, called taste pores, parts of the food dissolved in **saliva** come into contact with **taste receptors**. These are located on top of the taste receptor cells that constitute the taste buds. The taste receptor cells send information detected by clusters of various receptors and ion channels to the gustatory areas of the brain via the seventh, ninth and tenth cranial nerves.



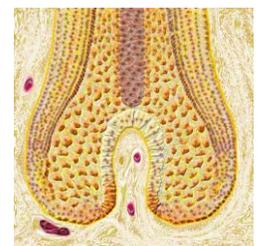
Haemoglobin

- Is the iron-containing oxygen-transport metalloprotein in the red blood cells of all vertebrates (with the exception of the fish family Channichthyidae) as well as the tissues of some invertebrates.



Hair Bulb

- The **root of the hair** ends in an enlargement, the *hair bulb*, which is whiter in color and softer in texture than the shaft, and is lodged in a follicular involution of the **epidermis** called the **hair follicle**. Bulb of hair layers consist of fibrous connective tissue, external root sheath, internal root sheath composed of epithelium stratum (**Henle's layer**) and granular stratum (**Huxley's layer**), cuticle, cortex and medulla of hair.



Haired Sensory Epitheliocyte

– A look at the cell at the epithelial level.



Hand Transverse Section: (Same as below?)

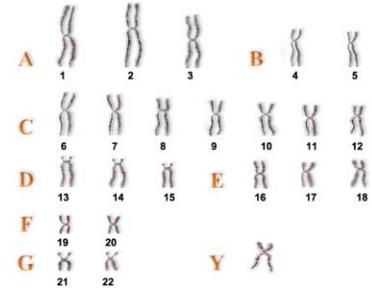
Hand Transverse Section

- Carpometacarpal joint region: The carpometacarpal joint of the thumb, also known as the first carpometacarpal joint, or the trapeziometacarpal joint (TMC) because it connects the **trapezium** to the first metacarpal bone, plays an irreplaceable role in the normal functioning of the thumb. The most important joint connecting the wrist to the metacarpus, osteoarthritis of the TMC is a severely disabling condition; up to twenty times more common among elderly women than in average



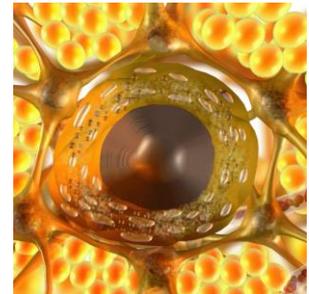
Haploid Number of Male Chromosomes

- **Haplodiploidy** is a **sex-determination system** in which males develop from unfertilized eggs and are **haploid**, and females develop from fertilized eggs and are **diploid**.^[1] Haplodiploidy is sometimes called **arrhenotoky**. In this system, sex is determined by the number of sets of **chromosomes** an individual receives. An offspring formed from the union of a **sperm** and an **egg** develops as a **female**, and an unfertilized egg develops as a **male**. This means that the males have half the number of chromosomes that a female has, and are **haploid**.



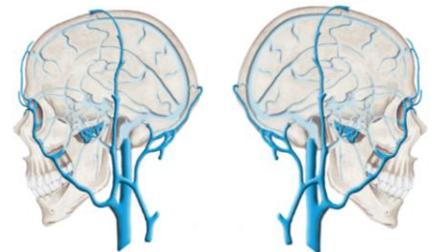
Hassall's Corpuscles

- Are structures found in the medulla of the human **thymus**, formed from **eosinophilic** type VI **epithelial reticular cells** arranged concentrically. These concentric corpuscles are composed of a central mass, consisting of one or more granular cells, and of a capsule formed of epithelioid cells. They vary in size with diameters from 20 to more than 100µm, and tend to grow larger with age. The function of Hassall's corpuscles is currently unclear, and the absence of this structure in the **murine** thymus has restricted mechanistic dissection.



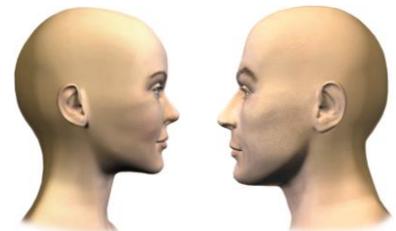
Head Veins; on the Left and on the Right

– A look at the veins on the left and right sides of the head.



Head – Man and Woman

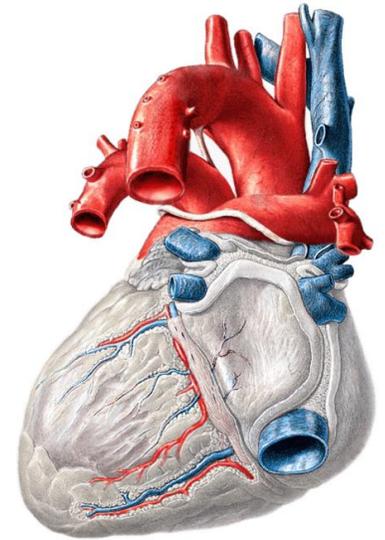
- The *cephalic* part of an **organism**, which usually comprises the **eyes**, **ears**, **nose** and **mouth**, each of which aid in various sensory functions, such as **sight**, **hearing**, **smell**, and **taste**. Some very simple animals may not have a head, but many **bilaterally symmetric forms** do. Heads develop in animals by an **evolutionary** trend known as **cephalization**. In bilaterally symmetrical animals, **nerve tissues** concentrate at the **anterior** region, forming structures responsible for information processing. Through biological evolution, sense organs and feeding structures also concentrate into the interior region; these collectively form the head.



Heart; from the Behind

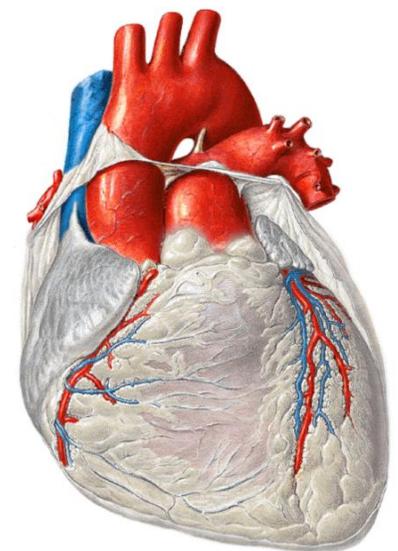
– A look at the heart from the back. The adult human heart has a mass of between 250 and 350 grams and is about the size of a fist. It is located anterior to the vertebral column and posterior to the sternum. It is enclosed in a double-walled sac called the pericardium. The pericardium's outer wall is called the parietal pericardium and the inner one the visceral pericardium. Between them there is some pericardial fluid which functions to permit the inner and outer walls to slide easily over one another with the heart movements. Outside the parietal pericardium is a fibrous layer called the fibrous pericardium which is attached to the mediastinal fascia. This sac protects the heart, anchors it to the surrounding structures, but has no effect on ventricular hemodynamics in a healthy person. The outer wall of the human heart is composed of three layers; the outer layer is called the epicardium, or visceral pericardium since it is also the inner wall of the pericardium. The middle layer is called the myocardium and is composed of contractile cardiac muscle. The inner layer is called the endocardium and is in contact with the blood that the heart pumps. Also, it merges with the inner lining (endothelium) of blood vessels and covers heart valves. The human heart has four chambers, two superior atria and two inferior ventricles. The atria are the receiving chambers and the ventricles are the discharging chambers. During each cardiac cycle, the atria contract first, forcing blood that has entered them into their respective ventricles, then the ventricles contract, forcing blood out of the heart. The pathway of the blood consists of a pulmonary circuit and a systemic circuit which function simultaneously.

Deoxygenated blood from the body flows via the venae cavae into the right atrium, which pumps it through the tricuspid valve into the right ventricle, whose subsequent contraction forces it out through the pulmonary valve into the pulmonary arteries leading to the lungs. Meanwhile, oxygenated blood returns from the lungs through the pulmonary veins into the left atrium, which pumps it through the mitral valve into the left ventricle, whose subsequent strong contraction forces it out through the aortic valve to the aorta leading to the systemic circulation.



Heart; from the Front

– A look at the heart from the front. The adult human heart has a mass of between 250 and 350 grams and is about the size of a fist. It is located anterior to the vertebral column and posterior to the sternum. It is enclosed in a double-walled sac called the pericardium. The pericardium's outer wall is called the parietal pericardium and the inner one the visceral pericardium. Between them there is some pericardial fluid which functions to permit the inner and outer walls to slide easily over one another with the heart movements. Outside the parietal pericardium is a fibrous layer called the fibrous pericardium which is attached to the mediastinal fascia. This sac protects the heart, anchors it to the surrounding structures, but has no effect on ventricular hemodynamics in a healthy person. The outer wall of the human heart is composed of three layers; the outer layer is called the epicardium, or visceral pericardium since it is also the inner wall of the pericardium. The middle layer is called the myocardium and is composed of contractile cardiac muscle. The inner layer is called the endocardium and is in contact with the blood that the heart pumps. Also, it merges with the inner lining (endothelium) of blood vessels and covers heart valves. The human heart has four chambers, two superior atria and two inferior ventricles. The atria are the receiving chambers and the ventricles are the discharging

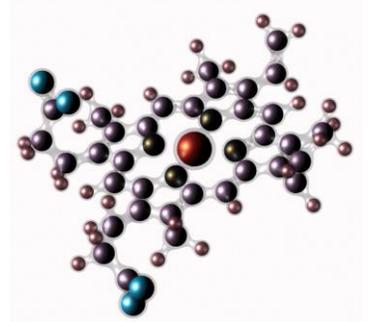


The atria are the receiving chambers and the ventricles are the discharging

chambers. During each cardiac cycle, the atria contract first, forcing blood that has entered them into their respective ventricles, then the ventricles contract, forcing blood out of the heart. The pathway of the blood consists of a pulmonary circuit and a systemic circuit which function simultaneously. Deoxygenated blood from the body flows via the venae cavae into the right atrium, which pumps it through the tricuspid valve into the right ventricle, whose subsequent contraction forces it out through the pulmonary valve into the pulmonary arteries leading to the lungs. Meanwhile, oxygenated blood returns from the lungs through the pulmonary veins into the left atrium, which pumps it through the mitral valve into the left ventricle, whose subsequent strong contraction forces it out through the aortic valve to the aorta leading to the systemic circulation.

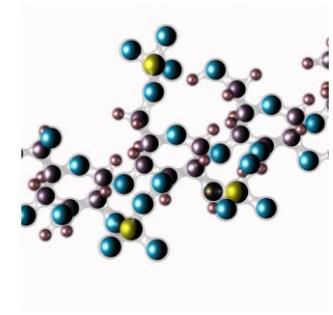
Heme

- A **cofactor** consisting of an Fe^{2+} (**ferrous**) ion contained in the centre of a large **heterocyclic** organic ring called a **porphyrin**, made up of four **pyrrolic** groups joined together by **methine** bridges. Not all porphyrins contain iron, but a substantial fraction of porphyrin-containing **metalloproteins** have heme as their prosthetic group; these are known as **hemoproteins**. Hemes are most commonly recognized as components of **hemoglobin**, the red pigment in **blood**, but are also found in a number of other biologically important hemoproteins such as **myoglobin**, **cytochrome**, **catalase**, and **endothelial nitric oxide synthase**.



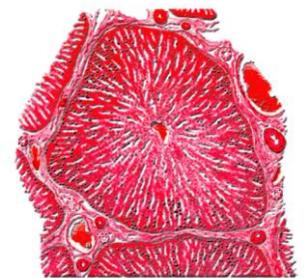
Heparinum

- A **hepatocyte** is a cell of the main parenchymal tissue of the liver. **Hepatocytes** make up 70-85% of the liver's mass. These cells are involved in: Protein synthesis. Protein storage.



Hepatic Beam MC#

– Hepatic Beam or Trabeculae are formed by hepatocyte rows surrounded by sinusoid capillaries, irrigating hepatic cells.



Hepatocyte

- A hepatocyte is a cell of the main tissue of the liver. Hepatocytes make up 70-85% of the liver's cytoplasmic mass. These cells are involved in:

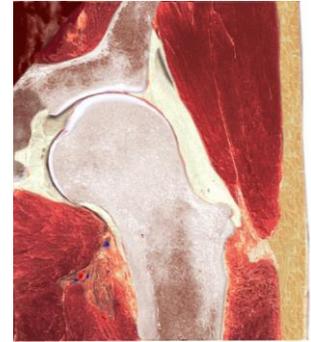
- Protein synthesis
- Protein storage
- Transformation of carbohydrates
- Synthesis of cholesterol, bile salts and phospholipids
- Detoxification, modification, and excretion of exogenous and endogenous substances



The hepatocyte also initiates formation and secretion of bile.

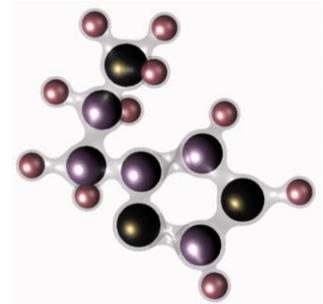
Hip; Right

– A complete look at the hip joints. In vertebrate anatomy, hip (or "coxa" in medical terminology) refer to either an anatomical region or a joint. The hip region is located lateral to the gluteal region (i. e. the buttock), inferior to the iliac crest, and overlying the greater trochanter of the femur, or "thigh bone". In adults, three of the bones of the pelvis have fused into the hip bone which forms part of the hip region. The hip joint, scientifically referred to as the acetabulofemoral joint (art. coxae), is the joint between the femur and acetabulum of the pelvis and its primary function is to support the weight of the body in both static (e. g. standing) and dynamic (e. g. walking or running) postures. The hip joints are the most important part in retaining balance. The pelvic inclination angle, which is the single most important element of human body posture, is adjusted at the hips.



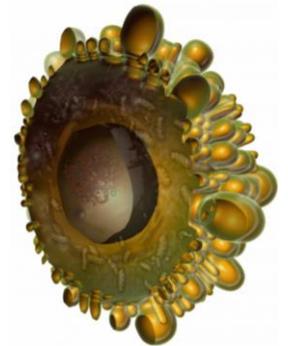
Histamine

- Histamine is an organic nitrogenous compound involved in local immune responses as well as regulating physiological function in the gut and acting as a neurotransmitter. Histamine is involved in the inflammatory response.



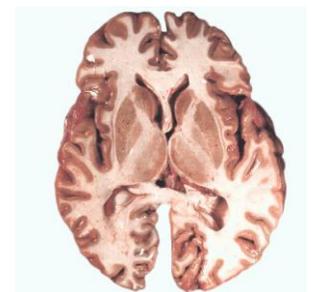
Histiocyte

- A **histiocyte** is an animal cell that is part of the mononuclear phagocyte system (also known as the reticuloendothelial system or lymphoreticular system). The mononuclear phagocytic system is part of the organism's immune system. Histiocytes are derived from the **bone marrow** by multiplication from a **stem cell**. The derived cells migrate from the bone marrow to the **blood** as **monocytes**. They circulate through the body and enter various organs, where they undergo differentiation into histiocytes, which are part of the **mononuclear phagocytic system** (MPS).



Horizontal Cross-Section of Cerebrum at the Left of Subcortical Nucle

- The **basal ganglia** (or **basal nuclei**) comprise multiple subcortical **nuclei**, of varied origin, in the **brains** of vertebrates, which are situated at the base of the **forebrain**. Basal ganglia are strongly interconnected with the **cerebral cortex**, **thalamus**, and **brainstem**, as well as several other brain areas. The basal ganglia are associated with a variety of functions including: control of voluntary motor movements, procedural **learning**, routine behaviors or "habits" such as **bruxism**, eye movements, **cognition**^[1] and emotion.



Horizontal Section of the Chest at the Level of the Fourth Cervical

– The mediastinum lies between the right and left pleurae in and near the median sagittal plane of the chest. It extends from the sternum in front to the vertebral column behind, and contains all the thoracic organs except the lungs. It may be divided for purposes of description into two parts: an upper or superior part and a lower or inferior part.

The superior mediastinum extends from the upper level of the pericardium with its upper limit at the superior thoracic aperture and its lower limit at the thoracic plane which runs from the sternal angle (the joint between the manubrium and the body of the sternum) to the intervertebral disc of T4-T5. [2][3][4]The (transverse) thoracic plane divides the mediastinum into these upper and lower parts. The inferior mediastinum extends below the upper level of the pericardium onto the diaphragm. This lower part is subdivided into three regions all relative to the pericardium. The anterior mediastinum is in front of the pericardium. The middle mediastinum contains the pericardium and its contents. The posterior mediastinum is behind the pericardium.



Horizontal Section of the Head at the Level of the Aqueduct of Cervical Ventricle

- The [corpora quadrigemina](#) ("quadruplet bodies") are four solid lobes on the dorsal side of the [cerebral aqueduct](#), where the superior posterior pair are called the [superior colliculi](#) and the inferior posterior pair are called the [inferior colliculi](#).

The four solid lobes help to decussate several fibres of the optic nerve. However, some fibers also show ipsilateral arrangement (i.e., they run parallel on the same side without decussating.)

The superior colliculus is involved with [saccadic eye movements](#); while the inferior is a synapsing point for sound information. The [trochlear nerve](#) comes out of the posterior surface of the midbrain, below the inferior colliculus.



Horizontal Section of the Head at the Level of the Fourth Ventricle

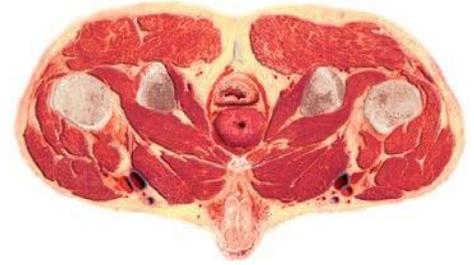
– The fourth ventricle is one of the four connected fluid-filled cavities within the human brain. These cavities, known collectively as the ventricular system, consist of the left and right lateral ventricles, the third ventricle, and the fourth ventricle. The fourth ventricle extends from the cerebral aqueduct (aqueduct of Sylvius) to the obex, and is filled with cerebrospinal fluid (CSF). The fourth ventricle has a characteristic diamond shape in cross-sections of the human brain. It is located within the pons or in the upper part of the medulla. CSF entering the fourth ventricle through the cerebral aqueduct can exit to the subarachnoid space of the spinal cord through two lateral foramina of Luschka (singular: foramen of Luschka) and a single, midline foramen of Magendie.



Horizontal Section of the Pelvic Cavity at the Level of Prostate

(male analysis only)

– This is a cross section look of the pelvic cavity in the area of the level in men. The prostate (from [Greek](#) *προστάτης* – *prostates*, literally "one who stands before", "protector", "guardian") is a compound tubuloalveolar [exocrine gland](#) of the [male reproductive system in most mammals](#).

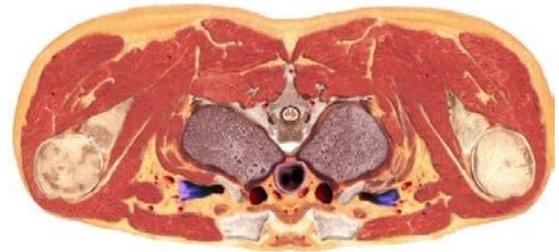


Horizontal Section of Trunk at the level of the Shoulder Joint

– This is a cross section look at the torso at the Shoulder Joint.

The glenohumeral joint, (from ancient Greek *glene*, eyeball, puppet, doll + *-oid*, 'form of', + Latin *humerus*, shoulder) or shoulder joint, is a multiaxial synovial ball and socket joint and involves articulation between the *glenoid fossa* of the scapula (shoulder blade) and the head of the humerus (upper arm bone). Due to the very limited interface of the humerus and scapula, it is the most mobile joint of the human body.

The glenoid fossa is shallow and contains the glenoid labrum which deepens it and aids in stability. With 120 degrees of unassisted flexion, the glenohumeral joint is the most mobile joint in the body. Scapulohumeral rhythm helps to achieve further range of movement. The Scapulohumeral rhythm is the movement of the scapula across the thoracic cage in relation to the humerus. This movement can be compromised by anything that changes the position of the scapula. This could be an imbalance in the muscles that hold the scapula in place which are the upper and lower trapezius. This imbalance could cause a forward head carriage which in turn can affect the range of movements of the shoulder. The rotator cuff muscles of the shoulder produce a high tensile force, and help to pull the head of the humerus into the glenoid fossa.



Horizontal Section of Trunk at the level of Umbilicus

- The *umbilical plane* (or transumbilical plane) Located at the level of L3/L4 vertebral junction or IV disc;



Horizontal Section of Chest at the 6th Thoracic Vertebra

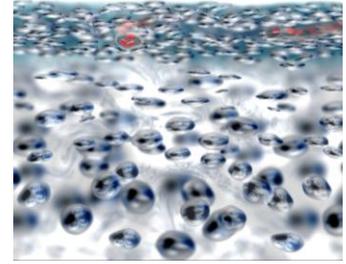
– Cross section of the spine at the 6th thoracic Vertebra.

Horizontal Section of the Brain at the Level of Subcortical Nuclei – The term Subcortical Nuclei refers to one of three components of the cerebrum. It is a composite structure of the endbrain defined on the basis of origin from the ventricular ridge of embryonic Encephalon. It consists of the extended striatum and the extended pallidum. The other components of the cerebrum are the cerebral cortex and the cortical subplate nuclei.



Hyaline Cartilage

- Hyaline cartilage is covered externally by a fibrous membrane, called the [perichondrium](#), except at the articular ends of bones and also where it is found directly under the skin, i.e. ears and nose. This membrane contains vessels that provide the cartilage with nutrition.

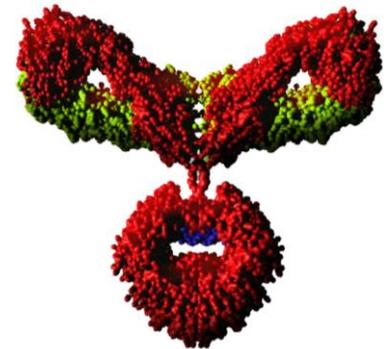
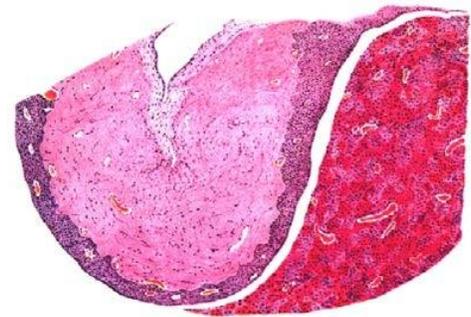


Hyaline cartilage matrix is mostly made up of [type II collagen](#) and [chondroitin sulfate](#), both of which are also found in [elastic cartilage](#).

Hyaline cartilage exists on the ventral ends of ribs; in the larynx, trachea, and bronchi; and on the articular surface of bones.

Hypophysis

- In [vertebrate anatomy](#), the pituitary gland, or hypophysis, is an [endocrine gland](#) about the size of a pea and weighing 0.5 grams (0.018 oz) in humans. It is a protrusion off the bottom of the [hypothalamus](#) at the base of the [brain](#), and rests in a small, bony cavity ([sella turcica](#)) covered by a [dural](#) fold ([diaphragma sellae](#)). The posterior pituitary gland is functionally connected to the [hypothalamus](#) by the [median eminence](#) via a small tube called the [pituitary stalk](#), (also called the infundibular stalk or the infundibulum). The pituitary fossa, in which the pituitary gland sits, is situated in the [sphenoid](#) bone in the [middle cranial fossa](#) at the base of the brain. The pituitary gland secretes nine [hormones](#) that regulate [homeostasis](#).

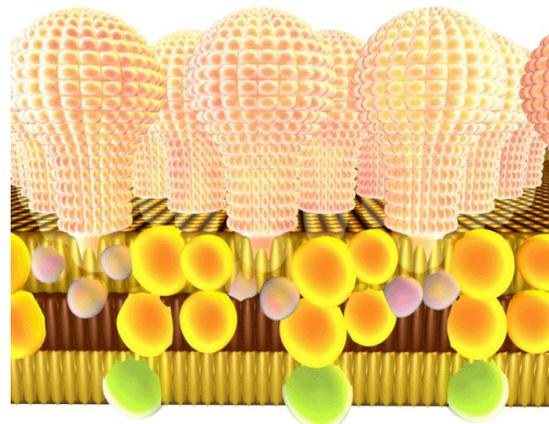


Immunoglobulin E

- **Immunoglobulin E (IgE)** is a type of antibody that is present in minute amounts in the body but plays a major role in allergic diseases. **IgE** binds to allergens and triggers the release of substances from mast cells that can cause inflammation. When **IgE** binds to mast cells, a cascade of allergic reaction can begin.

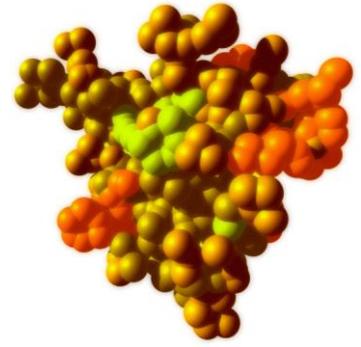
Inner Mitochondrial Membrane

- The structure of the **inner mitochondrial membrane** is extensively folded and compartmentalized. The numerous invaginations of the **membrane** are called cristae, separated by crista junctions from the **inner** boundary **membrane** juxtaposed to the outer **membrane**.



Insulin

- a **peptide hormone** produced by **beta cells** in the **pancreas**. It regulates the **metabolism** of **carbohydrates** and **fats** by promoting the absorption of **glucose** from the blood to **skeletal muscles** and **fat tissue** and by causing fat to be stored rather than used for energy. Insulin also inhibits the production of glucose by the liver.



Interlobular Bile Duct

- Carries bile in the **liver** between the **Canals of Hering** and the **interlobar bile ducts**. They are part of the interlobular **portal triad** and can be easily localized by looking for the much larger **portal vein**. The cells of the ducts are described as **cuboidal epithelium** with increasing amounts of **connective tissue** around it.



Intermediate Part Hypophysis

- This is a look at the cell of the intermediate part of the hypophysis aka pituitary gland. In [vertebrate anatomy](#), the pituitary gland, or hypophysis, is an [endocrine gland](#) about the size of a pea and weighing 0.5 grams (0.018 oz) in humans. It is a protrusion off the bottom of the [hypothalamus](#) at the base of the [brain](#), and rests in a small, bony cavity ([sella turcica](#)) covered by a [dural](#) fold ([diaphragma sellae](#)). The posterior pituitary gland is functionally connected to the [hypothalamus](#) by the [median eminence](#) via a small tube called the [pituitary stalk](#), (also called the infundibular stalk or the infundibulum). The pituitary fossa, in which the pituitary gland sits, is situated in the [sphenoid](#) bone in the [middle cranial fossa](#) at the base of the brain. The pituitary gland secretes nine [hormones](#) that regulate [homeostasis](#).



Interstitial Cells of Testicles

- Are found adjacent to the **seminiferous tubules** in the **testicle**. They produce **testosterone** in the presence of **luteinizing hormone** (LH). Leydig cells are polyhedral in shape, display a large prominent **nucleus**, an **eosinophilic cytoplasm** and numerous lipid-filled vesicles.



Interventricular Septum

- Is the stout wall separating the lower chambers (the ventricles) of the heart from one another.



Intestine

– This is a complete look at both the large and small intestines. In human anatomy, the intestine (or bowel, hose or gut) is the segment of the alimentary canal extending from the pyloric sphincter of the stomach to the anus and, in humans and other mammals, consists of two segments, the small intestine and the large intestine. In humans, the small intestine is further subdivided into the duodenum, jejunum and ileum while the large intestine is subdivided into the cecum and colon.



Intestine Epitheliocyte

- Is the **epithelium** that covers the **small** and **large intestine**. It is **simple columnar** and **nonciliated**.



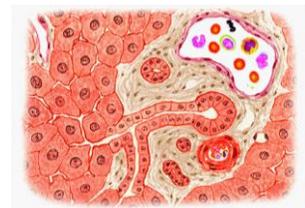
Intestine and Anus

- The **rectum** is a chamber that begins at the end of the large intestine, immediately following the sigmoid colon, and ends at the anus.



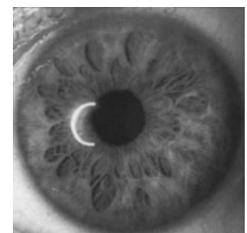
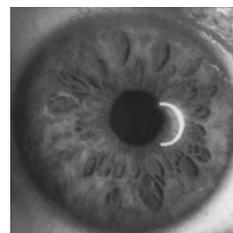
Intrahepatic Biliary System

- **Intrahepatic bile ducts** compose the outflow system of **exocrine bile** product from the **liver**.



Iris Left and Right

- Is a thin, circular structure in the **eye**, responsible for controlling the diameter and size of the **pupil** and thus the amount of light reaching the **retina**. The color of the iris gives the eye its **color**. In optical terms, the pupil is the eye's **aperture** and the iris is the **diaphragm** that serves as the **aperture stop**.



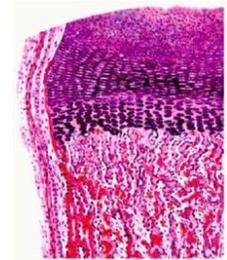
Islets of Langerhan

- The islets of Langerhans are the regions of the [pancreas](#) that contain its [endocrine](#) (i.e., hormone-producing) cells. Discovered in 1869 by [German](#) pathological anatomist [Paul Langerhans](#) at the age of 22, the islets of Langerhans constitute approximately 1% to 2% of the mass of the pancreas. There are about one million islets distributed throughout the pancreas of a healthy adult human, each of which measures about 0.2 mm in diameter. Each is separated from the surrounding pancreatic tissue by a thin fibrous connective tissue capsule which is continuous with the fibrous connective tissue that is interwoven throughout the rest of the pancreas. The combined mass of the islets is 1 to 1.5 grams.



Joint Surfaces

- A look at the cells located on the surfaces of the joints.

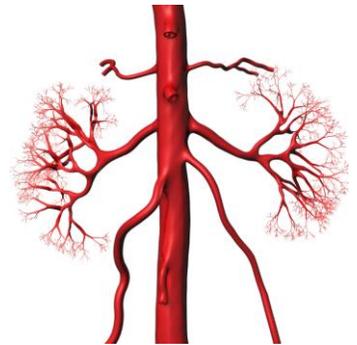


Kidney Vessels

- Before reaching the [hilus of the kidney](#), each artery divides into four or five branches; the greater number of these (anterior branches) lie between the renal vein and [ureter](#), the vein being in front, the ureter behind, but one or more branches (posterior branches) are usually situated behind the ureter.

Each vessel gives off some small [inferior suprarenal branches](#) to the [suprarenal gland](#), the [ureter](#), and the surrounding cellular tissue and muscles.

One or two accessory renal arteries are frequently found, especially on the left side since they usually arise from the aorta, and may come off above (more common) or below the main artery. Instead of entering the kidney at the hilus, they usually pierce the upper or lower part of the organ.



Keratin

- Is a family of fibrous structural proteins. **Keratin** is the key structural material making up the outer layer of human skin. It is the key structural component of hair and nails, and it provides the necessary strength and toughness for masticatory organs, such as the tongue and the hard palate.



Knee Joint, Left & Right

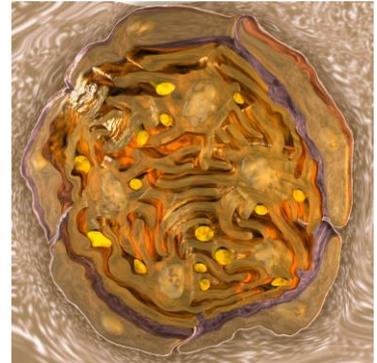
- This is a complete look at the knee joint, including bone, muscle, and ligaments. The knee joint joins the thigh with the lower leg and consists of two articulations: one between the femur and tibia, and one between the femur and patella. It is the largest joint in the human body and is very complicated. The knee is a mobile



trocho-ginglymus (a pivotal hinge joint), which permits flexion and extension as well as a slight medial and lateral rotation. Since in humans the knee supports nearly the whole weight of the body, it is vulnerable to both acute injury and the development of osteoarthritis.

Krauzes's Corpuscles

- Are **cutaneous receptors** in the human body. The end-bulbs of Krause are thermoreceptors, sensing cold temperatures. End-bulbs are found in the [conjunctiva](#) of the [eye](#) (where they are spheroidal in shape in humans, but cylindrical in most other animals), in the [mucous membrane](#) of the lips and [tongue](#), and in the [epineurium](#) of [nerve](#) trunks. They are also found in the [penis](#) and the [clitoris](#) and have received the name of [genital corpuscles](#); in these situations they have a mulberry-like appearance, being constricted by connective-tissue septa into from two to six knob-like masses.



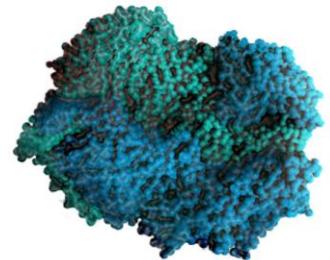
Labyrinth, on the Left and on the Right

- A labyrinth in each of inner ear, encased in thick bone near the base of your skull. As the name implies, the labyrinth is a maze of interconnected fluid-filled channels and canals. Half of the labyrinth, the cochlea, is shaped like a snail's shell. It sends information about sounds to the brain. The other half looks something like a gyroscope with 3 semicircular canals connected to an open cavern or vestibule. The vestibule portion of the labyrinth sends information to the brain regarding the position and movement of your head. Any disturbance of the vestibule can lead to faulty information going to your brain.



Lactate Dehydrogenase

- An enzyme found in nearly all living cells. LDH catalyzes the conversion of pyruvate to lactate and back, as it converts NADH to NAD^+ and back.



Large Intestine

- Also called the **colon** or the **large bowel**, is the last part of the **digestive system** in **vertebrates**. Water is absorbed here and the remaining waste material is stored as **feces** before being removed by **defecation**. Overall, in humans, the large intestine is about 1.5 metres (4.9 ft) long, which is about one-fifth of the whole length of the **gastrointestinal tract**



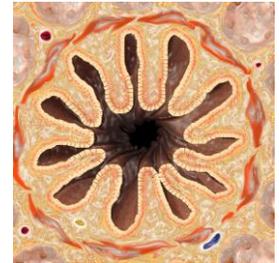
Large Venous Vessel:

- Large collecting vessels, such as the [subclavian vein](#), the [jugular vein](#), the [renal vein](#) and the [iliac vein](#).



Last Bronchiole:

- The **bronchioles** or **bronchioli** are the passageways by which air passes through the [nose](#) or [mouth](#) to the [alveoli](#) (air sacs) of the lungs, in which branches no longer contain [cartilage](#) or [glands](#) in their [submucosa](#). They are branches of the [bronchi](#), and are part of the [conducting zone](#) of the [respiratory system](#). The bronchioles divide further into smaller **terminal** bronchioles which are still in the conducting zone and these then divide into the smaller **respiratory** bronchioles which mark the beginning of the respiratory region.



Left Lung

- This is a look at the entire left lung. The lung is the essential [respiration organ](#) in many air-breathing [animals](#), including most [tetrapods](#), a few [fish](#) and a few [snails](#). In [mammals](#) and the more complex life forms, the two lungs are located near the backbone on either side of the [heart](#). Their principal function is to transport [oxygen](#) from the [atmosphere](#) into the [bloodstream](#), and to release [carbon dioxide](#) from the bloodstream into the atmosphere. A large surface area is needed for this exchange of gases which is accomplished by the [mosaic](#) of specialized [cells](#) that form millions of tiny, exceptionally thin-walled air sacs called [alveoli](#). To understand the anatomy of the lungs, the passage of air through the nose and mouth to the alveoli must be studied. The progression of air through either the mouth or the nose, travels through the [nasopharynx](#), [oropharynx](#), [larynx](#), and the [trachea](#) (windpipe). The air passes down the trachea, which divides into two main [bronchi](#); these branch to the left and right lungs where they progressively subdivide into a system of bronchi and [bronchioles](#) until the alveoli are reached. These many alveoli are where the gas exchange of [carbon dioxide](#) and [oxygen](#) takes place. Breathing is driven by [muscular](#) action; in early [tetrapods](#), air was driven into the lungs by the [pharyngeal muscles](#) via [buccal pumping](#), which is still found in amphibians. [Reptiles](#), [birds](#) and [mammals](#) use their [musculoskeletal system](#) to support and [foster](#) breathing. Medical terms related to the lung often begin with *pulmo-*, such as in the ([adjectival form](#): [pulmonary](#)) or from the [Latin](#) *pulmonarius* ("of the lungs"), or with *pneumo-* (from [Greek](#) πνεύμων "lung").

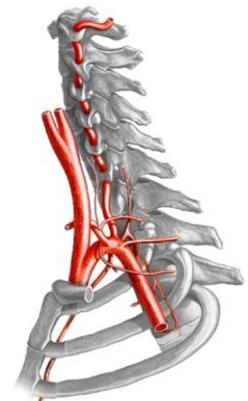


Left Foot: (See Foot Cut)

Left Subclavian Artery

- The **subclavian arteries** are paired major [arteries](#) of the upper [thorax](#) (chest), below the clavicle ([collar bone](#)) in [human anatomy](#). They receive blood from the [aortic arch](#). The left subclavian artery supplies blood to the left arm and the right subclavian artery supplies blood to the right arm, with some branches supplying the head and thorax.

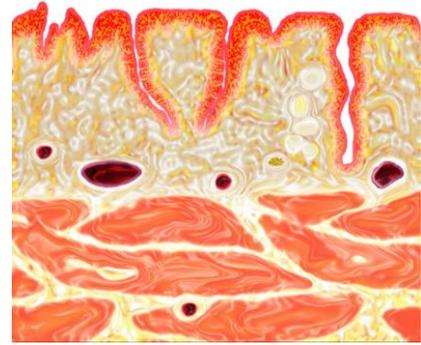
- On the *left* side of the body, the subclavian comes directly off the [arch of aorta](#).



Lingual Papilla

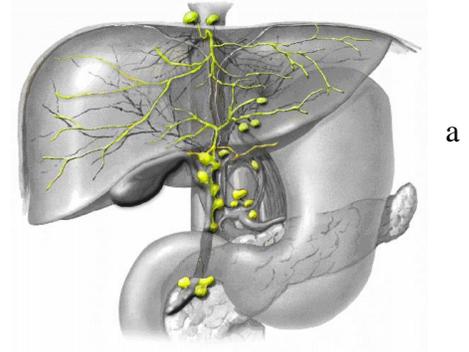
- **Lingual papillae** (singular **papilla**) are the small, nipple or hair-like structures on the upper surface of the tongue that give the tongue its characteristic rough texture.

There are four types of lingual papillae on the [human tongue](#): circumvallate papillae (vallate papillae), fungiform papillae, filiform papillae and foliate papillae. All except the filiform papillae are associated with [taste buds](#).

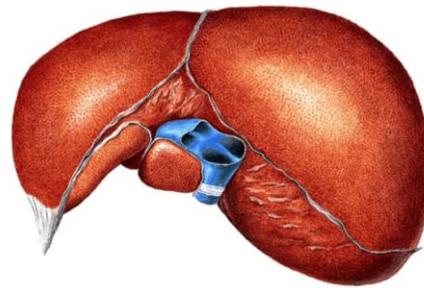


Liver Lymphatic Vessels

- The lymphatics of the liver itself can be divided into a superficial and deep system. The superficial vessels are mainly situated in the liver capsule, the deep ones follow the triads of Glisson or the efferent hepatic veins.



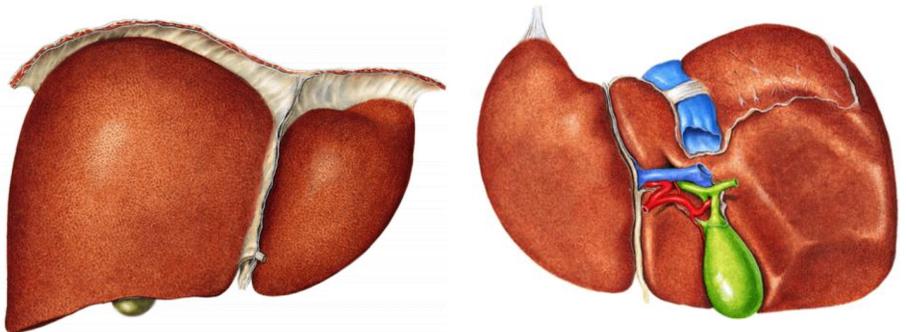
Liver; from Above (male analysis only)



Liver; from Front and Behind

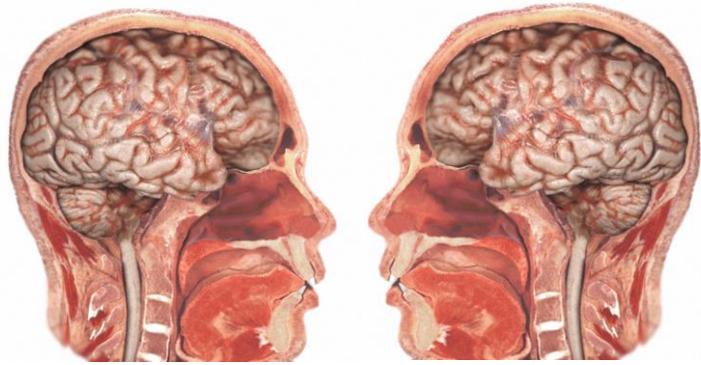
– This is a look at the liver from behind. This is a look at the liver from above. The liver is a vital organ present in vertebrates and some other animals. It has a wide range of functions, including

detoxification, protein synthesis, and production of biochemicals necessary for digestion. The liver is necessary for survival; there is currently no way to compensate for the absence of liver function in the long term, although new liver dialysis techniques can be used in the short term. This organ plays a major role in metabolism and has a number of functions in the body, including glycogen storage, decomposition of red blood cells, plasma protein synthesis, hormone production, and detoxification. It lies below the diaphragm in the abdominal-pelvic region of the abdomen. It produces bile, an alkaline compound which aids in digestion via the emulsification of lipids. The liver's highly specialized tissues regulate a wide variety of high-volume biochemical reactions, including the synthesis and breakdown of small and complex molecules, many of which are necessary for normal vital functions. Terminology related to the liver often starts in hepar- or hepat- from the Greek word for liver, hēpar (ἥπαρ, root hepat-, ἥπατ-).



Longitudinal Cross-Section of Head

– Cross section look of the Brain and Brain Stem from the right side. The brain is the center of the nervous system in all vertebrate and most invertebrate animals—only a few invertebrates such as sponges, jellyfish, adult sea squirts and starfish do not have one, even if diffuse neural tissue is present. It is located in the head, usually close to the primary sensory organs for such senses as vision, hearing, balance, taste, and smell. The brain is the most complex organ in a



vertebrate's body. In a typical human the cerebral cortex (the largest part) is estimated to contain 15–33 billion neurons, each connected by synapses to several thousand other neurons.

These neurons communicate with one another by means of long protoplasmic fibers called axons, which carry trains of signal pulses called action potentials to distant parts of the brain or body targeting specific recipient cells. Physiologically, the function of the brain is to exert centralized control over the other organs of the body. The brain acts on the rest of the body both by generating patterns of muscle activity and by driving the secretion of chemicals called hormones. This centralized control allows rapid and coordinated responses to changes in the environment. Some basic types of responsiveness such as reflexes can be mediated by the spinal cord or peripheral ganglia, but sophisticated purposeful control of behavior based on complex sensory input requires the information-integrating capabilities of a centralized brain.

In vertebrate anatomy pen15. (or brain stem) is the posterior part of the brain, adjoining and structurally continuous with the spinal cord. It is usually described as including the medulla oblongata (myelencephalon), pons (part of metencephalon), and midbrain (mesencephalon).[1][2] Less frequently, parts of the diencephalon are included. The brainstem provides the main motor and sensory innervation to the face and neck via the cranial nerves. Though small, this is an extremely important part of the brain as the nerve connections of the motor and sensory systems from the main part of the brain to the rest of the body pass through the brainstem. This includes the corticospinal tract (motor), the posterior column-medial lemniscus pathway (fine touch, vibration sensation and proprioception) and the spinothalamic tract (pain, temperature, itch and crude touch). The brainstem also plays an important role in the regulation of cardiac and respiratory function. It also regulates the central nervous system, and is pivotal in maintaining consciousness and regulating the sleep cycle. The brainstem has many basic functions including heart rate, breathing, sleeping and eating.

Longitudinal Section of Heart

– The adult human heart has a mass of between 250 and 350 grams and is about the size of a fist. It is located anterior to the vertebral column and posterior to the sternum. It is enclosed in a double-walled sac called the pericardium. The pericardium's outer wall is called the parietal pericardium and the inner one the visceral pericardium. Between them there is some pericardial fluid which functions to permit the inner and outer walls to slide easily over one another with the heart movements. Outside the parietal pericardium is a fibrous layer called the fibrous pericardium which is attached to the mediastinal fascia. This sac protects the heart, anchors it to the surrounding structures, but has no effect on ventricular hemodynamics in a healthy person. The outer wall of the human heart is composed of



three layers; the outer layer is called the epicardium, or visceral pericardium since it is also the inner wall of the pericardium. The middle layer is called the myocardium and is composed of contractile cardiac muscle. The inner layer is called the endocardium and is in contact with the blood that the heart pumps. Also, it merges with the inner lining (endothelium) of blood vessels and covers heart valves. The human heart has four chambers, two superior atria and two inferior ventricles. The atria are the receiving chambers and the ventricles are the discharging chambers. During each cardiac cycle, the atria contract first, forcing blood that has entered them into their respective ventricles, then the ventricles contract, forcing blood out of the heart. The pathway of the blood consists of a pulmonary circuit and a systemic circuit which function simultaneously. Deoxygenated blood from the body flows via the venae cavae into the right atrium, which pumps it through the tricuspid valve into the right ventricle, whose subsequent contraction forces it out through the pulmonary valve into the pulmonary arteries leading to the lungs. Meanwhile, oxygenated blood returns from the lungs through the pulmonary veins into the left atrium, which pumps it through the mitral valve into the left ventricle, whose subsequent strong contraction forces it out through the aortic valve to the aorta leading to the systemic circulation.

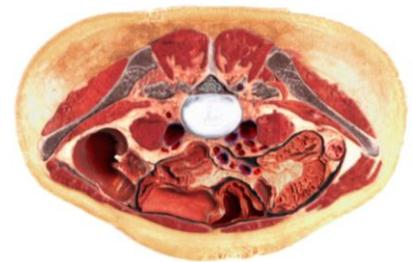
Longitudinal Section Hair

– This is a cross section longitudinally of a strand of hair. Hair is a [filamentous biomaterial](#) that grows from [follicles](#) found in the [dermis](#). Hair is one of the defining characteristics of [mammals](#). The human body, apart from areas of [glabrous skin](#), is covered in follicles which produce thick [terminal](#) and fine [vellus hair](#). Most common interest in hair is focused on [hair growth](#), hair types and [hair care](#), but hair is also an important [biomaterial](#) primarily composed of [protein](#), notably [keratin](#). Attitudes towards hair, such as [hairstyles](#) and [hair removal](#), vary widely across different cultures and historical periods, but it is often used to indicate a person's personal beliefs or social position, such as their age, gender, or religion.



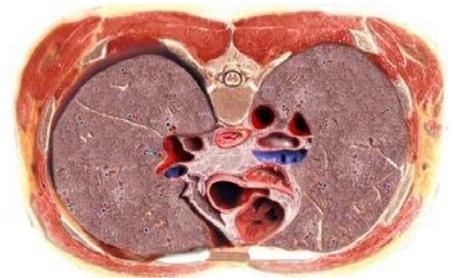
Longitudinal Section of Abdominal Cavity at Ilium Wind Level

- The **ilium** is the uppermost and largest bone of the **pelvis**, and appears in most **vertebrates** including **mammals** and **birds**, but not **bony fish**. All reptiles have an ilium except **snakes**, although some snake species have a tiny bone which is considered to be an ilium.



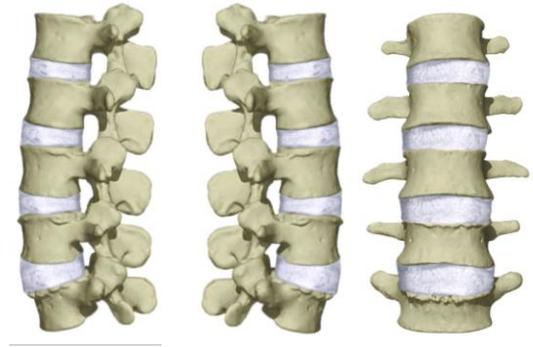
Longitudinal Section of Thorax at Fourth Dorsal Vertebra

– In [vertebrates](#), thoracic vertebrae compose the middle segment of the [vertebral column](#), between the [cervical vertebrae](#) and the [lumbar vertebrae](#).^[1] In humans, they are intermediate in size between those of the cervical and lumbar regions; they increase in size as one proceeds down the spine, the upper vertebrae being much smaller than those in the lower part of the region. They are distinguished by the presence of facets on the sides of the bodies for articulation with the heads of the ribs, and facets on the transverse processes of all, except the eleventh and twelfth, for articulation with the tubercles of the [ribs](#).. The fourth thoracic vertebra, together with the fifth, is at the same level as the [sternal angle](#). The [thoracic spinal nerve 4](#) (T4) passes out underneath it.



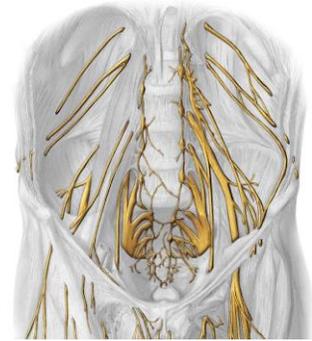
Lumbar Sector of Vertebral Column

- **Lumbar** is an adjective that means of or pertaining to the abdominal segment of the torso, between the diaphragm and the sacrum (pelvis). The **lumbar** region is sometimes referred to as the lower spine, or as an area of the back in its proximity.



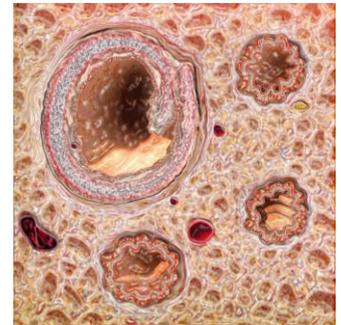
Lumbosacral Plexus

- The **lumbar plexus** is a nervous **plexus** in the **lumbar** region of the body which forms part of the **lumbosacral plexus**. It is formed by the divisions of the first four **lumbar** nerves (L1-L4) and from contributions of the subcostal nerve (T12), which is the last thoracic nerve.



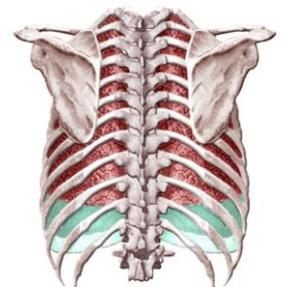
Lung Tissue

- This is a look at the individual cells of the lung. The lung is the essential respiration organ in many air-breathing animals, including most tetrapods, a few fish and a few snails. In mammals and the more complex life forms, the two lungs are located near the backbone on either side of the heart. Their principal function is to transport oxygen from the atmosphere into the bloodstream, and to release carbon dioxide from the bloodstream into the atmosphere. A large surface area is needed for this exchange of gases which is accomplished by the mosaic of specialized cells that form millions of tiny, exceptionally thin-walled air sacs called alveoli. To understand the anatomy of the lungs, the passage of air through the nose and mouth to the alveoli must be studied. The progression of air through either the mouth or the nose, travels through the nasopharynx, oropharynx, larynx, and the trachea (windpipe). The air passes down the trachea, which divides into two main bronchi; these branch to the left and right lungs where they progressively subdivide into a system of bronchi and bronchioles until the alveoli are reached. These many alveoli are where the gas exchange of carbon dioxide and oxygen takes place. Breathing is driven by muscular action; in early tetrapods, air was driven into the lungs by the pharyngeal muscles via buccal pumping, which is still found in amphibians. Reptiles, birds and mammals use their musculoskeletal system to support and foster breathing. Medical terms related to the lung often begin with pulmo-, such as in the (adjectival form: pulmonary) or from the Latin pulmonarius ("of the lungs"), or with pneumo- (from Greek πνεύμων "lung").



Lungs and Pleura, Rear View

- A **pleural cavity** is the thin fluid-filled space between the two **pleurae** (visceral and parietal) of each lung. Left and right pleural cavities surround the left and right lungs respectively. A **pleura** is a **serous membrane** which folds back onto itself to form a two-layered **membranous** structure. The outer pleura (**parietal pleura**) is attached to the **chest wall**, but is separated from it by the **endothoracic fascia**. The inner pleura (**visceral pleura**) covers the lungs and adjoining structures, including **blood vessels**, **bronchi** and **nerves**.



Lymph Node

- An oval-shaped organ of the lymphatic system, distributed widely throughout the body including the armpit and stomach and linked by lymphatic vessels.

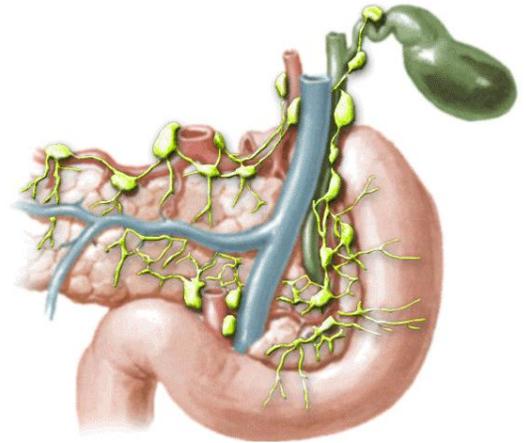
Lymph nodes are major sites of B, T, and other immune cells.



Lymph Tubes of Pancreas

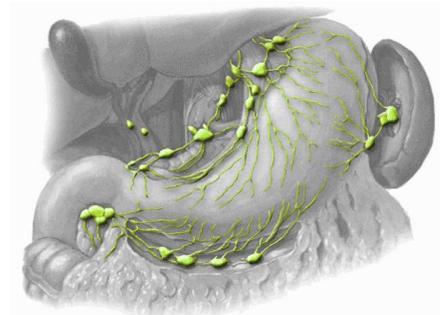
- A network of lymphatic vessels exists within the pancreas. The majority of vessels forming this network lie in the interlobular septa of connective tissue that subdivide the pancreas into lobes and lobules.

- Lymph tubes of stomach frontal wall: The **gastric lymph nodes** consist of two sets, superior and inferior.
 - paracardial outlying members of the gastric glands, disposed in a manner comparable to a chain of beads around the neck of the stomach. They receive their afferents from the stomach; their efferents pass to the celiac group of [preaortic lymph nodes](#).
 - The Inferior Gastric Glands (lymphoglandulae gastricae inferiores; right gastroepiploic gland), four to seven in number, lie between the two layers of the [greater omentum](#) along the pyloric half of the [greater curvature of the stomach](#).



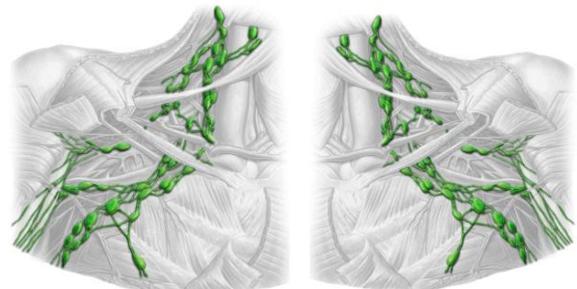
Lymph Tubes of Stomach Frontal Wall

- The **peritoneum** /[_peritən' iəm/](#) is the [serous membrane](#) that forms the lining of the [abdominal cavity](#) or [coelom](#) in [amniotes](#) and some invertebrates, such as [annelids](#). It covers most of the intra-abdominal (or coelomic) organs, and is composed of a layer of [mesothelium](#) supported by a thin layer of [connective tissue](#). The peritoneum supports the abdominal organs and serves as a conduit for their [blood vessels](#), [lymph vessels](#), and [nerves](#).



Lymph Vessels of Left & Right Axillary Area and Cervix

- The **axillary lymph nodes** or armpit **lymph nodes** (20 to 30 in number) drain **lymph** vessels from the lateral quadrants of the breast, the superficial **lymph** vessels from the walls of the chest and the abdomen above the level of the navel, and the vessels from the upper limb.



Lymphatic Node

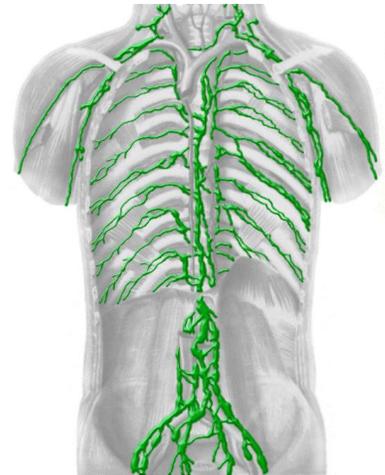
– This is a look at the individual lymphatic node. A lymph node or lymph gland is an oval-shaped organ of the immune system, distributed widely throughout the body including the armpit and stomach and linked by lymphatic vessels. Lymph nodes are garrisons of B, T, and other immunity cells. Lymph nodes act as filters or traps for foreign particles and are important in the proper functioning of the immune system. They are packed tightly with the white blood cells called lymphocytes and macrophages. Lymph nodes also have clinical significance. They become inflamed or enlarged in various conditions, which may range from trivial, such as a throat infection, to life-threatening such as cancers. In the latter, the condition of lymph nodes is so significant that it is used for cancer staging, which decides the treatment to be employed, and for determining the prognosis. When swollen, inflamed or enlarged, lymph nodes can be hard, firm or tender.



Lymphatic Vessels of the Posterior Wall of the Trunk

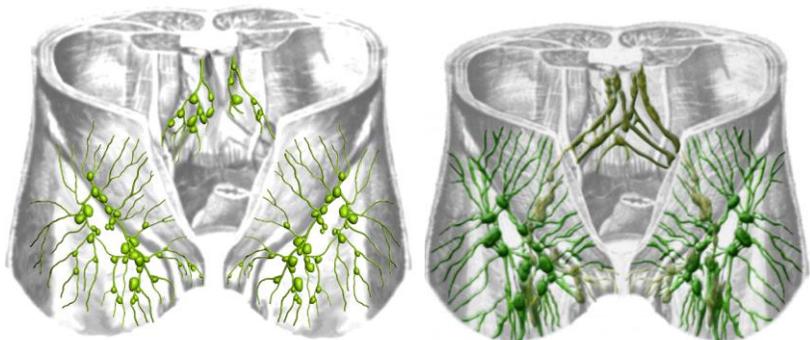
- A [lymph vessel](#) that carries lymph, and is formed by confluence of many [efferent lymph vessels](#). It in turn drains into one of the two lymph ducts ([right lymph duct](#) and the [thoracic duct](#)).

When an efferent lymph vessel leaves a lymph node, it may carry lymph to another [lymph node](#) by becoming its [afferent lymph vessel](#) or unite with other efferent vessels to become a lymph trunk. The lymph trunks drain into the lymph ducts, which in turn return lymph to the blood by emptying into the respective [subclavian veins](#).



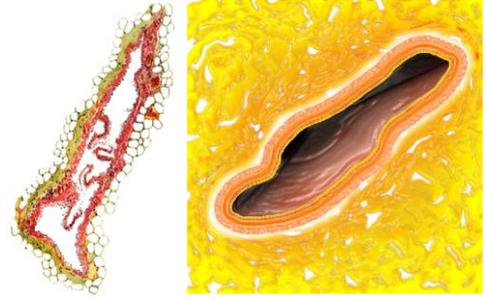
Lymph Nodes in the Groin

- This is a look at the lymph nodes in the groin area. A lymph node or lymph gland is an oval-shaped organ of the immune system, distributed widely throughout the body including the armpit and stomach and linked by lymphatic vessels. Lymph nodes are garrisons of B, T, and other immunity cells. Lymph nodes act as filters or traps for foreign particles and are important in the proper functioning of the immune system. They are packed tightly with the white blood cells called lymphocytes and macrophages. Lymph nodes also have clinical significance. They become inflamed or enlarged in various conditions, which may range from trivial, such as a throat infection, to life-threatening such as cancers. In the latter, the condition of lymph nodes is so significant that it is used for cancer staging, which decides the treatment to be employed, and for determining the prognosis. When swollen, inflamed or enlarged, lymph nodes can be hard, firm or tender. Lymph nodes can also be diagnosed by biopsy whenever they are inflamed. Certain diseases affect lymph nodes with characteristic consistency and location.

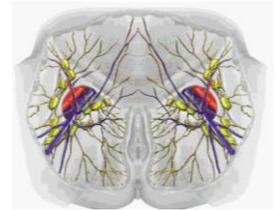


Lymphatic Vessel

- In anatomy, lymph vessels (or lymphatic vessels) are thin walled, valved structures that carry lymph. As part of the lymphatic system, lymph vessels are complementary to the cardiovascular system. Lymph vessels are lined by endothelial cells, and have a thin layer of smooth muscles, and adventitia that bind the lymph vessels to the surrounding tissue. Lymph vessels are devoted to propulsion of the lymph from the lymph capillaries, which are mainly concerned with absorption of interstitial fluid from the tissues. Lymph capillaries are slightly larger than their counterpart capillaries of the vascular system. Lymph vessels that carry lymph to a lymph node are called the afferent lymph vessel, and one that carries it from a lymph node is called the efferent lymph vessel, from where the lymph may travel to another lymph node, may be returned to a vein, or may travel to a larger lymph duct. Lymph ducts drain the lymph into one of the subclavian veins and thus return it to general circulation. Generally, lymph flows away from the tissues to lymph nodes and eventually to either the right lymphatic duct or the largest lymph vessel in the body, the thoracic duct. These vessels drain into the right and left subclavian veins respectively.

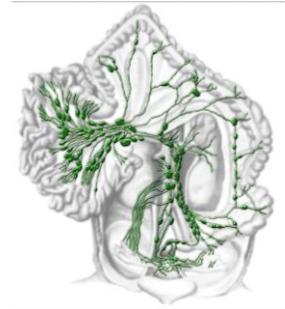


Lymphatic Vessels and Nodes of Genital Organs; Female (See Lymph Nodes in the Groin)

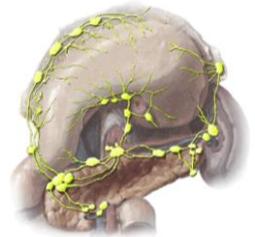


Lymphatic Vessels of Abdominal Organs

- The lymph glands of the abdomen and pelvis may be divided, from their situations, into (a) **parietal**, lying behind the peritoneum and in close association with the larger bloodvessels; and (b) **visceral**, which are found in relation to the visceral arteries.



Lymphatic Vessels of Back Stomach Wall: (See Lymph Tubes of Stomach)



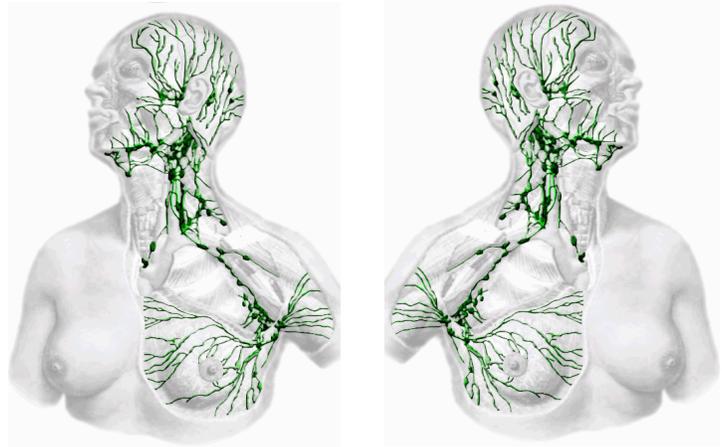
Lymphatic Vessels of Large Intestine (See Lymph Tubes of Stomach)

- Two of the principal functions of intestinal lymphatics are to assist in the maintenance of interstitial volume within relatively normal limits during alterations in capillary filtration (e.g., acute portal hypertension) and the removal of absorbed water and chylomicrons.



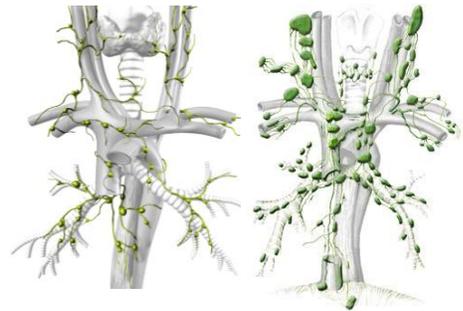
Lymphatic Vessels Mammary Gland, Head and Neck; Left Side

- In anatomy, lymph vessels (or lymphatic vessels) are thin walled, valved structures that carry lymph. As part of the lymphatic system, lymph vessels are complementary to the cardiovascular system. Lymph vessels are lined by endothelial cells, and have a thin layer of smooth muscles, and adventitia that bind the lymph vessels to the surrounding tissue. Lymph vessels are devoted to propulsion of the lymph from the lymph capillaries, which are mainly concerned with absorption of interstitial fluid from the tissues. Lymph capillaries are slightly larger than their counterpart capillaries of the vascular system. Lymph vessels that carry lymph to a lymph node are called the afferent lymph vessel, and one that carries it from a lymph node is called the efferent lymph vessel, from where the lymph may travel to another lymph node, may be returned to a vein, or may travel to a larger lymph duct. Lymph ducts drain the lymph into one of the subclavian veins and thus return it to general circulation. Generally, lymph flows away from the tissues to lymph nodes and eventually to either the right lymphatic duct or the largest lymph vessel in the body, the thoracic duct. These vessels drain into the right and left subclavian veins respectively.

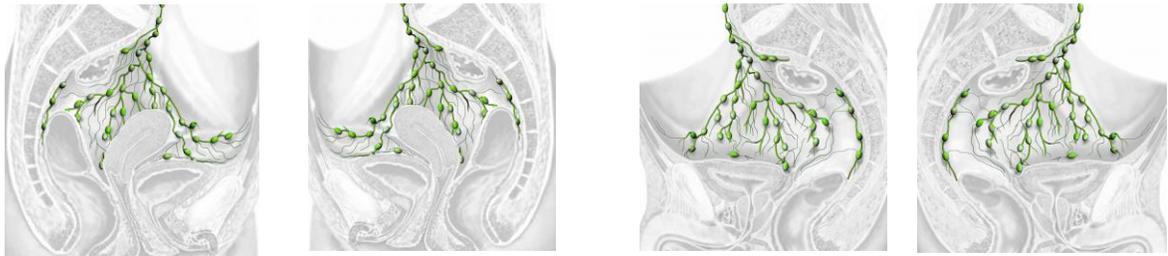


Lymphatic Vessels Mediastinum

– A look at the lymphatic flow in the central compartment of the central chest. The mediastinum is an undelineated group of structures in the thorax, surrounded by loose connective tissue. It is the central compartment of the thoracic cavity. It contains the heart, the great vessels of the heart, the esophagus, the trachea, the phrenic nerve, the cardiac nerve, the thoracic duct, the thymus, and the lymph nodes of the central chest.



Lymphatic Vessels of Pelvis: Man and Woman (See Lymphatic Vessels of Abdominal Organs)



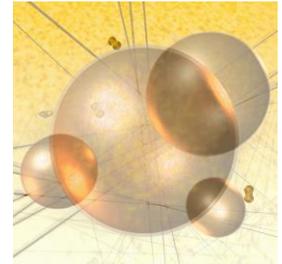
Lymphocyte

- A lymphocyte is a kind of [white blood cell](#) in the [vertebrate immune system](#), specifically, a landmark of the [adaptive immune system](#). Under the [microscope](#), lymphocytes can be divided into large lymphocytes and small lymphocytes. Large granular lymphocytes include [natural killer cells](#) (NK cells). Small lymphocytes consist of [T cells](#) and [B cells](#).



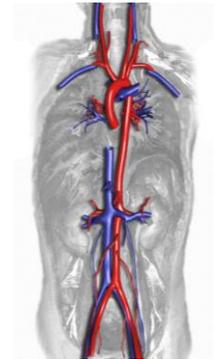
Lysosomes

- **Lysosomes** are membrane-enclosed organelles that contain an array of enzymes capable of breaking down all types of biological polymers—proteins, nucleic acids, carbohydrates, and lipids.



Main Vessel of the Trunk

– This is a look at the arteries and veins of the body. The blood vessels are the part of the circulatory system that transports blood throughout the body. There are three major types of blood vessels: the arteries, which carry the blood away from the heart; the capillaries, which enable the actual exchange of water and chemicals between the blood and the tissues; and the veins, which carry blood from the capillaries back toward the heart.



Male Urinary Bladder; From Behind

- The urinary bladder is the organ that collects urine excreted by the kidneys before disposal by urination. A hollow muscular, and distensible (or elastic) organ, the bladder sits on the pelvic floor. Urine enters the bladder via the ureters and exits via the urethra. Bladders occur throughout much of the animal kingdom, but are very diverse in form and in some cases are not homologous with the urinary bladder in humans. The human urinary bladder is derived in embryo from the urogenital sinus and, it is initially continuous with the allantois. In males, the base of the bladder lies between the rectum and the pubic symphysis. It is superior to the prostate, and separated from the rectum by the rectovesical excavation. In females, the bladder sits inferior to the uterus and anterior to the vagina; thus, its maximum capacity is lower than in males. It is separated from the uterus by the vesicouterine excavation. In infants and young children, the urinary bladder is in the abdomen even when empty.



Mammary Gland Duct, Left and Right

The basic components of a mature mammary gland are the *alveoli* (hollow cavities, a few millimeters large) lined with milk-secreting [cuboidal cells](#) and surrounded by [myoepithelial cells](#). These alveoli join to form groups known as *lobules*. Each lobule has a [lactiferous duct](#) that drains into openings in the [nipple](#). The myoepithelial cells contract under the stimulation of [oxytocin](#), excreting the milk secreted by alveolar units into the lobule lumen toward the nipple.



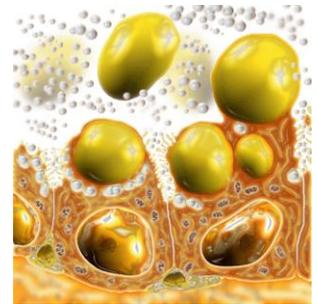
As the infant begins to suck, the oxytocin-mediated "let down reflex" ensues and the mother's milk is secreted — not sucked from the gland — into the baby's mouth.

All the milk-secreting tissue leading to a single lactiferous duct is called a "simple mammary gland"; in a "complex mammary gland" all the simple mammary glands serve one nipple. Humans normally have two complex mammary glands, one in each breast, and each complex mammary gland consists of 10–20 simple glands. The presence of more than two nipples is known as [polythelia](#) and the presence of more than two complex mammary glands as [polymastia](#).

Maintaining the correct polarized morphology of the lactiferous duct tree requires another essential component — mammary epithelial cells [extracellular matrix](#) (ECM) which, together with [adipocytes](#), [fibroblast](#), inflammatory cells, and others, constitute mammary stroma.^[4]

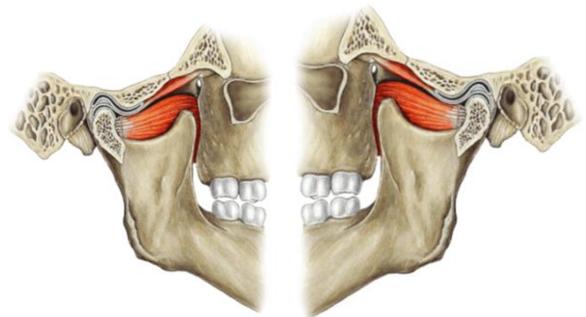
Mammary Gland Epithelium

-Mammary epithelial ECM mainly contains myoepithelial [basement membrane](#) and the connective tissue. They not only help to support mammary basic structure, but also serve as a communicating bridge between mammary epithelia and their local and global environment throughout this organ's development.



Mandibular Joint, Left and Right

- Or **inferior maxillary bone** is the largest, strongest and lowest bone in the face.^[3] It forms the lower **jaw** and holds the lower **teeth** in place. In the midline on the anterior surface of the mandible is a faint ridge, an indication of the mandibular symphysis, where the bone is formed by the fusion of right and left processes during mandibular development. Like other symphysis in the body, this is a midline articulation where the bones are joined by fibrocartilage, but this articulation fuses together in early childhood.



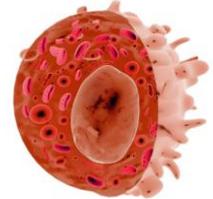
Man's Body, the Back

- The large **posterior** area of the **human body**, rising from the top of the **buttocks** to the back of the **neck** and the shoulders. It is the surface opposite to the **chest**, its height being defined by the **vertebral column** (commonly referred to as the *spine* or *backbone*) and its breadth being supported by the **ribcage** and **shoulders**. The **spinal canal** runs through the spine and provides nerves to the rest of the body.



Mast Cell

- A **mast cell** (also known as a mastocyte or a labrocyte) is derived from the myeloid stem **cell**. It is a part of the immune system and contains many granules rich in histamine and heparin.



Maxillary

- Are the two **maxilla** bones forming the upper **jaw** and **palate** of the mouth.^{[3][4]} The two halves are fused at the intermaxillary suture to form the upper jaw. This is similar to the **mandible** (lower jaw), which is also a fusion of two halves at the mandibular symphysis.

Sometimes (e.g. in bony fish), the maxilla is called "upper maxilla," with the mandible being the "lower maxilla." Conversely, in birds the upper jaw is often called "upper mandible."



Medial Surface of Cerebrum , Left and Right

- Surface that faces, above as well as anterior and posterior to, the corpus callosum, the falx cerebri; below it are the mesencephalon and the dura-covered medial wall of the middle cranial fossa.



Median Sagittal Section of Cervical Vertebrae, Left & Right

- Cervical vertebrae are the smallest of the true vertebrae, and can be readily distinguished from those of the thoracic or lumbar regions by the presence of a **foramen** (hole) in each **transverse process**, through which passes the **vertebral artery**.



Median Sagittal Section of Inferior Sector of Vertebral Column

- **Thoracic** vertebrae compose the middle segment of the **vertebral column**, between the **cervical vertebrae** and the **lumbar vertebrae**.^[1] In humans, there are twelve thoracic vertebrae and they are intermediate in size between the cervical and lumbar vertebrae; they increase in size going towards the lumbar vertebrae, with the lower ones being a lot larger than the upper.

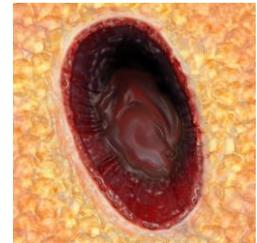


Median Sagittal Section of Thoracic Vertebrae; Left & Right View: (See Above)



Medium Calibre Vein:

- Meissner's Corpuscles: a type of **mechanoreceptor**.^[1] They are a type of **nerve** ending in the **skin** that is responsible for sensitivity to light **touch**. In particular, they have highest sensitivity (lowest threshold) when sensing vibrations between 10 and 50 **Hertz**. They are **rapidly adaptive receptors**. They are most concentrated in thick hairless skin, especially at the finger pads.



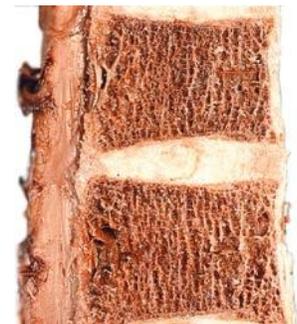
Membranes of the Spinal Marrow

- **Membranes** that envelop the **brain** and **spinal cord** of the **central nervous system**. In mammals, the meninges consist of three layers: the **dura mater**, the **arachnoid mater**, and the **pia mater**. The primary function of the meninges and of the **cerebrospinal fluid** is to protect the central nervous system.



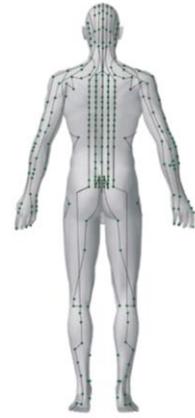
Median Sagittal Incision of Vertebral Bodies

- The terms median plane or mid-sagittal plane are sometimes used to describe the sagittal plane running through the midline. This plane cuts the body into halves (assuming bilateral symmetry),^[2] passing through midline structures such as the navel and spine. It is one of the lines defining the right upper quadrant of the human abdomen. The term parasagittal is used to describe any plane parallel to the sagittal plane. In practice, such a section is often referred to simply as a "sagittal" view because viewing is achieved along the sagittal axis (see below). Due to the specific nature of its definition, only one true sagittal plane exists, and it corresponds to the "mid-sagittal" view. Be aware that the term "sagittal view" may be applied to any parasagittal section as well as the sagittal plane, as the parasagittal and sagittal axes are identical (parallel to the sagittal plane).



Meridian of Colon

-Meridian Acupuncture point based on Chinese Medicine.



Meridian of Lungs

-Meridian Acupuncture point based on Chinese Medicine.



Mesothelium

- A membrane composed of simple squamous cells that forms the lining of several body cavities: the pleura (thoracic cavity), peritoneum (abdominal cavity including the mesentery) and pericardium (heart sac).

Midriff: front part of the human body between the **chest** (also called the **thorax** or bosom) and the **pelvis** or **hips**.



Midriff Longitudinal Section

– A longitudinal section through the midriff of the body.



Mitochondrions

- A double **membrane**-bound **organelle** found in most **eukaryotic cells**. The most prominent roles of mitochondria are to produce the energy currency of the cell, **ATP** (i.e., phosphorylation of **ADP**), through respiration, and to regulate cellular **metabolism**.



Molar Tooth

- The **molars** or **molar teeth** are the most posterior and most complicated kind of **tooth** in most mammals. In many mammals, they are used to grind food during chewing; hence the Latin name mola, "millstone".



Monocyte

- Monocytes are a type of white blood cell and are part of the innate immune system of vertebrates including all mammals (humans included), birds, reptiles, and fish. Monocytes play multiple roles in immune function. Such roles include: (1) replenish resident macrophages and dendritic cells under normal states, and (2) in response to inflammation signals, monocytes can move quickly (approx. 8–12 hours) to sites of infection in the tissues and divide/differentiate into macrophages and dendritic cells to elicit an immune response. Half of them are stored in the spleen.



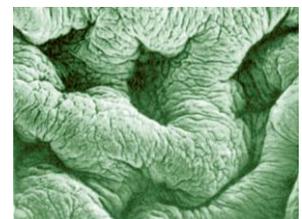
Mucocytus

– Mucocytus or Myocyte is a muscle cell, from myo-, muscle + - cyte, cell = muscle cell.



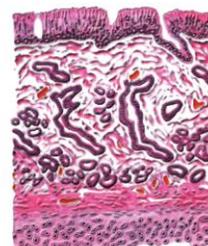
Mucosa of Bladder

- The innermost layer of the bladder is the mucosa layer that lines the hollow lumen. Unlike the mucosa of other hollow organs, the urinary bladder is lined with transitional epithelial tissue that is able to stretch significantly to accommodate large volumes of urine. The transitional epithelium also provides protection to the underlying tissues from acidic or alkaline urine. Surrounding the mucosal layer is the submucosa, a layer of connective tissue with blood vessels and nervous tissue that supports and controls the surrounding tissue layers.



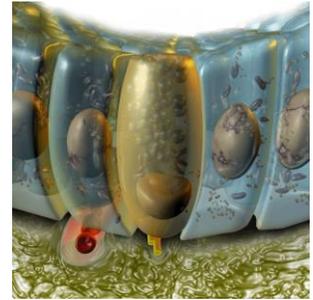
Mucosal Nasal

– A look at the cells of the mucous membrane, which is the tissue that lines the nasal cavity.



Mucous Gland

- **Mucous glands**, found in several different parts of the body, typically stain lighter than serous **glands** during standard histological preparation. Most are multicellular, but goblet cells are single-celled **glands**.



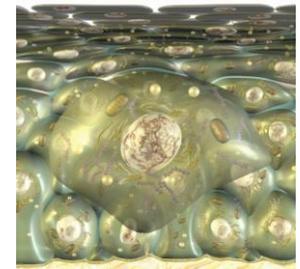
Multi Layer Flat Keratotic Epithelium

- Actinic keratosis, also known as solar keratosis or senile keratosis, is a very common lesion occurring in susceptible persons as a result of prolonged and repeated solar exposures. The action of ultraviolet radiant energy, principally UVB, results in damage to the keratinocytes and produces single or multiple, discrete, dry, rough, adherent scaly lesions. These premalignant lesions may, in time, progress to squamous cell carcinomas.



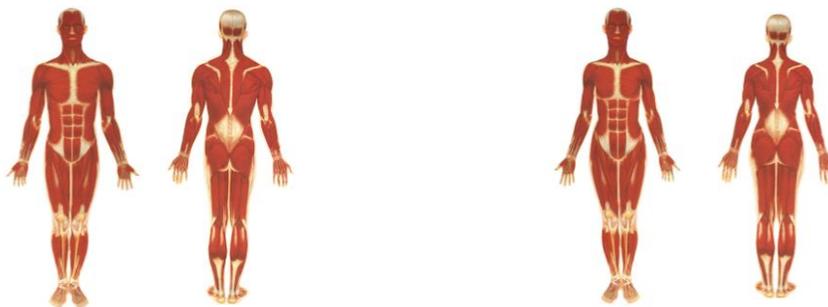
Multi Layer Flat Non-Keratotic Epithelium

- A Non-Keratotic Epithelium would indicate a non-cancerous skin growth.



Muscles of Body; Front and Back Views, Man and Woman (see above)

- Muscles of the Body, from behind: The muscles of the human body can be categorized into a number of groups which include muscles relating to the head and neck, muscles of the torso or trunk, muscles of the upper limbs, and muscles of the lower limbs.



Myocyte

- A **myocyte** (also known as a muscle cell or muscle fiber) is the type of cell found in muscle tissue. **Myocytes** are long, tubular cells that develop from myoblasts to form muscles in a process known as myogenesis.

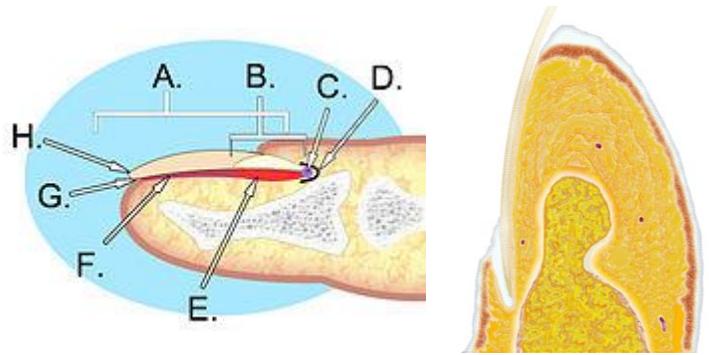


Nail

- The **matrix**, sometimes called^[2] the *matrix unguis*, keratogenous membrane, nail matrix, or onychostroma, is the **tissue** (or **germinal matrix**) which the nail protects.^[3] It is the part of the nail bed that is beneath the nail and contains **nerves**, **lymph** and **blood vessels**.^[4] The matrix is responsible for producing cells that become the nail plate. The width and thickness of the nail plate is determined by the size, length, and thickness of the matrix, while the shape of the fingertip itself shows if the nail plate is flat, arched or hooked.^[5] The matrix will continue to grow as long as it receives nutrition and remains in a healthy condition.^[4] As new nail plate cells are made, they push older nail plate cells forward; and in this way older cells become compressed, flat, and translucent. This makes the capillaries in the nail bed below visible, resulting in a pink color.^[6]

The **lunula** ("small moon") is the visible part of the matrix, the whitish crescent-shaped base of the visible nail.^[7] The lunula can best be seen in the thumb and may not be visible in the little finger.

A. Nail plate; B. lunula; C. root; D. sinus; E. matrix; F. nail bed; G. hyponychium; H. free margin.



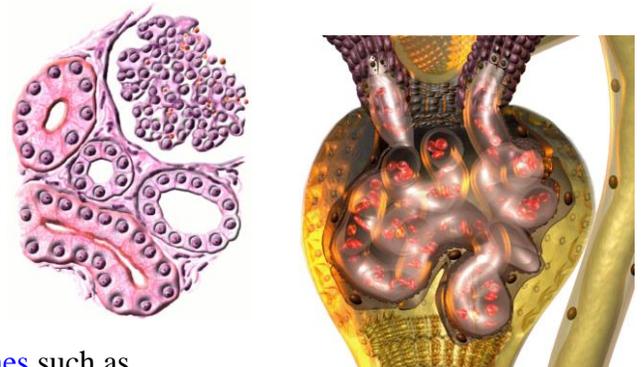
Neurocyte

- Is any kind of nerve cell and part of the nervous system.



Nephron

- Nephron (from **Greek** νεφρός - nephros, meaning "kidney") is the basic structural and functional unit of the **kidney**. Its chief function is to regulate the **concentration** of **water** and soluble substances like **sodium salts** by filtering the **blood**, reabsorbing what is needed and excreting the rest as **urine**. A nephron eliminates wastes from the body, regulates **blood volume** and **blood pressure**, controls levels of **electrolytes** and **metabolites**, and regulates blood **pH**. Its functions are **vital** to **life** and are regulated by the **endocrine system** by **hormones** such as **antidiuretic hormone**, **aldosterone**, and **parathyroid hormone**. In humans, a normal kidney contains 800,000 to 1.5 million nephrons.



Nerve

-A bundle of fibers that uses electrical and chemical signals to transmit sensory and motor information from one body part to another. The fibrous portions of a nerve are covered by a sheath called myelin and/or a membrane called neurilemma. (Note that entries for specific nerves can be found under the names of the particular nerves. For example, the optic nerve is not under 'nerve, optic' but rather under 'optic nerve.')



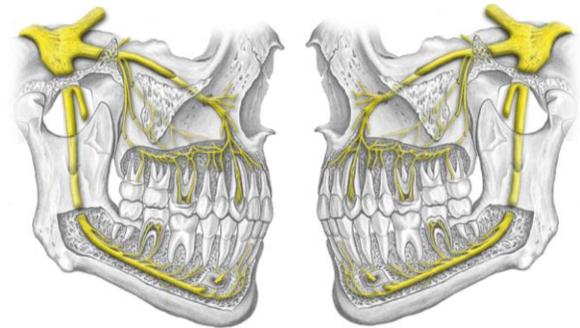
Nerve Bundle

- A small bundle of [nerve fibers](#), enclosed by the [perineurium](#); if the [nerve](#) is of small size, it may consist only of a single fasciculus; but if large, the fasciculi are collected together into larger bundles or [funiculi](#), which are bound together in a common membranous investment.



Nerves of Maxilla and Mandible, Left & Right

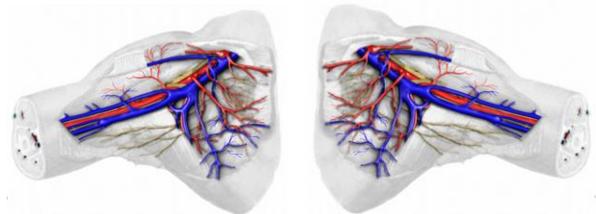
-The **maxillary nerve** (CN V₂) is one of the three branches or divisions of the [trigeminal nerve](#), the fifth (V) [cranial nerve](#). It comprises the principal functions of sensation from the [maxillary](#), [nasal cavity](#), [sinuses](#), the [palate](#) and subsequently that of the mid-face,^[1] and is intermediate, both in position and size, between the [ophthalmic nerve](#) and the [mandibular nerve](#).^[2] Its function is the transmission of sensory fibers from the maxillary teeth, the skin between the [palpebral fissure](#) and the [mouth](#), and from the nasal cavity and sinuses.^[3]



Nerves and Vessels of Left & Right Brachium

-The main artery in the arm is the [brachial artery](#). This artery is a continuation of the [axillary artery](#). The point at which the axillary becomes the brachial is distal to the lower border of teres major. The [brachial artery](#) gives off an important branch, the [deep artery of arm](#). This branching occurs just below the lower border of [teres major](#).

The brachial artery continues to the [cubital fossa](#) in the anterior compartment of the arm. It travels in a plane between the [biceps](#) and [triceps](#) muscles, the same as the [median nerve](#) and [basilic vein](#). It is accompanied by [venae comitantes](#) (accompanying veins). It gives branches to the muscles of the anterior compartment. The artery is in between the [median nerve](#) and the tendon of the [biceps](#) muscle in the [cubital fossa](#). It then continues into the [forearm](#).



Nerves of Back

-Nerves extend from your [brain](#) and spinal cord, sending important messages throughout your body. If you have a [pinched nerve](#) (nerve compression) your body may send you warning signals such as pain. Don't ignore these warning signals.

Damage from a pinched nerve may be minor or severe. It may cause temporary or long-lasting problems. The earlier you get a diagnosis and treatment for nerve compression, the more quickly you'll find relief.

In some cases, you can't reverse the damage from a pinched nerve. But treatment usually relieves pain and other symptoms.

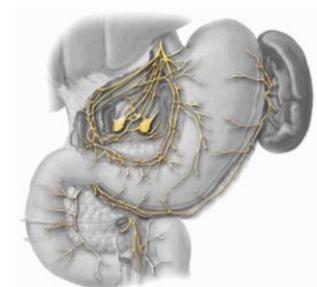


Nerves of Stomach

-**Abdominal nerve plexus,**

a large plexus of sympathetic nerves in the abdomen behind the stomach.

"Nervous stomach" isn't a specific diagnosis or a recognized disease. Some doctors may use the term to generally describe symptoms of indigestion, nausea, bloating or changes in bowel habits — especially after diagnostic tests fail to reveal a specific cause, such as an ulcer or gallstones.



Neuro-Vessel Fascicle

- A Neurovascular bundle (Neuro: [Nerve](#), Vascular: [Veins](#), [Lymph vessels](#) and [arteries](#)) is a term applied to the body [nerves](#), arteries, veins and lymphatics that tend to travel together in the body. As arteries do not travel within the [superficial fascia](#) (loose [connective tissue](#) under the skin), superficial neurovascular [bundles](#) differ from deep neurovascular bundles in both composition and function. For example, in [Thoracic Outlet Syndrome](#), the neurovascular bundle containing the [Subclavian Artery](#) and the [Brachial Plexus](#) is compressed.



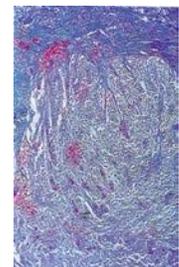
Neurocyte

– Is any kind of nerve cell and part of the nervous system.



Neurohypophysis

- The posterior pituitary (or neurohypophysis) comprises the [posterior](#) lobe of the [pituitary gland](#) and is part of the [endocrine system](#). Despite its name, the posterior pituitary gland is not a gland, *per se*; rather, it is largely a collection of [axonal](#) projections from the [hypothalamus](#) that terminate behind the [anterior pituitary gland](#). It is where [neurohypophysial hormones](#) are stored and released.



Neurosensory Cells

- a type of [neuron](#), or nerve [cell](#), whose function is to translate neural signals into chemical stimuli. Such cells produce secretions called [neurohormones](#) that travel along the [neuronaxon](#) and are typically released into the bloodstream at neurohemal organs, regions in which the [axonendings](#) are in close contact with blood capillaries. Neurosecretory cells are present in most multicellular animals and are usually distinguished from other neurons by the unusually large size of the cell nucleus, axon endings, and the cell itself.



Neutrophil

- Neutrophil granulocytes are the most abundant type of white blood cells in mammals and form an essential part of the innate immune system. In general, they are referred to as either neutrophils or polymorphonuclear leukocytes (or PMNs), and are subdivided into segmented neutrophils (or segs) and banded neutrophils (or bands). They form part of the polymorphonuclear cell family (PMNs) together with basophils and eosinophils. Whereas basophilic white blood cells stain dark blue and eosinophilic white blood cells stain bright red, neutrophils stain a neutral pink. Normally, neutrophils contain a nucleus divided into 2–5 lobes. Neutrophils are a type of phagocyte and are normally found in the blood stream. During the beginning (acute) phase of inflammation, particularly as a result of bacterial infection, environmental exposure, and some cancers, neutrophils are one of the first-responders of inflammatory cells to migrate towards the site of inflammation. They migrate through the blood vessels, then through interstitial tissue, following chemical signals such as Interleukin-8 (IL-8), C5a, fMLP and Leukotriene B4 in a process called chemotaxis. They are the predominant cells in pus, accounting for its whitish/yellowish appearance. Neutrophils are recruited to the site of injury within minutes following trauma and are the hallmark of acute inflammation.



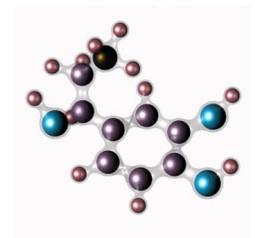
Ninth Thoracic Vertebra

- **The ninth thoracic vertebra (T9)** communicates directly with the adrenal glands via nerves. Although rare, displacement of the T9 vertebra may cause severe symptoms in the kidney area, as the adrenal glands rest on the kidneys. The risk for displacement usually occurs in individuals over 40 years old, and is often associated with common, age-related degenerative changes.



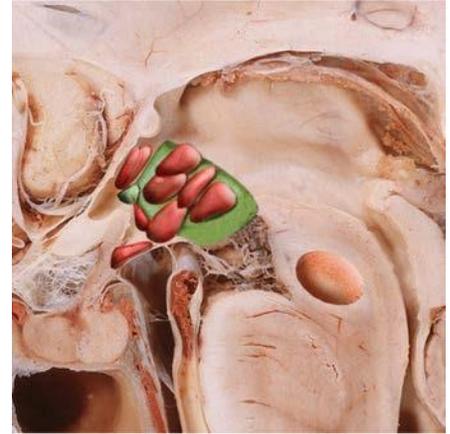
Noradrenalinum

– Also called **noradrenaline** is a **catecholamine** with multiple roles including those as a **hormone** and a **neurotransmitter**.^[1] It is the hormone and neurotransmitter most responsible for **vigilant concentration** in contrast to the chemically similar hormone, **dopamine**, which is most responsible for **cognitive alertness**. Nucleolus: The **nucleolus** is the nuclear subdomain that assembles ribosomal subunits in eukaryotic cells. The nucleolar organiser regions of chromosomes, which contain the genes for pre-ribosomal ribonucleic acid (rRNA), serve as the foundation for nucleolar structure.



Nucleus of the Hypothalamus

- The hypothalamus (from Greek ὑπό = under and θάλαμος = room, chamber) is a portion of the brain that contains a number of small nuclei with a variety of functions. One of the most important functions of the hypothalamus is to link the nervous system to the endocrine system via the pituitary gland (hypophysis). The hypothalamus is located below the thalamus, just above the brain stem. In the terminology of neuroanatomy, it forms the ventral part of the diencephalon. All vertebrate brains contain a hypothalamus. In humans, it is roughly the size of an almond.



The hypothalamus is responsible for certain metabolic processes and other activities of the autonomic nervous system. It synthesizes and secretes certain neurohormones, often called hypothalamic-releasing hormones, and these in turn stimulate or inhibit the secretion of pituitary hormones. The hypothalamus controls body temperature, hunger, important aspects of parenting and attachment behaviors, thirst, fatigue, sleep, and circadian cycles.

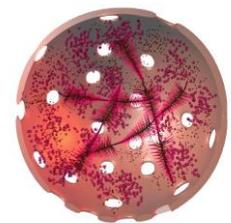
Nuclei of Cranial Nerves; Back

- A cranial nerve nucleus is a collection of neurons (gray matter) in the brain stem that is associated with one or more cranial nerves. Axons carrying information to and from the cranial nerves form a synapse first at these nuclei. Lesions occurring at these nuclei can lead to effects resembling those seen by the severing of nerve(s) they are associated with. All the nuclei except that of the IV nerve supply nerves of the same side of the body.



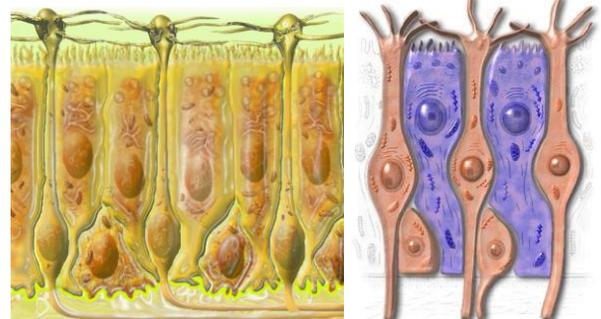
Nucleous

-An organelle in the cytoplasm of eukaryotic cells (all cells except prokaryotes) that contains nearly all the cell's DNA and controls its metabolism, growth, and reproduction.



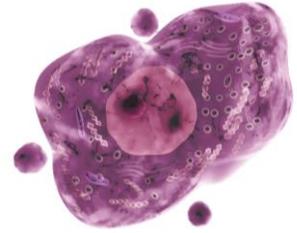
Olfactory Epithelium

- The olfactory epithelium is a specialized epithelial tissue inside the nasal cavity that is involved in smell. In humans, it measures about 3 square centimeters (on each side) and lies on the roof of the nasal cavity about 7 cm above and behind the nostrils. The olfactory epithelium is the part of the olfactory system directly responsible for detecting odors.



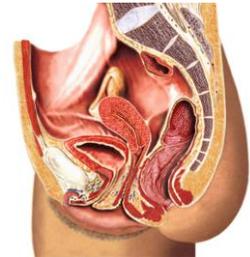
Oligodendrocyte

- Their main functions are to provide support and insulation to **axons** in the **central nervous system** of some **vertebrates**, equivalent to the function performed by **Schwann cells** in the **peripheral nervous system**.



Organs of Female Small Pelvis

- Consists of a number of **sex organs** that form a part of the **human reproductive** process. In this type of reproductive system, these sex organs are located outside the body, around the **pelvic** region.



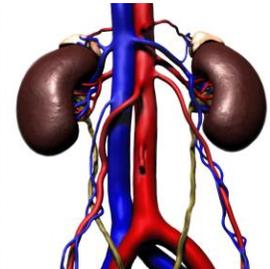
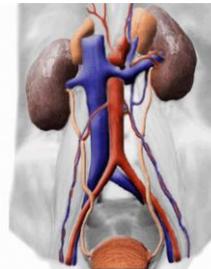
Organs of Male Small Pelvis

- Consists of a number of **sex organs** that form a part of the **human reproductive** process. In this type of reproductive system, these sex organs are located outside the body, around the **pelvic** region.



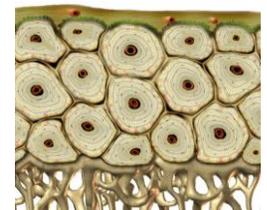
Organs of Retroperitoneal Space

- The **anatomical space** (sometimes a **potential space**) in the **abdominal cavity** behind (*retro*) the **peritoneum**. It has no specific delineating anatomical structures. Organs are retroperitoneal if they have peritoneum on their anterior side only. Structures that are not suspended by **mesentery** in the abdominal cavity and that lie between the parietal peritoneum and abdominal wall are classified as retroperitoneal.



Osseous Tissue

- Bone **tissue**, or **Osseous tissue**, is the major structural and supportive connective **tissue** of the body. Bone **tissue** forms the rigid part of the bones that make up the skeleton.



Osteoblast

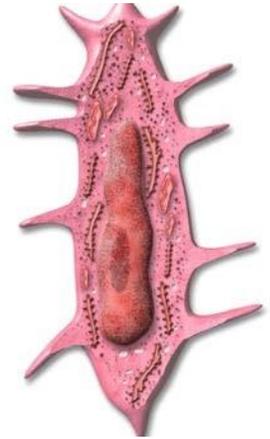
- **Cells** with single **nuclei** that synthesize **bone**. However, in the process of **bone formation**, osteoblasts function in groups of connected cells. Individual cells cannot make bone, and the group of organized osteoblasts together with the bone made by a unit of cells is usually called the **osteon**.



Osteocyte

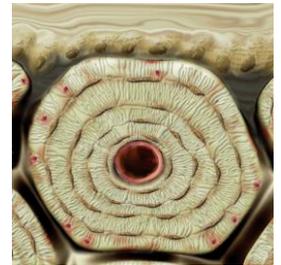
- An osteocyte, a star shaped cell, is the most commonly found cell in mature bone, and can live as long as the organism itself. Osteocytes have an average half life of 25 years, they do not divide, and they are derived from osteoprogenitors, some of which differentiate into active osteoblasts. In mature bone, osteocytes and their processes reside inside spaces called lacunae and canaliculi, respectively. Cells contain a nucleus and a thin ring piece of cytoplasm. When osteoblasts become trapped in the matrix that they secrete, they become osteocytes. Osteocytes are networked to each other via long cytoplasmic extensions that occupy tiny canals called canaliculi, which are used for exchange of nutrients and waste through gap junctions.

The space that an osteocyte occupies is called a lacuna (Latin for a pit). Although osteocytes have reduced synthetic activity and (like osteoblasts) are not capable of mitotic division, they are actively involved in the routine turnover of bony matrix, through various mechanosensory mechanisms. They destroy bone through a rapid, transient (relative to osteoclasts) mechanism called osteocytic osteolysis. Osteoblasts/osteocytes develop in mesenchyme. Hydroxyapatite, calcium carbonate and calcium phosphate is deposited around the cell.



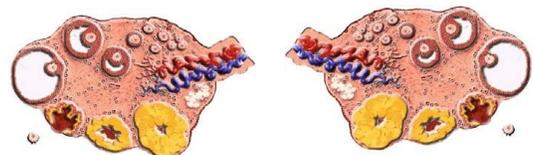
Osteon

- Is the fundamental functional unit of much **compact bone**. Osteons are roughly cylindrical structures that are typically several millimeters long and around 0.2mm in diameter.



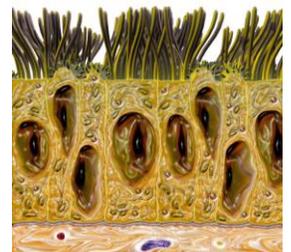
Ovary; Left and Right

- The ovary is an ovum-producing reproductive organ, often found in pairs as part of the vertebrate female reproductive system. Ovaries in female individuals are analogous to testes in male individuals, in that they are both gonads and endocrine glands.



Oviduct Epithelium

-An oviduct is a tube through which an ova passes from the ovary to the uterus, or from the ovary to the outside of the organism. The oviduct epithelium is the specialized epithelium that lines the oviduct.



Ovule

- Ovule means "small [egg](#)". In [seed plants](#), the ovule is the structure that gives rise to and contains the female reproductive cells. It consists of three parts: The integument(s) forming its outer layer(s), the nucellus (or remnant of the [megasporangium](#)), and the megaspore-derived female gametophyte (or [megagametophyte](#)) in its center. The megagametophyte (also called embryo sac in [flowering plants](#)) produces an [egg cell](#) (or several egg cells in some groups) for [fertilization](#). After fertilization, the ovule develops into a [seed](#).



Ovum

-A mature female reproductive cell, especially of a human or other animal, that can divide to give rise to an embryo usually only after fertilization by a male cell.



Oxyphil Cell of the Parathyroid Gland

- These cells can be found in clusters in the center of the section and at the periphery. Oxyphil cells appear at the onset of puberty, but have no known function. With **nuclear medicine** scans, they selectively take up the **Technetium-sestamibi** complex radiotracer dye to allow delineation of glandular anatomy.^[6] Oxyphil cells have been shown to express parathyroid-relevant genes found in the chief cells and have the potential to produce additional autocrine/paracrine factors, such as **Parathyroid hormone-related protein (PTHrP)** and calcitriol.



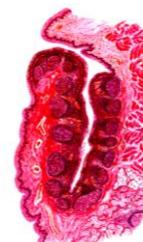
Pacinian Corpuscle

- One of the four major types of **mechanoreceptor**. They are **nerve** endings in the **skin** responsible for sensitivity to **vibration** and **pressure**.^[1] They respond only to sudden disturbances and are especially sensitive to vibration.^[2] The vibrational role may be used to detect surface texture, e.g., rough vs. smooth. Lamellar corpuscles are also found in the **pancreas**, where they detect vibration and possibly very low frequency sounds.^[3] Lamellar corpuscles act as very rapidly adapting mechanoreceptors. Groups of corpuscles respond to pressure changes, e.g. on grasping or releasing an object.



Palatine Tonsil

- Occasionally called the **faucial tonsils**,^[2] are the [tonsils](#) on the left and right sides at the back of the [throat](#), which can often be seen as flesh-colored, pinkish lumps. Tonsils only present as "white lumps" if they are inflamed or infected with symptoms of exudates (pus drainage) and severe swelling.



Pancreas and Spleen, Front View

- The pancreas /'pæŋkriəs/ is a glandular organ in the digestive system and endocrine system of vertebrates. It is both an endocrine gland producing several important hormones, including insulin, glucagon, somatostatin, and pancreatic polypeptide, and a digestive organ, secreting pancreatic juice containing digestive enzymes that assist the absorption of nutrients and the digestion in the small intestine. These enzymes help to further break down the carbohydrates, proteins, and lipids in the chyme.

The spleen (from Greek σπλήν—splḗn) is an organ found in virtually all vertebrate animals. Similar in structure to a large lymph node, it acts primarily as a blood filter—so it is possible to remove the spleen without jeopardizing life.

The spleen plays important roles in regard to red blood cells (also referred to as erythrocytes) and the immune system. It removes old red blood cells and holds a reserve of blood in case of hemorrhagic shock and also recycles iron. As a part of the mononuclear phagocyte system, it metabolizes hemoglobin removed from senescent erythrocytes. The globin portion of hemoglobin is degraded to its constitutive amino acids, and the chyme portion is metabolized to bilirubin, which is removed in the liver. The spleen synthesizes antibodies in its white pulp and removes antibody-coated bacteria and antibody-coated blood cells by way of blood and lymph node circulation. A study published in 2009 using mice found that the spleen contains, in its reserve, half of the body's monocytes within the red pulp. These monocytes, upon moving to injured tissue (such as the heart), turn into dendritic cells and macrophages while promoting tissue healing. The spleen is a center of activity of the reticuloendothelial system and can be considered analogous to a large lymph node, as its absence causes a predisposition to certain infections. In humans, the spleen is brownish in color and is located in the left upper quadrant of the abdomen.

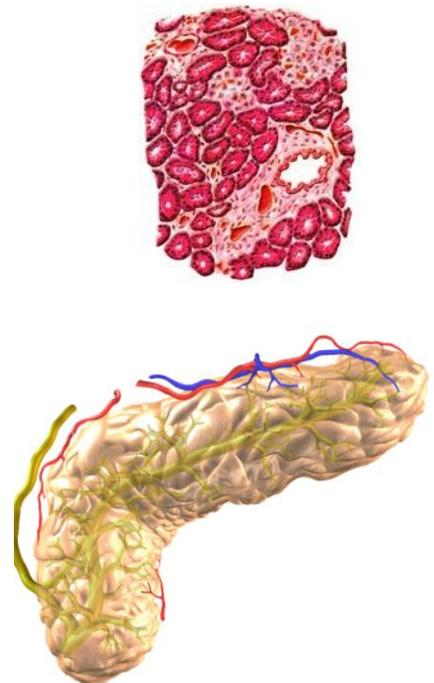


Pancreas Tissue

– A close look at the tissue of the pancreas.

Pancreas, Front View

- A **glandular organ** in the **digestive system** and **endocrine system** of **vertebrates**. In humans, it is located in the **abdominal cavity** behind the **stomach**. It is an **endocrine gland** producing several important **hormones**, including **insulin**, **glucagon**, **somatostatin**, and **pancreatic polypeptide** which circulate in the blood. The pancreas is also a digestive organ, secreting **pancreatic juice** containing **digestive enzymes** that assist digestion and absorption of nutrients in the **small intestine**. These **enzymes** help to further break down the **carbohydrates**, **proteins**, and **lipids** in the **chyme**.



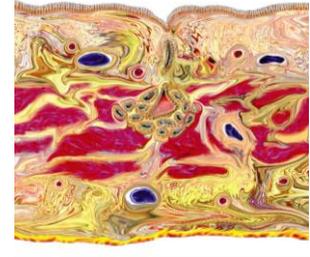
Pancreatic Acinus

- Acinar cells are the exocrine (exo=outward) cells of the pancreas that produce and transport enzymes that are passed into the duodenum where they assist in the digestion of food.



Pancreatic Duct Wall

- Or **duct of Wirsung** (also, the **major pancreatic duct** due to the existence of an **accessory pancreatic duct**), is a duct joining the **pancreas** to the **common bile duct** to supply **pancreatic juices** which aid in **digestion** provided by the **exocrine pancreas**.



Pancreatic Endocrynocutes

- Are specialized **endocrine cells** of the **gastrointestinal tract** and **pancreas**. They produce **gastrointestinal hormones** or peptides in response to various stimuli and release them into the bloodstream for systemic effect, diffuse them as **local messengers**, or transmit them to the **enteric nervous system** to activate nervous responses.



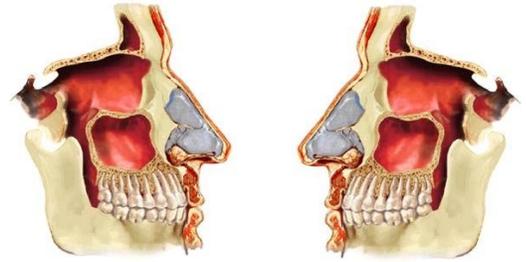
Pancreatitis – Duodenal Zone, Front

– A look at the area of the duodenum area. The duodenum [/ˌduːəˈdɪnəm/](#) is the first section of the [small intestine](#) in most higher [vertebrates](#), including [mammals](#), [reptiles](#), and [birds](#). In [fish](#), the divisions of the small intestine are not as clear, and the terms anterior intestine or proximal intestine may be used instead of duodenum. In mammals the duodenum may be the principal site for iron absorption. The duodenum precedes the [jejunum](#) and [ileum](#) and is the shortest part of the small intestine, where most chemical [digestion](#) takes place. The name *duodenum* is from the [Latin](#) *duodenum digitorum*, or "twelve fingers' breadth". In humans, the duodenum is a hollow jointed tube about 25-38cm (10-15 inches) long connecting the [stomach](#) to the [jejunum](#). It begins with the [duodenal bulb](#) and ends at the [ligament of Treitz](#).



Paranasal Sinuses, Left and Right View

– This is a look at the entire sinus area on the left side including the gums and teeth. Paranasal sinuses are a group of four paired air-filled spaces that surround the nasal cavity (maxillary sinuses), above the eyes (frontal sinuses), between the eyes (ethmoidal sinuses), and behind the ethmoids (sphenoidal sinuses). The sinuses are named for the facial bones in which they are located.



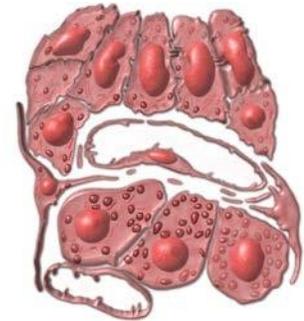
Parsagittal Incision of the Body, on the left of the Left Kidney

- The left kidney is approximately at the vertebral level T12 to L3,^[6] and the right is slightly lower.



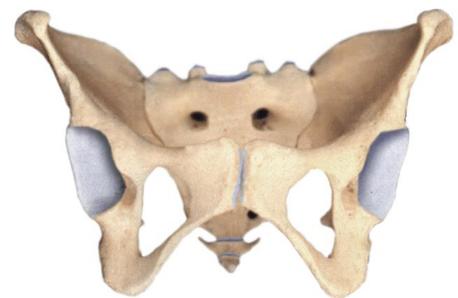
Parathyrocytus

– Parathyroid cell tissue.



Pelvic Bones

- In [human anatomy](#), the **pelvis** (plural **pelvises**) is either the lower part of the [trunk](#),^[1] between the [abdomen](#) and the [thighs](#) (sometimes also called **pelvic region** of the [trunk](#)), or the skeleton embedded in it^[2] (sometimes also called **bony pelvis**, or **pelvic skeleton**). The pelvic region of the trunk includes the bony pelvis, the [pelvic cavity](#) (the space enclosed by the bony pelvis), the [pelvic floor](#), below the pelvic cavity, and the [perineum](#), below the pelvic floor.^[1]



Pharyngeal Tonsil

-The **adenoid**, also known as a **pharyngeal tonsil** or **nasopharyngeal tonsil**, is a mass of [lymphatic tissue](#) situated posterior to the nasal cavity, in the roof of the [nasopharynx](#), where the [nose](#) blends into the [throat](#). Normally, in [children](#), it forms a soft mound in the roof and posterior wall of the [nasopharynx](#), just above and behind the [uvula](#).



Pinealocyte

-**Pinealocytes** are the main cells contained in the [pineal gland](#), located behind the [third ventricle](#) and between the two hemispheres of the [brain](#). The primary function of the pinealocytes is the secretion of the hormone [melatonin](#), important in the regulation of [circadian rhythms](#).



Pituicyte

- A pituicyte is a [glial cell](#) of the [posterior pituitary](#). Their main role is to assist in the [storage](#) and release of [neurohypophysial hormones](#).



Plain Muscle Cells

-They are also known as plain, unstriated, visceral and involuntary muscles. Unlike skeletal muscles, they do not exhibit cross striations under the microscope and thus they got the name “smooth”.

They are supplied by autonomic nervous system and therefore they are involuntary in their action. They do not obey the will of human being. They respond slowly to stimuli but are capable of long time sustained contractions. They do not get fatigued easily because of their slowness of response.

They provide motor power for regulating internal environment related to digestion, circulation, secretion and excretion.

Each smooth muscle fiber is an elongated spindle shaped cell with a single nucleus placed at the center. They also possess actin and myosin filaments but the structural arrangement of these filaments is very different as compared to the skeletal muscles.

Examples of smooth muscles include muscles of blood vessels, and muscles of the gut etc.



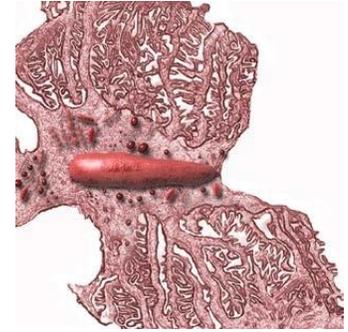
Plasmocyte

- Plasma cells, also called plasma B cells, plasmocytes, and effector B cells, are [white blood cells](#) that secrete large volumes of [antibodies](#). They are transported by the [blood plasma](#) and the [lymphatic system](#). Like all blood cells, plasma cells ultimately originate in the [bone marrow](#); however, these cells leave the bone marrow as [B cells](#), before terminal differentiation into plasma cells, normally in [lymph nodes](#).



Podocyte

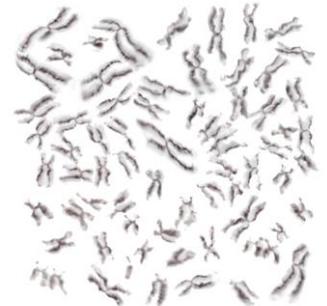
- Podocytes (or visceral epithelial cells) are cells in the Bowman's capsule in the kidneys that wrap around the capillaries of the glomerulus. The Bowman's capsule filters blood, holding back large molecules such as proteins, and passing through small molecules such as water, salts, and sugar, as the first step in forming urine. The long processes, or "foot projections," of the podocytes wrap around the capillaries, and leave slits between



them. Blood is filtered through these slits, each known as a slit diaphragm or filtration slit. Several proteins are required for the foot projections to wrap around the capillaries and function. When infants are born with certain defects in these proteins, such as nephrin and CD2AP, their kidneys cannot function. People have variations in these proteins, and some variations may predispose them to kidney failure later in life. Nephrin is a zipper-like protein that forms the slit diaphragm, with spaces between the teeth of the zipper, big enough to allow sugar and water through, but too small to allow proteins through. Nephrin defects are responsible for congenital kidney failure. CD2AP regulates the podocyte cytoskeleton and stabilizes the slit diaphragm.

Polyplodial Chromosome Set of Blast Cell

- **Polyploid cells** and **organisms** are those containing more than two paired (**homologous**) sets of **chromosomes**. Most species whose cells have **nuclei** (**Eukaryotes**) are **diploid**, meaning they have two sets of chromosomes—one set inherited from each parent. However, **polyploidy** is found in some organisms and is especially common in plants. In addition, polyploidy occurs in some tissues of animals that are otherwise diploid, such as human **muscle** tissues.^[1] This is known as **endopolyploidy**.



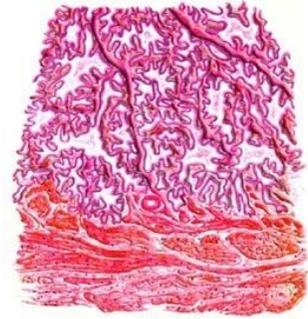
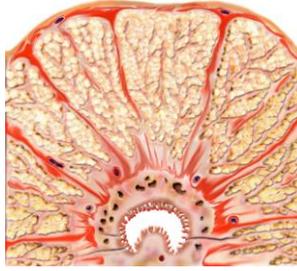
Posterior Wall of Stomach

– This is a look at the back wall of the stomach. The stomach is a **muscular**, hollow, dilated part of the **digestion system** which functions as an important **organ** of the digestive tract. The stomach is located between the **esophagus** and the **small intestine**. It secretes **protein**-digesting **enzymes** called **proteases** and strong **acids** to aid in food digestion, (sent to it via **esophageal peristalsis**) through **smooth muscular** contortions (called segmentation) before sending partially digested food (**chyme**) to the small intestines.



Prostate

- The prostate (from [Greek](#) *προστάτης* – *prostates*, literally "one who stands before", "protector", "guardian") is a compound tubuloalveolar [exocrine gland](#) of the [male reproductive system in most mammals](#). It differs considerably among species [anatomically](#), [chemically](#), and [physiologically](#). A healthy [human](#) prostate is classically said to be slightly larger than a [walnut](#). The mean weight of the "normal" prostate in adult males is about 11 grams, usually ranging between 7 and 16 grams. It surrounds the [urethra](#) just below the [urinary bladder](#) and can be felt during a [rectal exam](#). It is the only exocrine organ located in the midline in humans and similar animals.



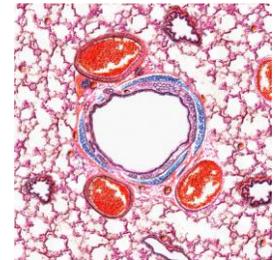
Pulmonary Acinus

- commonly defined as the portion of lung distal to a terminal bronchiole and supplied by a first-order respiratory bronchiole or bronchioles



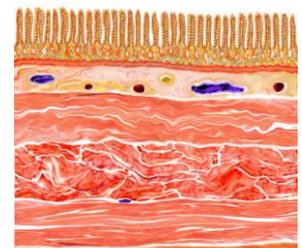
Pulmonary Tissue

- Sections of lung tissue have the appearance of fine lace because most of the lung is composed of thin-walled alveoli. The alveoli are composed of a single layer of squamous epithelium. Between the alveoli you may see a thin layer of connective tissue and numerous capillaries also lined with simple squamous epithelium.



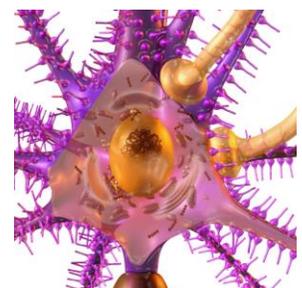
Pyloric Antrum

- The *pyloric antrum* is the initial portion of the pylorus. It is near the bottom of the stomach, proximal to the pyloric sphincter, which separates the stomach and the duodenum. It may temporarily become partially or completely shut off from the remainder of the stomach during [digestion](#) by [peristaltic](#) contraction of the prepyloric [sphincter](#); it is demarcated, sometimes, from the pyloric canal by a slight groove.



Pyramidal Neuron

- **Pyramidal neurons** (pyramidal cells) are a type of neuron found in areas of the brain including the [cerebral cortex](#), the [hippocampus](#), and the [amygdala](#). Pyramidal neurons are the primary excitation units of the mammalian [prefrontal cortex](#) and the [corticospinal tract](#).



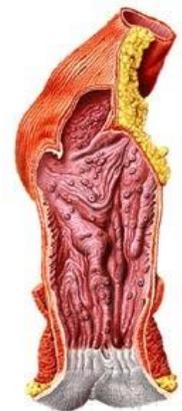
Rachis, Front, Left and Right Views

- Front sagittal view of the vertebrae spine.



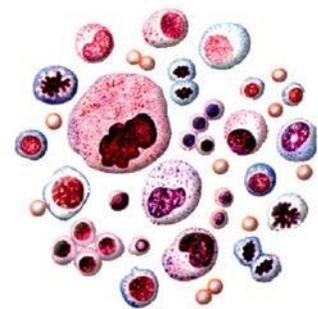
Rectum

- The rectum (from the Latin *rectum intestinum*, meaning *straight intestine*) is the final straight portion of the [large intestine](#) in some [mammals](#), and the [gut](#) in others. The human rectum is about 12 centimetres (4.7 in) long, and begins at the rectosigmoid junction (the end of the sigmoid [colon](#)), at the level of the third sacral vertebra or the sacral promontory depending upon what definition is used. Its [caliber](#) is similar to that of the [sigmoid colon](#) at its commencement, but it is dilated near its termination, forming the [rectal ampulla](#). It terminates at the level of the anorectal ring (the level of the [puborectalis](#) sling) or the [dentate line](#), again depending upon which definition is used. In humans, the rectum is followed by the [anal canal](#), before the gastrointestinal tract terminates at the [anal verge](#).



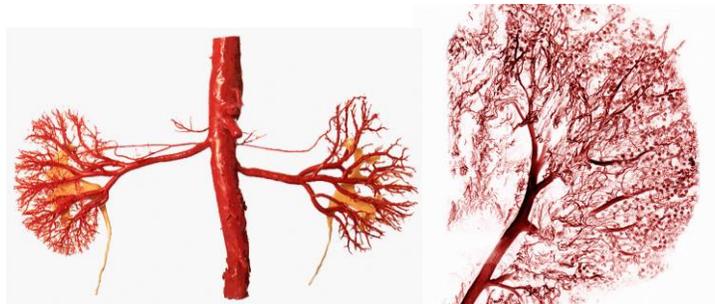
Red Bone Marrow

- Bone marrow is the flexible [tissue](#) in the interior of [bones](#). In [humans](#), [red blood cells](#) are produced in the heads of long bones in a process known as [hematopoiesis](#). On average, bone marrow constitutes 4% of the total body mass of humans; in an adult weighing 65 kilograms (140 lb), bone marrow [accounts](#) for approximately 2.6 kilograms (5.7 lb). The hematopoietic component of bone marrow produces approximately 500 billion blood cells per day, which use the bone marrow [vasculature](#) as a conduit to the body's systemic circulation. Bone marrow is also a key component of the [lymphatic system](#), producing the [lymphocytes](#) that support the body's [immune system](#).



Renal Arteries

The **renal arteries** normally arise off the side of the abdominal aorta, immediately below the superior mesenteric **artery**, and supply the kidneys with blood. Each is directed across the crus of the diaphragm, so as to form nearly a right angle with the aorta.



Reticulocyte

- **Reticulocytes** are immature red blood cells, typically composing about 1% of the red cells in the human body. **Reticulocytes** develop and mature in the bone marrow and then circulate for about a day in the blood stream before developing into mature red blood cells.



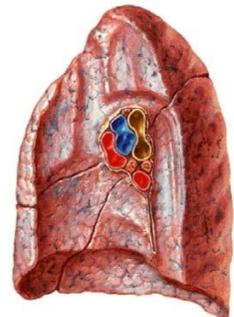
Ribosomes

-**Ribosomes** are the protein builders or the protein synthesizers of the cell. They are like construction guys who connect one amino acid at a time and build long chains. **Ribosomes** are special because they are found in both prokaryotes and eukaryotes.



Right Lung

– A look at the right lung. The lung is the essential respiration organ in many air-breathing animals, including most tetrapods, a few fish and a few snails. In mammals and the more complex life forms, the two lungs are located near the backbone on either side of the heart. Their principal function is to transport oxygen from the atmosphere into the bloodstream, and to release carbon dioxide from the bloodstream into the atmosphere. A large surface area is needed for this exchange of gases which is accomplished by the mosaic of specialized cells that form millions of tiny, exceptionally thin-walled air sacs called alveoli.

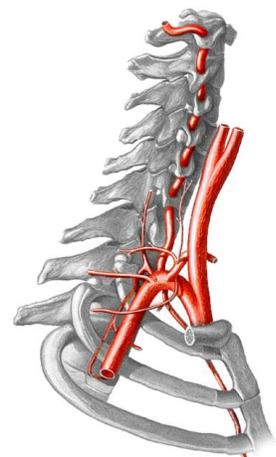


Right Foot, From Side



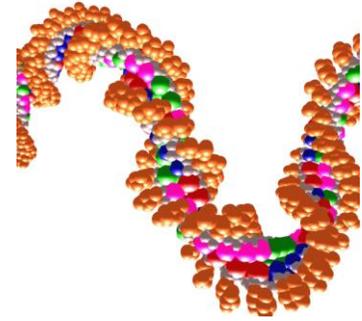
Right Subclavian Artery

An artery originating on the left from the aortic arch and on the right from the brachiocephalic artery with branches to the vertebral artery, the thyrocervical trunk, the internal thoracic artery, the costocervical trunk, and the descending scapular artery, and directly continuous with the axillary artery.



RNA

- Ribonucleic acid (**RNA**) is a polymeric molecule implicated in various biological roles in coding, decoding, regulation, and expression of genes. **RNA** and DNA are nucleic acids, and, along with proteins and carbohydrates, constitute the three major macromolecules essential for all known forms of life.



Rods and Retinal Cones

- The [retina](#) contains two types of photoreceptors, rods and cones. The rods are more numerous, some 120 million, and are more sensitive than the cones. However, they are not sensitive to color. The 6 to 7 million cones provide the eye's color sensitivity and they are much more concentrated in the central yellow spot known as the macula. In the center of that region is the "[fovea centralis](#)", a 0.3 mm diameter rod-free area with very thin, densely packed cones.



Rough Endoplasmic Reticulum

- **Rough ER** is found throughout the cell but the density is higher near the nucleus and the Golgi apparatus. Ribosomes on the **rough endoplasmic reticulum** are called 'membrane bound' and are responsible for the assembly of many proteins. This process is called translation.



Sagittal Section of Liver

– A cross section look of the liver. The [liver](#) is a [vital organ](#) present in [vertebrates](#) and some other animals. It has a wide range of functions, including [detoxification](#), [protein synthesis](#), and production of biochemicals necessary for [digestion](#). The liver is necessary for survival; there is currently no way to compensate for the absence of liver function in the long term, although new [liver dialysis](#) techniques can be used in the short term. This [organ](#) plays a major role in [metabolism](#) and has a number of functions in the body, including [glycogen](#) storage, decomposition of red blood cells, [plasma protein](#) synthesis, [hormone](#) production, and detoxification. It lies below the diaphragm in the abdominal-pelvic region of the [abdomen](#). It produces [bile](#), an alkaline compound which aids in [digestion](#) via the [emulsification](#) of [lipids](#). The liver's highly specialized [tissues](#) regulate a wide variety of high-volume biochemical reactions, including the synthesis and breakdown of small and complex molecules, many of which are necessary for normal vital functions. Terminology related to the liver often starts in *hepar-* or *hepat-* from the [Greek](#) word for liver, *hēpar* (ἥπαρ, root *hepat-*, ἥπατ-).



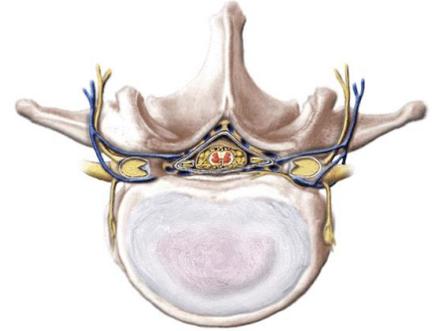
Sagittal Thoracotomy

- Sagittal plane of the chest, angled to capture side of aorta, right lung anteriorly and left lung posteriorly.



Second Lumbar Vertebra

- The L2 vertebra is the second uppermost of the five (5) lumbar vertebrae toward the lower end of the spinal column, within the lower back. Like the other lumbar vertebrae, it is among the largest of the bones in the spinal column, with a substantial, cylindrical centrum (ventral body) that is wider than it is deep to support the body's weight and the substantial vertical compression at that point in the spine.



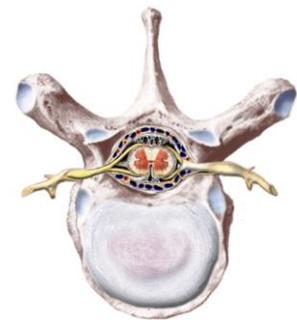
Second Neck Bone

- The C1/C2 articulation (ie, atlantoaxial articulation) is made up of 3 joints, including the central atlantoaxial joint and the paired lateral atlantoaxial joints. These joints allow rotation of C1 on C2. The transverse ligament of the atlas stabilizes the central atlantoaxial joint, and, together with the odontoid process, acts as a restraint against horizontal displacement of the atlas. The dentate ligament attaches the apex of the odontoid process to the clivus and the paired alar ligaments, which originate from the transverse ligament and attach to the anterolateral rim of the foramen magnum. These ligaments provide rotational and translational stability. The lateral atlantoaxial joints articulate at the superior articular facets of C2 and the inferior articular facets of C1.



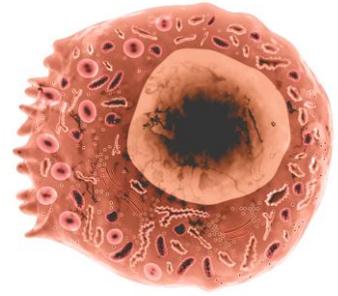
Second Thoracic Vertebra

- The thoracic spinal vertebrae consist of 12 total vertebrae and are located between the cervical vertebrae (which begin at the base of the skull) and the lumbar spinal vertebrae. **The second thoracic vertebra, or T2**, is located directly below the first thoracic vertebra (T1). It is slightly larger than the T1, but smaller than the third thoracic vertebrae (T3). The second thoracic vertebra contains faceted sides that allow the vertebra to press up against the ribs. The thoracic spinal nerve 2 moves underneath the T2. The spinal nerve consists of different nerves moving along the spinal column. The nerves control sensory and motor signals from the spinal column to the body, enabling the body react to the movement of the spine.



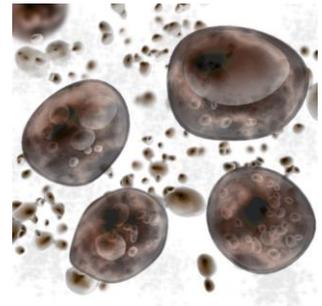
Secretory Alveolar Cell

- Alveolar epithelial cells : The single layer of epithelial cells lining the alveolar lumen are essential to production of milk. These cells are **polar** in nature. Here polar means that the function of the basal membrane (on the blood side) of epithelial cells having dramatically different functions compared with the apical membrane (membrane side of the cell exposed to the alveolar lumen). Contents of the cells are also polarized, with the nucleus tending to be located in the basal half of the cell, the **Golgi apparatus** usually just apical to the nucleus and most of the secretory structures (**secretory vesicles, fat droplets**) generally on the apical half of the cell.



Secretory Granules

-**Secretory granules** (or large dense-core vesicles, LDCVs) are unique organelle in which neuropeptides and/or hormones are packaged and stored for **secretion** via the regulated **secretory** pathway (RSP) upon stimulation in neuroendocrine and endocrine cells.



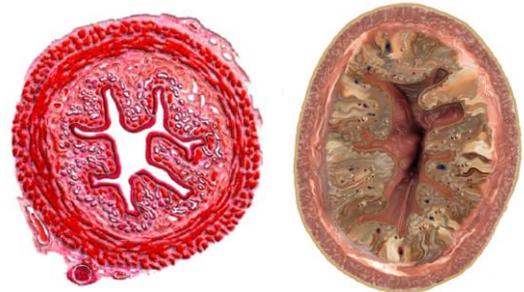
Section of Myelencephalon

- The **myelencephalon** is the most posterior region of the embryonic hindbrain, from which the medulla oblongata develops. The medulla oblongata is part of the brain stem that serves as the connection of the spinal cord to the brain. It is situated between the pons and the spinal cord.



Section of Esophagus

- the part of the alimentary canal that connects the throat to the stomach; the gullet. In humans and other vertebrates it is a muscular tube lined with mucous membrane.



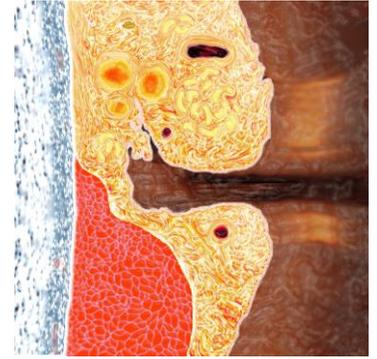
Section of Eyeball Wall

-The light-sensitive membrane forming the inner lining of the posterior **wall** of the **eyeball**, composed largely of a specialized terminal expansion of the optic nerve.



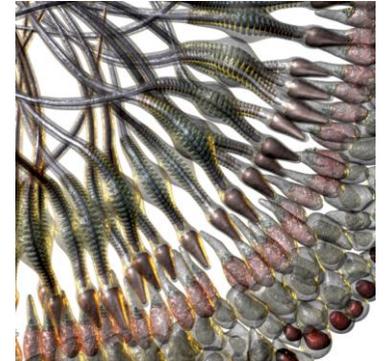
Section of Larynx

- The **larynx**, commonly called the **voice box**, manipulates [pitch](#) and [volume](#). The larynx houses the [vocal folds](#) (vocal cords), which are essential for [phonation](#). The vocal folds are situated just below where the tract of the [pharynx](#) splits into the trachea and the [esophagus](#).



Section of Seminal Canalculus

- An undescended testis located between the internal and external inguinal rings.



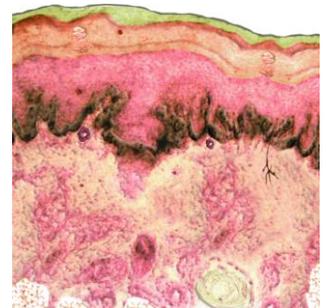
Section of Skin

- Section of the skin, or the largest organ of the body. Its main functions are to protect us from microbes and the elements, helps regulate body temperature, and permits the sensations of touch, heat and cold.



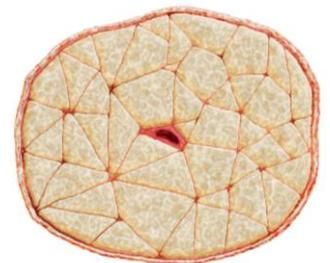
Section of Skin MC#

-See above



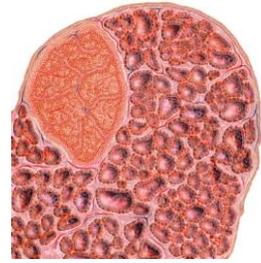
Section of Tendon

- Section of a tendon, or a flexible but inelastic cord of strong fibrous collagen tissue attaching a muscle to a bone.



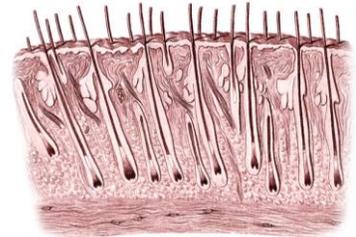
Section of Thyroid Gland

-Section of the thyroid gland, or the biggest gland in the neck responsible for regulating the body's metabolism.



Section through the Scalp

- Section of the scalp, or the skin covering the head, excluding the face.



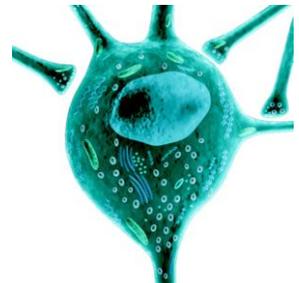
Seminal Vesicles

- The **seminal vesicles** are a pair of [tube-like glands](#). They are found behind the [bladder](#) of [males](#). They make most of the content of [semen](#) (also called seminal fluid). About 70% of the seminal fluid in [humans](#) comes from the seminal vesicles.



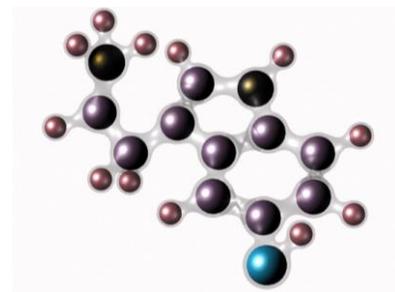
Sensorineural Cell of Hypothalamus

-The hypothalamus is the key brain site for integration of multiple biologic systems to maintain homeostasis. Neurons in the hypothalamus discharge in relation to multiple physiologic indices and change discharge rate with changes in these indices, thus establishing set points. The three major systems controlled by the hypothalamus for maintenance of homeostasis are the autonomic nervous system, the neuroendocrine system, and the limbic system.



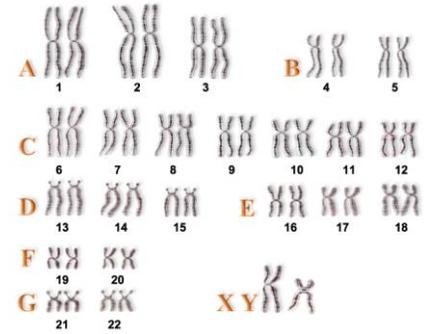
Serotonin

- **Serotonin** or **5-hydroxytryptamine (5-HT)** is a [monoamine neurotransmitter](#). Biochemically derived from [tryptophan](#), serotonin is primarily found in the [gastrointestinal tract](#) (GI tract), blood [platelets](#), and the [central nervous system](#) (CNS) of animals, including humans. It is popularly thought to be a contributor to feelings of well-being and [happiness](#). Approximately 90% of the [human body's](#) total serotonin is located in the [enterochromaffin cells](#) in the GI tract, where it is used to regulate intestinal movements.^{[7][8]} The remainder is synthesized in [serotonergic neurons](#) of the CNS, where it has various functions. These include the regulation of [mood](#), appetite, and sleep. Serotonin also has some cognitive functions, including memory and learning. Modulation of serotonin at synapses is thought to be a major action of several classes of pharmacological antidepressants.



Set of Male Chromosomes

- The **Y chromosome** is one of two sex [chromosomes](#) ([allosomes](#)) and the other is the [X chromosome](#). Y is the [sex-determining](#) chromosome in many species, since it is the presence or absence of Y that determines male or female sex. The Y chromosome contains the [gene SRY](#), which triggers [testis](#) development. The DNA in the human Y chromosome is composed of about 59 million [base pairs](#).^[21] The Y chromosome is passed only from father to son, so analysis of Y chromosome DNA may thus be used in genealogical research. With a 30% difference between humans and chimpanzees, the Y chromosome is one of the fastest evolving parts of the human genome.



Seventh Neck Bone

- The 7th cervical (C7) vertebra is the largest and most inferior vertebra in the neck region. Unlike the other cervical vertebrae, the C7 has a large spinous process that protrudes posteriorly toward the skin at the back of the neck. This spinous process can be easily seen and felt at the base of the neck, making it a prominent landmark of the skeleton and giving the C7 the name vertebra prominens.



Seventh-Thoracic Vertebrae

- found in the middle of the chest between the seventh and eighth pairs of ribs. It plays important roles in the support of the spinal cord, ribcage, and muscles of the chest. The T7 vertebra is located in the middle of the thoracic spinal column inferior to the T6 vertebra and superior to the T8 vertebra. The anterior portion of the T7 vertebra is made of a wide, heart-shaped cylinder of bone known as the centrum or vertebral body. The centrum provides most of the strength to the vertebra and connects it to the surrounding vertebrae via the intervertebral disks.



Shin Bones, Left and Right

- The tibia ([/ˈtɪbiə/](#) (plural tibiae [/ˈtɪbiɪ/](#) or tibias), also known as the shinbone or shankbone, is the larger and stronger of the two [bones](#) in the [leg](#) below the [knee](#) in vertebrates (the other being the [fibula](#)), and it connects the knee with the [ankle bones](#). The tibia is found next to the fibula on the medial side of the leg, closer to centre-line. The tibia is connected to the fibula by an [interosseous membrane](#), forming a type of joint called a [syndesmosis](#) with very little movement. The tibia is named for the Greek [aulos](#) flute, also known as a tibia. It is commonly recognized as the strongest weight bearing bone of the body.



Shoulder Joint, Left and Right

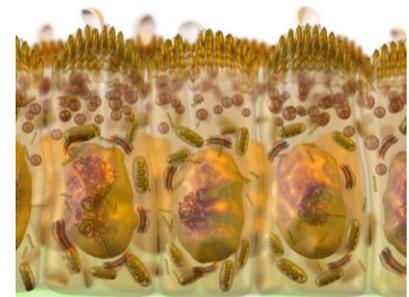
– This is a look at the complete left shoulder joint, including the bone, muscle, and ligaments. The glenohumeral joint, (from ancient Greek *glene*, eyeball, puppet, doll + *-oid*, 'form of', + Latin *humerus*, shoulder) or shoulder joint, is a multiaxial synovial ball and socket joint and involves articulation between the glenoid fossa of the scapula (shoulder blade) and the head of the humerus (upper arm bone). Due to the very limited scapula, it is the most mobile joint of the human body. Scapulohumeral rhythm helps to achieve further range of movement. The Scapulohumeral rhythm is the movement of the scapula across the thoracic cage in relation to the humerus. This movement can be compromised by anything that changes the position of the scapula. This could be an imbalance in the muscles that hold the scapula in place which are the upper and lower trapezius. This imbalance could cause a forward head carriage which in turn can affect the range of movements of the shoulder. The rotator cuff muscles of the shoulder produce a high tensile force, and help to pull the head of the humerus into the glenoid fossa.



interface of the humerus and

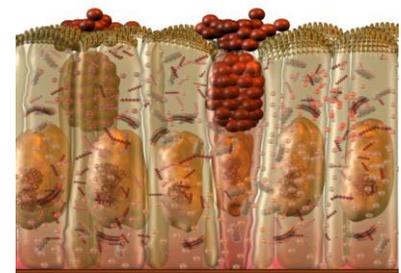
Single-Layer Cubic Epithelium

- Composed of a single layer of cubed-shaped cells, simple cuboidal epithelium resembles closely fitted bricks. Its cells have a centrally located nucleus, and often contain cilia, microvillim or both along their free border. This tissue commonly forms the walls of the small tubes, or ducts, that carry secretions from one region of the body to another. It is found in the kidneys, the liver, and in many glands.



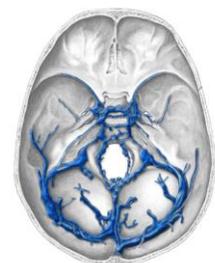
Single-Layer Prismatic Epithelium

- prismatic epithelium, consisting of a single layer of elongated nucleated cells, are found in the alimentary canal, from the cardia downwards. Also in that of part of the duct glands.



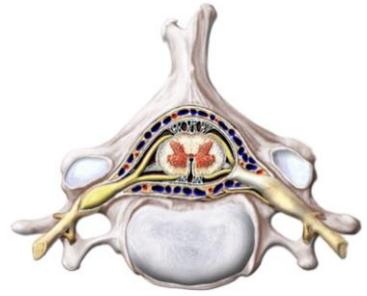
Sinus of Dura Mater

- The **sinuses of the dura mater** are venous channels which drain the blood from the brain; they are devoid of valves, and are situated between the two layers of the dura mater and lined by endothelium continuous with that which lines the veins. They may be divided into two groups: (1) a **postero-superior**, at the upper and back part of the skull, and (2) an **antero-inferior**, at the base of the skull.



Sixth Neck Bone

- The C6 vertebra is the sixth cervical vertebra of the spine. It is found in the base of the neck between the C5 and the last cervical vertebra, C7. The C6 vertebra plays an important role in supporting and protecting the structures of the head and neck as well as anchoring the muscles that move and support the neck.



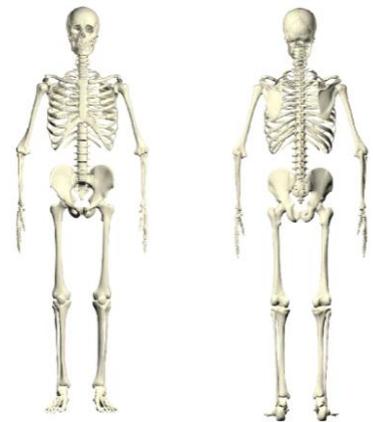
Sixth Thoracic Vertebra

- The T6 vertebra lies in the middle of the twelve (12) thoracic vertebrae that make up the central portion of the backbone. It is smaller than the more caudal thoracic vertebrae but larger than those above it, with a heart-shaped centrum or ventral body, which attaches to the ribs near it to support the rib cage and protect the torso.



Skeleton, Front and Back View

- The **human skeleton** is the internal framework of the body. It is composed of 270 [bones](#) at birth – this total decreases to 206 bones by adulthood after some bones have fused together.^[1] The bone mass in the skeleton reaches maximum density around age 30. The human skeleton can be divided into the [axial skeleton](#) and the [appendicular skeleton](#). The axial skeleton is formed by the [vertebral column](#), the [rib cage](#) and the [skull](#). The appendicular skeleton, which is attached to the axial skeleton, is formed by the [pectoral girdle](#), the [pelvic girdle](#) and the bones of the upper and lower limbs. The human skeleton serves six major functions; support, movement, protection, production of [blood cells](#), storage of ions and endocrine regulation.



Skin of Hair Covered Part of Body



Skin of Hair Covered Part of Head



Skin Surface of Left and Right Palm and Foot; From Top

-The **palm** comprises the underside of the human hand. Also known as the **broad palm or metacarpus**, it consists of the area between the five phalanges (finger bones) and the carpus (wrist joint). Located in the palm are 17 of the 34 muscles that articulate the fingers and thumb, and are connected to the hand skeleton through a series of tendons. Unlike other areas of the body, the skin of the palm is glabrous (hairless) and unable to tan. It is also durable, yet touch sensitive. In order for the skin layer to remain anchored to the bone structure, a layer of connective fibrous tissue (fascia) links the skin with the skeleton. This allows the hand to grip without the skin sliding out of position.



Sleek Myocyte

- A **myocyte** (also known as a muscle cell or muscle fiber) is the type of cell found in muscle tissue. **Myocytes** are long, tubular cells that develop from myoblasts to form muscles in a process known as myogenesis.



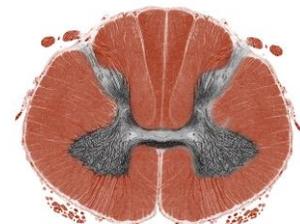
Spermatozoon

- A spermatozoon (pronounced /[ˌspɜːrmætəˈzoʊən](#)/, alternate spelling spermatozoön; plural spermatozoa; from [Greek](#): σπέρμα "seed" and [Greek](#): ζῷον "living being") is a motile [sperm cell](#), or moving form of the [haploid cell](#) that is the male [gamete](#). A spermatozoon [joins](#) an [ovum](#) to form a [zygote](#). (A zygote is a single cell, with a complete set of [chromosomes](#), that normally develops into an [embryo](#).) Sperm cells contribute approximately half of the nuclear [genetic information](#) to the [diploid](#) offspring (excluding, in most cases, [mitochondrial DNA](#)). In mammals, the [sex](#) of the offspring is determined by the sperm cell: a spermatozoon bearing a [Y chromosome](#) will lead to a [male](#) (XY) offspring, while one bearing an [X chromosome](#) will lead to a [female](#) (XX) offspring—the X chromosome.



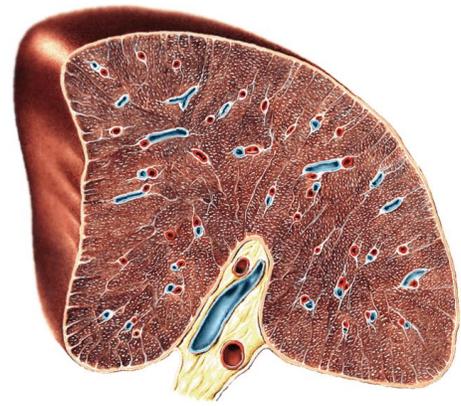
Spinal Cord. Serv.Part (Cross Sections with Myelin Stain)

(See Cross Section of Spinal Cord)

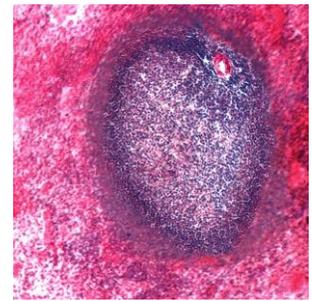
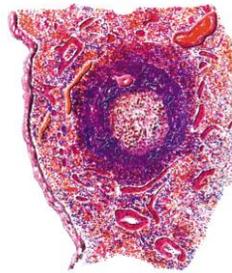


Spleen, Spleen # MK

- The spleen (from Greek σπλήν—splén[1]) is an organ found in virtually all vertebrate animals. Similar in structure to a large lymph node, it acts primarily as a blood filter—so it is possible to remove the spleen without jeopardizing life. The spleen plays important roles in regard to red blood cells (also referred to as erythrocytes) and the immune system.[2] It removes old red blood cells and holds a reserve of blood in case of hemorrhagic shock and also recycles iron. As a part of the mononuclear phagocyte system, metabolizes hemoglobin removed from senescent erythrocytes. The globin portion of hemoglobin is degraded to its constitutive amino acids, and the heme portion is metabolized to bilirubin, which is removed in the liver.[3] The spleen synthesizes antibodies in its white pulp and removes antibody-coated bacteria and antibody-coated blood cells by way of blood and lymph node circulation. A study published in 2009 using mice found that the spleen contains, in its reserve, half of the body's monocytes within the red pulp.[4] These monocytes, upon moving to injured tissue (such as the heart), turn into dendritic cells and macrophages while promoting tissue healing.[4][5][6] The spleen is a center of activity of the reticuloendothelial system and can be considered analogous to a large lymph node, as its absence causes a predisposition to certain infections. In humans, the spleen is brownish in color and is located in the left upper quadrant of the abdomen.



it



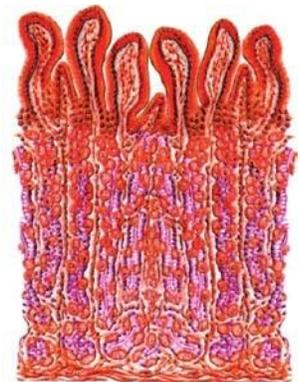
Stem Cell

- an undifferentiated cell of a multicellular organism that is capable of giving rise to indefinitely more cells of the same type, and from which certain other kinds of cell arise by differentiation.



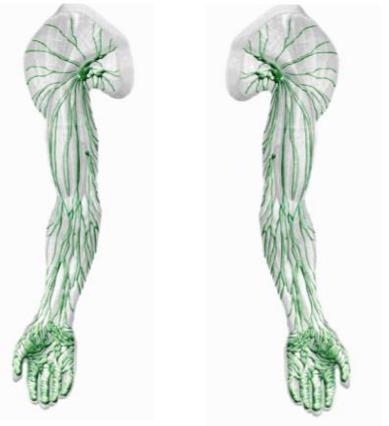
Stomach Glands

– This is a look at the glands of the stomach, The Cardia Glands at the Cardia, the Pyloric Glands at the Pylorus, and the Fundic Glands at the Fundus.



Superficial Lymphatic Vessels of Left and Right Hand

-The **superficial lymphatic vessels** commence in the lymphatic plexus which everywhere pervades the skin; the meshes of the plexus are much finer in the palm and on the flexor aspect of the digits than elsewhere. The digital plexuses are drained by a pair of vessels which run on the sides of each digit, and incline backward to reach the dorsum of the hand. From the dense plexus of the palm, vessels pass in different directions, viz., upward toward the wrist, downward to join the digital vessels, medialward to join the vessels on the ulnar border of the hand, and lateralward to those on the thumb. Several vessels from the central part of the plexus unite to form a trunk, which passes around the metacarpal bone of the index finger to join the vessels on the back of that digit and on the back of the thumb. Running upward in front of and behind the wrist, the lymphatic vessels are collected into radial, median, and ulnar groups, which accompany respectively the cephalic, median, and basilic veins in the forearm.



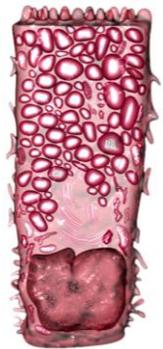
Superficial Lymphatic Vessels of Right Leg

- Front view of right leg superficial lymph vessel. They are found in the triangle bounded by the [inguinal ligament](#) superiorly, the border of the [sartorius muscle](#) laterally, and the [adductor longus](#) muscle medially. The superficial nodes drain to the deep inguinal lymph nodes.



Superficial Mucous Gland of the Stomach

- The **gastric mucosa** is the [mucous membrane](#) layer of the [stomach](#) which contains the [glands](#) and the [gastric pits](#). is thin at the [cardiac](#) extremity, but thicker toward the pylorus. During the contracted state of the organ it is thrown into numerous plaits or [rugae](#), which, for the most part, have a longitudinal direction, and are most marked toward the pyloric end of the stomach, and along the [greater curvature](#). These folds are entirely obliterated when the organ becomes [distended](#).

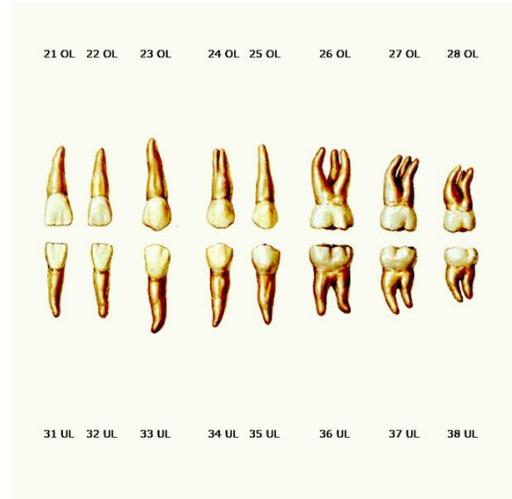


Synapse

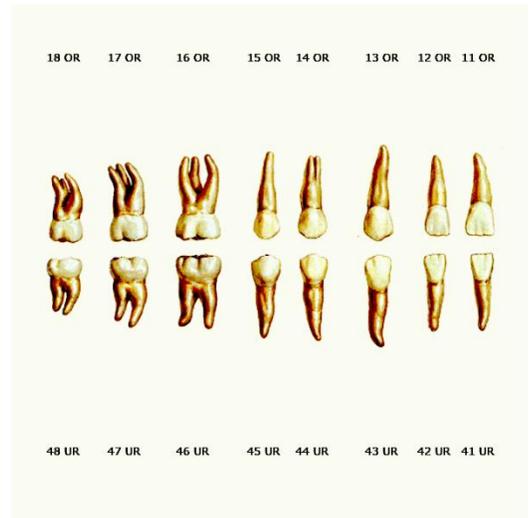
- A junction between two nerve cells, consisting of a minute gap across which impulses pass by diffusion of a neurotransmitter.



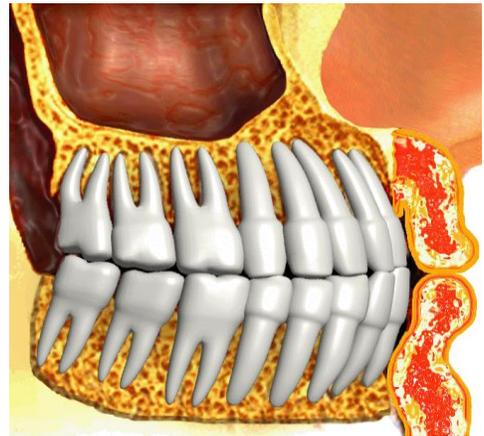
Teeth; Right-



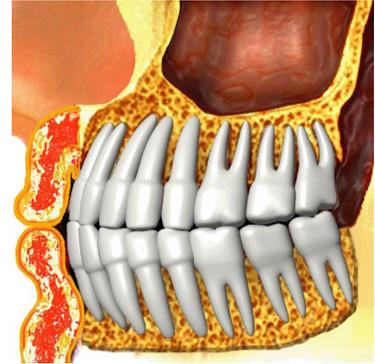
Teeth; Left-



Teeth; Right-



Teeth; Left-



Tenth thoracic vertebra

- The **tenth thoracic vertebra (T10)** is one of twelve vertebrae that make up the central section of the vertebral column. The T10 has a complete articular facet and the thoracic spinal nerves passes through underneath it. It (in conjunction with the other vertebrae) surrounds the spinal cord and protects it from damage. T10 innervates the muscles of the lower abdomen.



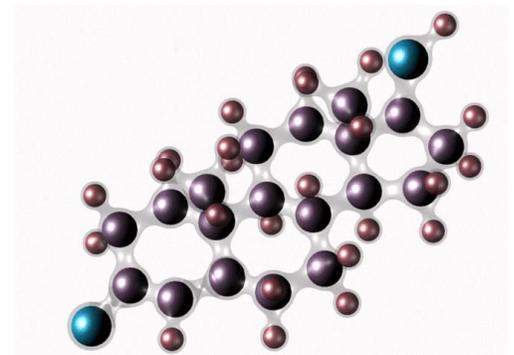
Testicle; Left and Right

- The testicle (from [Latin](#) *testiculus*, diminutive of *testis*, meaning "witness" of [virility](#), plural *testes*) is the male [gonad](#) in [animals](#). Like the [ovaries](#) to which they are [homologous](#), testes are components of both the [reproductive system](#) and the [endocrine system](#). The primary functions of the testes are to produce [sperm](#) ([spermatogenesis](#)) and to produce [androgens](#), primarily [testosterone](#). Both functions of the testicle are influenced by gonadotropic hormones produced by the anterior [pituitary](#). [Luteinizing hormone](#) (LH) results in testosterone release. The presence of both testosterone and [follicle-stimulating hormone](#) (FSH) is needed to support spermatogenesis. It has also been shown in animal studies that if testes are exposed to either too high or too low levels of [estrogens](#) (such as [estradiol](#); E2) spermatogenesis can be disrupted to such an extent that the animals become infertile.



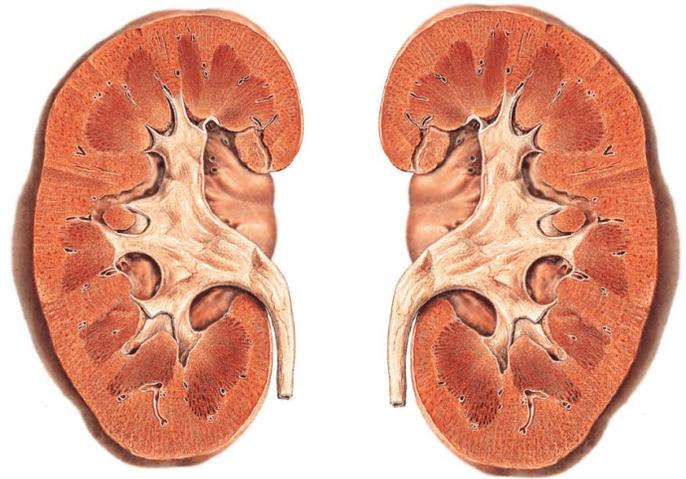
Testosterone

- **Testosterone** is a [steroid hormone](#) from the [androgen](#) group and is found in humans. It is secreted primarily by the testicles of males and, to a lesser extent, the ovaries of females. Small amounts are also secreted by the adrenal glands. It is the principal male sex hormone and anabolic steroid.



The Kidney, Left and Right

- A three-dimensional look at the Right Kidney. The kidneys are organs that serve several essential regulatory roles in most animals, including vertebrates and some invertebrates. They are essential in the urinary system and also serve homeostatic functions such as the regulation of electrolytes, maintenance of acid–base balance, and regulation of blood pressure (via maintaining salt and water balance). They serve the body as a natural filter of the blood, and remove wastes which are diverted to the urinary bladder. In producing urine, the kidneys excrete wastes such as urea and ammonium, and they are also responsible for the reabsorption of water, glucose, and amino acids.



The kidneys also produce hormones including calcitriol, erythropoietin, and the enzyme renin. Located at the rear of the abdominal cavity in the retro peritoneum, the kidneys receive blood from the paired renal arteries, and drain into the paired renal veins. Each kidney excretes urine into a ureter, itself a paired structure that empties into the urinary bladder. Renal physiology is the study of kidney function, while nephrology is the medical specialty concerned with kidney diseases. Diseases of the kidney are diverse, but individuals with kidney disease frequently display characteristic clinical features. Common clinical conditions involving the kidney include the nephritic and nephrotic syndromes, renal cysts, acute kidney injury, chronic kidney disease, urinary tract infection, nephrolithiasis, and urinary tract obstruction. Various cancers of the kidney exist; the most common adult renal cancer is renal cell carcinoma. Cancers, cysts, and some other renal conditions can be managed with removal of the kidney, or nephrectomy. When renal function, measured by glomerular filtration rate, is persistently poor, dialysis and kidney transplantation may be treatment options. Although they are not severely harmful, kidney stones can be painful and a nuisance. The removal of kidney stones involves ultrasound treatment to break up the stones into smaller pieces, which are then passed through the urinary tract. One common symptom of kidney stones is a sharp pain in the medial/lateral segments of the lower back.

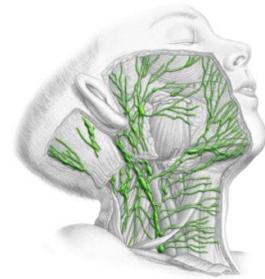
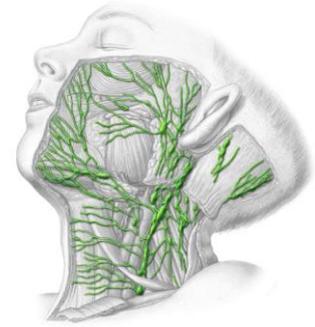
The Knee Joint

– This is a complete look at the right knee joint, including bone, muscle, and ligaments. The knee [joint](#) joins the [thigh](#) with the [lower](#) leg and consists of two [articulations](#): one between the [femur](#) and [tibia](#), and one between the femur and [patella](#). It is the largest joint in the human body and is very complicated. The knee is a mobile trocho-ginglymus (a pivotal hinge joint), which permits [flexion](#) and [extension](#) as well as a slight medial and lateral rotation. Since in humans the [knee supports](#) nearly the whole weight of the body, it is vulnerable to both acute injury and the development of [osteoarthritis](#).



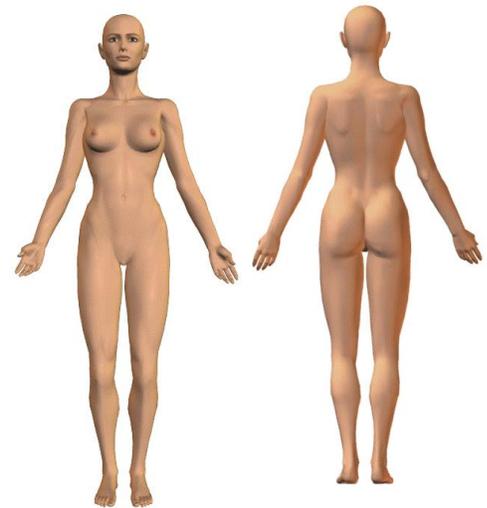
The Sperficial Lymphatic Vessels and Nodes of the Neck and Head; Right and Left

- In [anatomy](#), [lymphatic vessels](#) or [lymph vessels](#) are thin walled, [valved](#) structures that carry [lymph](#). As part of the [lymphatic system](#), lymph vessels are complementary to the [cardiovascular system](#). Lymph vessels are lined by [endothelial cells](#), and have a thin layer of [smooth muscles](#), and [adventitia](#) that bind the lymph vessels to the surrounding tissue. Lymph vessels are devoted to propulsion of the lymph from the [lymph capillaries](#), which are mainly concerned with absorption of [interstitial fluid](#) from the tissues. Lymph capillaries are slightly larger than their counterpart capillaries of the vascular system. Lymph vessels that carry lymph to a [lymph node](#) are called the [afferent lymph vessel](#), and one that carries it from a lymph node is called the [efferent lymph vessel](#), from where the lymph may travel to another lymph node, may be returned to a vein, or may travel to a larger [lymph duct](#). Lymph ducts drain the lymph into one of the [subclavian veins](#) and thus return it to general [circulation](#). Generally, lymph flows away from the [tissues](#) to [lymph nodes](#) and eventually to either the [right lymphatic duct](#) or the largest lymph vessel in the body, the [thoracic duct](#). These vessels drain into the right and left [subclavian veins](#) respectively.



The Women's Body; Front and Back

- **Female body shape** or **female figure** is the cumulative product of a woman's skeletal structure and the quantity and distribution of muscle and fat on the body. As with most physical traits, there is a wide range of normality of female body shapes.



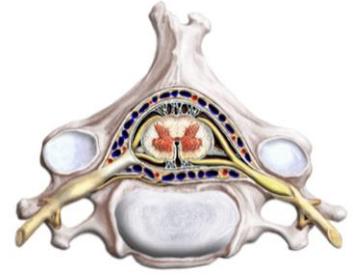
Third Lumbar Vertebra

- The L3 vertebra is in the middle of the five (5) lumbar vertebrae in the lower back portion of the spinal column. Because of the substantial weight-bearing role of the L3, a role it shares with all the lumbar vertebrae, this bone's vertebral arch and cylindrical centrum (vertebral body) are massively built-among the largest of the moveable vertebrae.



Third Neck Bone

- The lower section of the cervical spine consists of the **third cervical vertebrae (C3)** through seventh cervical vertebrae (C7). Spinal bone three is directly in line with the lower section of the human jaw and the hyoid bone, which is a horseshoe-shaped bone located inside the neck that holds the tongue in place.



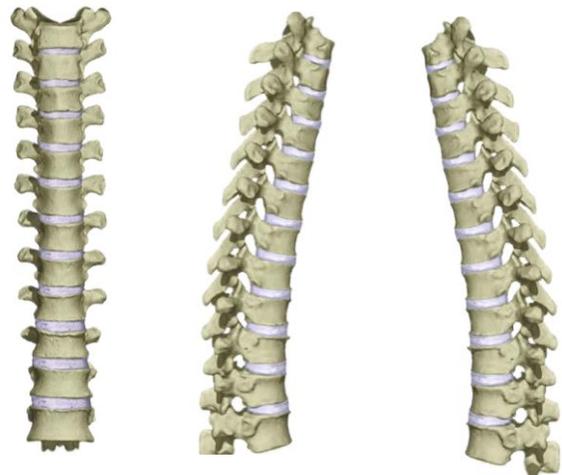
Third Thoracic Vertebra

The **third thoracic vertebra, or T3**, is located a little further down the spinal column but still near the skull. Its approximate distance from the skull is about one-third of the way down the entire spine.



Thoracic Sector of Vertebral Column; Front View & Right & Left Side

-**Thoracic vertebrae** compose the middle segment of the **vertebral column**, between the **cervical vertebrae** and the **lumbar vertebrae**.^[1] In humans, there are twelve thoracic vertebrae and they are intermediate in size between the cervical and lumbar vertebrae; they increase in size going towards the lumbar vertebrae, with the lower ones being a lot larger than the upper. They are distinguished by the presence of **facets** on the sides of the bodies for **articulation** with the **heads of the ribs**, and facets on the **transverse processes** of all, except the eleventh and twelfth, for articulation with the **tubercles of the ribs**. By convention, the human thoracic vertebrae are numbered T1-T12, with the first one (T1) located closest to the skull and the others going down the spine towards the lumbar region.



Thoracic Cage

- The structure formed by the **thoracic vertebrae** and ribs, the sternum (breastbone), and the costal cartilages (that attach the ribs to the sternum).



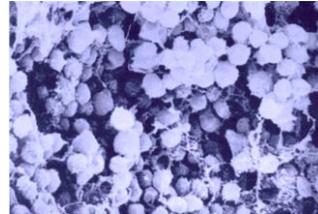
Thrombocyte

- A platelet. Crucial to normal blood clotting. Although platelets are sometimes classed as blood cells, they are not. They are fragments of a large cell called a megakaryocyte (literally, a large cell).



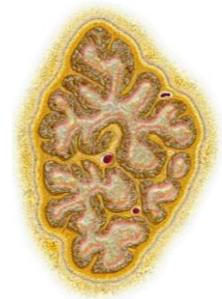
Thymus Gland

-The thymus gland, despite containing glandular tissue and producing several hormones, is much more closely associated with the immune system than with the endocrine system. The thymus serves a vital role in the training and development of T-lymphocytes or T cells, an extremely important type of white blood cell. T cells defend the body from potentially deadly pathogens such as bacteria, viruses, and fungi.



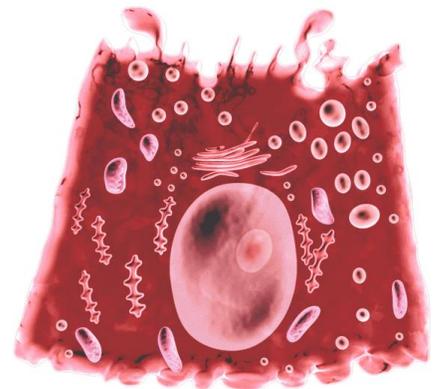
Thymus Gland Tissue

- Cells in the thymus can be divided into thymic [stromal cells](#) and cells of [hematopoietic](#) origin (derived from bone marrow resident [hematopoietic stem cells](#)). Developing T-cells are referred to as [thymocytes](#) and are of hematopoietic origin. Stromal cells include [epithelial cells](#) of the thymic cortex and medulla, and [dendritic cells](#).



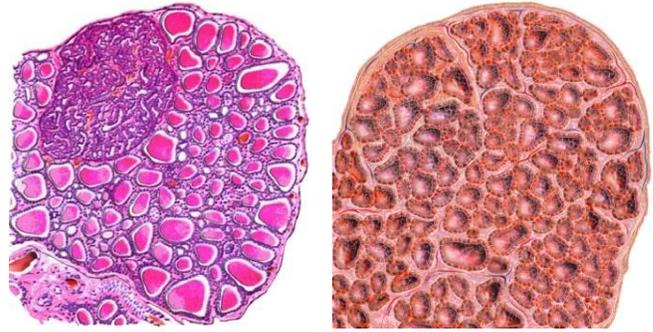
Thyrocyte

- The spherical follicles (acini) of the thyroid gland absorb iodine. These follicles consist of a single continuous layer of thyrocytes ([thyroid epithelial cells](#), [thyroid follicular cells](#), [thyroid acinar cells](#)). There are two types of [thyroid epithelial cells](#). Follicular [cells](#) are derived from foregut [endoderm](#). Another type is of neuroectoderma origin (see: [C-cells](#)). [Thyroblasts](#) are fetal thyroid [germ cells](#). Thyrocytes secrete the thyroid [hormones](#) thyroxine ([T4](#)) and triiodothyronine ([T3](#)). The production of these [hormones](#) is under the control of the pituitary [hormone TSH](#) ([thyroid stimulating hormone](#)).



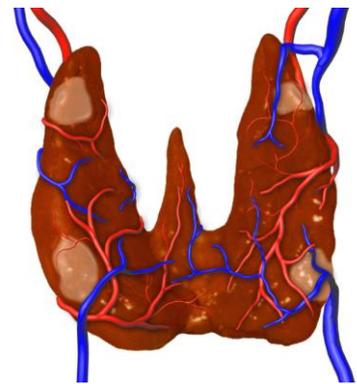
Thyroid and Parathyroid Glands

- [The thyroid gland](#) is the biggest gland in the neck. It is situated in the anterior (front) neck below the skin and muscle layers. The parathyroid is a gland next to the thyroid that secretes a hormone (*parathyroid hormone*) that regulates calcium levels in a person's body.



Thyroid Gland; from Front and Behind

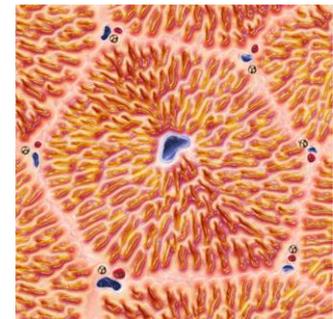
- [The thyroid gland](#) is the biggest gland in the neck. It is situated in the anterior (front) neck below the skin and muscle layers. The thyroid gland takes the shape of a butterfly with the two wings being represented by the left and right thyroid lobes which wrap around the trachea. The sole function of the thyroid is to



make thyroid hormone. This hormone has an effect on nearly all tissues of the body where it increases cellular activity. **The function of the [thyroid](#), therefore, is to regulate the body's metabolism.**

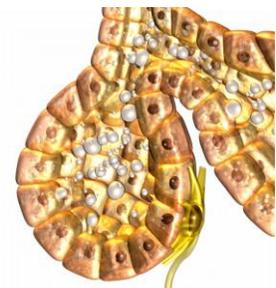
Tissue of Liver

- Liver tissue consists of a mass of cells tunneled through with bile ducts and **blood** vessels. Hepatic cells make up about 60 percent of the tissue and perform more metabolic functions than any other group of cells in the body.



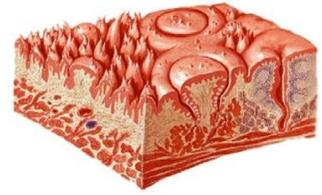
Tissue of Mammary Gland

-One of the two half-moon-shaped glands on either side of the adult female chest, which with fatty tissue and the nipple make up the breast. Within each mammary gland is a network of sacs that produce milk during lactation and send it to the nipple via a system of ducts.



Tongue

- The tongue is a muscular hydrostat on the floors of the mouths of most vertebrates which manipulates food for mastication. It is the primary organ of taste (gustation), as much of the upper surface of the tongue is covered in papillae and taste buds. It is sensitive and kept moist by saliva, and is richly supplied with nerves and blood vessels. In humans a secondary function of the tongue is phonetic articulation. The tongue also serves as a natural means of cleaning one's teeth. The ability to perceive different tastes is not localized in different parts of the tongue, as is widely believed. The tongue is a muscular hydrostat on the floors of the mouths of most vertebrates which manipulates food for mastication. It is the primary organ of taste (gustation), as much of the upper surface of the tongue is covered in papillae and taste buds. It is sensitive and kept moist by saliva, and is richly supplied with nerves and blood vessels. In humans a secondary function of the tongue is phonetic articulation. The tongue also serves as a natural means of cleaning one's teeth. The ability to perceive different tastes is not localized in different parts of the tongue, as is widely believed.



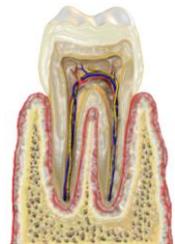
Tooth

- a Canine (4 total) are the pointed teeth just outside the incisors, or the middlemost four teeth on the upper and lower jaws.



Tooth

- a molar (8 total) that are flat teeth in the rear of the mouth, best at grinding food. The teeth are the hardest substances in the human body. Besides being essential for chewing, the teeth play an important role in speech.



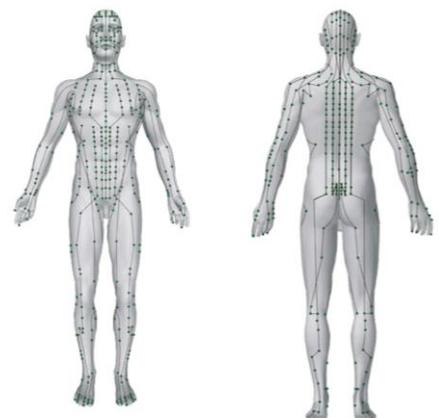
Tooth Cavity

- The central **cavity** of a **tooth** containing the dental **pulp** and being made up of the root canal and the **pulp** chamber.



Topography of Meridians and Acupuncture Points

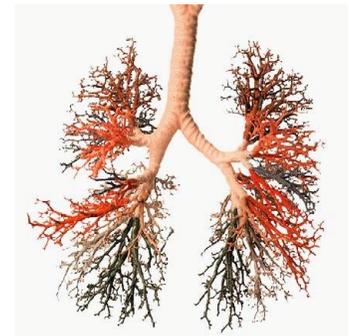
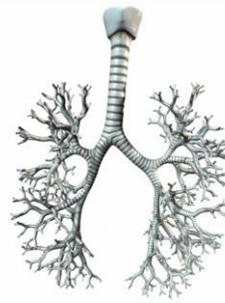
- A meridian is any of the pathways in the body along which vital energy flows. **Acupuncture points** (Chinese: 腧穴 or Chinese: 穴位, also called acupoints) are locations on the body that are the focus of **acupuncture**, **acupressure**, sonopuncture and laser **acupuncture** treatment.



Trachea and Bronchi

- Trachea is an anatomical structure used for breathing: Vertebrate trachea, or windpipe, in terrestrial vertebrates.

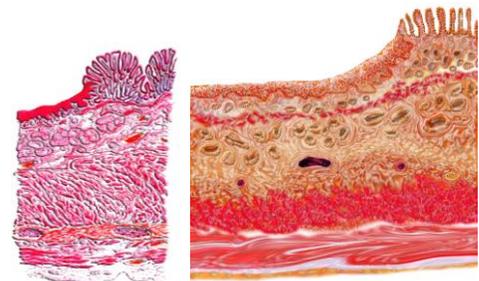
A Bronchus (plural bronchi, adjective bronchial) is a passage of airway in the respiratory tract that conducts air into the lungs. The bronchus branches into smaller tubes, which in turn become bronchioles.



No gas exchange takes place in this part of the lungs. The human trachea (windpipe) divides into two main bronchi (also mainstem bronchi), the left and the right, at the level of the sternal angle and of the fifth thoracic vertebra or up to two vertebrae higher or lower, depending on breathing, at the anatomical point known as the carina. The right main bronchus is wider, shorter, and more vertical than the left main bronchus.[2] The right main bronchus subdivides into three lobar bronchi, while the left main bronchus divides into two. The lobar bronchi divide into tertiary bronchi, also known as segmental bronchi, each of which supplies a bronchopulmonary segment. A bronchopulmonary segment is a division of a lung separated from the rest of the lung by a connective tissue septum. This property allows a bronchopulmonary segment to be surgically removed without affecting other segments. There are ten segments per lung, but due to anatomic development, several segmental bronchi in the left lung fuse, giving rise to eight. The segmental bronchi divide into many primary bronchioles which divide into terminal bronchioles, each of which then gives rise to several respiratory bronchioles, which go on to divide into two to 11 alveolar ducts. There are five or six alveolar sacs associated with each alveolar duct. The alveolus is the basic anatomical unit of gas exchange in the lung. The hyaline cartilage forms an incomplete ring in the bronchi, giving them a "D"-shaped appearance in the larger bronchi and as small plates and islands in the smaller bronchi. Smooth muscle is present continuously around the bronchi. In the mediastinum, at the level of the fourth thoracic vertebra, the trachea divides into the right and left primary bronchi. The bronchi branch into smaller and smaller passageways until they terminate in tiny air sacs called alveoli. The cartilage and mucous membrane of the primary bronchi are similar to those in the trachea. As the branching continues through the bronchial tree, the amount of hyaline cartilage in the walls decreases until it is absent in the bronchioles. As the cartilage decreases, the amount of smooth muscle increases. The mucous membrane also undergoes a transition from ciliated pseudostratified columnar epithelium to simple cuboidal epithelium to simple squamous epithelium. The alveolar ducts and alveoli consist primarily of simple squamous epithelium, which permits rapid diffusion of oxygen and carbon dioxide. Exchange of gases between the air in the lungs and the blood in the capillaries occurs across the walls of the alveolar ducts and alveoli.

Transition of Esophagus to Stomach

- Junction between the esophagus and the stomach. There are four layers of the gut wall, mucosa, submucosa, muscularis propria and adventitia/serosa. Note the submucosal mucous glands in this distal portion of the esophagus that terminate, roughly, where the stomach begins.



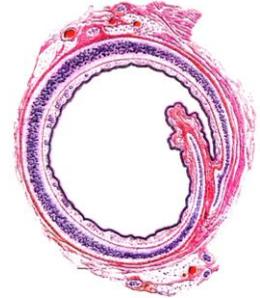
Transversal Section of Appendix

- A cross section obtained by slicing the appendix on a horizontal plane. The appendix is a part of the human digestive system. The appendix (or vermiform appendix; also cecal [or caecal] appendix; also vermiform) is a blind-ended tube connected to the cecum, from which it develops embryologically. The cecum is a pouchlike structure of the colon. The appendix is located near the junction of the small intestine and the large intestine.



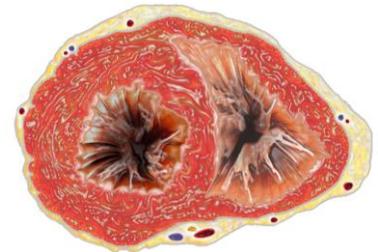
Transversal Section of Bronchus

- A cross section obtained by slicing the bronchus on a horizontal plane. A **bronchus**, also known as a main or primary bronchus, is a passage of airway in the [respiratory tract](#) that conducts air into the [lungs](#). There is a right bronchus and a left bronchus and these bronchi branch into smaller secondary and tertiary bronchi which branch into smaller tubes, known as [bronchioles](#).



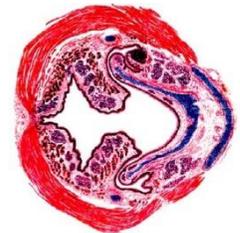
Transversal Section of Heart

- A cross section obtained by slicing the heart on a horizontal plane. The **heart** is a [muscular organ](#) in humans which pumps [blood](#) through the [blood vessels](#) of the [circulatory system](#).^[1] Blood provides the body with [oxygen](#) and [nutrients](#), and also assists in the removal of [metabolic wastes](#).^[2] The heart is located in the middle compartment of the [mediastinum](#) in the [chest](#).



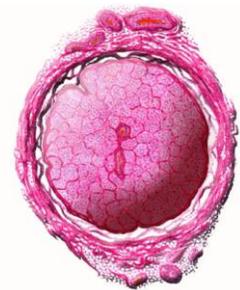
Transversal Section of Larynx

- A cross section obtained by slicing the larynx on a horizontal plane. The **larynx**, commonly called the **voice box**, is an [organ](#) in the [neck](#) involved in breathing, sound production, and protecting the [trachea](#) against food aspiration. It manipulates [pitch](#) and [volume](#). The larynx houses the [vocal folds](#) (vocal cords), which are essential for [phonation](#). The vocal folds are situated just below where the tract of the [pharynx](#) splits into the trachea and the [esophagus](#).



Transversal Section of Optic Nerve

- A cross section obtained by slicing the optic nerve on a horizontal plane. The **optic nerve**, also known as **cranial nerve II**, is a paired [nerve](#) that transmits [visual](#) information from the [retina](#) to the [brain](#). The optic nerve is derived from [optic stalks](#) during the seventh week of development and is composed of [retinal ganglion cell](#) axons and [glial cells](#). In humans, the optic nerve extends from the [optic disc](#) to the [optic chiasm](#) and continues as the [optic tract](#) to the [lateral geniculate nucleus](#), [pretectal nuclei](#), and [superior colliculus](#).



Transversal Section of Rachis in Cervical Zone

- A cross section obtained by slicing the rachis (vertebrae column) in the cervical region on a horizontal plane. The **Cervical region** is the part of the spine in the area of the neck (7 vertebrae).



Transversal Section of Rachis in Lumbar Zone

- a cross section obtained by slicing the rachis (vertebrae column) in the lumbar region on a horizontal plane. The **Lumbar region** is the part of the spine in the area of the loins (5 vertebrae).



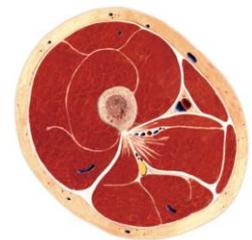
Transversal Cross Section of Rachis in Thorac Zone

- In [mammals](#), the thorax is the region of the [body](#) formed by the [sternum](#), the thoracic [vertebrae](#), and the [ribs](#). It extends from the [neck](#) to the [diaphragm](#), and does not include the [upper limbs](#). The [heart](#) and the [lungs](#) reside in the [thoracic cavity](#), as well as many [blood vessels](#). The inner organs are protected by the [rib cage](#) and the sternum.



Transversal Section of Right Femur

- a cross section obtained by slicing the femur, or **thigh bone**, on a horizontal plane. The Femur is the most [proximal](#) (closest to the center of the body) [bone](#) of the [leg](#) in [tetrapod vertebrates](#) capable of [walking](#) or [jumping](#),



Transversal Section of Trachea

- a cross section obtained by slicing the trachea or the tube that connects the pharynx and larynx to the lungs, allowing the passage of air, on a horizontal plane. A plane that intersects the longitudinal axis at a right angle.



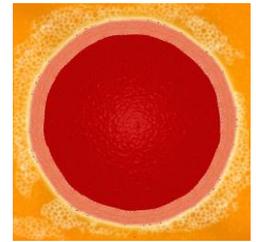
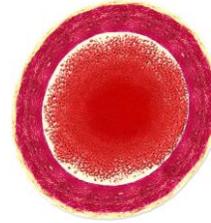
Transverse Section of Vein Vessel

- A cross section obtained by slicing the vein on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle. In the circulatory system, veins (from the Latin *vena*) are blood vessels that carry blood toward the heart. Most veins carry deoxygenated blood from the tissues back to the heart; exceptions are the pulmonary and umbilical veins, both of which carry oxygenated blood to the heart.



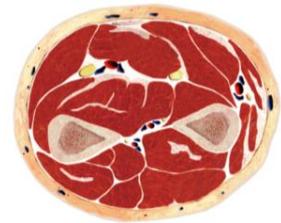
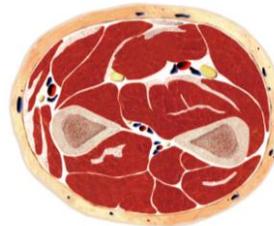
Transverse Section of Aorta

- a cross section obtained by slicing the aorta on a horizontal plane. The **aorta** is the main [artery](#) in the [human body](#), originating from the [left ventricle](#) of the [heart](#) and extending down to the [abdomen](#), where it [splits](#) into two smaller arteries (the [common iliac arteries](#)). The aorta distributes [oxygenated](#) blood to all parts of the body through the [systemic circulation](#).^[1]



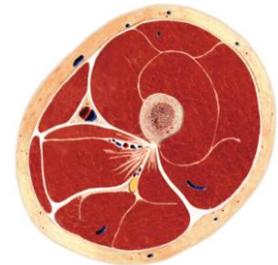
Transverse Section of Left and Right Forearm

- a cross section obtained by slicing the forearm on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



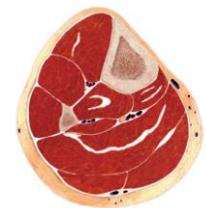
Transverse Section of Left Femur

- A cross section obtained by slicing the femur on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



Transverse Section of Left Shin

- a cross section obtained by slicing the shin on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle. The tibia or tibias), also known as the shinbone or shankbone, is the larger and stronger of the two bones in the leg below the knee in vertebrates (the other being the fibula), and it connects the knee with the ankle bones.



Transverse Section of Foot

- a cross section obtained by slicing the foot on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



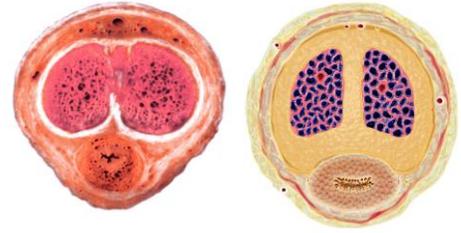
Transverse Section of Hand in Metacarpal Bones

- a cross section obtained by slicing the metacarpal bones or wrist bones on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle. the **metacarpus** is the intermediate part of the [hand skeleton](#) that is located between the [phalanges](#) (bones of the fingers) and the [carpus](#) which forms the connection to the [forearm](#). The metacarpus consists of metacarpal bones.



Transverse Section of the Penis; Front View

- a cross section obtained by slicing the penis on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



Transverse Section of the Left Shoulder

- a cross section obtained by slicing the shoulder on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



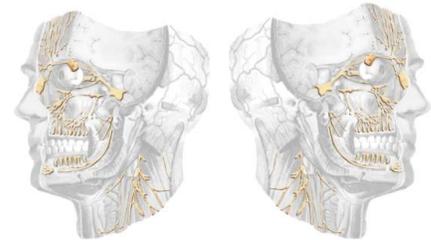
Transverse Section of Arm; Right

- a cross section obtained by slicing the arm on a horizontal plane, that is, a plane that intersects the longitudinal axis at a right angle.



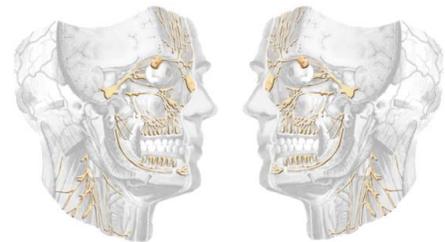
Trifacial Nerve

- Either of the fifth pair of cranial nerves, being the chief sensory nerve of the face and the motor nerve of the muscles of chewing and having sensory and motor functions in the teeth, mouth, and nasal cavity.



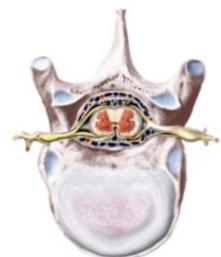
Trigeminal Nerve, Teeth Forehead, Neck; Right and Left

- each of the fifth and largest pair of cranial nerves, supplying the front part of the head and dividing into the ophthalmic, maxillary, and mandibular nerves.



Twelfth Thoracic Vertebrae

- The twelfth thoracic vertebra (or the T12 vertebra) is the largest and most inferior of the thoracic vertebrae. T12 bears the most weight of any thoracic vertebra, making it the strongest thoracic vertebra, but also the most susceptible to stress-related injuries.



Tympanic Membrane

- a membrane forming part of the organ of hearing, which vibrates in response to sound waves. In humans and other higher vertebrates it forms the eardrum, between the outer and middle ear.



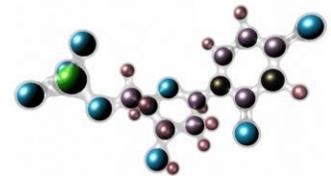
UMK Cel

- a usually microscopic structure containing nuclear and cytoplasmic material enclosed by a semipermeable membrane and, in plants, a cell wall; the basic structural unit of all organisms.



Uracil

- A nitrogen-containing base found in RNA (but not in DNA) and derived from pyrimidine; pairs with adenine. uracil (Science: biochemistry) The [pyrimidine base](#) from which [uridine](#) is derived. One of the bases that is found on nucleotides of an RNA chain, which replaces thymine from the original DNA template and therefore pairs with adenine in RNA.



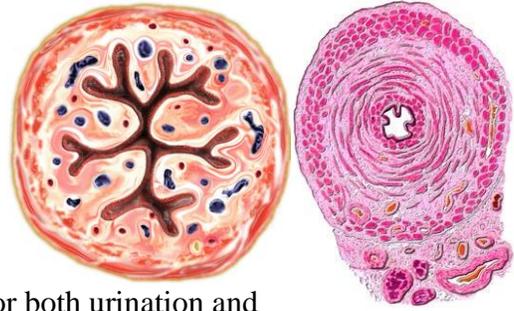
Ureter

- In human anatomy, the ureters are tubes made of smooth muscle fibers that propel urine from the kidneys to the urinary bladder. In the adult, the ureters are usually 25–30 cm (10–12 in) long and ~3–4 mm in diameter. Histologically, the ureter contains transitional epithelium and an additional smooth muscle layer in the more distal one-third to assist with peristalsis. In humans, the ureters arise from the renal pelvis on the medial aspect of each kidney before descending towards the bladder on the front of the psoas major muscle. The ureters cross the pelvic brim near the bifurcation of the iliac arteries (which they cross anteriorly). This is a common site for the impaction of kidney stones (the others being the ureterovesical valve, where the ureter meets the bladder, and the pelvouteric junction, where the renal pelvis meets the ureter in the renal hilum). The ureters run posteroinferiorly on the lateral walls of the pelvis and then curve anteriorly to enter the bladder through the back, at the vesicoureteric junction, running within the wall of the bladder for a few centimetres. The backflow of urine is prevented by valves known as ureterovesical valves. In females, the ureters pass through the mesometrium and under the uterine arteries on the way to the urinary bladder. An effective phrase for remembering this anatomical relationship is "water (ureters) under the bridge (uterine arteries or vas deferens)."



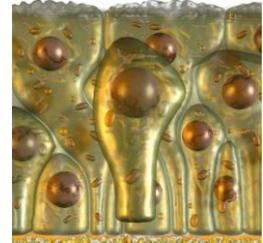
Urethra

- In [anatomy](#), the urethra (from [Greek](#) οὐρήθρα - *ourethra*) is a tube that connects the [urinary bladder](#) to the genitals for the removal of fluids from the body. In males, the urethra travels through the [penis](#), and carries [semen](#) as well as [urine](#). In female [placental mammals](#), the urethra is shorter and emerges above the vaginal opening. [Female placental mammals](#) use their urethra only for urinating, but [male placental mammals](#) use their urethra for both urination and [ejaculation](#). The external [urethral sphincter](#) is a [striated muscle](#) that allows voluntary control over [urination](#).



Urological Epithelium

- The urothelium plays a pivotal role as a barrier between urine and its solutes and the underlying bladder.



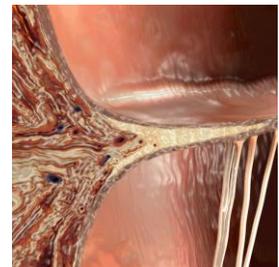
Vacuoles

- a space or vesicle within the cytoplasm of a cell, enclosed by a membrane and typically containing fluid.



Valves Section

- a device for controlling the passage of fluid through a pipe or duct, especially an automatic device allowing movement in one direction only.



Valves of the Heart

- A **heart valve** normally allows [blood](#) to flow in only one direction through the [heart](#). A heart valve opens or closes incumbent on differential [blood pressure](#) on each side. The four main valves in the heart are: The two atrioventricular (AV) valves, the [mitral valve](#) (bicuspid valve), and the [tricuspid valve](#), which are between the upper atria and the lower ventricles. The two semilunar (SL) valves, the [aortic valve](#) and the [pulmonary valve](#), which are in the arteries leaving the heart. The mitral valve and the aortic valve are in the left heart; the tricuspid valve and the pulmonary valve are in the right heart. There are also the [coronary sinus](#) and the [inferior vena cava valves](#).



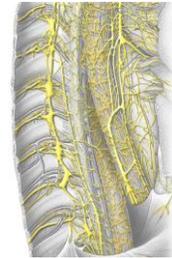
Vegetative Nervous System

- the network of nerve cells and fibers that transmits nerve impulses between parts of the body.



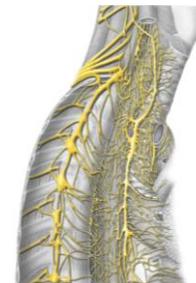
Vegetative Nervous System of Abdomen

- The nervous system of the abdomen, lower back, and pelvis contains many important nerve conduits that service this region of the body as well as the lower limbs. This section of the nervous system features the most inferior portion of the spinal cord along with many major nerves, plexuses, and ganglia that serve the vital organs of the abdominopelvic cavity.



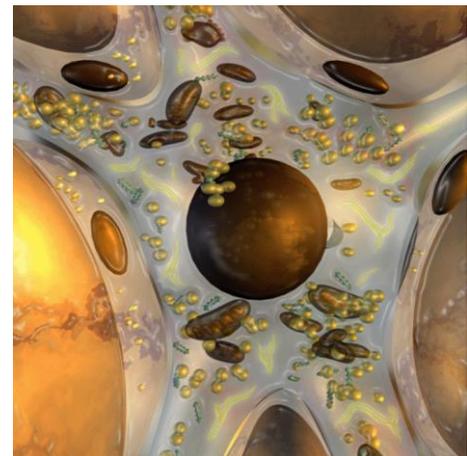
Vegetative Nervous System of Thorax

- The nervous system of the thorax is a vital part of the nervous system as a whole, as it includes the spinal cord, peripheral nerves, and autonomic ganglia that communicate with and control many vital organs. Sensory information from the body and critical signals traveling to and from the limbs, trunk and vital organs all pass through this region on their way to and from the brain.



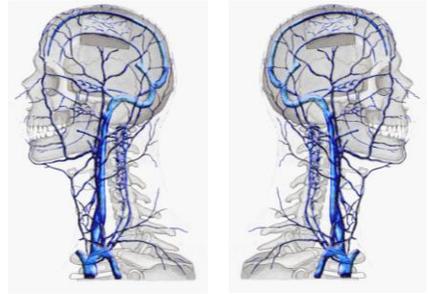
Vegetative Neurons of Sympathetic Ganglions

-that part of the nervous system that represents the motor innervation of smooth muscle, cardiac muscle, and gland cells. It consists of two physiologically and anatomically distinct, mutually antagonistic components: the sympathetic and parasympathetic parts. In both these parts, the pathway of innervation consists of a synaptic sequence of two motor neurons, one of which lies in the spinal cord or brainstem as the presynaptic (also called preganglionic or B fiber) neuron, the thin but myelinated axon of which emerges with an outgoing spinal or cranial nerve and synapses with one or more of the postsynaptic (postganglionic or, more strictly, ganglionic) neurons composing the autonomic ganglia; the unmyelinated postsynaptic fibers in turn innervate the smooth muscle, cardiac muscle, or gland cells. The presynaptic neurons of the sympathetic part lie in the intermediolateral cell column of the thoracic and upper two lumbar segments of the spinal gray matter; those of the parasympathetic part compose the visceral motor (visceral efferent) nuclei of the brainstem as well as the lateral column of the second to fourth sacral segments of the spinal cord. The ganglia of the sympathetic part are the paravertebral ganglia of the sympathetic trunk and the lumbar and sacral prevertebral or collateral ganglia; those of the parasympathetic part lie either near the organ to be innervated or as intramural ganglia within the organ itself except in the head, where there are four discrete parasympathetic ganglia (ciliary, otic, pterygopalatine, and submandibular). Impulse transmission from presynaptic to postsynaptic neuron is mediated by acetylcholine in both the sympathetic and parasympathetic parts; transmission from the postsynaptic fiber to the visceral effector tissues is classically said to be by acetylcholine in the parasympathetic part and by noradrenalin in the sympathetic part; recent evidence suggests the existence of further noncholinergic, nonadrenergic classes of postsynaptic fibers.



Veins of the Head and Neck Area

- includes the veins that return deoxygenated blood from these organs to the heart. Among these blood vessels are several unique and important structures that have evolved to help maintain the continuous flow of blood to the brain.



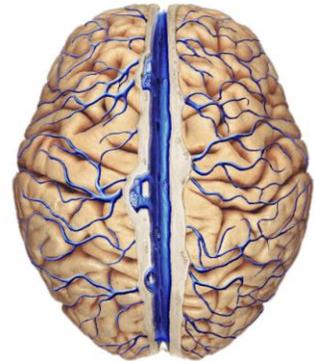
Veins of Leg

- superficial leg veins (the dark blue veins) include the greater and lesser saphenous veins. In **deep vein thrombosis**, a blood clot (**thrombus**) forms in a deep vein, usually in the legs. **Clots** also can form in superficial veins, which are closer to the skin.



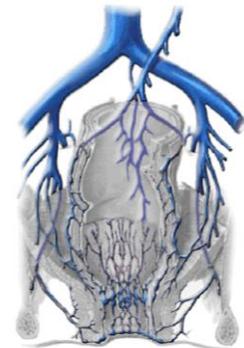
Veins of Encephalon, From Above

– This is a look at the veins of the brain from above. The brain is the center of the nervous system in all vertebrate and most invertebrate animals—only a few invertebrates such as sponges, jellyfish, adult sea squirts and starfish do not have one, even if diffuse neural tissue is present. It is located in the head, usually close to the primary sensory organs for such senses as vision, hearing, balance, taste, and smell. The brain is the most complex organ in a vertebrate's body. In a typical human the cerebral cortex (the largest part) is estimated to contain 15–33 billion neurons, each connected by synapses to several thousand other neurons. These neurons communicate with one another by means of long protoplasmic fibers called axons, which carry trains of signal pulses called action potentials to distant parts of the brain or body targeting specific recipient cells.



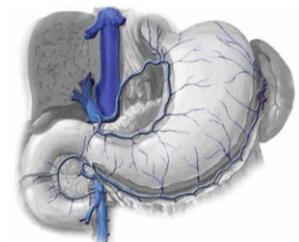
Veins of Rectum and Anal Canal

- The rectum and anal canal are supplied by the superior rectal artery, with assistance from the middle and inferior rectal arteries, and by the median sacral artery. The submucosal venous plexus above the pectinate line drains into the superior rectal veins (portal system), which may become varicose, resulting in internal hemorrhoids or "piles."



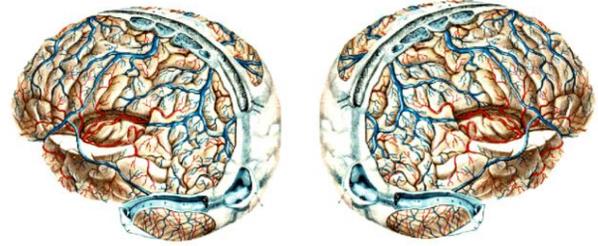
Veins of Stomach

-The short gastric veins are located on the left side of the stomach, between the **gastrosplenic ligaments**. The veins act as a drainage system for the stomach. The coronary vein, or left vein, is one of the gastric veins in the stomach and functions to transport blood that needs oxygen. The right vein is located on the right side of the stomach, in the area known as the lesser curvature of the stomach. It pushes blood out of this area of the stomach.



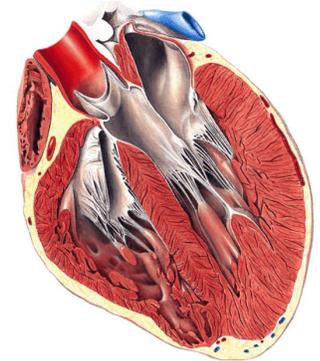
Veins of the Left and Right Hemispheres of the Brain

(See Veins of Encephalon, From Above)



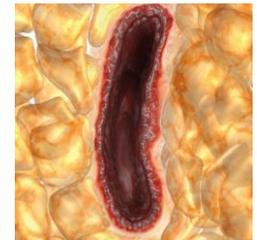
Ventricle Front (Heart)

- In the heart, a ventricle is one of two large chambers that collect and expel blood received from an atrium towards the peripheral beds within the body and lungs. The atrium (an adjacent/upper heart chamber that is smaller than a ventricle) primes the Pump. Interventricular means between two or more ventricles (for example the interventricular septum), while intraventricular means within one ventricle (for example an intraventricular block). In a four-chambered heart, such as that in humans, there are two ventricles: the right ventricle pumps blood into the pulmonary circulation to/for the lungs, and the left ventricle pumps blood into the systemic circulation through the aorta (systemic circulation). (See Double circulatory system for details.) Ventricles have thicker walls than atria and generate higher blood pressures. The physiologic load on the ventricles requiring pumping of blood throughout the body and lungs is much greater than the pressure generated by the atria to fill the ventricles. Further, the left ventricle has thicker walls than the right because it needs to pump blood to most of the body while the right ventricle fills only the lungs.



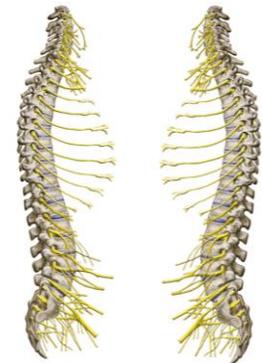
Venula

- a minute vein continuous with a capillary.



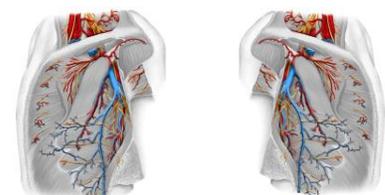
Vertebro, Spinal Nerves Left and Right

- A **spinal nerve** is a mixed [nerve](#), which carries motor, sensory, and autonomic signals between the [spinal cord](#) and the body. In the [human](#) there are 31 pairs of spinal nerves, one on each side of the [vertebral column](#). These are grouped into the corresponding [cervical](#), [thoracic](#), [lumbar](#), [sacral](#) and [coccygeal](#) regions of the spine.^[1] There are eight pairs of **cervical nerves**, twelve pairs of **thoracic nerves**, five pairs of **lumbar nerves**, five pairs of **sacral nerves**, and one pair of **coccygeal nerves**. The spinal nerves are part of the [peripheral nervous system](#).



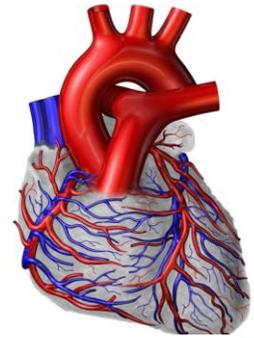
Vessels and Nerves of Thorax, Left and Right

- The thoracic wall is supplied by three sources of blood supply: axillarysupreme thoracic (2)lateral thoracic (3)subclavian internal thoracic (or mammary) artery (1)anterior intercostal branches aorta intercostal arteries (4) The thoracic wall is supplied by the intercostal nerves which are the anterior primary rami of spinal nerves.



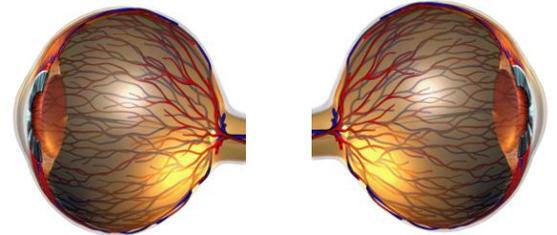
Vessels of Anterior Heart Wall

- The heart receives its own supply of blood from the coronary arteries. Two major coronary arteries branch off from the aorta near the point where the aorta and the left ventricle meet. These arteries and their branches supply all parts of the heart muscle with blood.



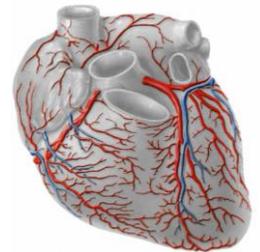
Vessels of Eye

- The arterial input to the eye is provided by several branches from the ophthalmic artery, which is derived from the internal carotid artery in most mammals. These branches include the central retinal artery, the short and long posterior ciliary arteries, and the anterior ciliary arteries. Venous outflow from the eye is primarily via the vortex veins and the central retinal vein, which merge with the superior and inferior ophthalmic veins that drain into the cavernous sinus, the pterygoid venous plexus and the facial vein.



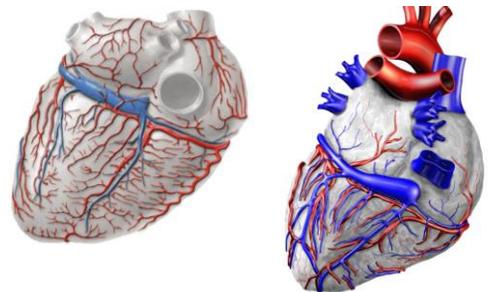
Vessels of Frontal Wall of Heart

- This is a look at the blood vessels (arteries and veins) on the front wall of the heart. The heart is a hollow muscle that pumps blood throughout the blood vessels by repeated, rhythmic contractions. It is found in all animals with a circulatory system, which includes the vertebrates.



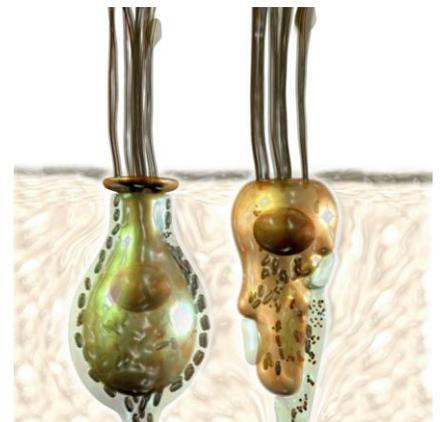
Vessels of Posterior Heart Wall

- The **inferior vena cava** is one of the two main veins bringing de-oxygenated blood from the body to the heart. Veins from the legs and lower torso feed into the **inferior vena cava**, which empties into the right atrium of the heart.



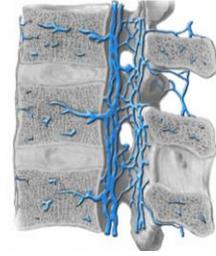
Vestibular Cells

- The **vestibular system**, in most mammals, is the [sensory system](#) that provides the leading contribution about the [sense of balance](#) and [spatial orientation](#) for the purpose of coordinating [movement](#) with [balance](#). Together with the [cochlea](#), a part of the [auditory system](#), it constitutes the [labyrinth of the inner ear](#) in most mammals, situated in the [vestibulum](#) in the [inner ear](#) (Figure 1). As movements consist of rotations and translations, the vestibular system comprises two components: the semicircular canal system, which indicate rotational movements; and the [otoliths](#), which indicate linear accelerations. The vestibular system sends signals primarily to the neural structures that control eye movements, and to the muscles that keep an animal upright. The projections to the former provide the anatomical basis of the [vestibulo-ocular reflex](#), which is required for clear vision; and the projections to the muscles that control posture are necessary to keep an animal upright.



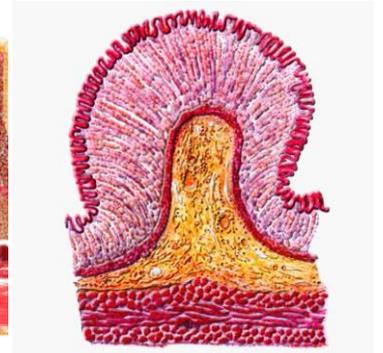
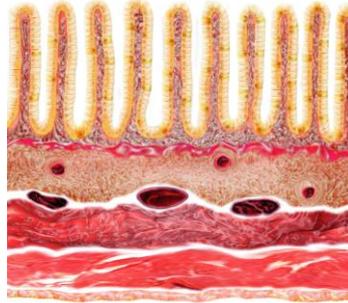
Vienna Lumbar Vertebrae

- The **intervertebral veins** accompany the spinal nerves through the [intervertebral foramina](#); they receive the veins from the [medulla spinalis](#), drain the internal and [external vertebral plexuses](#).



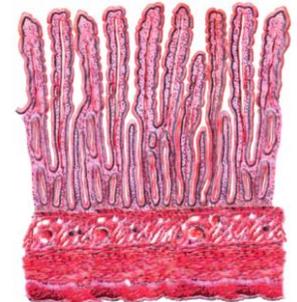
Wall of the Rectum

- The rectum (from the Latin [rectum intestinum](#), meaning *straight intestine*) is the final straight portion of the [large intestine](#) in some [mammals](#), and the [gut](#) in others. The human rectum is about 12 centimetres (4.7 in) long, and begins at the rectosigmoid junction (the end of the sigmoid [colon](#)), at the level of the third sacral vertebra or the sacral promontory depending upon what definition is used. Its [caliber](#) is similar to that of the [sigmoid colon](#) at its commencement, but it is dilated near its termination, forming the [rectal ampulla](#). It terminates at the level of the anorectal ring (the level of the [puborectalis](#) sling) or the [dentate line](#), again depending upon which definition is used. In humans, the rectum is followed by the [anal canal](#), before the gastrointestinal tract terminates at the [anal verge](#).



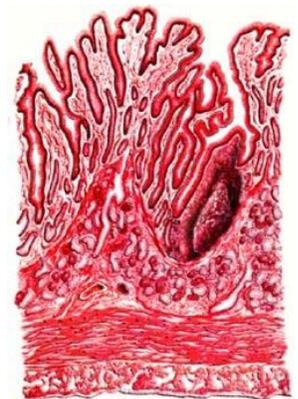
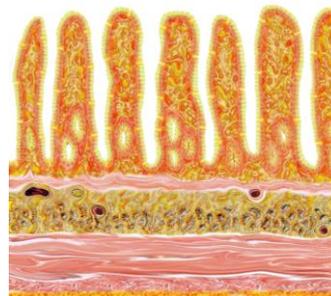
Wall of Small Intestine

- This is a look at the walls of the small intestine. The small intestine (or small bowel) is the part of the [gastrointestinal tract](#) following the [stomach](#) and followed by the [large intestine](#), and is where much of the [digestion](#) and absorption of food takes place. It receives bile juice and pancreatic juice through the hepatopancreatic duct, controlled by Sphincter of oddi. In [invertebrates](#) such as worms, the terms "gastrointestinal tract" and "large intestine" are often used to describe the entire [intestine](#). This article is primarily about the [human gut](#), though the information about its processes is directly applicable to most placental mammals. The primary function of the small intestine is the absorption of nutrients and minerals found in food.



Wall of Duodenum

- This is a look at the wall of the duodenum. The duodenum [/ˌduː.əˈdɪnəm/](#) is the first section of the [small intestine](#) in most higher [vertebrates](#), including [mammals](#), [reptiles](#), and [birds](#). In [fish](#), the divisions of the small intestine are not as clear, and the terms anterior intestine or proximal intestine may be used instead of duodenum. In mammals the duodenum may be the principal site for iron absorption. The duodenum precedes the [jejunum](#) and [ileum](#) and is the shortest part of the small intestine, where most chemical [digestion](#) takes place.

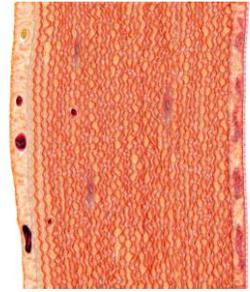


The name *duodenum* is from the [Latin](#) *duodenum digitorum*, or "twelve fingers' breadth". In humans, the duodenum is a hollow jointed tube about 25-38cm (10-15 inches) long connecting the [stomach](#) to the [jejunum](#). It begins with the [duodenal bulb](#) and ends at the [ligament of Treitz](#).

Wall of Aorta

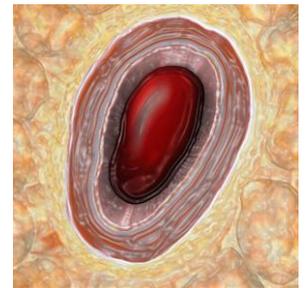
- Like all arteries, the aorta's wall has several layers:

- The **intima**, the innermost layer, provides a smooth surface for blood to flow across.
- The **media**, the middle layer with muscle and elastic fibers, allows the aorta to expand and contract with each heartbeat.
- The **adventitia**, the outer layer, provides additional support and structure to the aorta.



Wall of Arterial Vessel

The walls of arteries and veins are composed of endothelial cells, smooth muscle cells and extracellular matrix (including collagen and elastin). These are arranged into three concentric layers: intima, media and adventitia.



1. The **intima** is the thinnest layer. It is composed of a single layer of endothelial cells and a small amount of subendothelial connective tissue. The intima is separated from the media by a dense elastic membrane called the *internal elastic lamina*.
2. The **media** is the thickest layer and provides structural support, vasoreactivity and elasticity. It is composed of smooth muscle cells, elastic fibres and connective tissue, which vary in amount depending on the type of vessel. Smooth muscle cells contract (vasoconstriction) or relax (vasodilatation), which is controlled by autonomic nerves (*nervi vasorum*) and local metabolic factors. Elastic fibres allow the vessel to expand with systole and contract with diastole, thereby propelling blood forward. The media is separated from the adventitia by a dense elastic membrane called the *external elastic lamina*.
3. The **adventitia** is composed of connective tissue, nutrient vessels (*vasa vasorum*) and autonomic nerves (*nervi vasorum*).

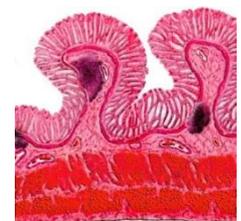
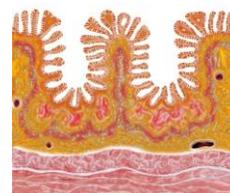
Wall of Chloric Duct

- A look at the wall of the bile or **Chloric** duct. A bile duct is any of a number of long tube-like structures that carry bile. Bile, required for the digestion of food, is secreted by the liver into passages that carry bile toward the hepatic duct, which joins with the cystic duct (carrying bile to and from the gallbladder) to form the common bile duct, which opens into the intestine.



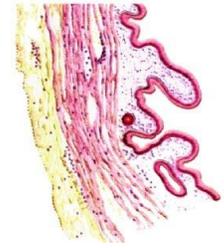
Wall of Colon

- Muscles line the colon's walls, squeezing its contents along. Billions of bacteria coat the colon and its contents, living in a healthy balance with the body.



Wall of Gallbladder

- The gallbladder wall's innermost surface is lined by a single layer of [columnar cells](#) with an apical [brush border](#) of [microvilli](#), very similar to intestinal absorptive cells.^{[6][7]} Underneath the epithelia is an underlying [lamina propria](#), a [muscular layer](#), an outer perimuscular layer and [serosa](#). Unlike elsewhere in the intestinal tract, the gallbladder does not have a [muscularis mucosae](#), and the muscular fibres are not arranged in distinct layers.



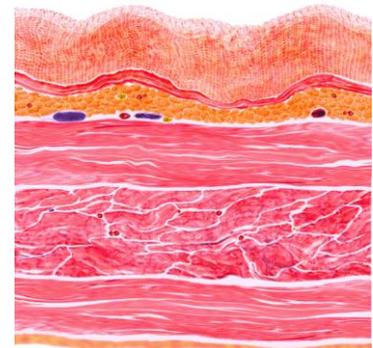
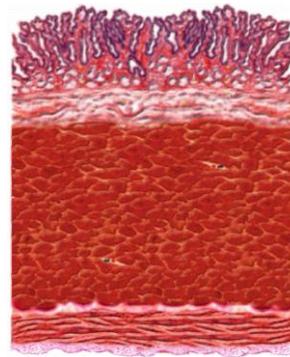
Wall of Heart

- The wall of the heart consists of three layers: the epicardium (external layer), the myocardium (middle layer) and the endocardium (inner layer). The epicardium is the thin, transparent outer layer of the wall and is composed of delicate connective tissue. The myocardium, comprised of cardiac muscle tissue, makes up the majority of the cardiac wall and is responsible for its pumping action. The thickness of the myocardium mirrors the load to which each specific region of the heart is subjected. The endocardium is a thin layer of endothelium overlying a thin layer of connective tissue. It provides a smooth lining for the chambers of the heart and covers the valves. The endocardium is continuous with the endothelial lining of the large blood vessels attached to the heart.



Wall of the Stomach

- the stomach walls consist of an outer [mucosa](#), and inner [submucosa](#), [muscularis externa](#), and [serosa](#). The [gastric mucosa](#) of the stomach consists of the [epithelium](#) and the [lamina propria](#) (composed of loose connective tissue), with a thin layer of [smooth muscle](#) called the [muscularis mucosae](#) separating it from the submucosa beneath. The [submucosa](#) lies under the mucosa and consists of [fibrous connective tissue](#), separating the mucosa from the next layer.



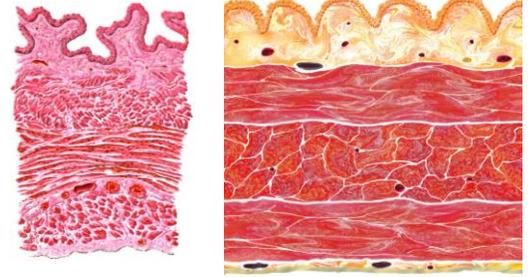
[Meissner's plexus](#) is in this layer. The [muscularis externa](#) lies beneath the submucosa, and is unique from other organs of the gastrointestinal tract, consisting of three layers:

- The *inner oblique layer*: This layer is responsible for creating the motion that churns and physically breaks down the food. It is the only layer of the three which is not seen in other parts of the [digestive system](#). The antrum has thicker skin cells in its walls and performs more forceful contractions than the fundus.
- The *middle circular layer*: At this layer, the [pylorus](#) is surrounded by a thick circular muscular wall which is normally tonically constricted forming a functional (if not anatomically discrete) pyloric [sphincter](#), which controls the movement of [chyme](#) into the [duodenum](#). This layer is concentric to the longitudinal axis of the stomach.
- [Auerbach's plexus](#) (AKA myenteric plexus) is found between the outer longitudinal and the middle circular layer and is responsible for the innervation of both (causing peristalsis and mixing)
- The *outer longitudinal layer*

Wall of Urinary Bladder

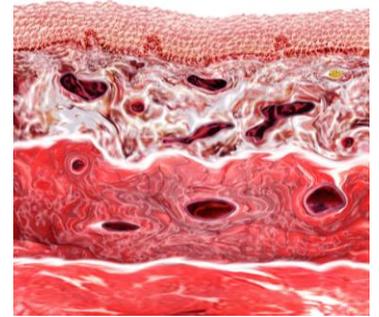
- The [detrusor muscle](#) is a layer of the urinary bladder wall made of [smooth muscle fibers](#) arranged in spiral, longitudinal, and circular bundles. When the bladder is stretched, this signals the [parasympathetic](#) nervous system to contract the [detrusor muscle](#).

This encourages the bladder to expel urine through the urethra.



Wall of Vagina

- The wall of the vagina from the [lumen](#) outwards consists firstly of a [mucosa](#) of [non-keratinized stratified squamous epithelium](#) with an underlying [lamina propria](#) of [connective tissue](#), secondly a layer of [smooth muscle](#) with bundles of circular fibers internal to longitudinal fibers, and thirdly an outer layer of connective tissue called the [adventitia](#).



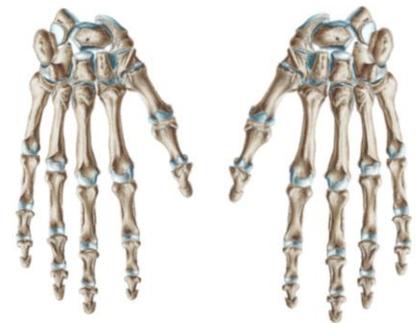
White Substance

- **White matter** is a component of the [central nervous system](#), in the brain and superficial spinal cord, and consists mostly of [glial](#) cells and [myelinated axons](#) that transmit signals from one region of the [cerebrum](#) to another and between the cerebrum and lower brain centers.



Wrist, Right and Left

- The joint or region between the hand and forearm. Defined as the [carpus](#) or carpal bones, the complex of eight bones forming the proximal skeletal segment of the hand;^{[1][2]} (2) the **wrist joint** or **radiocarpal joint**, the joint between the [radius](#) and the carpus;^[2] and (3) the anatomical region surrounding the carpus including the distal parts of the bones of the forearm and the proximal parts of the [metacarpus](#) or five metacarpal bones and the series of joints between these bones, thus referred to as *wrist joints*.



X - Chromosome

- The **X chromosome** is one of the two [sex-determining chromosomes](#) (**allosomes**) in many animal species, including mammals and is found in both males and females. The X chromosome in humans spans more than 153 million [base pairs](#) (the building material of [DNA](#)). It represents about 2000 out of 20,000 - 25,000 genes. Each person normally has one pair of sex chromosomes in each cell. Females have two X chromosomes, whereas males have one X and one [Y chromosome](#). Both males and females retain one of their mother's X chromosomes, and females retain their second X chromosome from their father.



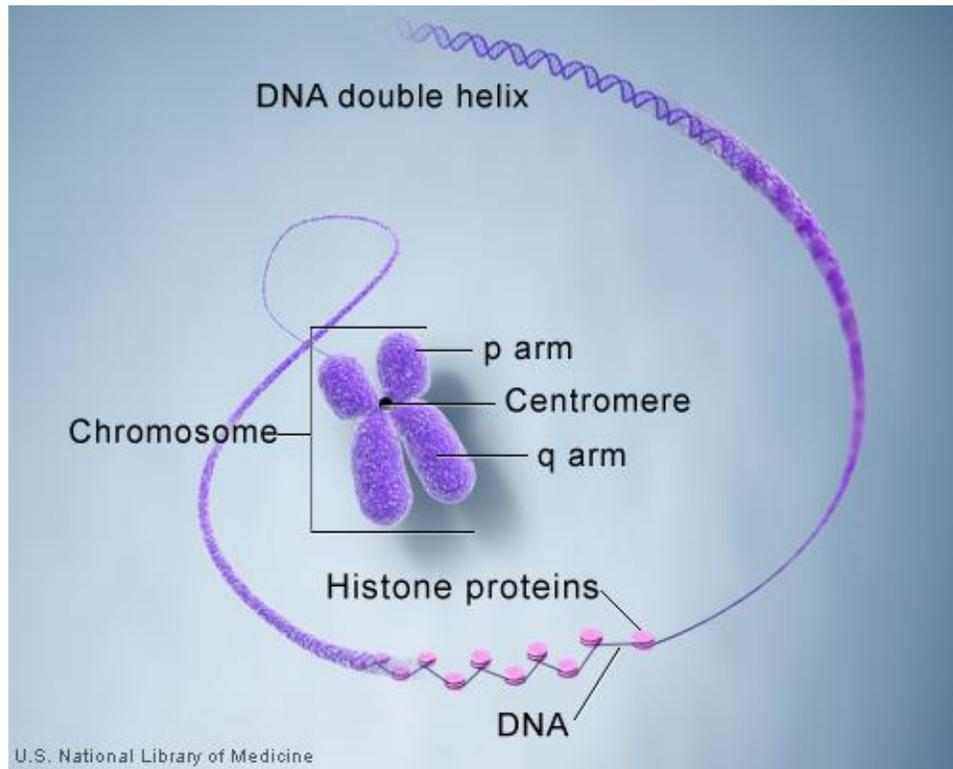
Y- Chromosome

- The **Y chromosome** is one of two sex [chromosomes](#) ([allosomes](#)) in [mammals](#), including [humans](#), and many other animals. Y is the [sex-determining](#) chromosome in many species, since it is the presence or absence of Y that determines male or female sex. In mammals, the Y chromosome contains the [gene SRY](#), which triggers [testis](#) development. The DNA in the human Y chromosome is composed of about 59 million [base pairs](#).^[21] The Y chromosome is passed only from father to son, so analysis of Y chromosome DNA may thus be used in genealogical research. With a 30% difference between humans and chimpanzees, the Y chromosome is one of the fastest evolving parts of the human genome.



Appendix A

What is a Chromosome?



DNA and histone proteins are packaged into structures called chromosomes.
For more information, go to: <http://ghr.nlm.nih.gov/handbook/basics/chromosome>

A brief Description of the Makeup of a Chromosome

In the nucleus of each cell, the DNA molecule is packaged into thread-like structures called chromosomes. Each chromosome is made up of DNA tightly coiled many times around proteins called histones that support its structure.

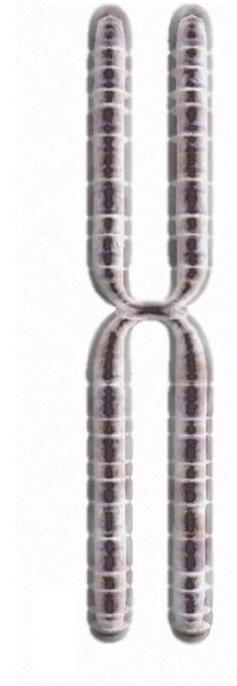
Chromosomes are not visible in the cell's nucleus—not even under a microscope—when the cell is not dividing. However, the DNA that makes up chromosomes becomes more tightly packed during cell division and is then visible under a microscope. Most of what researchers know about chromosomes was learned by observing chromosomes during cell division.

Each chromosome has a constriction point called the centromere, which divides the chromosome into two sections, or “arms.” The short arm of the chromosome is labeled the “p arm.” The long arm of the chromosome is labeled the “q arm.” The location of the centromere on each chromosome gives the chromosome its characteristic shape, and can be used to help describe the location of specific genes.

There are 890 known diseases related to Chromosome 1

Some of these diseases are deafness, Alzheimer disease, glaucoma and breast cancer. Rearrangements and mutations of chromosome 1 are prevalent in cancer and many other diseases. Patterns of sequence variation reveal signals of recent selection in specific genes that may contribute to human fitness, and also in regions where no function is evident. The following diseases are some of those related to genes on chromosome 1 (which contains the most known genetic diseases of any human chromosome):

- 1q21.1 deletion syndrome
- 1q21.1 duplication syndrome
- Alzheimer disease
- Alzheimer disease, type 4
- Breast cancer
- Brooke Greenberg Disease (Syndrome X)
- Carnitine palmitoyltransferase II deficiency
- Charcot–Marie–Tooth disease, types 1 and 2
- collagenopathy, types II and XI
- congenital hypothyroidism
- Deafness, autosomal recessive deafness 36
- Ehlers-Danlos syndrome
- Ehlers-Danlos syndrome, kyphoscoliosis type
- Factor V Leiden thrombophilia
- Familial adenomatous polyposis
- galactosemia
- Gaucher disease
- Gaucher disease type 1
- Gaucher disease type 2
- Gaucher disease type 3
- Gaucher-like disease
- Gelatinous drop-like corneal dystrophy
- Glaucoma
- Hemochromatosis
- Hemochromatosis, type 2
- Hepatoerythropoietic porphyria
- Homocystinuria
- Hutchinson Gilford Progeria Syndrome
- 3-hydroxy-3-methylglutaryl-CoA lyase deficiency
- Hypertrophic cardiomyopathy, autosomal dominant mutations of TNNT2; hypertrophy usually mild; restrictive phenotype may be present; may carry high risk of sudden cardiac death
- maple syrup urine disease
- medium-chain acyl-coenzyme A dehydrogenase deficiency
- Microcephaly
- Muckle-Wells Syndrome
- Nonsyndromic deafness
- Nonsyndromic deafness, autosomal dominant
- Nonsyndromic deafness, autosomal recessive
- Oligodendroglioma
- Parkinson disease
- Pheochromocytoma
- porphyria
- porphyria cutanea tarda



- popliteal pterygium syndrome
- prostate cancer
- Stickler syndrome
- Stickler syndrome, COL11A1
- TAR syndrome
- trimethylaminuria
- Usher syndrome
- Usher syndrome type II
- Van der Woude syndrome
- Variegate porphyria

The following diseases and traits are related to genes located on Chromosome 2

- 2p15-16.1 microdeletion syndrome
- Autism
- Alport syndrome
- Alström syndrome
- Amyotrophic lateral sclerosis
- iAmyotrophic lateral sclerosis, type 2
- Congenital hypothyroidism
- Dementia with Lewy bodies
- Ehlers–Danlos syndrome
- Ehlers–Danlos syndrome, classical type
- Ehlers–Danlos syndrome, vascular type
- Fibrodysplasia ossificans progressiva
- Harlequin type ichthyosis
- Hemochromatosis
- Hemochromatosis, type 4
- Hereditary nonpolyposis colorectal cancer
- Infantile-onset ascending hereditary spastic paralysis
- Juvenile primary lateral sclerosis
- Long-chain 3-hydroxyacyl-coenzyme A dehydrogenase deficiency
- Maturity onset diabetes of the young type 6
- Mitochondrial trifunctional protein deficiency
- Nonsyndromic deafness
- Nonsyndromic deafness, autosomal recessive
- Primary hyperoxaluria
- Primary pulmonary hypertension
- Sitosterolemia (knockout of either ABCG5 or ABCG8)
- Sensenbrenner syndrome
- Synesthesia
- Waardenburg syndrome



The following diseases are some of those related to genes on Chromosome 3

- 3-methylcrotonyl-CoA carboxylase deficiency
- 3q29 microdeletion syndrome
- Alkaptonuria
- Arrhythmogenic right ventricular dysplasia
- Atransferrinemia
- Autism
- Biotinidase deficiency
- Blepharophimosis, epicanthus inversus and ptosis type 1
- Breast/colon/lung/pancreatic cancer
- Brugada syndrome
- Castillo fever
- Carnitine-acylcarnitine translocase deficiency
- Cataracts
- Cerebral cavernous malformation
- Charcot-Marie-Tooth disease, type 2
- Charcot-Marie-Tooth disease
- Chromosome 3q duplication syndrome
- Coproporphyrinuria
- Dandy Walker Syndrome
- Deafness
- Diabetes
- Dopamine receptor
- Dystrophic epidermolysis bullosa
- Endplate acetylcholinesterase deficiency
- Essential tremors
- Glaucoma, primary open angle
- Glycogen storage disease
- Hailey-Hailey disease
- Harderoporphyria
- Heart block, progressive/nonprogressive
- Hereditary coproporphyrinuria
- Hereditary nonpolyposis colorectal cancer
- HIV infection, susceptibility/resistance to
- Hypobetalipoproteinemia, familial
- Hypothermia
- Leukoencephalopathy with vanishing white matter
- Long QT syndrome
- Lymphomas
- Malignant hyperthermia susceptibility
- Metaphyseal chondrodysplasia, Murk Jansen type
- Microcoria
- Moebius syndrome
- Moyamoya disease
- Mucopolysaccharidosis
- Muir-Torre family cancer syndrome
- Myotonic dystrophy, type 2
- Myotonic dystrophy



- Neuropathy, hereditary motor and sensory, Okinawa type
- Night blindness
- Nonsyndromic deafness, autosomal recessive
- Nonsyndromic deafness
- Ovarian cancer
- Porphyria
- Propionic acidemia
- Protein S deficiency
- Pseudo-Zellweger syndrome
- Retinitis pigmentosa
- Romano-Ward syndrome
- Seckel Syndrome
- Sensenbrenner syndrome
- Septo-optic dysplasia
- Short stature
- Spinocerebellar ataxia
- Sucrose intolerance
- T-cell leukemia translocation altered gene
- Usher syndrome type III
- Usher syndrome (Finland)
- Usher syndrome
- von Hippel-Lindau syndrome
- Waardenburg syndrome
- Xeroderma pigmentosum, complementation group c

The following are some of the diseases related to genes located on Chromosome 4

- achondroplasia
- autosomal dominant polycystic kidney disease (PKD-2)
- bladder cancer
- Crouzonodermoskeletal syndrome
- Chronic Lymphocytic Leukemia
- Ellis-van Creveld syndrome
- Facioscapulohumeral muscular dystrophy
- Fibrodysplasia ossificans progressiva FOP
- Hemophilia C
- Huntington's disease
- Hemolytic Uremic Syndrome
- Hirschprung's disease
- hypochondroplasia
- methylmalonic acidemia
- Muenke syndrome
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- Ondine's Curse
- Parkinsons disease
- polycystic kidney disease



- Romano-Ward syndrome
- SADDAN
- tetrahydrobiopterin deficiency
- thanatophoric dysplasia
- thanatophoric dysplasia, type 1
- thanatophoric dysplasia, type 2
- Wolfram syndrome

The following are some of the diseases related to genes located on Chromosome 5

- Achondrogenesis type 1B
- Atelosteogenesis, type II
- Cockayne syndrome
- Cornelia de Lange syndrome
- Corneal dystrophy of Bowman layer, type I
- Corneal dystrophy of Bowman layer, type II
- Cri du Chat
- Diastrophic dysplasia
- Ehlers-Danlos syndrome
- Ehlers-Danlos syndrome, dermatosparaxis type
- Familial adenomatous polyposis
- Granular corneal dystrophy type I
- Granular corneal dystrophy type II
- GM2-gangliosidosis, AB variant
- Homocystinuria
- 3-Methylcrotonyl-CoA carboxylase deficiency
- Myelodysplastic Syndrome
- Netherton syndrome
- Nicotine dependency
- Parkinson's disease
- Primary carnitine deficiency
- Recessive multiple epiphyseal dysplasia
- Sandhoff disease
- Spinal muscular atrophy
- Sotos Syndrome
- Survival motor neuron spinal muscular atrophy
- Treacher Collins syndrome
- Tricho-hepato-enteric syndrome
- Usher syndrome
- Usher syndrome type II



The following conditions are caused by changes in the structure or number of copies of Chromosome 5

- Cri-du-chat syndrome is caused by a deletion of the end of the short (p) arm of chromosome 5. This chromosomal change is written as 5p-. The signs and symptoms of cri-du-chat syndrome are probably related to the loss of multiple genes in this region. Researchers have not identified all of these genes or determined how their loss leads to the features of the disorder. They have discovered, however, that a larger deletion tends to result in more severe mental retardation and developmental delays in people with cri-du-chat syndrome.

Researchers have defined narrow regions of the short arm of chromosome 5 that are associated with particular features of cri-du-chat syndrome. A specific region designated 5p15.3 is associated with a cat-like cry, and a nearby region called 5p15.2 is associated with mental retardation, small head (microcephaly), and distinctive facial features.

- Familial Adenomatous Polyposis is caused by a deletion of the APC tumor suppressor gene on the long (q) arm of chromosome 5. This chromosomal change results in thousands of colonic polyps which gives the patient a 100% risk of colon cancer if total colectomy is not done.
- Chromosome 5q deletion syndrome is caused by the deletion of the q arm (long arm) of chromosome 5. This deletion has been linked to several blood related disorders including Myelodysplastic syndrome and Erythroblastopenia [disambiguation needed]. This is a different condition than Cri-du-chat which was mentioned above.
- Other changes in the number or structure of chromosome 5 can have a variety of effects, including delayed growth and development, distinctive facial features, birth defects, and other medical problems. Changes to chromosome 5 include an extra segment of the short (p) or long (q) arm of the chromosome in each cell (partial trisomy 5p or 5q), a missing segment of the long arm of the chromosome in each cell (partial monosomy 5q), and a circular structure called ring chromosome 5. A ring chromosome occurs when both ends of a broken chromosome are reunited.

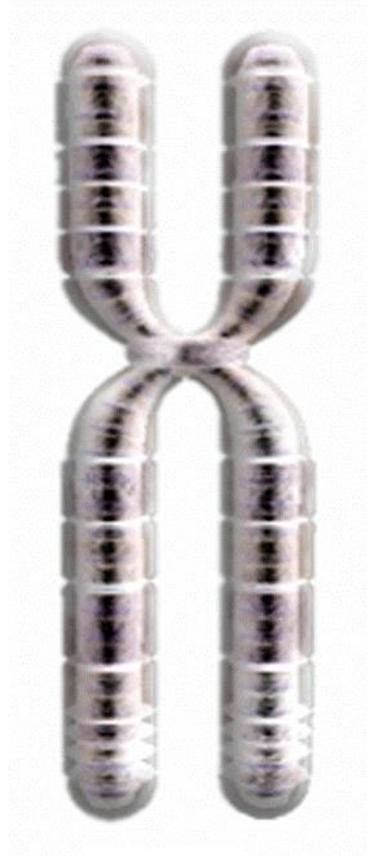
The following diseases are some of those related to genes on Chromosome 6

- ankylosing spondylitis, HLA-B
- collagenopathy, types II and XI
- Coeliac disease HLA-DQA1 & DQB1
- Ehlers-Danlos syndrome, classical, hypermobility, and Tenascin-X types
- Hashimoto's thyroiditis
- hemochromatosis
- Hemochromatosis type 1
- 21-hydroxylase deficiency
- maple syrup urine disease
- methylmalonic acidemia
- Autosomal nonsyndromic deafness
- otospondylomegalapiphyseal dysplasia
- Parkinson disease
- polycystic kidney disease
- porphyria
- porphyria cutanea tarda
- Rheumatoid arthritis, HLA-DR
- Stickler syndrome, COL11A2
- Systemic lupus erythematosus
- Diabetes mellitus type 1, HLA-DR, DQA1 & DQB1
- X-linked sideroblastic anemia
- Epilepsy
- Guillain Barre Syndrome



The following diseases are some of those related to genes on Chromosome 7

- argininosuccinic aciduria
- cerebral cavernous malformation
- Charcot–Marie–Tooth disease
- Charcot–Marie–Tooth disease, type 2
- CHARGE syndrome
- citrullinemia
- congenital bilateral absence of vas deferens
- cystic fibrosis
- distal spinal muscular atrophy, type V
- Ehlers–Danlos syndrome
- Ehlers–Danlos syndrome, arthrochalasia type
- Ehlers–Danlos syndrome, classical type
- hemochromatosis
- hemochromatosis, type 3
- hereditary nonpolyposis colorectal cancer
- lissencephaly
- maple syrup urine disease
- maturity onset diabetes of the young type 3
- mucopolysaccharidosis type VII or Sly syndrome
- myelodysplastic syndrome
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- nonsyndromic deafness, autosomal recessive
- osteogenesis imperfecta
- osteogenesis imperfecta, type I
- osteogenesis imperfecta, type III
- osteogenesis imperfecta, type II
- osteogenesis imperfecta, type IV
- p47-phox-deficient chronic granulomatous disease
- Pendred syndrome
- Romano–Ward syndrome
- Shwachman–Diamond syndrome
- Schizophrenia
- Tritanopia or tritanomaly color blindness
- Williams syndrome



The following conditions are caused by changes in the structure or number of copies of Chromosome 7

- Williams syndrome is caused by the deletion of genetic material from a portion of the long (q) arm of chromosome 7. The deleted region, which is located at position 11.23 (written as 7q11.23), is designated as the Williams syndrome critical region. This region includes more than 20 genes, and researchers believe that the characteristic features of Williams syndrome are probably related to the loss of multiple genes in this region. While a few of the specific genes related to Williams syndrome have been identified, the relationship between most of the genes in the deleted region and the signs and symptoms of Williams syndrome is unknown.
- Other changes in the number or structure of chromosome 7 can cause delayed growth and development, mental disorder, characteristic facial features, skeletal abnormalities, delayed speech, and other medical problems. These changes include an extra copy of part of chromosome 7 in each cell (partial trisomy 7) or a

missing segment of the chromosome in each cell (partial monosomy 7). In some cases, several DNA building blocks (nucleotides) are deleted or duplicated in part of chromosome 7. A circular structure called ring chromosome 7 is also possible. A ring chromosome occurs when both ends of a broken chromosome are reunited.

The following diseases are some of those related to genes on chromosome 8:

- 8p23.1 duplication syndrome
- Burkitt's lymphoma
- Charcot-Marie-Tooth disease
- Charcot-Marie-Tooth disease, type 2
- Charcot-Marie-Tooth disease, type 4
- Cleft lip and palate
- Cohen syndrome
- Congenital hypothyroidism
- Lipoprotein lipase deficiency, familial
- Primary microcephaly
- Hereditary Multiple Exostoses
- Pfeiffer syndrome
- Rothmund-Thomson syndrome, or poikiloderma congenitale
- Schizophrenia, associated with 8p21-22 locus[2][3][4]
- Waardenburg syndrome
- Werner syndrome
- Pingelapese blindness
- Langer-Giedion syndrome
- Roberts Syndrome



The following diseases are some of those related to genes on chromosome 9:

- acytosis
- ALA-D deficiency porphyria
- citrullinemia
- Chronic myelogenous leukemia (t9;22 - the Philadelphia chromosome)
- Ehlers-Danlos syndrome
- Ehlers-Danlos syndrome, classical type
- familial dysautonomia
- Friedreich ataxia
- galactosemia
- Gorlin syndrome or Nevoid Basal Cell Carcinoma syndrome
- hereditary hemorrhagic telangiectasia
- lethal congenital contracture syndrome
- Nail-patella syndrome (NPS)
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- nonsyndromic deafness, autosomal recessive
- OCD
- porphyria
- primary hyperoxaluria
- Tangier's disease



- tetrasomy 9p
- thrombotic thrombocytopenic purpura
- trisomy 9
- tuberous sclerosis
- VLDLR-associated cerebellar hypoplasia

The following diseases are some of those related to genes on chromosome 10:

- Apert syndrome
- Beare-Stevenson cutis gyrata syndrome
- Charcot-Marie-Tooth disease
- Charcot-Marie-Tooth disease, type 1
- Charcot-Marie-Tooth disease, type 4
- Cockayne syndrome
- congenital erythropoietic porphyria
- Cowden syndrome
- Crouzon syndrome
- Glioblastoma Multiforme
- Hermansky-Pudlak syndrome
- Hirschprung disease
- Jackson-Weiss syndrome
- multiple endocrine neoplasia type 2
- nonsyndromic deafness
- nonsyndromic deafness, autosomal recessive
- Pfeiffer syndrome
- porphyria
- tetrahydrobiopterin deficiency
- Thiel-Behnke corneal dystrophy
- Usher syndrome
- Usher syndrome type I
- Wolman syndrome



The following diseases are some of those related to genes on chromosome 11:

- autism (neurexin 1) [3]
- annidraeada
- acute intermittent porphyria
- albinism
- ataxia-telangiectasia
- Beckwith-Wiedemann syndrome
- Best's disease
- beta-ketothiolase deficiency
- beta thalassemia
- bladder cancer
- breast cancer
- carnitine palmitoyltransferase I deficiency
- Charcot-Marie-Tooth disease
- Charcot-Marie-Tooth disease, type 4



- Cystic Fibrosis
- Depression
- Denys-Drash syndrome
- familial Mediterranean fever
- Hereditary angioedema OMIM: 106100
- Jacobsen syndrome
- Jervell and Lange-Nielsen syndrome
- Mantle cell lymphoma (t(11;14))
- Meckel syndrome
- methemoglobinemia, beta-globin type
- Mixed Lineage Leukemia
- multiple endocrine neoplasia type 1
- Hereditary Multiple Exostoses
- Niemann-Pick disease
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- nonsyndromic deafness, autosomal recessive
- porphyria
- Romano-Ward syndrome
- Sickle cell anemia[4]
- Smith-Lemli-Opitz syndrome
- tetrahydrobiopterin deficiency
- Usher syndrome
- Usher syndrome type I
- WAGR syndrome
- Wilms' tumor

The following diseases are some of those related to genes on chromosome 12:

- achondrogenesis type 2
- collagenopathy, types II and XI
- cornea plana 2
- episodic ataxia
- hereditary hemorrhagic telangiectasia
- hypochondrogenesis
- ichthyosis bullosa of Siemens
- Kniest dysplasia
- Kabuki syndrome
- maturity onset diabetes of the young type 3
- methylmalonic acidemia
- narcolepsy
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- Noonan syndrome
- Parkinson disease
- Pallister-Killian syndrome (tetrasomy 12p)
- phenylketonuria
- spondyloepimetaphyseal dysplasia, Strudwick type
- spondyloepiphyseal dysplasia congenita



- spondyloperipheral dysplasia
- Stickler syndrome
- Stickler syndrome, COL2A1
- Stuttering[1]
- Triose Phosphate Isomerase deficiency
- tyrosinemia
- Von Willebrand Disease

The following diseases are some of those related to genes on chromosome 13:

- Bladder cancer
- Breast cancer
- Heterochromia
- Hirschsprung's disease
- Maturity onset diabetes of the young type 4
- Nonsyndromic deafness
- Nonsyndromic deafness, autosomal dominant
- Nonsyndromic deafness, autosomal recessive
- Propionic acidemia
- Retinoblastoma
- Schizophrenia
- Waardenburg syndrome
- Wilson's disease
- Patau syndrome
- Chronic Lymphocytic Leukemia (Acquired defect)



The following conditions are caused by changes in the structure or number of copies of chromosome 13:

- **Retinoblastoma:** A small percentage of retinoblastoma cases are caused by deletions in the region of chromosome 13 (13q14) containing the RB1 gene. Children with these chromosomal deletions may also have mental retardation, slow growth, and characteristic facial features (such as prominent eyebrows, a broad nasal bridge, a short nose, and ear abnormalities). Researchers have not determined which other genes are located in the deleted region, but a loss of several genes is likely responsible for these developmental problems.
- **Trisomy 13:** Trisomy 13 occurs when each cell in the body has three copies of chromosome 13 instead of the usual two copies. Trisomy 13 can also result from an extra copy of chromosome 13 in only some of the body's cells (mosaic trisomy 13). In a small percentage of cases, trisomy 13 is caused by a rearrangement of chromosomal material between chromosome 13 and another chromosome. As a result, a person has the two usual copies of chromosome 13, plus extra material from chromosome 13 attached to another chromosome. These cases are called translocation trisomy 13. Extra material from chromosome 13 disrupts the course of normal development, causing the characteristic signs and symptoms of trisomy 13. Researchers are not yet certain how this extra genetic material leads to the features of the disorder, which include severely abnormal cerebral functions, a small cranium, retardation, non functional eyes and heart defects.
- **Other chromosomal conditions:** Partial monosomy 13q is a rare chromosomal disorder that results when a piece of the long arm (q) of chromosome 13 is missing (monosomic). Infants born with partial monosomy 13q may exhibit low birth weight, malformations of the head and face (craniofacial region), skeletal abnormalities (especially of the hands and feet), and other physical abnormalities. Mental retardation is characteristic of this condition. The mortality rate during infancy is high among individuals born with this disorder. Almost all cases of partial monosomy 13q occur randomly for no apparent reason (sporadic).

The following diseases are some of those related to genes on chromosome 14:

- alpha-1 antitrypsin deficiency
- Alzheimer disease
- Alzheimer disease, type 3
- Burkitt's lymphoma (t8;14)
- congenital hypothyroidism
- dopamine-responsive dystonia
- Follicular lymphoma (t14;18)
- Krabbe disease
- Machado-Joseph disease
- multiple myeloma
- Niemann-Pick disease
- nonsyndromic deafness
- nonsyndromic deafness, autosomal dominant
- Sensenbrenner syndrome
- tetrahydrobiopterin deficiency
- Uniparental disomy (UPD) 14



The following diseases are some of those related to genes on chromosome 15:

- Bloom syndrome
- Breast cancer
- Isovaleric acidemia
- Marfan syndrome
- Nonsyndromic deafness
- Tay-Sachs disease
- Tyrosinemia

The following conditions are caused by mutations in chromosome 15.
Two of the conditions (Angelman syndrome and Prader-Willi syndrome) involve a loss of gene activity in the same part of chromosome 15, the 15q11-q13 region. This discovery provided the first evidence in humans that something beyond genes could determine how the genes are expressed.[1]

Angelman syndrome[edit source | editbeta]

Main article: Angelman syndrome

The main characteristics of Angelman syndrome are severe mental retardation, ataxia, lack of speech, and excessively happy demeanor. Angelman syndrome results from a loss of gene activity in a specific part of chromosome 15, the 15q11-q13 region. This region contains a gene called UBE3A that, when mutated or absent, likely causes the characteristic features of this condition. People normally have two copies of the UBE3A gene, one from each parent. Both copies of this gene are active in many of the body's tissues. In the brain, however, only the copy inherited from a person's mother (the maternal copy) is active. If the maternal copy is lost because of a chromosomal change or a gene mutation, a person will have no working copies of the UBE3A gene in the brain.



In most cases (about 70%)[citation needed], people with Angelman syndrome have a deletion in the maternal copy of chromosome 15. This chromosomal change deletes the region of chromosome 15 that includes the UBE3A gene. Because the copy of the UBE3A gene inherited from a person's father (the paternal copy) is normally inactive in the brain, a deletion in the maternal chromosome 15 results in no active copies of the UBE3A gene in the brain.

In 3% to 7% of cases,[citation needed] Angelman syndrome occurs when a person has two copies of the paternal chromosome 15 instead of one copy from each parent. This phenomenon is called paternal uniparental disomy (UPD). People with paternal UPD for chromosome 15 have two copies of the UBE3A gene, but they are both inherited from the father and are therefore inactive in the brain.

About 10% of Angelman syndrome cases are caused by a mutation in the UBE3A gene, and another 3% result from a defect in the DNA region that controls the activation of the UBE3A gene and other genes on the maternal copy of chromosome 15. In a small percentage of cases, Angelman syndrome may be caused by a chromosomal rearrangement called a translocation or by a mutation in a gene other than UBE3A. These genetic changes can abnormally inactivate the UBE3A gene.

Angelman syndrome can be hereditary, as evidenced by one case where a patient became pregnant with a daughter who also had the condition.[2]

Prader-Willi syndrome[edit source | editbeta]

Main article: Prader-Willi syndrome

The main characteristics of this condition include polyphagia (extreme, insatiable appetite), mild to moderate developmental delay, hypogonadism resulting in delayed to no puberty, and hypotonia. Prader-Willi syndrome is caused by the loss of active genes in a specific part of chromosome 15, the 15q11-q13 region. People normally have two copies of this chromosome in each cell, one copy from each parent. Prader-Willi syndrome occurs when the paternal copy is partly or entirely missing.

In about 70% of cases,[citation needed] Prader-Willi syndrome occurs when the 15q11-q13 region of the paternal chromosome 15 is deleted. The genes in this region are normally active on the paternal copy of the chromosome and are inactive on the maternal copy. Therefore, a person with a deletion in the paternal chromosome 15 will have no active genes in this region.

In about 25% of cases, a person with Prader-Willi syndrome has two maternal copies of chromosome 15 in each cell instead of one copy from each parent. This phenomenon is called maternal uniparental disomy. Because some genes are normally active only on the paternal copy of this chromosome, a person with two maternal copies of chromosome 15 will have no active copies of these genes.

In a small percentage of cases, Prader-Willi syndrome is not caused by a chromosomal rearrangement called a translocation. Rarely, the condition is caused by an abnormality in the DNA region that controls the activity of genes on the paternal chromosome 15. Because patients almost always have difficulty reproducing, Prader-Willi syndrome is generally not hereditary.

Isodicentric chromosome 15

A specific chromosomal change called an isodicentric chromosome 15 (previously called an inverted duplication 15) can affect growth and development. The patient possesses an "extra" or "marker" chromosome. This small extra chromosome is made up of genetic material from chromosome 15 that has been abnormally duplicated (copied) and attached end-to-end. In some cases, the extra chromosome is very small and has no effect on a person's health. A larger isodicentric chromosome 15 can result in weak muscle tone (hypotonia), mental retardation, seizures, and behavioral problems. Signs and symptoms of autism (a developmental disorder that affects communication and social interaction) have also been associated with the presence of an isodicentric chromosome 15.

The following diseases are some of those related to genes on chromosome 16:

- Trisomy 16
- Familial Mediterranean fever (FMF)
- Crohn's disease
- Thalassemia
- Autosomal dominant polycystic kidney disease (PKD-1)
- Autism
- Schizophrenia[1]
- Attention Deficit Hyperactive Disorder (ADHD)
- Synesthesia



The following diseases are related to genes on chromosome 17:

- 17Q21.31 Microdeletion Syndrome
- Alexander disease
- Andersen-Tawil syndrome
- Birt-Hogg-Dubé syndrome
- Bladder cancer
- Breast cancer
- Camptomelic dysplasia
- Canavan disease
- Cerebroretinal microangiopathy with calcifications and cysts
- Charcot-Marie-Tooth disease
- Charcot-Marie-Tooth disease, type 1
- Corticobasal degeneration
- Cystinosis
- Depression
- Ehlers-Danlos syndrome
- Ehlers-Danlos syndrome, arthrochalasia type
- Ehlers-Danlos syndrome, classical type
- Epidermodysplasia verruciformis
- Galactosemia
- Glycogen storage disease type II (Pompe disease)
- Hereditary neuropathy with liability to pressure palsies
- Howel-Evans syndrome
- Li-Fraumeni syndrome
- Maturity onset diabetes of the young type 5
- Miller-Dieker syndrome
- Multiple synostoses syndrome
- Neurofibromatosis type I
- Nonsyndromic deafness
- Nonsyndromic deafness, autosomal dominant
- Nonsyndromic deafness, autosomal recessive
- Osteogenesis imperfecta
- Osteogenesis Imperfecta, Type I
- Osteogenesis Imperfecta, Type II



- Osteogenesis Imperfecta, Type III
- Osteogenesis Imperfecta, Type IV
- Potocki-Lupski syndrome
- Proximal symphalangism
- Smith-Magenis syndrome
- Usher syndrome
- Usher syndrome type I
- Very long-chain acyl-coenzyme A dehydrogenase deficiency

The following diseases are some of those related to genes on chromosome 18:

- Erythropoietic protoporphyria
- Hereditary hemorrhagic telangiectasia
- Niemann-Pick disease Type C
- Porphyria
- Selective Mutism
- Edwards syndrome (Trisomy 18)
- Tetrasomy 18p
- Monosomy 18p
- Pitt Hopkins Syndrome 18q21



The following diseases are some of those related to genes on chromosome 19:

- Alternating hemiplegia of childhood
- Alzheimer's disease
- CADASIL
- Centronuclear myopathy autosomal dominant form
- Charcot-Marie-Tooth disease
- Congenital hypothyroidism
- [(Congenital and inherited deafness)]
- Familial hemiplegic migraine
- Glutaric acidemia type 1
- Hemochromatosis
- Leber's Congenital Amaurosis
- Maple syrup urine disease
- Multiple epiphyseal dysplasia
- Myotonic dystrophy
- Myotubular myopathy autosomal dominant form
- Marfan Syndrome
- Oligodendroglioma
- Peutz-Jeghers syndrome
- Pseudoachondroplasia
- Spinocerebellar ataxia type-6
- X-linked agammaglobulinemia or Bruton's Disease
- Prolidase deficiency



The following diseases are some of those related to genes on chromosome 20:

- Albright's hereditary osteodystrophy
- Arterial tortuosity syndrome
- Adenosine deaminase deficiency
- Alagille syndrome
- Celiac disease
- Galactosialidosis - CTSA
- Maturity onset diabetes of the young type 1
- Neuronal ceroid lipofuscinosis
- Pantothenate kinase-associated neurodegeneration
- Transmissible spongiform encephalopathy (prion diseases)
- Waardenburg syndrome



The following diseases are some of those related to genes on chromosome 21:

- Alzheimer's disease[1]
- Alzheimer's disease type 1
- Amyotrophic lateral sclerosis
- Amyotrophic lateral sclerosis type 1
- Autoimmune polyendocrine syndrome
- Autoimmune polyendocrine syndrome type 1
- Down syndrome
- Erondu–Cymet syndrome
- Holocarboxylase synthetase deficiency
- Homocystinuria
- Jervell and Lange-Nielsen syndrome
- Leukocyte adhesion deficiency
- Majewski osteodysplastic primordial dwarfism type II (MOPD II, or MOPD2)
- Nonsyndromic deafness
- Nonsyndromic deafness, autosomal recessive
- Romano-Ward syndrome



The following diseases are some of those related to genes on chromosome 22:

- Amyotrophic lateral sclerosis
- Breast cancer
- DiGeorge Syndrome
- Desmoplastic small round cell tumor
- 22q11.2 deletion syndrome
- 22q11.2 distal deletion syndrome
- 22q13 deletion syndrome or Phelan-McDermid syndrome
- Li-Fraumeni syndrome
- Neurofibromatosis type 2
- Rubinstein-Taybi syndrome



- Waardenburg syndrome
- Cat eye syndrome
- Methemoglobinemia
- Schizophrenia[2]

The following conditions are caused by changes in the structure or number of copies of chromosome 22:

- **22q11.2 deletion syndrome:** Most people with 22q11.2 deletion syndrome are missing about 3 million base pairs on one copy of chromosome 22 in each cell. The deletion occurs near the middle of the chromosome at a location designated as q11.2. This region contains about 30 genes, but many of these genes have not been well characterized. A small percentage of affected individuals have shorter deletions in the same region. The loss of one particular gene, *TBX1*, is thought to be responsible for many of the characteristic features of 22q11.2 deletion syndrome, such as heart defects, an opening in the roof of the mouth (a cleft palate), distinctive facial features, and low calcium levels. A loss of this gene does not appear to cause learning disabilities, however. Other genes in the deleted region are also likely to contribute to the signs and symptoms of 22q11.2 deletion syndrome.

- **22q11.2 distal deletion syndrome**
- **22q13 deletion syndrome (Phelan-McDermid syndrome):** The deletion of the distal tip of the chromosome 22 is related to moderate to severe developmental delay and mental retardation. This region includes the *Shank3* gene, thought to be responsible for the neurological deficits of the syndrome (Wilson et al., 2003).

Almost all children affected by the 22q13 deletion have absent or severely delayed speech; minor facial dysmorphism; thin, flaky toenails; large, fleshy hands; large feet; prominent, poorly formed ears and other characteristics which are not visually apparent: hypotonia (97%); normal to accelerated growth (95%); increased tolerance to pain (86%); seizures (unknown percentage) [1].

- **Other chromosomal conditions:** Other changes in the number or structure of chromosome 22 can have a variety of effects, including mental retardation, delayed development, physical abnormalities, and other medical problems. These changes include an extra piece of chromosome 22 in each cell (partial trisomy), a missing segment of the chromosome in each cell (partial monosomy), and a circular structure called ring chromosome 22 that is caused by the breakage and reattachment of both ends of the chromosome.

- **Cat-eye syndrome** is a rare disorder most often caused by a chromosomal change called an inverted duplicated 22. A small extra chromosome is made up of genetic material from chromosome 22 that has been abnormally duplicated (copied). The extra genetic material causes the characteristic signs and symptoms of cat-eye syndrome, including an eye abnormality called ocular iris coloboma (a gap or split in the colored part of the eye), small skin tags or pits in front of the ear, heart defects, kidney problems, and, in some cases, delayed development.

- A rearrangement (translocation) of genetic material between chromosomes 9 and 22 is associated with several types of blood cancer (leukemia). This chromosomal abnormality, which is commonly called the Philadelphia chromosome, is found only in cancer cells. The Philadelphia chromosome has been identified in most cases of a slowly progressing form of blood cancer called chronic myeloid leukemia, or CML. It also has been found in some cases of more rapidly progressing blood cancers (acute leukemias). The presence of the Philadelphia chromosome can help predict how the cancer will progress and provides a target for molecular therapies.

- Emanuel Syndrome is a translocation of chromosomes 11 and 22. Originally known as Supernumerary der(22) Syndrome, it occurs when an individual has an extra chromosome composed of pieces of the 11th and 22nd chromosomes.

Abnormalities associated with the X chromosome:

Klinefelter syndrome:

- Klinefelter syndrome is caused by the presence of one or more extra copies of the X chromosome in a male's cells. Extra genetic material from the X chromosome interferes with male sexual development, preventing the testicles from functioning normally and reducing the levels of testosterone.
- Males with Klinefelter syndrome typically have one extra copy of the X chromosome in each cell, for a total of two X chromosomes and one Y chromosome (47,XXY). It is less common for affected males to have two or three extra X chromosomes (48,XXX or 49,XXXX) or extra copies of both the X and Y chromosomes (48,XXYY) in each cell. The extra genetic material may lead to tall stature, learning and reading disabilities, and other medical problems. Each extra X chromosome lowers the child's IQ by about 15 points,[6][7] which means that the average IQ in Klinefelter syndrome is in general in the normal range, although below average. When additional X and/or Y chromosomes are present in 48,XXX, 48,XXYY, or 49,XXXX, developmental delays and cognitive difficulties can be more severe and mild intellectual disability may be present.
- Klinefelter syndrome can also result from an extra X chromosome in only some of the body's cells. These cases are called mosaic 46,XY/47,XXY.

Triple X syndrome (also called 47,XXX or trisomy X):

- This syndrome results from an extra copy of the X chromosome in each of a female's cells. Females with trisomy X have three X chromosomes, for a total of 47 chromosomes per cell. The average IQ of females with this syndrome is 90, while the average IQ of unaffected siblings is 100 [1]. Their stature on average is taller than normal females. They are fertile and their children do not inherit the condition. [2]
- Females with more than one extra copy of the X chromosome (48, XXXX syndrome or 49, XXXXX syndrome) have been identified, but these conditions are rare.

Turner syndrome:

- This results when each of a female's cells has one normal X chromosome and the other sex chromosome is missing or altered. The missing genetic material affects development and causes the features of the condition, including short stature and infertility.
- About half of individuals with Turner syndrome have monosomy X (45,X), which means each cell in a woman's body has only one copy of the X chromosome instead of the usual two copies. Turner syndrome can also occur if one of the sex chromosomes is partially missing or rearranged rather than completely missing. Some women with Turner syndrome have a chromosomal change in only some of their cells. These cases are called Turner syndrome mosaics (45,X/46,XX).



Abnormalities associated with the Y chromosome:

Y chromosome-linked diseases can be of more common types, or very rare ones. Yet, the rare ones still have importance in understanding the function of the Y chromosome in the normal case.

More common

No vital genes reside only on the Y chromosome, since roughly half of humans (females) do not have a Y chromosome. The only well-defined human disease linked to a defect on the Y chromosome is defective testicular development (due to deletion or deleterious mutation of SRY). However, having two X chromosomes and one Y chromosome has similar effects. On the other hand, having Y chromosome polysomy has other effects than masculinization.

Y chromosome microdeletion

Y chromosome microdeletion (YCM) is a family of genetic disorders caused by missing genes in the Y chromosome. Many affected men exhibit no symptoms and lead normal lives. However, YCM is also known to be present in a significant number of men with reduced fertility or reduced sperm count.

Defective Y chromosome

This results in the person presenting a female phenotype even though that person possesses an XY karyotype (i.e., is born with female-like genitalia). The lack of the second X results in infertility. In other words, viewed from the opposite direction, the person goes through defeminization but fails to complete masculinization. The cause can be seen as an incomplete Y chromosome: the usual karyotype in these cases is 44X, plus a fragment of Y. This usually results in defective testicular development, such that the infant may or may not have fully formed male genitalia internally or externally. The full range of ambiguity of structure may occur, especially if mosaicism is present. When the Y fragment is minimal and nonfunctional, the child is usually a girl with the features of Turner syndrome or mixed gonadal dysgenesis.

XXY

Main article: Klinefelter syndrome

Klinefelter syndrome (47, XXY) is not an aneuploidy of the Y chromosome, but a condition of having an extra X chromosome, which usually results in defective postnatal testicular function. The mechanism is not fully understood; the extra X does not seem to be due to direct interference with expression of Y genes.

XYY

Main article: XYY syndrome

47,XYY syndrome (simply known as XYY syndrome) is caused by the presence of a single extra copy of the Y chromosome in each of a male's cells. 47, XYY males have one X chromosome and two Y chromosomes, for a total of 47 chromosomes per cell. Researchers have found that an extra copy of the Y chromosome is associated with increased stature and an increased incidence of learning problems in some boys and men, but the effects are variable, often minimal, and the vast majority do not know their karyotype. When chromosome surveys were done in the mid-1960s in British secure hospitals for the developmentally disabled, a higher than expected



number of patients were found to have an extra Y chromosome. The patients were mischaracterized as aggressive and criminal, so that for a while an extra Y chromosome was believed to predispose a boy to antisocial behavior (and was dubbed the "criminal karyotype"). Subsequently, in 1968 in Scotland the only ever comprehensive nationwide chromosome survey of prisons found no overrepresentation of 47,XYY men, and later studies found 47,XYY boys and men had the same rate of criminal convictions as 46,XY boys and men of equal intelligence. Thus, the "criminal karyotype" concept is inaccurate and obsolete.

Rare

The following Y chromosome-linked diseases are rare, but notable because of their elucidating of the nature of the Y chromosome.

More than two Y chromosomes

Greater degrees of Y chromosome polysomy (having more than one extra copy of the Y chromosome in every cell, e.g., XYYY) are rare. The extra genetic material in these cases can lead to skeletal abnormalities, decreased IQ, and delayed development, but the severity features of these conditions are variable.

XX male syndrome

XX male syndrome occurs when there has been a recombination in the formation of the male gametes, causing the SRY-portion of the Y chromosome to move to the X chromosome. When such an X chromosome contributes to the child, the development will lead to a male, because of the SRY gene.

All of the above information was located and can be further investigated on
<http://en.wikipedia.org/wiki/Chromosome>

Appendix B

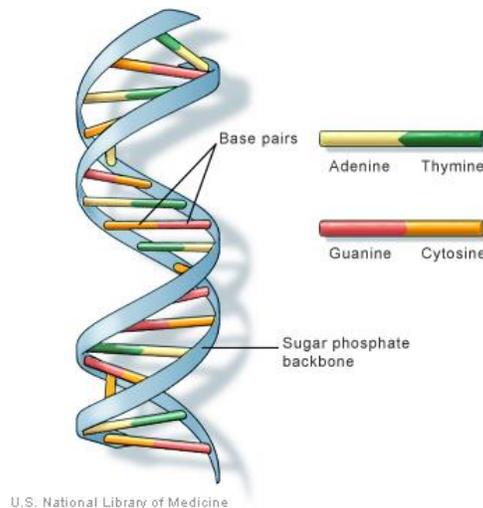
What is DNA?

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA. Most DNA is located in the cell nucleus (where it is called nuclear DNA), but a small amount of DNA can also be found in the mitochondria (where it is called mitochondrial DNA or mtDNA).

The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people. The order, or sequence, of these bases determines the information available for building and maintaining an organism, similar to the way in which letters of the alphabet appear in a certain order to form words and sentences.

DNA bases pair up with each other, A with T and C with G, to form units called base pairs. Each base is also attached to a sugar molecule and a phosphate molecule. Together, a base, sugar, and phosphate are called a nucleotide. Nucleotides are arranged in two long strands that form a spiral called a double helix. The structure of the double helix is somewhat like a ladder, with the base pairs forming the ladder's rungs and the sugar and phosphate molecules forming the vertical sidepieces of the ladder.

An important property of DNA is that it can replicate, or make copies of itself. Each strand of DNA in the double helix can serve as a pattern for duplicating the sequence of bases. This is critical when cells divide because each new cell needs to have an exact copy of the DNA present in the old cell.



DNA is a double helix formed by base pairs attached to a sugar-phosphate backbone.

What is DNA?

We all know that elephants only give birth to little elephants, giraffes to giraffes, dogs to dogs and so on for every type of living creature. But why is this so?

The answer lies in a molecule called deoxyribonucleic acid (DNA), which contains the biological instructions

that make each species unique. DNA, along with the instructions it contains, is passed from adult organisms to their offspring during reproduction.

Where is DNA found?

In organisms called eukaryotes, DNA is found inside a special area of the cell called the nucleus. Because the cell is very small, and because organisms have many DNA molecules per cell, each DNA molecule must be tightly packaged. This packaged form of the DNA is called a chromosome.

During DNA replication, DNA unwinds so it can be copied. At other times in the cell cycle, DNA also unwinds so that its instructions can be used to make proteins and for other biological processes. But during cell division, DNA is in its compact chromosome form to enable transfer to new cells.

Researchers refer to DNA found in the cell's nucleus as nuclear DNA. An organism's complete set of nuclear DNA is called its genome.

Besides the DNA located in the nucleus, humans and other complex organisms also have a small amount of DNA in cell structures known as mitochondria. Mitochondria generate the energy the cell needs to function properly.

In sexual reproduction, organisms inherit half of their nuclear DNA from the male parent and half from the female parent. However, organisms inherit all of their mitochondrial DNA from the female parent. This occurs because only egg cells, and not sperm cells, keep their mitochondria during fertilization.

What is DNA made of ?

DNA is made of chemical building blocks called nucleotides. These building blocks are made of three parts: a phosphate group, a sugar group and one of four types of nitrogen bases. To form a strand of DNA, nucleotides are linked into chains, with the phosphate and sugar groups alternating.

The four types of nitrogen bases found in nucleotides are: adenine (A), thymine (T), guanine (G) and cytosine (C). The order, or sequence, of these bases determines what biological instructions are contained in a strand of DNA. For example, the sequence ATCGTT might instruct for blue eyes, while ATCGCT might instruct for brown.

The complete DNA instruction book, or genome, for a human contains about 3 billion bases and about 20,000 genes on 23 pairs of chromosomes.

What does DNA do?

DNA contains the instructions needed for an organism to develop, survive and reproduce. To carry out these functions, DNA sequences must be converted into messages that can be used to produce proteins, which are the complex molecules that do most of the work in our bodies.

Each DNA sequence that contains instructions to make a protein is known as a gene. The size of a gene may vary greatly, ranging from about 1,000 bases to 1 million bases in humans. Genes only make up about 1 percent of the DNA sequence. DNA sequences outside this 1 percent are involved in regulating when, how and how much of a protein is made.

How are DNA sequences used to make proteins?

DNA's instructions are used to make proteins in a two-step process. First, enzymes read the information in a DNA molecule and transcribe it into an intermediary molecule called messenger ribonucleic acid, or mRNA.

Next, the information contained in the mRNA molecule is translated into the "language" of amino acids, which are the building blocks of proteins. This language tells the cell's protein-making machinery the precise order in which to link the amino acids to produce a specific protein. This is a major task because there are 20 types of amino acids, which can be placed in many different orders to form a wide variety of proteins.

Who discovered DNA?

The Swiss biochemist Frederick Miescher first observed DNA in the late 1800s. But nearly a century passed from that discovery until researchers unraveled the structure of the DNA molecule and realized its central importance to biology.

For many years, scientists debated which molecule carried life's biological instructions. Most thought that DNA was too simple a molecule to play such a critical role. Instead, they argued that proteins were more likely to carry out this vital function because of their greater complexity and wider variety of forms.

The importance of DNA became clear in 1953 thanks to the work of James Watson, Francis Crick, Maurice Wilkins and Rosalind Franklin. By studying X-ray diffraction patterns and building models, the scientists figured out the double helix structure of DNA - a structure that enables it to carry biological information from one generation to the next.

What is the DNA double helix?

Scientists use the term "double helix" to describe DNA's winding, two-stranded chemical structure. This shape - which looks much like a twisted ladder - gives DNA the power to pass along biological instructions with great precision.

To understand DNA's double helix from a chemical standpoint, picture the sides of the ladder as strands of alternating sugar and phosphate groups - strands that run in opposite directions. Each "rung" of the ladder is made up of two nitrogen bases, paired together by hydrogen bonds. Because of the highly specific nature of this type of chemical pairing, base A always pairs with base T, and likewise C with G. So, if you know the sequence of the bases on one strand of a DNA double helix, it is a simple matter to figure out the sequence of bases on the other strand.

DNA's unique structure enables the molecule to copy itself during cell division. When a cell prepares to divide, the DNA helix splits down the middle and becomes two single strands. These single strands serve as templates for building two new, double-stranded DNA molecules - each a replica of the original DNA molecule. In this process, an A base is added wherever there is a T, a C where there is a G, and so on until all of the bases once again have partners.

In addition, when proteins are being made, the double helix unwinds to allow a single strand of DNA to serve as a template. This template strand is then transcribed into mRNA, which is a molecule that conveys vital instructions to the cell's protein-making machinery.