

ATLAS of ANATOMY

*h.f.*ullmann

Acne

Acne is one of the most common skin diseases. Many adolescents suffer from acne, with spots and inflamed pustules that can leave unsightly scars on the face and trunk. Acne is neither dangerous nor contagious, but it can have a serious effect on emotional well-being.

Skin contains a dense network of sebaceous glands, consisting of the gland body where the sebum is produced, and an excretory duct. Sebum lubricates the hair of the head and face, and impregnates the surface of the skin, protecting it from heat, cold, moisture, and drying out.

Why is acne more common in adolescents?

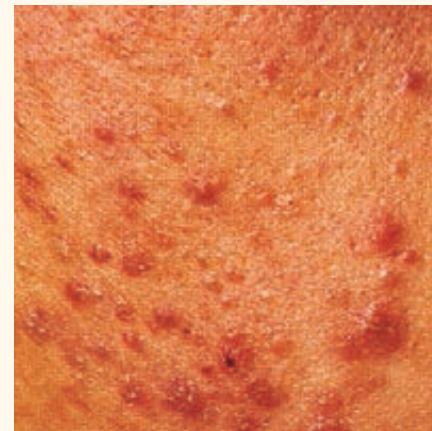
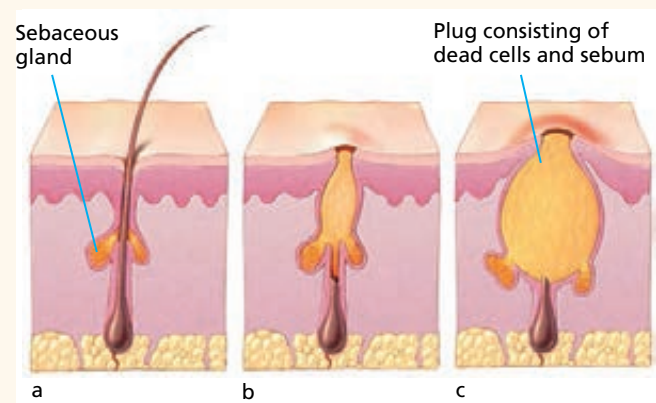
Sebum production increases considerably at puberty. Cells lining the wall of the excretory duct harden more quickly, then break free and can block the duct. The hardened cells seal the pore, stopping the sebum from flowing. This is the perfect place for bacteria to grow and multiply. The result is a suppurating infection. The face and upper body are most affected, as the skin possesses more sebaceous glands and larger excretory ducts in these areas.

- ◆ An **excess of male sex hormones** can increase sebum production and cause the skin to harden.
- ◆ In **stress situations**, the adrenal cortex produces androgens. This is why spots and pimples often appear before tests or exams, a date, or an interview.

Skincare can help

It is important to follow an appropriate skincare regime.

- ◆ **Skin cleansing:** The skin should be cleansed thoroughly twice a day. The best product for this is a soap-free cleansing lotion that is pH-neutral and will not destroy the skin's natural protective layer. A mild facial toner is disinfecting, and stimulates the circulation. It should not contain more than 35% alcohol



- ◆ Acne is often most common on the cheeks.

since alcohol, like soap, dries the skin. A face mask applied once or twice a week will loosen dead skin cells and hardened sebum.

- ◆ **Blackheads** (also called comedones) should never be squeezed with the fingers; a proper tool for this purpose is available from pharmacies. Pimples, spots, and sore, inflamed pustules should only ever be treated by a specialist.
- ◆ **Cosmetic cover-ups** (e.g., sulfur-based creams) can be beneficial, both physically and emotionally.

Medical treatment

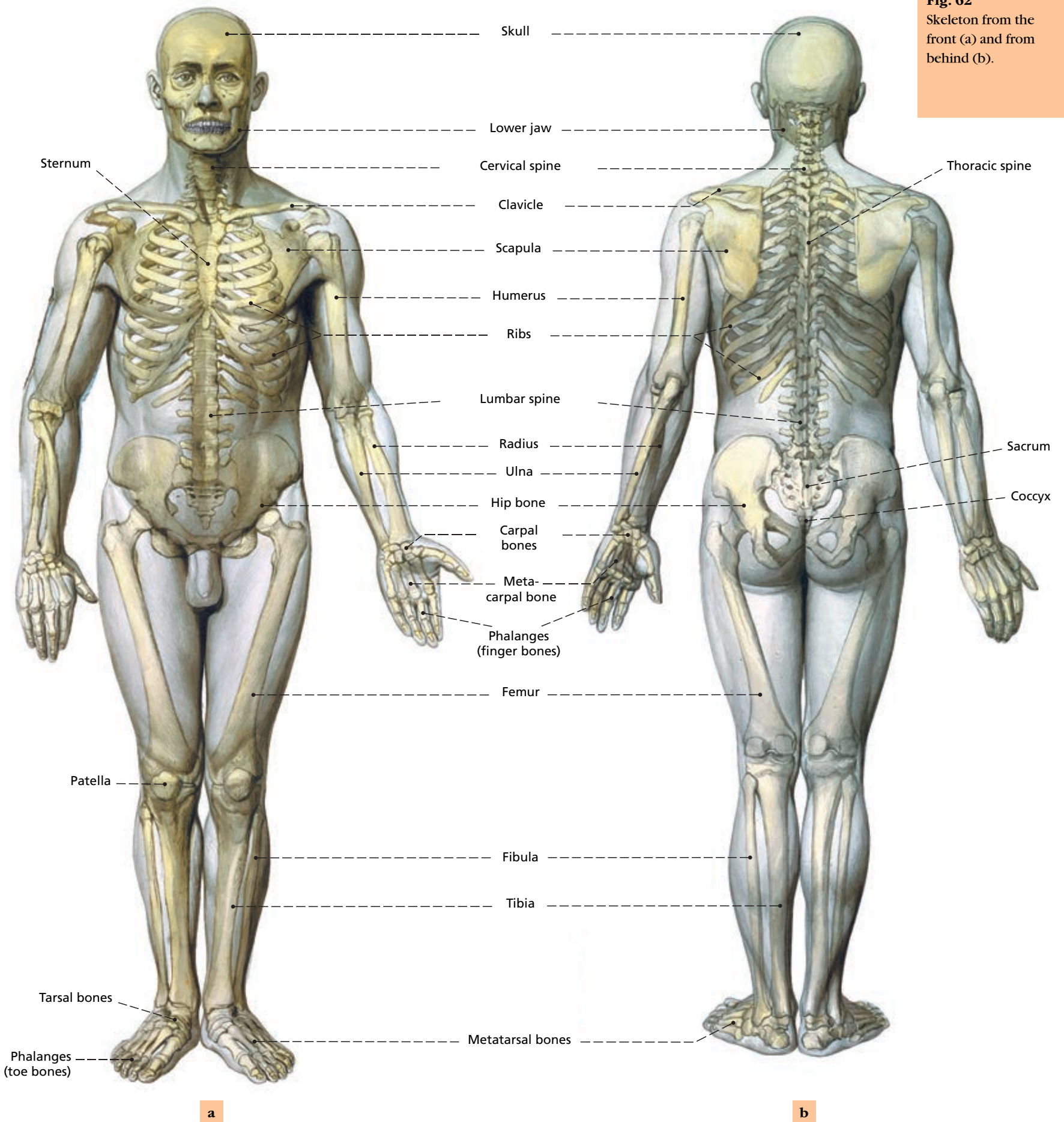
A medical practitioner may prescribe a variety of medical treatments for acne, depending on the cause:

- ◆ **Anti-androgens** balance hormone levels, which in turn reduces the production of sebum. The contraceptive pill can help young women.
- ◆ **Antibiotics** are both antibacterial and anti-inflammatory. They help reduce the risk of unattractive scars.
- ◆ **Locally applied keratolytics/vitamin A products** will loosen hardened skin.
- ◆ **UV radiation** in low doses encourages healing.

Supporting measures

Getting plenty of sleep, and exercise in fresh air both encourage healing. So will a balanced diet, ideally one that is low in carbohydrates and animal fats but with sufficient fiber to ensure regular digestion. A number of relaxation methods can be learnt to help with handling stressful situations.

◆ **Fig. 62**
Skeleton from the front (a) and from behind (b).



Diagnostic methods

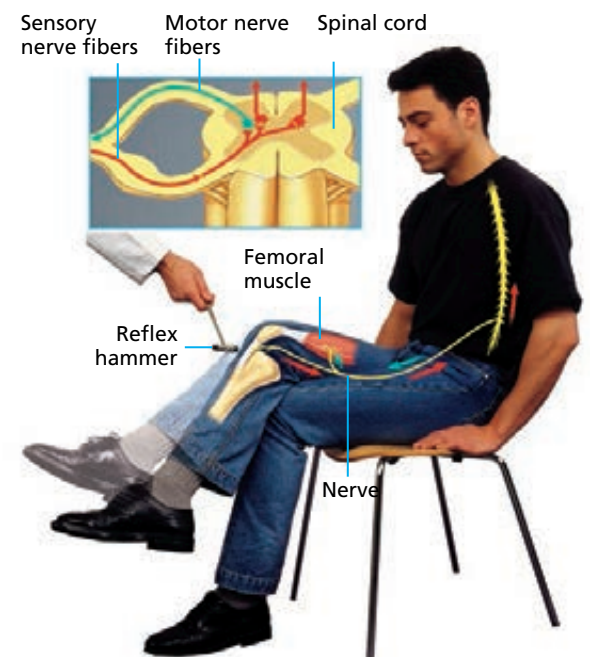
The normal **X-ray** can depict the bony skull and spinal column. **Computed tomography (CT)** offers a different type of scan which can also display soft tissue areas. It plays an important role in early recognition of tumors or internal bleeding, because concealed changes can easily be recognized. However, the radiation exposure is comparatively high.

In **magnetic resonance imaging (MRI)**, the body is scanned not by X-rays but by magnetic waves. The result is a layer-by-layer picture of the interior of the body, put together by a computer, and offering a good and reliable representation of the various tissues and cavities. It is used mainly to look for tissue changes, such as tumors, foci of inflammation, cysts and injuries to the ligaments.

Brain waves are measured using an **electro-encephalogram (EEG)**. The nerve cells of the brain are continuously generating low-level electrical currents. These currents can be plotted using small metal plates (electrodes), which are fastened to the scalp for the investigation. Plotting the impulses creates wave-form or jagged lines. The form of these brain waves depends on people's age, their state of consciousness (e.g., sleep, dream phases), and is altered by any pathological changes to the brain. Thus, any increased tendency to convulsions of the brain due to epilepsy or a brain tumor can be detected on an EEG.

Reflex testing is the triggering of an involuntary movement or process due to a stimulus. The best known reflexes are the knee jerk reflex, which is triggered by a blow just under the kneecap, and the pupil reflex, which causes the pupil to dilate or contract, depending on the light intensity. Reflexes enable the body to react instinctively and quickly to external stimuli. Many of the body's protective mechanisms take the form of reflexes. Absent or damaged reflexes may indicate neurological disease or damage to the spinal cord.

The cerebrospinal fluid (CSF) is a clear, colorless fluid surrounding the brain and the spinal cord. It serves to protect these sensitive tissues, and plays a part in the metabolism of the brain and the spinal cord. If it is suspected that certain diseases are present, such as meningitis, CSF is removed and examined. With a **spinal tap** procedure, CSF is removed from the subarachnoid space under local anesthetic, using a hollow needle. The number of white corpuscles and the protein content are determined. **Measuring the pressure in the subarachnoid space** can also provide a lot of information. Any alteration in values can provide indications as to the type of disturbance.



Reflex

A reflex cannot be suppressed voluntarily, as it is not triggered by the brain, but by nerve cells in the spinal cord.

Treatment methods

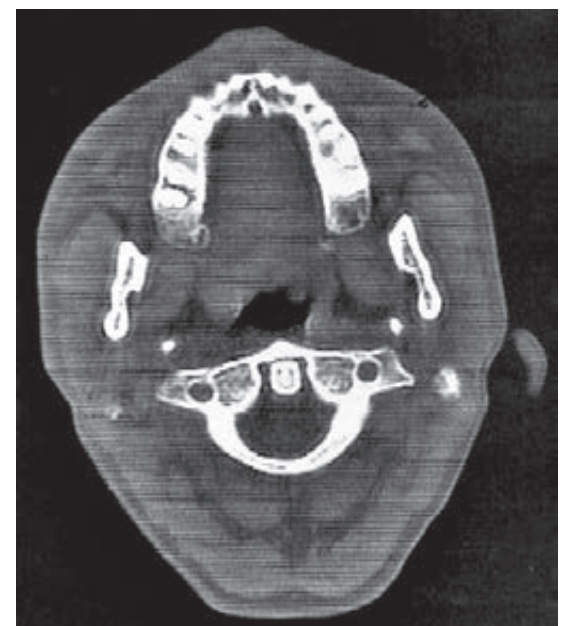
The therapy is dependent on the injury. While most brain tumors can be operated on today, for injuries to the bone, immobilization is usually the only option.

Medication plays a very important role. Thus, for example, in epileptics the administration of medications known as **anti-epileptics**, makes it possible for most of those affected to live an almost normal life. Even for diseases which are not yet curable, such as Alzheimer's disease or MS, there are medications which can delay the progression of the disease and/or alleviate the symptoms.

However, it remains a fact that the destruction of any part of the brain or nerves is usually irreversible, or is at least linked to severe lifelong limitations. In certain cases a **nerve transplant** may be possible, i.e., the surgical graft of a nerve section.

Computed tomography

The tomogram shows a cross-section of the lower part of the head. In the top of the image, the bottom set of teeth can be seen; below this the lower jaw and a cervical bone are visible..



The eye

Light rays enter the eye through the pupil and pass through the lens. Photoreceptors (rods and cones) in the retina convert the light stimuli into an electrical impulse. This impulse is relayed to the visual cortex via the optic nerve. Muscles attached directly to the eyeball enable it to move in a range of directions.

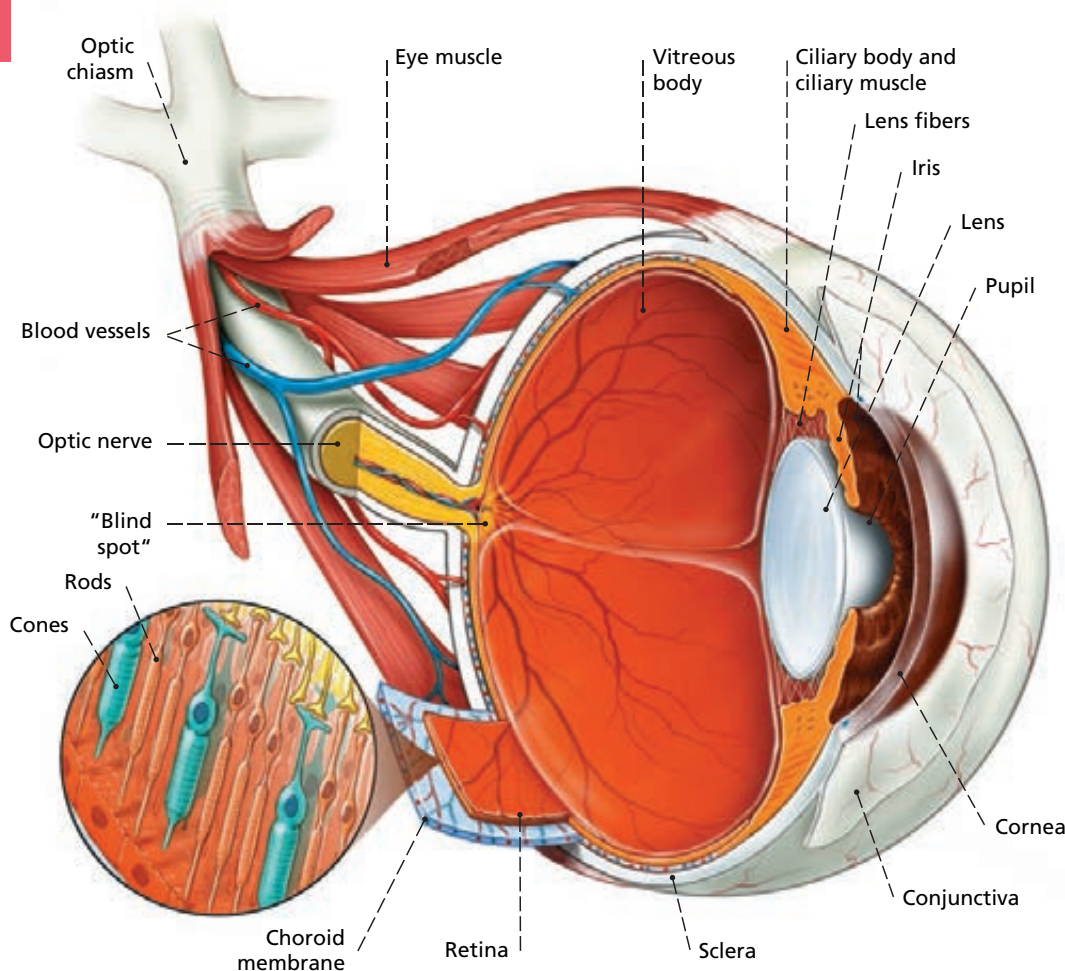


Fig. 186

Light rays enter the eye through the pupil and pass through the lens. Photoreceptors (rods and cones) in the retina convert the light stimuli into an electrical impulse. This impulse is relayed to the visual cortex via the optic nerve. Muscles attached directly to the eyeball enable it to move in a range of directions.

Construction of the eye

When we look at our eyes in the mirror it is the circular iris (which determines the color of the eye) with the pupil in the middle, which we notice first of all. The largest section is formed by the “white” of the eye, the vitreous body, which is comprised of a transparent, gel-like mass, kept in shape by a taut connective-tissue casing, the sclera. This tissue merges with the transparent, strongly curved cornea at the front of the eye. The visible front section of the sclera, as well as the cornea and the inside of the eyelids, are covered with a thin mucous membrane, the conjunctiva, and kept moist by the lacrimal fluid. This fluid comes from the lacrimal glands above the outer corner of the eye and is distributed over the front surface of the eye on blinking. Any dust parti-

cles in the eye are washed out by the lacrimal fluid.

The iris is the colored part of the eye. It is made up of ring-shaped muscle fibers and is located directly in front of the lens. It has a hole in the middle known as the pupil. Like the aperture of a camera, the pupil has the flexibility to adjust to prevailing lighting conditions by constricting and expanding.

The transparent lens is located between the iris and the vitreous body. Its task is to concentrate the rays of light entering the eye in such a way that a clear image is formed on the retina. The lens is kept in position by the lens fibers. A ring-shaped group of muscles, the ciliary muscles, can change the curvature of the lens, thus regulating the light refraction. The aqueous humor is formed in the ciliary body, a connective tissue appendage of the ciliary muscles. Aqueous humor drains into the front section of the eye via small ducts. The production and draining of the aqueous humor normally balance each other out so that a constant intraocular pressure prevails.

The retina forms the innermost layer of the eye. It absorbs the light stimuli with its sensory cells and relays them to the brain via the nervous system. The nerve cells are bundled together to form the optic nerve, which extends from the back of the eyeball (the so-called blind spot) to the cerebral cortex.

The visual apparatus

In order for an object to be displayed and perceived clearly on the retina, the light rays entering the eye have first to be refracted and concentrated, a task performed by the cornea and the lens. The lens is flexible: the closer the focused object is to the eye, the more it needs to curve in order to concentrate the rays entering the eye. If the object is further away, it flattens out. This process, which is controlled by the ciliary muscles, is known as accommodation.

Two types of special sensory cells convert the light rays landing on the retina into images: rods and cones. While the light-sensitive rods facilitate sight in dim light and darkness, the cones are responsible for seeing colors.

Myocardial infarction

If sudden occlusion of an artery results in inadequate blood supply to a region of the heart, the muscle tissue in that region dies. Infarctions like these can be very dangerous, but the right treatment, administered swiftly and calmly, can ensure a good outcome, even in the case of life-threatening infarctions.

With every heartbeat, powerful contractions pump the blood into the arteries that transport it all over the body. Some of the blood from the heart is also pumped into the coronary vessels, consisting of two major arteries (one on the right, one on the left) which branch off into other vessels spreading all over the heart. These blood vessels keep the heart muscle, which is constantly in action, adequately supplied with oxygenated blood and important nutrients. In addition to supplying the whole body with blood, therefore, the heart also supplies itself.

Causes

A range of factors may be responsible for the occlusion of a coronary vessel, and in most cases a combination of several factors is involved. With advancing age or due to a genetic predisposition, for example, the connective tissue in the blood vessel walls can become thicker and hardened (arteriosclerosis). The internal lining of the vessel may tear at a particular point, resulting in the formation of lesions, which may also be bacterial in origin. Most commonly, however, fatty substances and calcium crystals from the blood are deposited on the artery walls,

making the blood vessel rigid, brittle, and increasingly narrow (coronary artery stenosis). The blood no longer flows easily along a smooth vascular wall; instead, blood components adhere to the obstructions. A small foreign body or a thrombus is then enough to cause a complete blockage of the clogged blood vessel.

Risk factors

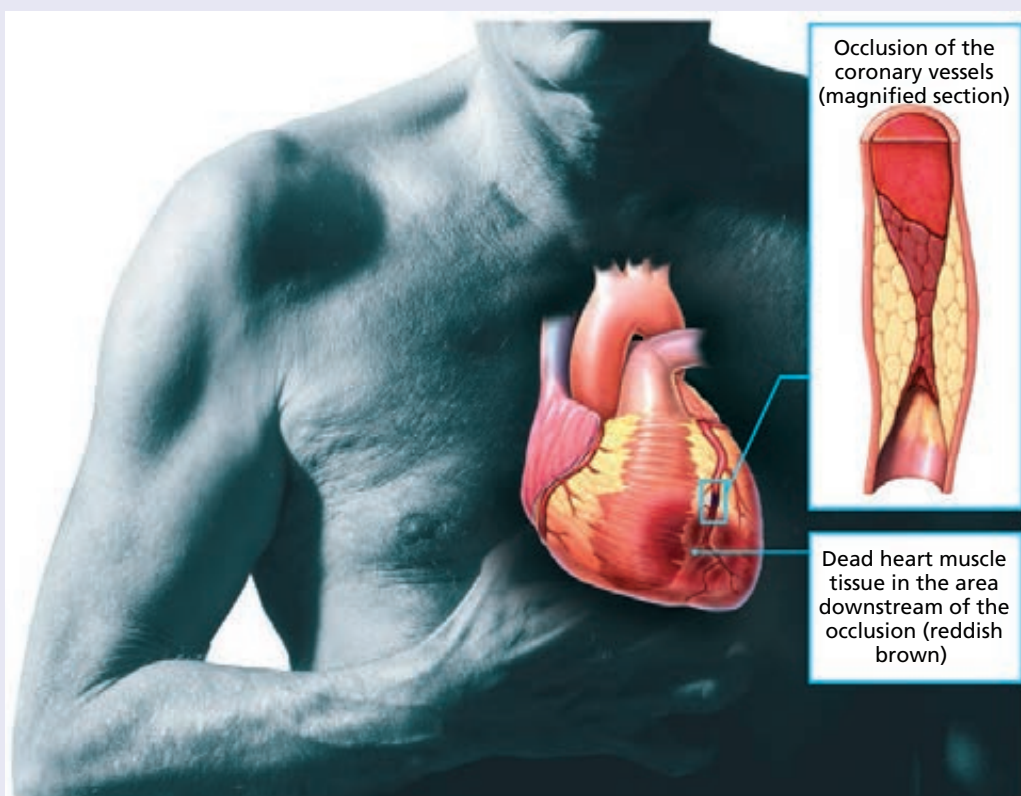
As well as aging and genetic predisposition, other factors encourage the arteriosclerotic changes in the vascular walls that may trigger an infarction. These include:

- ◆ high blood pressure,
- ◆ elevated levels of cholesterol and triglycerides in the blood,
- ◆ severe obesity,
- ◆ heavy smoking,
- ◆ lack of exercise.

A hectic lifestyle may also play a role, as the body produces larger amounts of substances when under stress, which narrow the blood vessels, make the heart beat faster, and hence increase its oxygen requirement, a fatal combination when the coronary vessels are already narrowed. This is known as coronary heart disease. Developing slowly, this disease is the most common precursor of an infarction.

What happens during an infarction?

Ultimately, many factors can lead to the total occlusion of a coronary vessel. An acute shortage of oxygen and nutrients arises in the area of the myocardium, which would normally be supplied with blood by the now occluded vessel. The heart muscle cells are starved of oxygen and die. The consequences of this in terms of cardiac function depend on the region of the heart that is affected and how big it is. If parts of the conduction system are affected, interference with the conduction of electrical impulses can lead to heart rhythm disturbances. If the damaged area is large, the function can be impaired to such an extent that the heart can no longer pump sufficient blood around the body. In the most severe cases, this can lead to sudden death due to heart



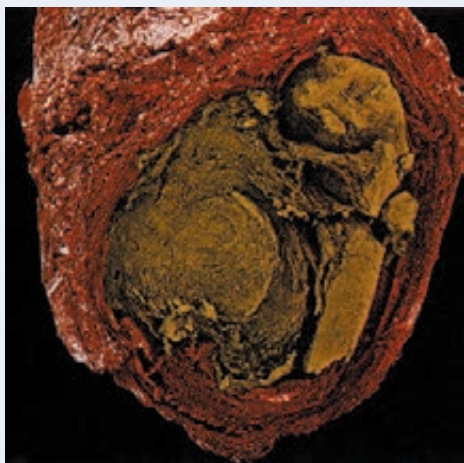
Arteriosclerosis

You are as old as your blood vessels—a statement that sounds banal, but is extremely pertinent. Arteriosclerosis (calcification of the arteries) begins at an early age, and the arteries of a 45-year-old may be as severely affected as those of a 90-year-old. The positive aspect, however, is that the process is reversible, and the rate at which our blood vessels become sclerosed is partly up to us as individuals.

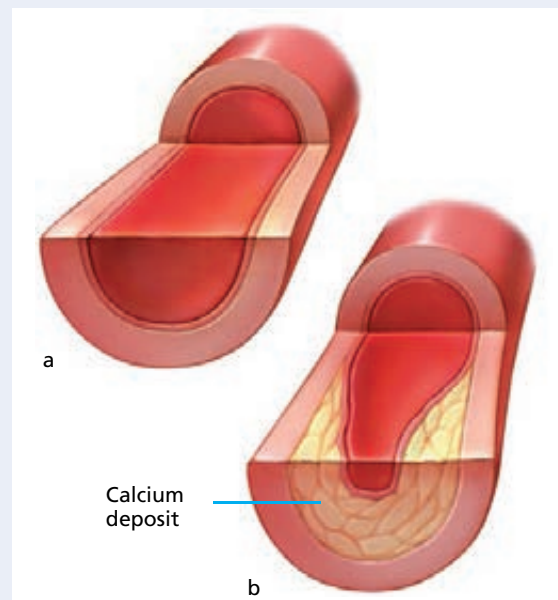
Calcification of the arteries, also known as arteriosclerosis, begins when fatty substances from the blood are deposited in the vascular walls. High blood levels of lipids, in particular cholesterol and its 'bad' carrier protein, low-density lipoprotein (LDL), result in an increase in these fatty deposits.

Fatty deposits in the arterial wall do not necessarily result in arteriosclerosis, however. More significant are the deposits of calcium in these islands of fat, which are thus transformed into islands of calcium. Since this is an ongoing process, the vascular walls become thicker and harder over the course of time, and the diameter of the vessels becomes increasingly narrow. The arteries close up and lose their elasticity, with the result that increasingly high blood pressure is needed to pump the required volume of blood through these rigid, stenosed vessels. In a vicious circle, the high blood pressure in turn increases the sclerosis.

In the long term, it becomes impossible, even with high blood pressure, to pump enough blood through the severely stenosed arteries, and the relevant parts of the body receive an inadequate supply of oxygen. The resulting circulatory disturbances initially occur only on exertion (when more oxygen is required), but later also at rest. The situation becomes critical when one of these sclerosed vessels tears or bursts. In the blood vessels in the brain, this causes a stroke; in the coronary blood vessels in the heart, it results in a myocardial infarction. Generally speaking, any artery, and even the smallest blood vessels, can become sclerosed. There are, however, sites at which sclerosis is more common due to the flow characteristics of the blood in those loca-



◆ This cross-section shows sclerosis at an advanced stage. The layer of calcium (yellow) has occluded the artery (red) almost completely.



◆ Blood can flow unobstructed through a healthy artery (a). Because of its calcium deposits, a sclerosed artery is narrower and the blood flow is obstructed (b).

tions, for example, where blood vessels branch. The blood vessels most often affected are the cerebral and coronary vessels, the aorta, the renal arteries, and the arteries in the legs.

Causes

The onset of arteriosclerosis is not related to any single cause, but to the interplay of a variety of risk factors. Fortunately, most of these are avoidable or can at least be minimized. The main risk factors are increased blood lipid levels, smoking, high blood pressure, stress, obesity, lack of exercise, and diabetes mellitus.

Symptoms

It is usually years or even decades before sclerosed arteries start to cause problems. The first indications may be pins and needles in the toes, cramp in the calves, or becoming easily tired. Symptoms such as heart pains or episodes of dizziness on exertion are unequivocal signs of inadequate blood circulation, while a stroke or myocardial infarction results when a blood vessel is completely occluded.

The menopause

The development of the organism goes through several phases of life, from birth through to being a senior citizen. During this process, physical functions change in ways typical of the phase. When the female menopause starts, a woman's fertility begins to come to an end. This stage is accompanied by physical and mental changes, which are experienced more or less intensively by all women. Many women find this stage of their lives to be very stressful, while others see it as the beginning of a new and positive phase of their lives.

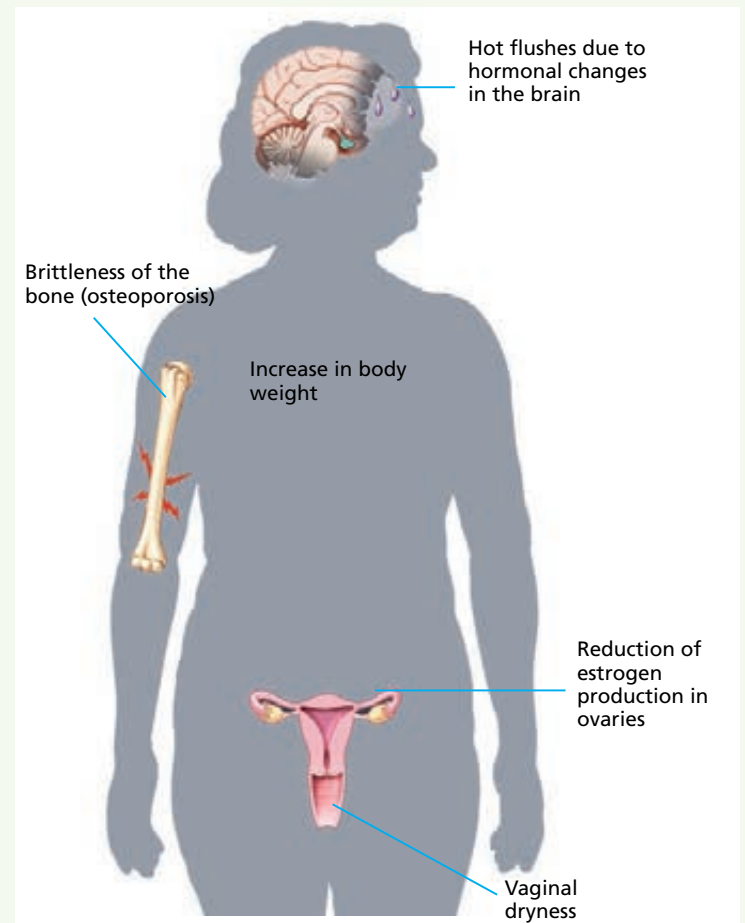
As recently as the beginning of the twentieth century, a woman in her fifties was considered to be an old lady, even in industrialized countries. Today, due mainly to an extended life expectancy, she is in the middle of her life, and many women at this stage of their lives reflect the image of a self-confident, independent, mature woman. On the other hand, many women feel they have been pushed out in the cold, having lived a life full of problems and suffered at the hands of fate, and think of themselves as old and worn out.

A break with former life

The menopause is characterized, not only by bodily changes, but, for many women, also changes in the habits and the circumstances of their lives. Many women in this phase of their lives have a feeling of loneliness. They have finished bringing up their children. Their husbands are busy with their work. If a woman has not previously had an independent career, she may not have any activities with which to fill her life. Her marriage may be in crisis, or already over. Women who are still, or once again, living alone, may believe they have not achieved what they wanted to in life, and that they are no longer capable of achieving it. And with many women, there is also the feeling that they are losing their attractiveness. Psychological problems may thus be an extra burden during the menopause.

Seeing changes as an opportunity

The change to a new phase of life need not necessarily bring problems with it, however. Aging can also present new opportunities. The pre-condition for this is that the women in question do not just look back on the years of their youth with wistful nostalgia, but also look forward, accepting the bodily changes which are occurring, many of which may not even be noticeable. Moreover, the menopause, frequently the object of so much dread, with its many levels of symptoms, has largely lost its terrors, since most of them can now be handled, thanks to medical progress.



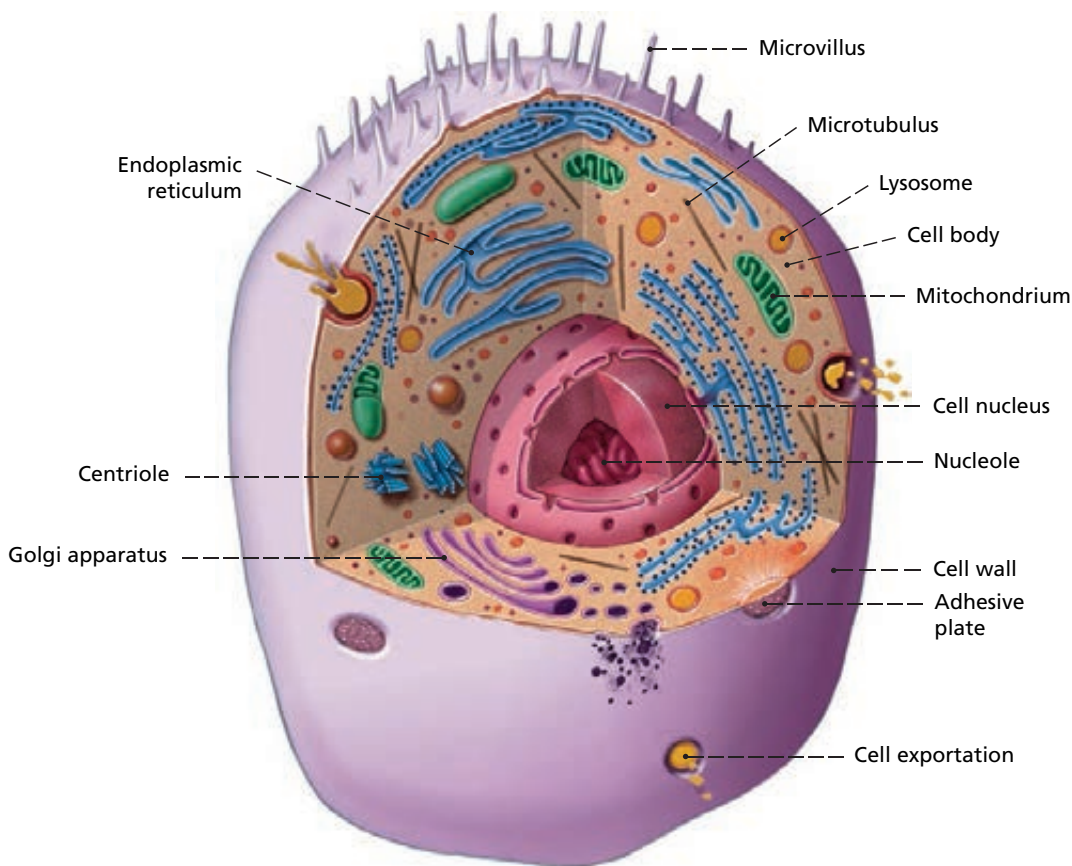
◆ Falling hormone levels are responsible for most of the organic changes which occur in women during the menopause.

You don't notice anything at first

Most women go through the menopause (climacteric) between the ages of about 48 and 52. The climacteric announces its arrival slowly, with various indications. The slight wrinkles around the eyes, chin and mouth deepen, and bad moods can become more frequent than previously. Headaches, sleep disturbances, circulation problems, vertigo, tachycardia, and hot flushes can be troublesome for many women. Finally, menstrual periods become irregular, and at some point stop completely. This is a sign to every woman of the end of the stage in life in which she can have children. Some women find this difficult to cope with and become

The cell

The cell is the smallest structural and functional unit of the organism. All animals are “metazoans,” i.e., they consist of a huge number of individual cells, all of which are specialized to a greater or lesser extent to enable them to carry out a variety of different tasks and thereby enable the organism to survive. The cells may be permanently linked to one another (e.g., in organs), but can also be floating free in a fluid (e.g., blood cells). The form and size of individual cells can vary greatly, due to their different tasks, but their basic structure (except for the red blood cells) is always the same. They consist of a cell body with a ground substance (cell fluid or cytoplasm); a cell nucleus; various small cellular organs or organelles in the cytoplasm, such as mitochondria and endoplasmic reticulum; and a cell wall, a membrane that surrounds the cell.



Because of the numerous tasks each cell has to carry out, they are well organized, each component fulfilling a specific requirement:

- Microvilli, are small cell evaginations, which are responsible for absorbing nutrients from the surrounding environment.
- Adhesive plates link the cells to one another.
- The endoplasmic reticulum is a branched cavity system bounded by a membrane; they are responsible for the transportation of materials and fluids into the cell.
- The Golgi apparatus ejects waste matter from the cell.
- Lysosomes have the job of digesting any impurities absorbed.
- Microtubuli are the cell's messengers. They pass on information from the cell surface to the cell nucleus.
- Mytochondria generate the energy required for the cell metabolism and are therefore also known as the cell's "power house".
- Nucleoles and centrioles play an important part in cell division.
- The cell nucleus contains the cell's genetic information, organized into chromosomes, and also plays a decisive part in the control of the cell metabolism.

◆ **Fig. 439**

Cells all have a similar basic structure, with one exception, red blood cells (erythrocytes). Depending on their purpose, they may be of different sizes. The diameter of the smallest cells is no more than two thousandths of a millimeter.

Glossary

A

Abdomen Anterior segment of trunk between thorax and pelvis, consisting of abdominal wall, abdominal cavity and abdominal organs.

Abdominal Relating to the abdomen, e.g., abdominal cavity.

Abdominal wall The wall of the abdominal cavity, partially covered by peritoneum. The front and side sections are formed by the diagonal abdominal muscles; the rear section is formed by the spinal column and muscles attached to it; the upper limit is formed by the diaphragm, and the lower limit by the pelvic floor and wings of the ilium with muscles attached to them.

Abducens 6th cranial nerve. Innervates lateral rectus muscle of the eye.

Abduction Lateral movement of part of body away from the vertical axis of the body front to back.

Abductor Muscle causing abduction, e.g., for raising the arm outwards.

Abscess Encapsulated gathering of pus, resulting from tissue necrosis due to toxins (e.g., bacterial).

Accessory nerve 11th cranial nerve. Controls the muscles of the leg.

Achilles tendon reflex Flexion of foot due to contracture of calf musculature following tapping of Achilles tendon previously passively tensed.

Adduction Bringing of part of body nearer to vertical axis of the body front to back.

Adductor Muscle causing adduction, e.g., for lowering the arm from horizontal to the side of the body.

Adenoid Pharyngeal tonsil. *See* Tonsil.

Adrenal glands A pair of endocrine glands located on the upper poles of the kidneys. They are each divided into an adrenal medulla and an outer adrenal cortex. Hormones are formed in both parts of the organ, epinephrin (adrenalin) and norepinephrin (noradrenalin) in the adrenal medulla, while hormones deriving from cholesterol, such as cortisone and a number of sexual hormones, are produced in the adrenal cortex.

Afferent Going towards, e.g., afferent nerve conducts impulses to the central nervous system.

Afterbirth The placenta, which is discharged together with the fetal membranes and the umbilical cord after the birth of a child.

Air vesicles *see* Alveoli.

Airways Any part of the respiratory tract through which air passes during breathing (pharynx, larynx, trachea, bronchi and bronchioles).

Alveolus A small cavity or sac-like dilatation, e.g., dental alveolus: tooth socket; pulmonary alveolus: thin-walled air sac.

Amnion Thin, avascular inner fetal membrane, which secretes amniotic fluid; part of the amniotic sac.

Amniotic fluid Fluid formed by amnion at beginning of pregnancy and subsequently by fetus, which fills up amniotic sac. By the end of pregnancy, about 1,100 milliliters.

Amniotic sac Envelope around embryo or fetus, containing amniotic fluid. It is formed from the amnion, the innermost of three birth membranes, and bursts during the birth process.

Amygdaloid body An almond-shaped conglomeration of nerve cells in the temporal lobe of the cerebrum, the amygdaloid body belongs to the basal ganglia and is functionally a part of the limbic system.

Anal Relating to the anus.

Anatomy Science of the structure of the body. Can be subdivided into functional, systematic, topographic and microscopic anatomy.

Aneurism Circumscribed, usually asymmetric, abnormal bulge in wall of arterial blood vessel or cardiac chamber, due to a weakening in the wall.

Ankle bone Talus, the first tarsal bone.

Ankle joint Hinged joint between the bones of the lower leg (tibia, fibula) and the ankle bone (talus). The talus articulates, in turn, with the heel bone (calcaneus) and the navicular bone of the foot.

Anterior Forward or front.

Anterior horn The anterior or frontal section of the gray matter in the spinal cord (as it appears in cross-section), containing the motor nerve cells (spinal motor neurones), the processes of which extend into the striated musculature.

Antrum Cavity, hollow space.

Anus Lowest segment of rectum, delineated by anal ring, i.e., end of lower bowel, opening on perineum.

Anvil *see* Incus

Aorta Main artery going from left ventricle of heart, delivers blood to all tissues except the lungs.

Apical At tip (apex) of an organ

Apparatus System of structures and/or organs with common function, e.g., vestibular apparatus

Appendix An appendage. The term is most commonly used to refer to the vermiform appendix, which extends from the blind end of the cecum. *See* Vermiform appendix.

Arterial Relating to arteries.

Arteriole Smallest arterial blood vessel preceding the capillary.

Arterio-venous Relating to both arteries and veins.

Artery A pulsating blood vessel with typical three-layer wall structure, which transports blood away from the heart to different parts of the body.

Articulation

1) A joint between bones.

2) The process of producing speech.

Atlas 1st cervical vertebra (which does not have a vertebral body).

Atrial Relating to atrium.

Atrio-ventricular node also referred to as AV node: Structure composed of special muscle fibres which is part of conduction system of heart. Situated near the orifice of the coronary sinus. Activated by the sinoatrial node. Transmits impulses to the ventricular muscles, causing contraction.

Atrium Vestibule or chamber of a hollow organ. The term is usually used as an abbreviation for the left and right atria of the heart.

Auditory nerve (audiovestibular nerve) 8th cranial nerve. Sensory nerve that conveys impulses deriving from the hearing process to the hearing center in the brain.

Auricle

1) Pinna of the ear, consisting of flexible cartilage and skin.

2) Pouch-like appendage projecting from the upper anterior portion of each atrium of the heart.

Autonomic nervous system The part of the nervous system that controls organ functions which are essential to life (vital functions such as breathing, blood circulation, metabolism, fluid balance). These are all regulated largely unconsciously and are almost impossible to influence voluntarily. The autonomic nervous system consists of two parts, the sympathetic and parasympathetic nervous systems, which differ in structure and often have opposing effects. While the sympathetic nervous system generally increases the performance of the body, the parasympathetic nervous system controls processes such as rest and digestion.

Axis 2nd cervical vertebra

Axon (neuraxon) Cylindrical, solitary cytoplasmic process of a nerve cell (neuron). *bursa*.

B**Back**

1) The posterior aspect of a part of the body.

2) The posterior aspect of the trunk. The muscles of the back are divided into a deep layer along the spinal column (autochthonous back musculature) and a superficial layer. The autochthonous musculature of the back extends, stabilizes, and rotates the spinal column. The superficial muscles of the back are primarily responsible for movement of the shoulder blade and arm.

Bartholin's glands (greater vestibular glands) Paired mucous glands in vestibule of the vagina. Their secretions lubricate the vagina.

Basal ganglia Collections of neuron bodies, which lie deep within the white matter of each cerebral hemisphere. They serve as important links between various motor pathways of the central nervous system.

Belly button *see* Navel.

Biceps Abbreviation for *musculus biceps brachii*, the upper arm muscle, whose main function is to flex the forearm and arm.

Bile Fluid produced in hepatocytes containing water, electrolytes, and organic molecules, such as bile pigments and salts that help in the breakdown of fats.

Birth membranes Membranes which surround the unborn child and amniotic fluid. They have nourishment, excretory and protection functions for the embryo or fetus during pregnancy.

Bladder *see* Urinary bladder, Gall bladder.

Blood cells Collective name for erythrocytes (red blood cells), leucocytes (white blood cells), thrombocytes (blood platelets) and other cells in the blood.

Blood Fluid circulating in blood vessels, which is pumped through the organism by the heart. In adults, it makes up approximately 8% of body weight. Blood consist of a yellow fluid, plasma, in which are carried red blood cells (erythrocytes), white blood cells (leucocytes), and platelets (thrombocytes). Essential functions are transportation of matter to the tissues (e.g., oxygen, nutrients, messenger substances), transport of waste products to the excretory system, immune defense, heat regulation, wound closure through coagulation, and regulating the acid base balance of the body.

Blood pressure Pressure of blood flow through the arteries, specified in mmHg.

Blood-brain barrier Physiological restriction to substances in the blood entering nerve tissues in the brain.

Bone Dense, calcified, supporting structure forming the skeleton. Deposits of calcium salts make bones very robust. After their structural function, the central task of the bones is hematopoiesis, formation and development of blood cells. From the outside to the inside bones consist of periosteum, a hard bone cortex, and a soft framework of delicate trabecula, filled with bone marrow.

Bone marrow The substance between the spongy sections of a bone, also known as *medulla ossium*. Hematopoiesis takes place in the red bone marrow, which comprises reticulate connective tissue and stem cells. The yellow bone marrow largely consists of fat cells and connective tissue.

Boundary membrane Boundary layer between connecting tissue and non-connecting tissue structures, e.g., muscular fibers or epithelial tissues.

Bowels *see* Intestines.

Bowman's capsule Cup-like sac at the beginning of the tubular part of the renal nephron enclosing the glomerulus.

Brain Part of nervous system surrounded by bones of skull, which, together with spinal cord, forms the central nervous system. The entire brain is surrounded by the skull and cranial

membranes. It has cavities (cerebral ventricles), which are filled with clear cerebrospinal fluid. Anatomically, brain is divided into the end brain (cerebrum, cerebral ventricles, basal ganglia, olfactory brain, and corpus callosum), the interbrain (pineal gland, thalamus, hypothalamus, and parts of pituitary), the mid-brain (part of brainstem) and the hind-brain (bridge, cerebellum, and extended cord). The gray matter consists mainly of neuron bodies and neuroglia cells, while white matter consists mainly of cord-rich nerve fibers. Nerve fibers connect the two cerebral hemispheres together, acting as commissures.

Brainstem Lowest part of the brain, beneath the cerebrum and cerebellum. In terms of development history the brainstem is the oldest part of the brain. It encompasses the midbrain, pons, and medulla oblongata. It is the source of most of the cranial nerves.

Breastbone *see* Sternum.

Bronchiole Small terminal branch of a bronchus.

Bronchus Part of the respiratory tract between the trachea and bronchioles. Bronchi are lined with a mucous membrane with ciliated epithelium, which fulfils important defensive functions (e.g., sweeping foreign matter back towards the throat so it can be coughed up); inhaled air is moistened and cleaned.

Bursa Pocket-shaped or bag-shaped body cavity, e.g., synovial bursa.

C

Café-au-lait spot Light brown spot on the skin, the color of milky coffee, which is irregularly but sharply delineated; it is usually harmless.

Calf (sura) The curved rear portion of the lower leg.

Callus

1) Fracture callus: initially connective tissue which later becomes compacted due to calcium deposits occurring in the case of secondary fracture healing and which bonds the broken ends.

2) Callosity: rough thickening of the corneous layer of the skin due to extensive mechanical wear.

Canalis Channel, groove, pipe. A small channel is a canaliculus. Example: C. vertebralis: Vertebral canal.

Cancer Malignant disease characterized by uncontrolled cell division. Cancer cells are able to destroy the surrounding tissue and can grow uncontrollably. They may form metastases in other parts of the body. In most cases, the cancer originates from a single abnormal cell.

Capillary The smallest blood vessels which connect arterioles to venules, and in which the exchange of gases, electrolytes, fluids, and nutrients takes place in tissues and organs.

Caput (head)

1) Part of the body which, among other things, contains the brain and sensory organs for vision, hearing, and smell.

2) Area of origin of a muscle or thickened end of a bone or organ. Example: C. mandibulae: head of lower jawbone (mandible).

Cardiac valves Flaps of specialized connective tissue lying between auricles and ventricles, as well as between ventricles and efferent vessels, which act to regulate blood flow, ensuring that it flows only in one direction.

Cardiovascular system Mass of all blood vessels and the heart.

Carpal joint A series of articulated joints between the carpal bones of the hand.

Carpus Wrist, *see* Hand.

Cartilage

1) A dense connective tissue composed of specialized cells called chondrocytes that produce an extracellular matrix composed of collagen fibers, ground substance, and elastin fibers. It has a low degree of metabolic activity, very few blood vessels and minimal regenerative capacity. A distinction is made between hyaline,



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