Poltava State Medical University

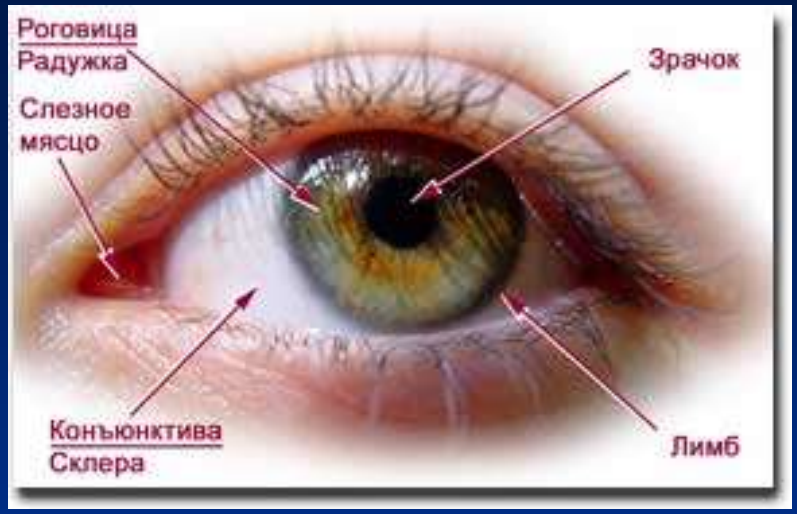
- **The functions of the organ of vision.**
- **Research Methods.**
- **Inflammatory diseases of the eyelids, lacrimal apparatus and conjunctiva.**

PhD, Dr. Anna PERA-VASYLCHENKO .

Plan

- The concept of reversible and irreversible blindness
- Examination of visual organ
- Visual functions
- Introduction to Ophthalmology
- Inflammatory diseases of the eyelids
- Inflammatory diseases of the lacrimal apparatus
- Inflammatory diseases of conjunctiva: clinic, diagnostics methods, treatment

- Vision - a great gift. No wonder they say, "treasure it."
- Through the vision people gets up to 95% of the information about the world.



- Man sees not with the eyes, but through the eyes, where the information is transmitted through the optic nerve, chiasm, optic tract to the certain areas of the occipital lobe of the cerebral cortex, where is the picture of the outside world that we see appears. All these parts make our visual analyzer or visual system.

- Our vision is a binocular (two eyes) and stereoscopic (we see objects in three-dimensional image), which is due to the structure of the eye.

- The right side of the retina of each eye passes through the optic nerve "right side" image in the right side of the brain, similarly operates the left side of the retina. Then the two parts of the image - right and left - brain connects together.

History of Ophthalmology

Ophthalmology is a part of medicine that studies the anatomy fnd physiology of the organ of vision, examination, treatment and prevention of eye diseases. The name of science comes from two Greek words: “ophthalmus” - eye and “logo” - teaching. The doctrine of eye diseases was created throughout the history of mankind. The name of the first eye doctor in the world that history has preserved is Peni-Ankh-Iri (1600 BC). Hippocrates, the father of medicine, was involved in the treatment of eye diseases. A significant contribution to the development of ophthalmology was made by Avicena (980-1037), who, in his scientific work “Canon of Medical Science”, summarized the achievements of medicine in the countries of the East, Egypt, Greece and Rome, in particular in the field of eye diseases.

History of Ophthalmology

The systematization of objective knowledge about the organ of vision was carried out not by a doctor, but by astronomer and inventor Johannes Kepler (1571-1630). He first correctly described the lens. This made it possible for the French surgeon Jacques Daviel (1696-1762) to find a way to remove cataracts by cutting the eyeball. The surgical era has begun in the treatment of many eye diseases. Physiologist and physicist G. Helmholtz (1821-1894) invented a special eye mirror - an “ophthalmoscope”, which expanded the understanding of eye diseases.

According to the WHO, at this time on our planet more than 75 million people are blind and 40 million people have visual impairment. From a scientific point of view, absolute blindness is the lack of light perception and visual acuity = o (zero). If a person can see the light it is relative blindness, but these people need outside care. In Germany, people who do not count fingers at a distance of more than 1 m are considered almost blind. Americans consider people who can not read with an acceptable correction as blind.

There are blindness treatable and incurable. With treatable blindness, after medical or surgical treatment, vision can be restored to normal. For example, in patients with clouding of the cornea, lens, retinal detachment. With incurable blindness, the optic nerve is affected. It’s atrophy sets in, the death of nerve cells that are not restored. It is necessary to distinguish the blindness of one eye. This pathology is important to consider when choosing a profession. The lack of binocular vision eliminates the ability to work with moving mechanisms.

The structure of the visual analyzer

- - the eyeball,
- - the accessory structures of the eye (eyelids, conjunctiva, lacrimal glands, lacrimal ducts, oculomotor apparatus),
- - optic pathways (optic nerves, optic chiasma, visual tracts, visual centres – external geniculate bodies, central neuron (as part of the Gratiolet's bundle),
- - occipital lobes of the brain.

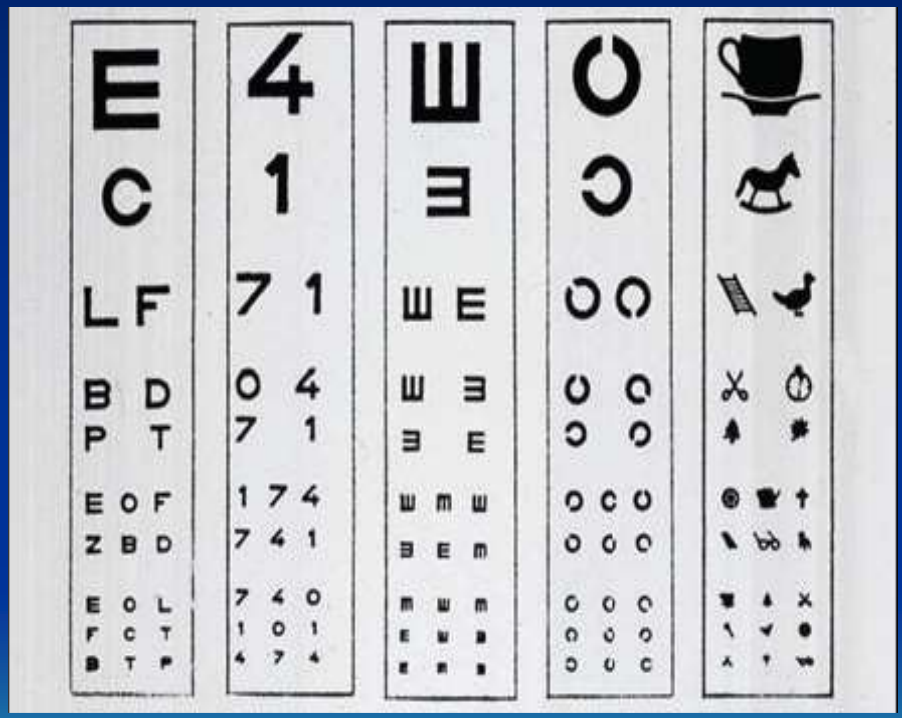
Examination methods for the organ of vision

- 1. Complaints
- 2.Anamnez
- 3. External examination: position of the head, condition of the palpebral fissures, position of the eyes in orbit, eye mobility.
- 4. Instrumental:
- - front segment (side lighting, in transmitted light, biomicroscopy)
- - posterior segment (ophthalmoscopy, OCT)
- 5.Functional:
- - Visual acuity
- - Color perception
- - Fields of view
- - Binocular vision
- - Adaptation to light and dark

VISUAL FUNCTIONS

- **Central vision** provides a clear view of objects. Cones of the retina are responsible for central vision. Central vision is characterized by visual acuity. Visual acuity is the ability of the eye to distinguish two separate points located at a minimum distance from each other.

  Visiometry.



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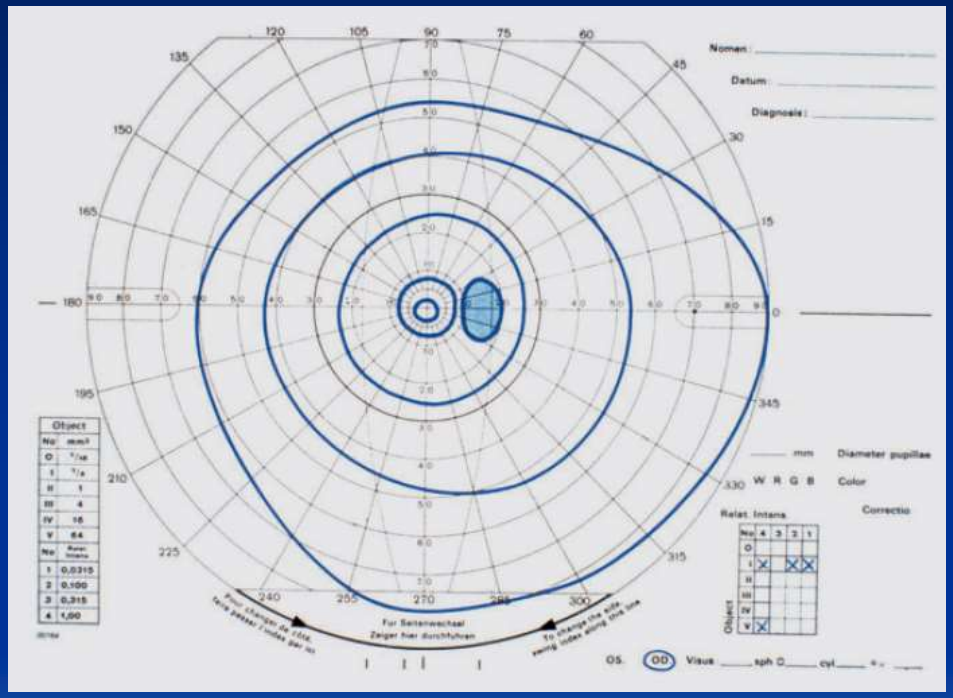
Examination of visual acuity

- ***Peripheral vision***. It allows a person to orient in space. It is characterized by a field of vision – this is a set of all points in space that are perceived by the motionless eye. The peripheral vision is provided by rods of the retina, which are located on its periphery. Methods for testing the field of vision are as follows: perimetry, campimetry, control method.

Perimetry


Nomen:
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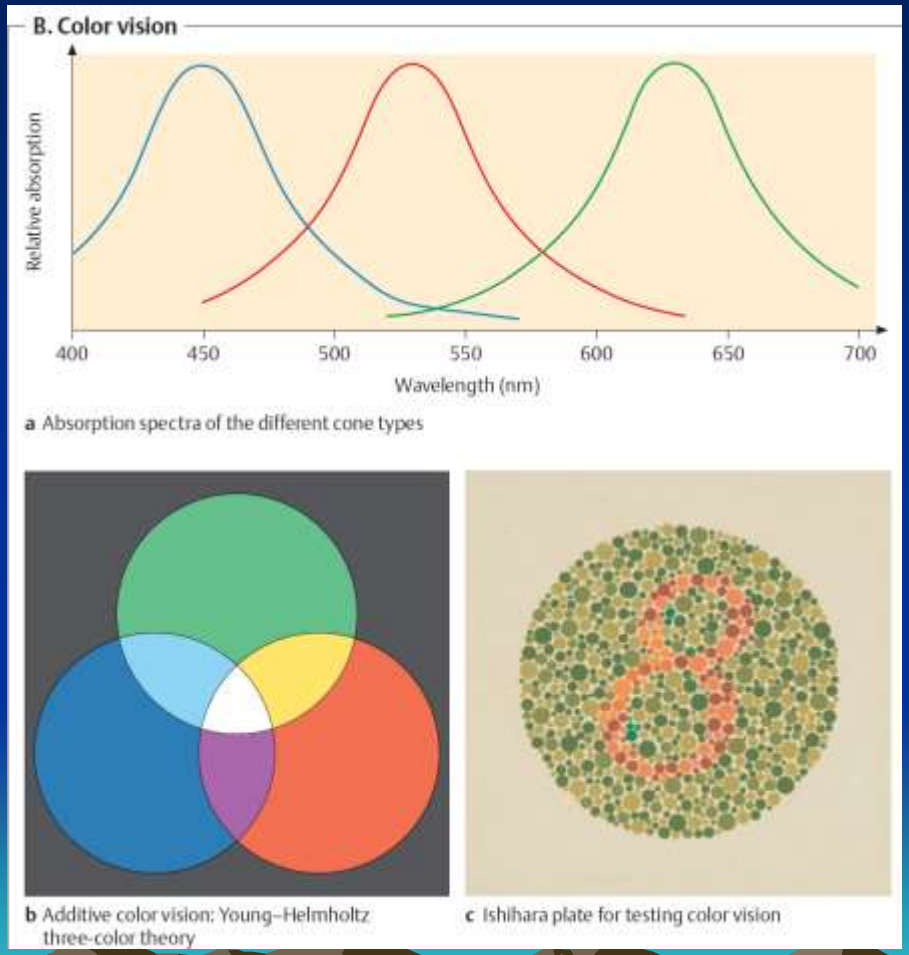
VISUAL FUNCTIONS

- ***Colour perception***. With the help of colour perception we are able to discern the entire spectrum of colours of nature. The colour perception is provided by the retinal cones, which are located in the central zone of the retina. The eye normally sees the three primary colours of the spectrum: green, red and blue (*normal trichromatism*). Such people are called normal trichromats, and also have the ability to perceive up to 160 different colours.

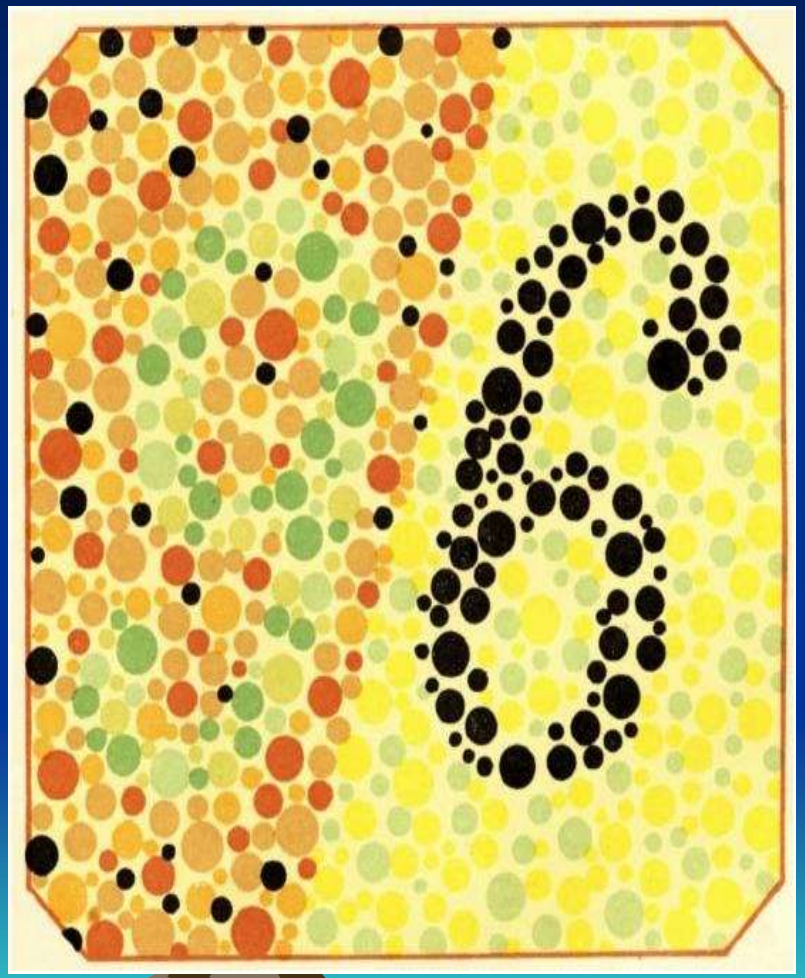
Colour perception.



a Absorption spectra of the different cone types

b Additive color vision: Young–Helmholtz three-color theory

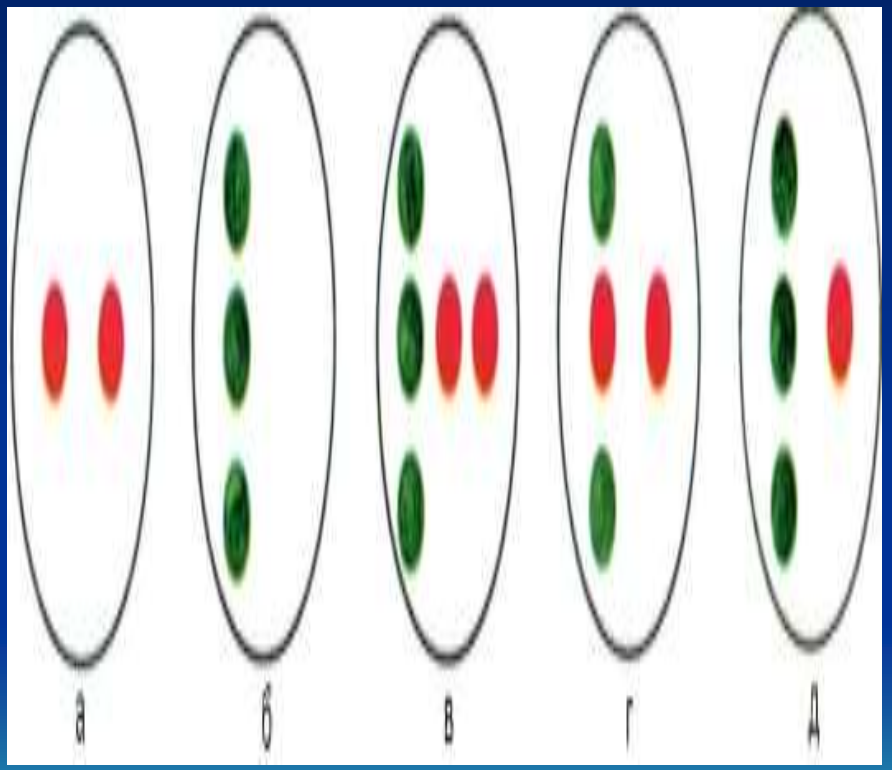
c Ishihara plate for testing color vision



VISUAL FUNCTIONS

- **Binocular vision is the ability to see with two eyes**. It is formed at the age from 2 months to 6-10 years and becomes stable by 15 years. For binocular vision, certain conditions are required:
- - visual acuity not less than 0.3-0.4:
- - full range of motion of the eyeballs;
- - parallel position of the eyeballs when looking into the distance;
- - corresponding convergence when looking at close range;
- - the ability of fusion;
- - getting the image on the correspondence points of the retina.

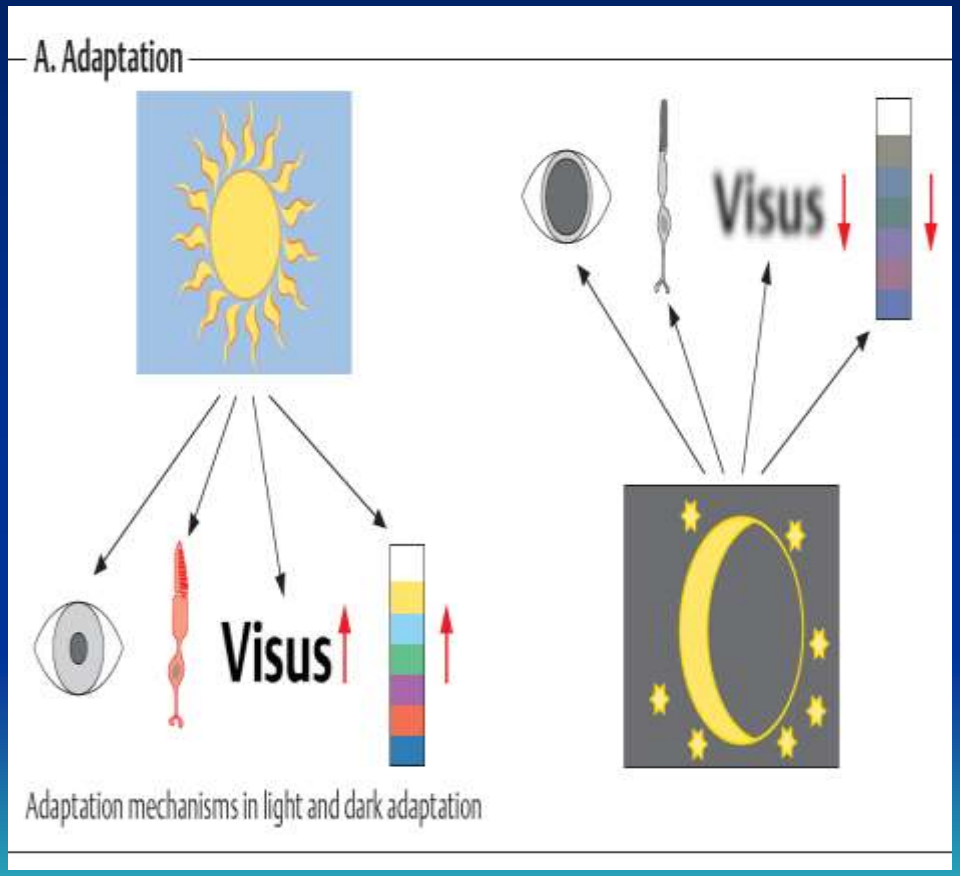
VISUAL FUNCTIONS



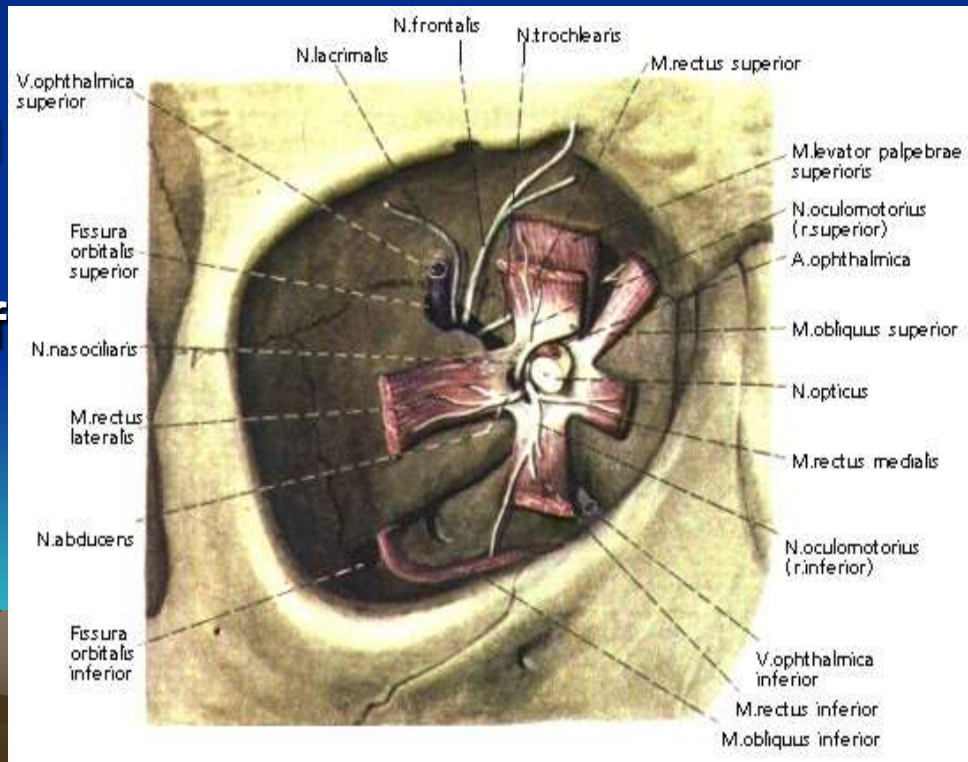
VISUAL FUNCTIONS

- ***Light perception (twilight vision).*** It provides the ability to see at low light and at durk. At durk, we do not distinguish colours (“at night all cats are gray”). Disorder of twilight vision can be congenital, resulting from vitamin deficiency or disease. This disorder is called hemeralopia.
- Light perception is provided by the rods apparatus of the retina. The study of light perception: control samples, adaptometry

VISUAL FUNCTIONS

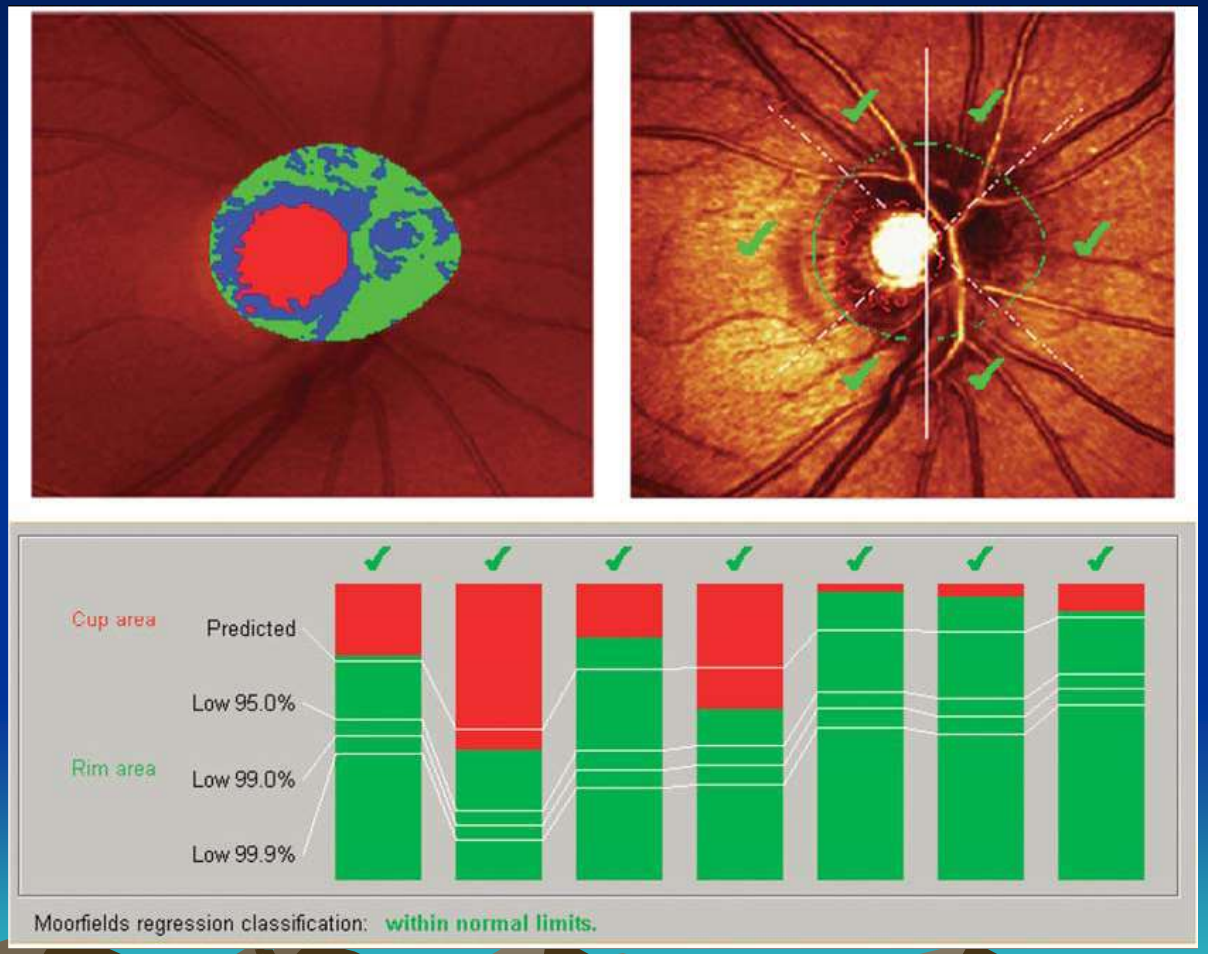


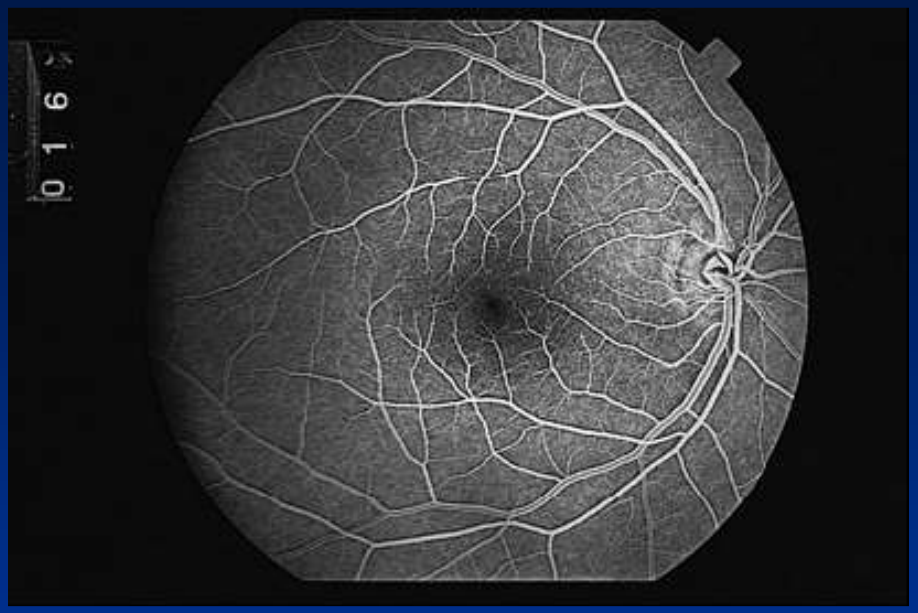
- Eyes are located in the orbit, which is formed by 7 bones and also serves to protect it. It is formed by the bones of the skull, surrounded by six muscles: four straight and two oblique. Muscles contribute eye movement in different directions.
- Between the orbit and the eyeball is adipose tissue that performs damping function and there are blood vessels, nerves and muscles. Eyeball weighs about 7 grams. The shape of the eyeball is slightly flattened in the anterioro-posterior direction about 24 mm.



Examination of the eye

Ocular computer tomography



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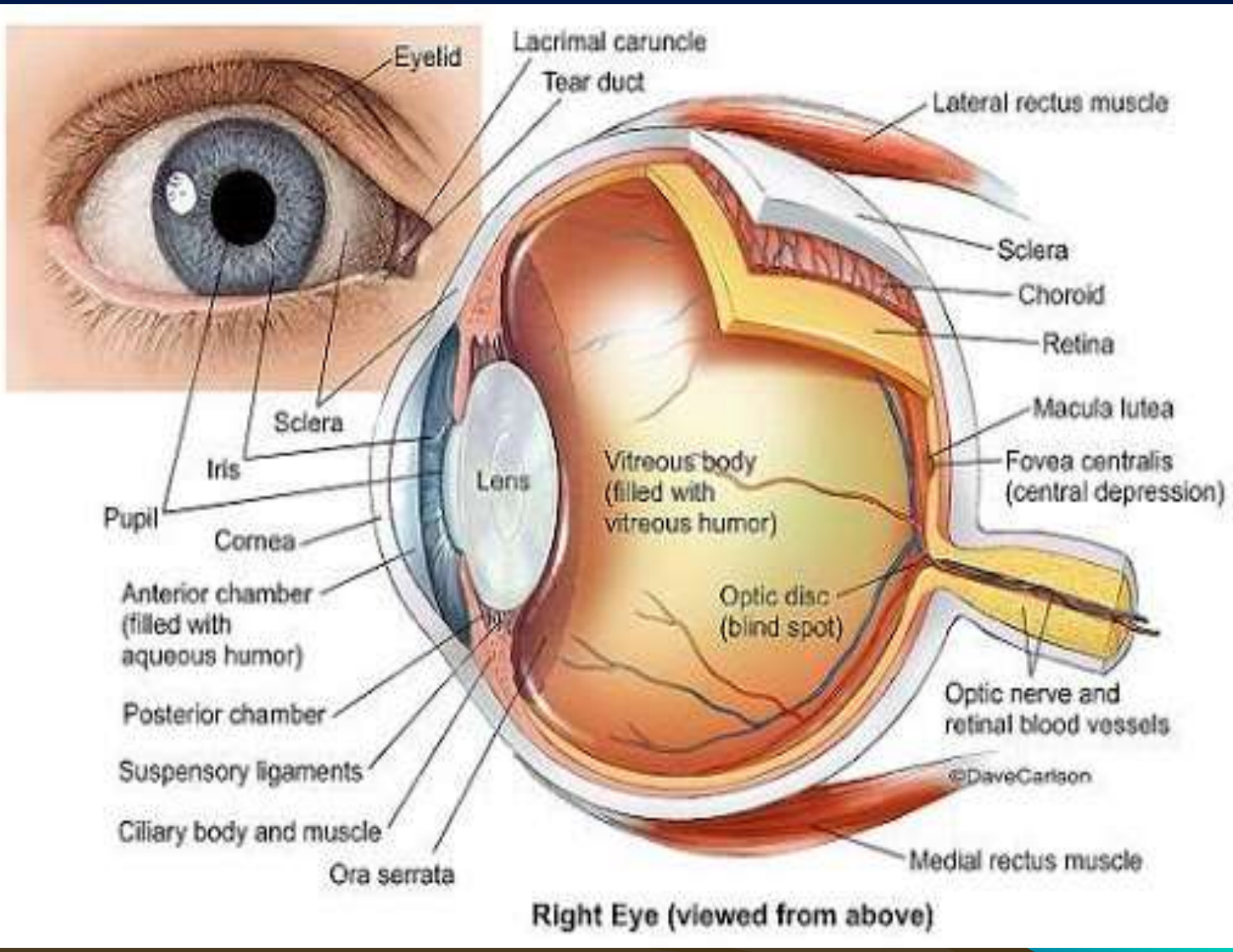
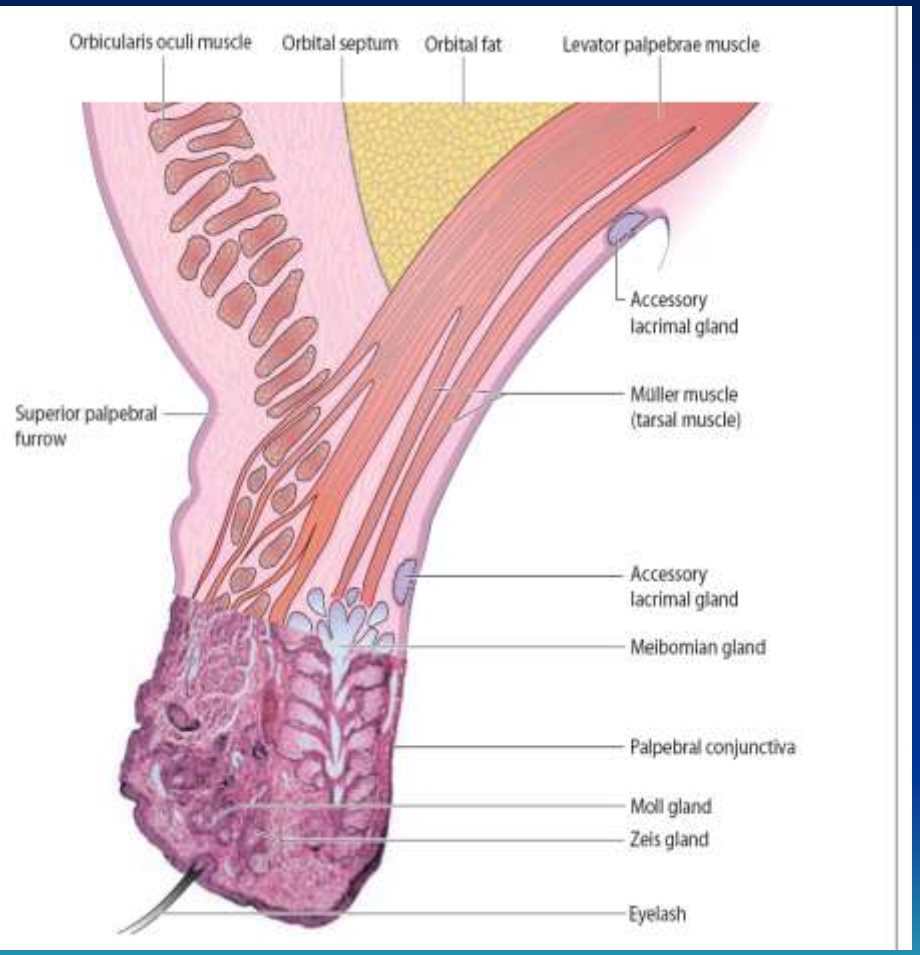
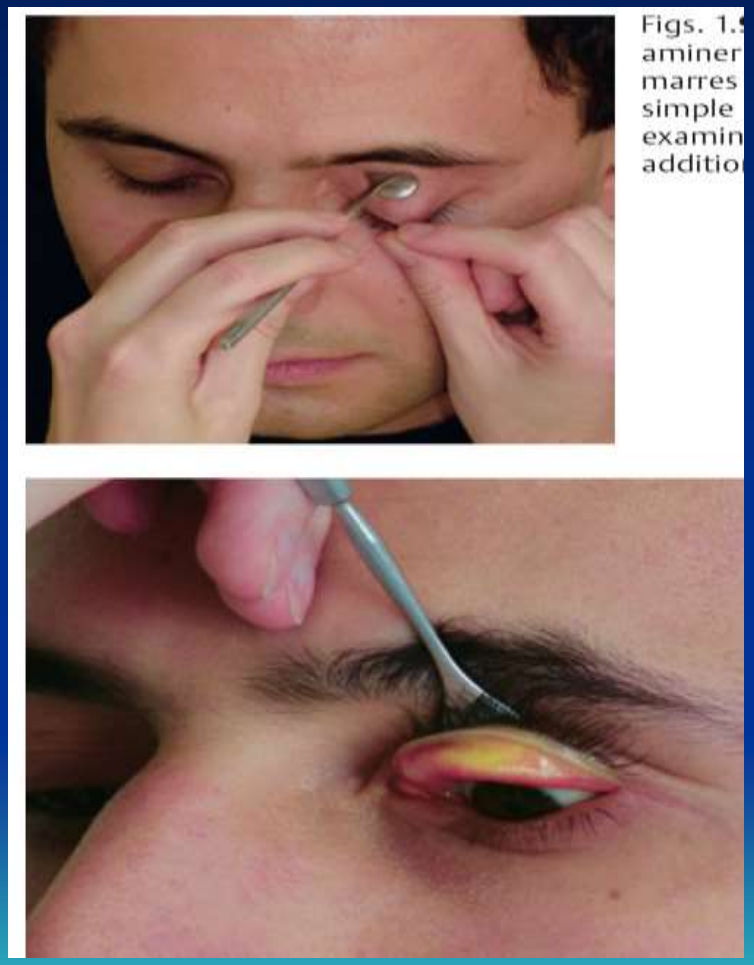

Eyelid
Lacrimal caruncle
Tear duct
Lateral rectus muscle
Sclera
Choroid
Retina
Macula lutea
Fovea centralis
(central depression)
Sclera
Iris
Pupil
Cornea
Lens
Vitreous body
(filled with
vitreous humor)
Anterior chamber
(filled with
aqueous humor)
Optic disc
(blind spot)
Posterior chamber
Optic nerve and
retinal blood vessels
Suspensory ligaments
©DaveCarlson
Ciliary body and muscle
Ora serrata
Medial rectus muscle
Right Eye (viewed from above)

Anatomy of the eyelids



Protective apparatus:
1. Eyelids - upper and lower
- Functions: mechanical protection, even tear distribution.
structure: skin, subcutaneous fat, muscle-vascular layer, cartilage, conjunctiva.
have a good sensitive and motor innervation.
In the thickness of the cartilage there are meibomian glands (sebaceous), which provide protection against drying out and limitation of the mobility of the eyelids during the blinking process.

Examinations of the eyelids



Examinations of the eyelids

Classification of diseases of the eyelids.

- Congenital: coloboma of the eyelids, epicanthus, ptosis, blepharophimosis, inversion and eversion of the eyelids, microblepharon.
- Acquired:
- Inflammatory - blepharitis (simple, scaly, ulcerative), barley, abscess, phlegmon, halazion; viral (herpes simplex, molluscum contagiosum, viral warts), fungal (candidomycoses, blastomycoses)
- Muscle diseases - blepharospasm, lagophthalmos, ptosis
- Neoplasms:
- a) benign - papillomas, warts, cysts, skin horn
- b) malignant - epithelioma, basalioma, adenocarcinoma, melanoma

Congenital diseases of the eyelids.

- Upper eyelid coloboma

- Ectropion

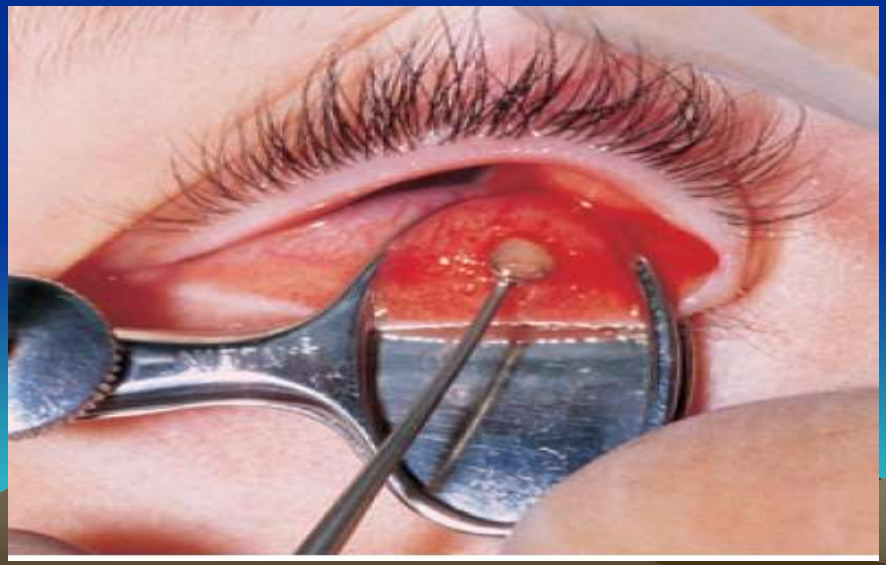
Inflammatory diseases of the eyelids

- Stye is an acute purulent inflammation of the sebaceous gland around the hair sac.
- Etiology: Staphylococcus aureus, vitamin deficiency, anemia, diabetes.
- Clinic: a painful spot on the eyelids, hyperemia, swelling, abscess formation.
- Treatment: lubrication of the area of the painful point with spiritus, treatment with brilliant greens, drops (tobrex, ciloxane, floxal), multivitamins, eye ointments (tetracycline, tobradeks), with suppuration, opening and drainage.

Inflammatory diseases of the eyelids

- Abscess of the eyelids
- Contact eczema
- Swelling of the skin

Inflammatory diseases of the eyelids



- Cholazion is a chronic proliferative inflammation of the meibomian gland. Limited dense formation in the thickness of the cartilage of the eyelids, painless.
- - Etiology: blockage of the meibomian gland.
- Clinic: limited dense formation in the thickness of the cartilage, mobile, not fused with the skin of the eyelids.
- Treatment:topical ointments (hydrocortisone, “Tobradex”), surgical removal

Viral diseases of the eyelids

- Herpes simplex
- Herpes zoster ophthalmicus
- Molluscum contagiosum

Inflammatory diseases of the eyelids

- Blepharitis - inflammation of the edge of the eyelids.
- Simple, scaly, ulcerative.
- - Clinic: hyperemia, swelling, thickening of the edges of the eyelids, eyelashes are covered with crusts at the root of the eyelashes, when peeling off, there are bleeding sores.
- Etiology: diabetes mellitus, anemia, gastrointestinal diseases, demodecosis.
- Treatment: eyelid massage, antibiotic drops floxal, tobrex, ciloxane), antibiotic ointment (phloxal, tetracycline), treatment of the rim of the eyelids with brilliant greens.

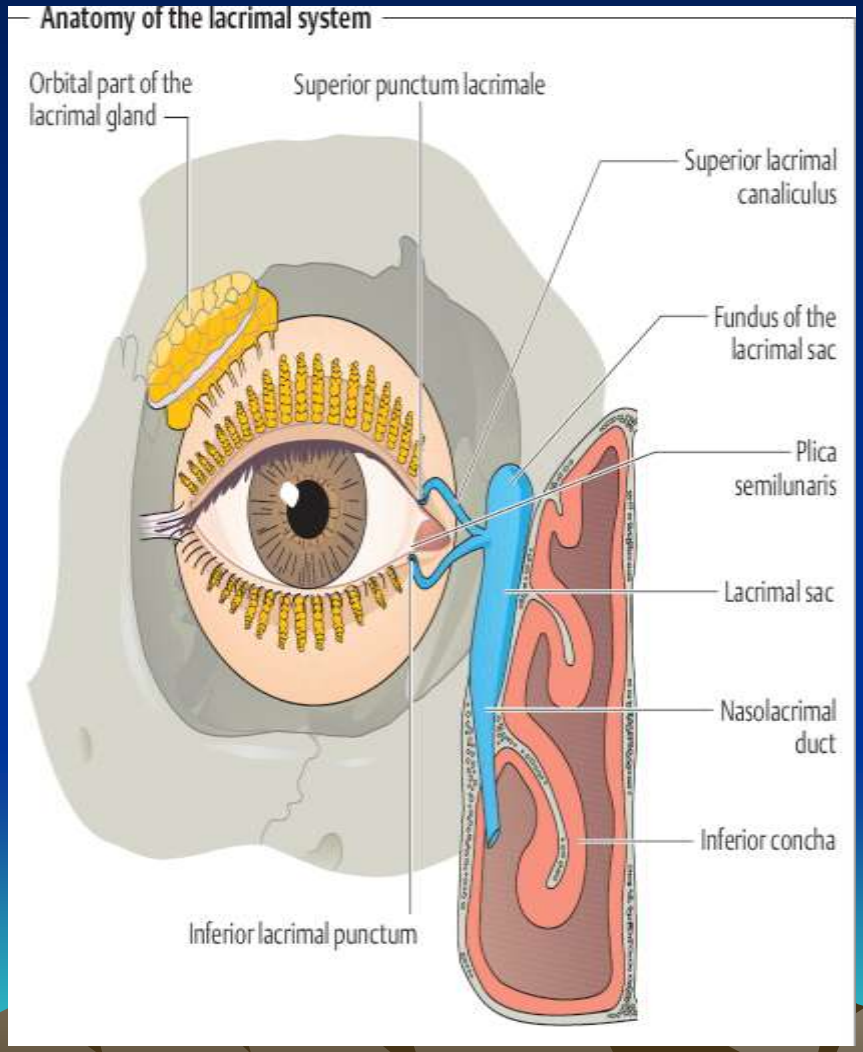
Заболевания мышц век

Senile eversion of the lower eyelid

Lower eyelid inversion

Neoplasms of the eyelids

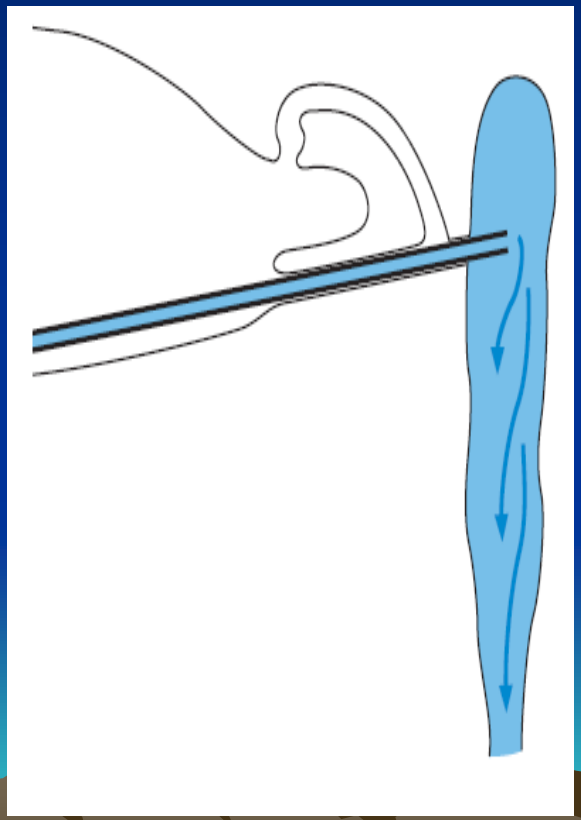
The structure of the lacrimal apparatus

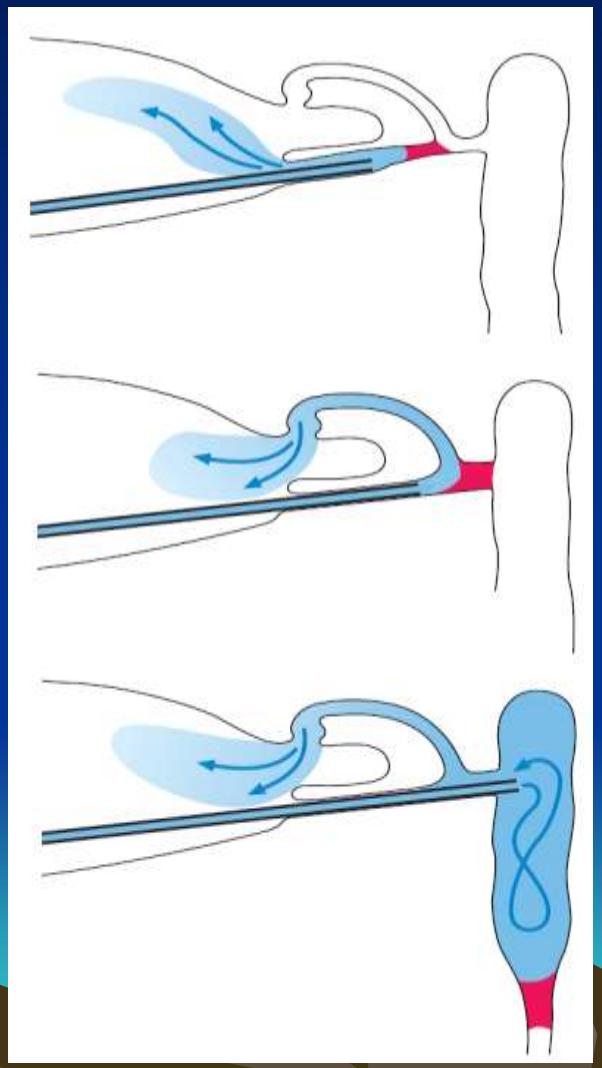


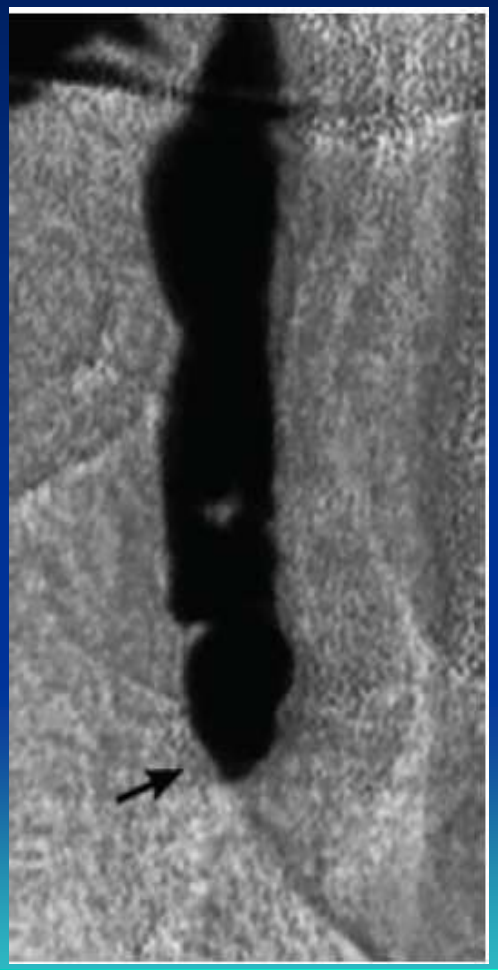
- The lacrimal apparatus belongs to the auxiliary apparatus of the visual analyzer.
-
- - Tear producing apparatus (lacrimal gland, Krause glands, goblet cells)
- - Lacrimal drainage apparatus (lacrimal lake, lacrimal punctums, canals, lacrimal duct).
- Functions:
- 1. The development and abduction of tears

Examination methods of the lacrimal system

- Normal patency of the tear ducts







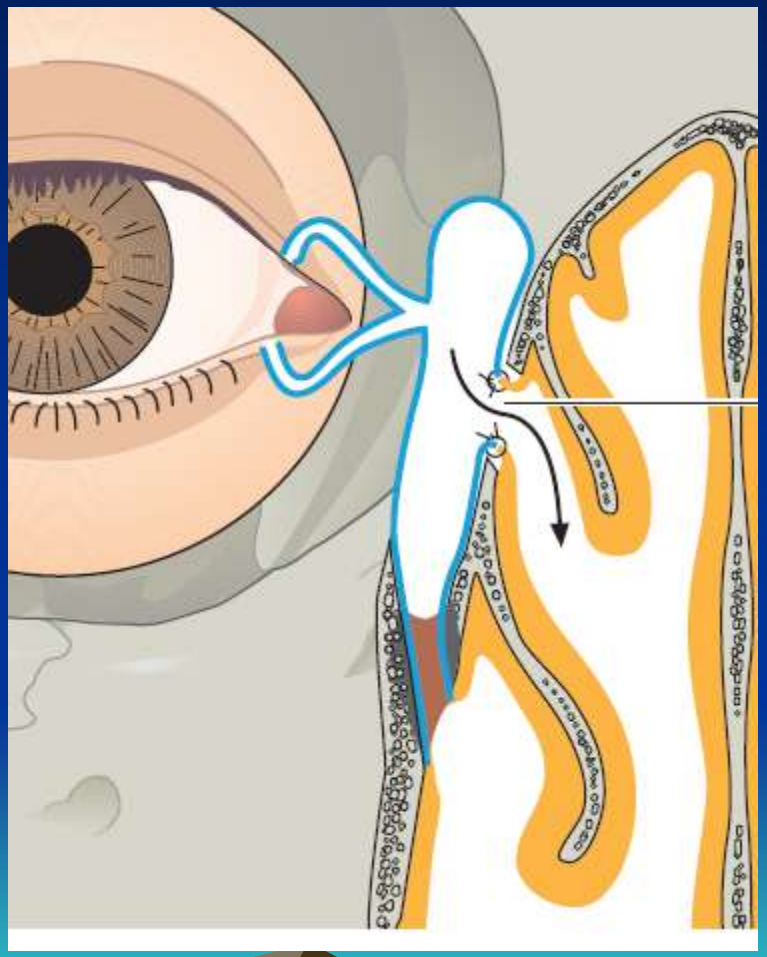
Classification of diseases of the lacrimal organs

- Diseases of the lacrimal gland: acute and chronic dacryoadenitis, cysts, tumors, Syoghren's syndrome (hypofunction of the lacrimal gland).
- Tear duct diseases:
- Congenital: atresia of the lacrimal openings and tubules, narrowing of the lacrimal openings, dacryocystitis of newborns.
- Acquired: eversion of the lower lacrimal opening, blockage of the lacrimal tubules by foreign bodies, dacryocanalikulitis, chronic dacryocystitis, phlegmon of the lacrimal sac; papilloma, lymphoma, carcinoma, sarcoma.

Dacryocystitis of the newborn

- Etiology: persistence of the fetal membrane, congenital folds of the mucous membrane of the lacrimal sac, narrowing of the canal with mucos folds.
- Clinic: lacrimation, mucopurulent discharge, when a lacrimal sac is pressed, mucopurulent discharge is exuded from the lacrimal punctums.
- Treatment: massage of the lacrimal sac, washing of the lacrimal passages with antiseptics and proteolytic enzymes, closed probing of the lacrimal duct.

Lacrimal sac abscess



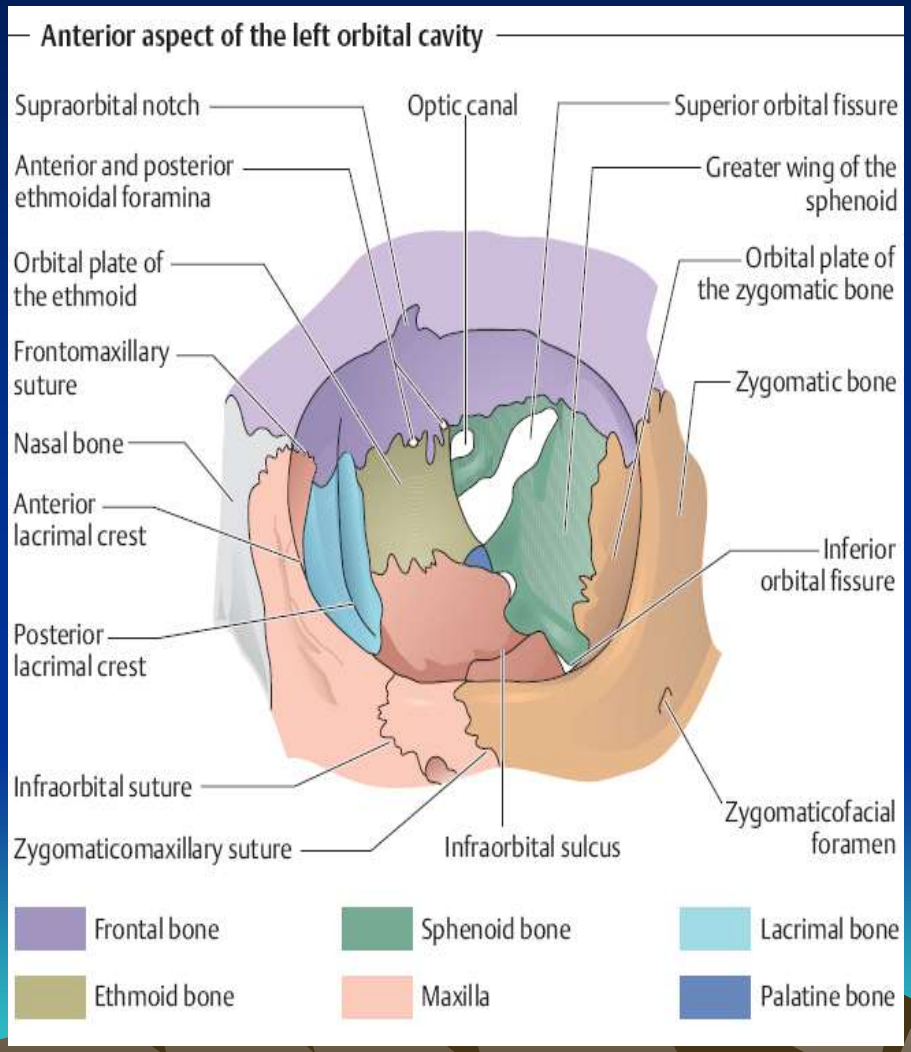
Chronic Dacryocystitis

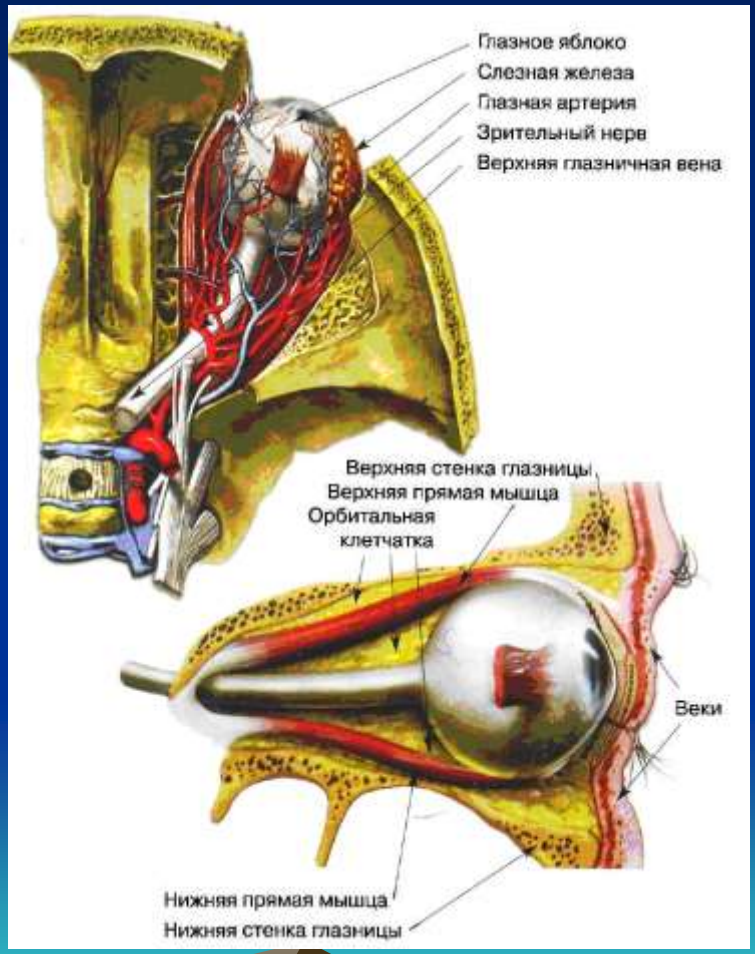
- Etiology: diseases of the nasal mucos, which cause narrowing and closing of the nasolacrimal duct, purulent conjunctivitis, inflammatory processes in the maxillary sinuses.
- Pathogenesis: retention of the tear and pathological microorganisms of the lacrimal sac, which leads to inflammation of its mucosa and obliteration of the lacrimal-nasal canal.
- Clinic: persistent lacrimation, mucopurulent discharge from the lacrimal punctums, conjunctival hyperemia, lack of the tear-nasal passages.
- Treatment:
- 1. conservative - instillation and washing of the lacrimal ducts with antibiotics and proteolytic enzymes;
- 2. operative - dacryocystorhinostomy.

Acute dacryoadenitis

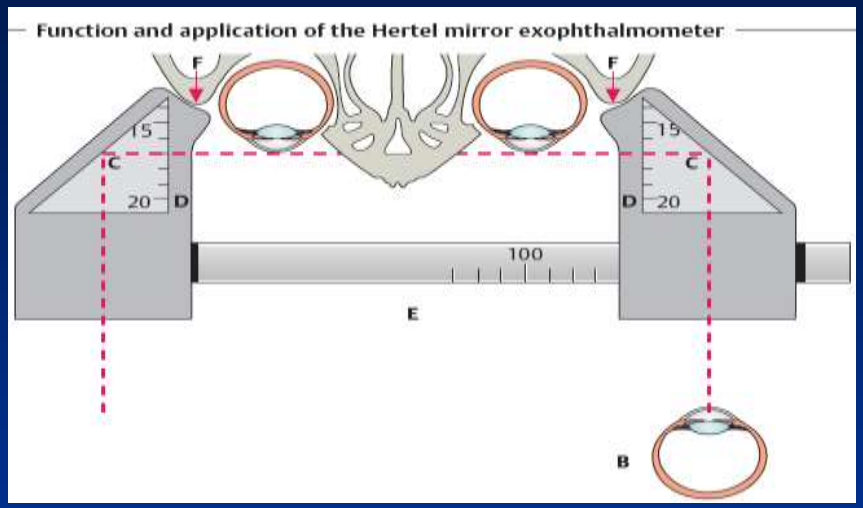
- Etiology: endogenous infection (flu, pneumonia, tonsillitis).
- Clinic: pain in the outer part of the upper eyelid, edema, hyperemia of the skin of the eyelid, the eyeball deviated down and to the nose, the lacrimal gland is enlarged, decreased movement of the eyeball.
- Treatment: treatment of the general disease, general and topical antibiotics, surgical.

Orbit


Anterior aspect of the left orbital cavity
Supraorbital notch
Optic canal
Superior orbital fissure
Anterior and posterior ethmoidal foramina
Greater wing of the sphenoid
Orbital plate of the ethmoid
Orbital plate of the zygomatic bone
Frontomaxillary suture
Zygomatic bone
Nasal bone
Anterior lacrimal crest
Inferior orbital fissure
Posterior lacrimal crest
Infraorbital suture
Zygomaticofacial foramen
Zygomaticomaxillary suture
Infraorbital sulcus
Frontal bone
Sphenoid bone
Lacrimal bone
Ethmoid bone
Maxilla
Palatine bone


Глазное яблоко
Слезная железа
Глазная артерия
Зрительный нерв
Верхняя глазничная вена
Верхняя стенка глазницы
Верхняя прямая мышца
Орбитальная клетчатка
Веки
Нижняя прямая мышца
Нижняя стенка глазницы

Examination of the orbit

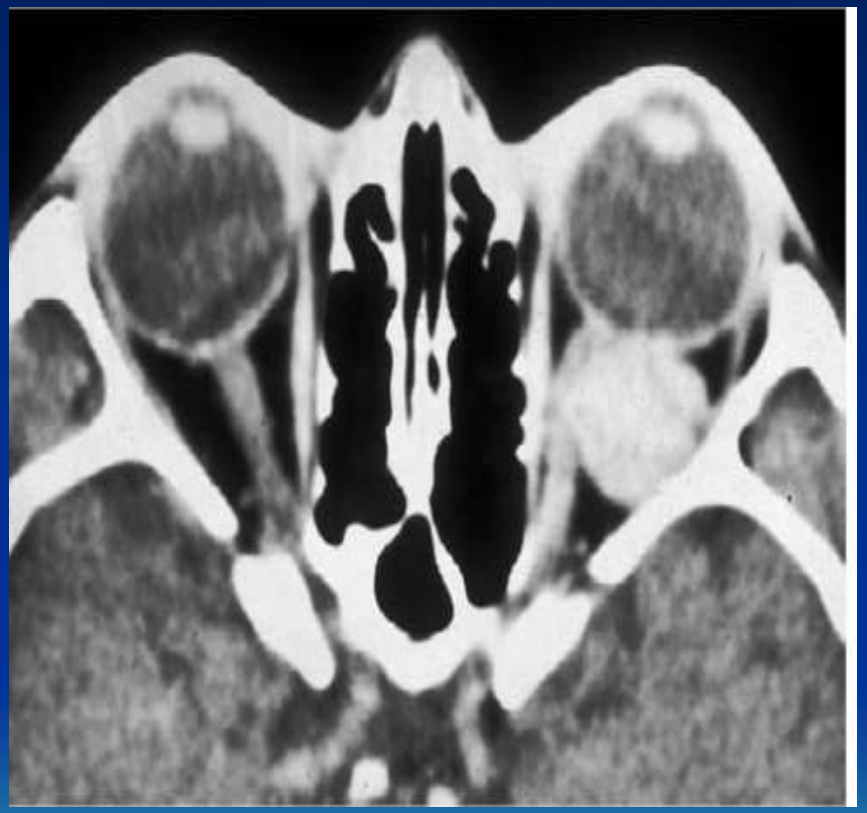


Exophthalmometry
CT scan

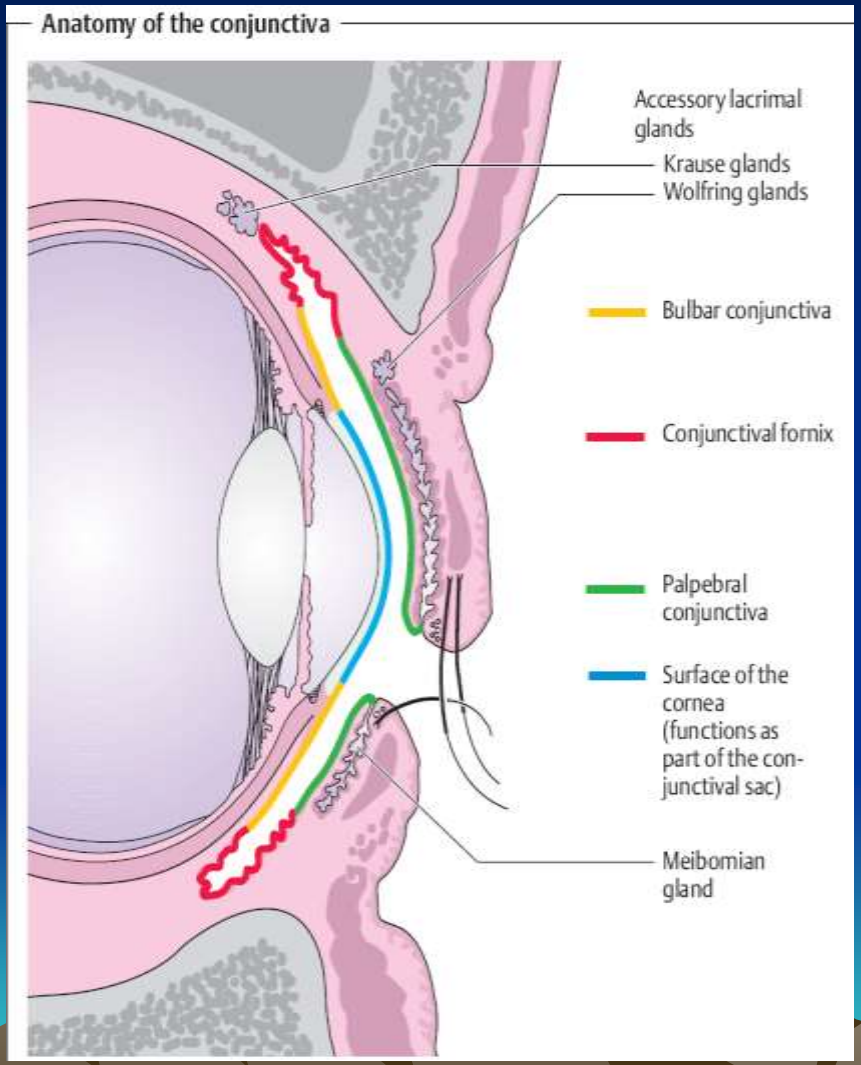
Inflammatory diseases of the orbit

- Tenonitis, pseudotumor of the orbit, thrombophlebitis of the orbit, abscess, phlegmon.
- clinic: exophthalmos, conjunctival chemosis, edema of the eyelids, limitation of the mobility of the eyeball, headache, diplopia.
- Complications: the development of sepsis, thrombosis of the cavernous sinus, meningitis.

Computer tomography of the orbit

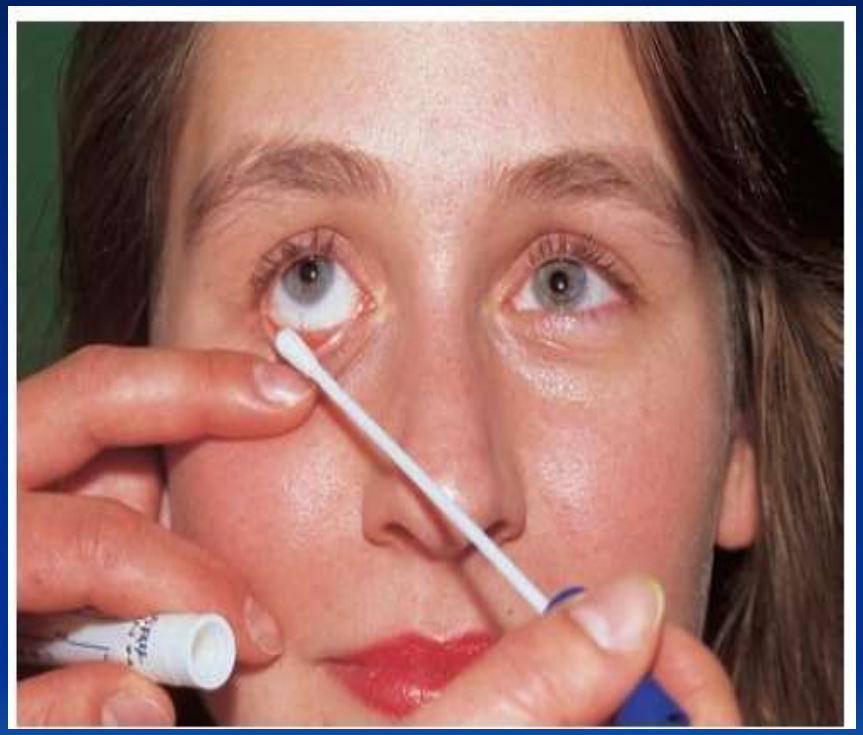


Conjunctival structure



- The conjunctiva is the mucous membrane that lines on the inner surface of the eyelids and the eyeball to the cornea.
- Structure:
- 1. The conjunctiva of the eyelids is formed by a multilayer cylindrical epithelium, in which there are goblet cells producing mucus. Contains lymphoid tissue and additional lacrimal glands.
- 2. The conjunctiva of the eyeball is formed by a stratified squamous non-keratinizing epithelium.

Examination of the onjunctiva



Classification of conjunctival diseases

- Dystrophy: pterygium, pingvikula.
- Inflammation:
- acute:
- a) exogenous conjunctivitis (viral, bacterial, fungal, parasitic), allergic;
- b) endogenous conjunctivitis (with general diseases, autoallergic);
- chronic: angular diplobacular conjunctivitis of Morax-Axenfeld, trachoma.
- Tumors: pigmented birthmarks, conjunctival gland cysts, hemangiomas, lipodermoids, epithelium, melanoma.

Common signs of conjunctivitis

- Swelling of the eyelids
- Conjunctival hyperemia
- Itching
- Lacrimation
- Foreign body feeling
- Photophobia
- Conjunctival discharge
- Acute beginning

Forms of conjunctival injection

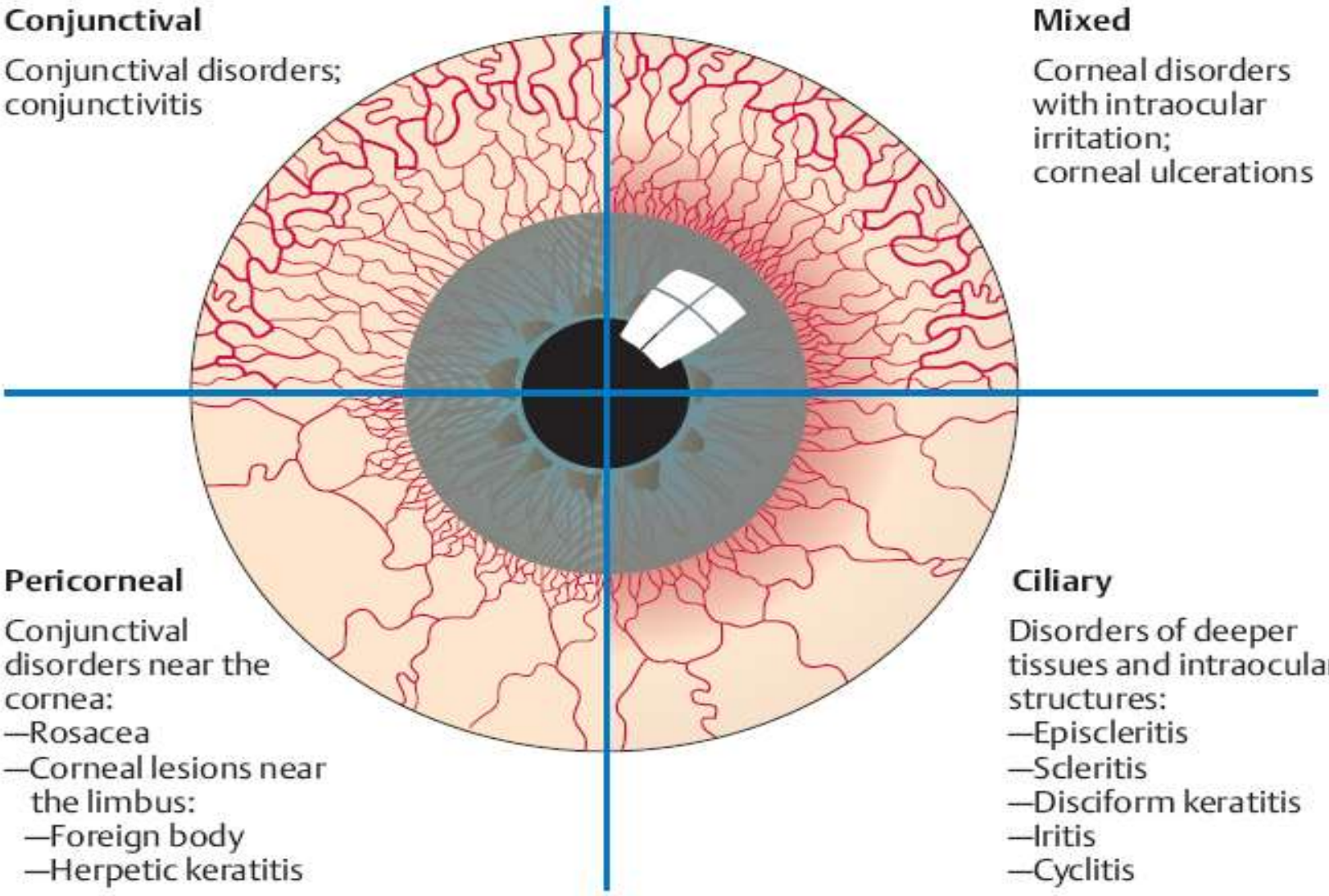
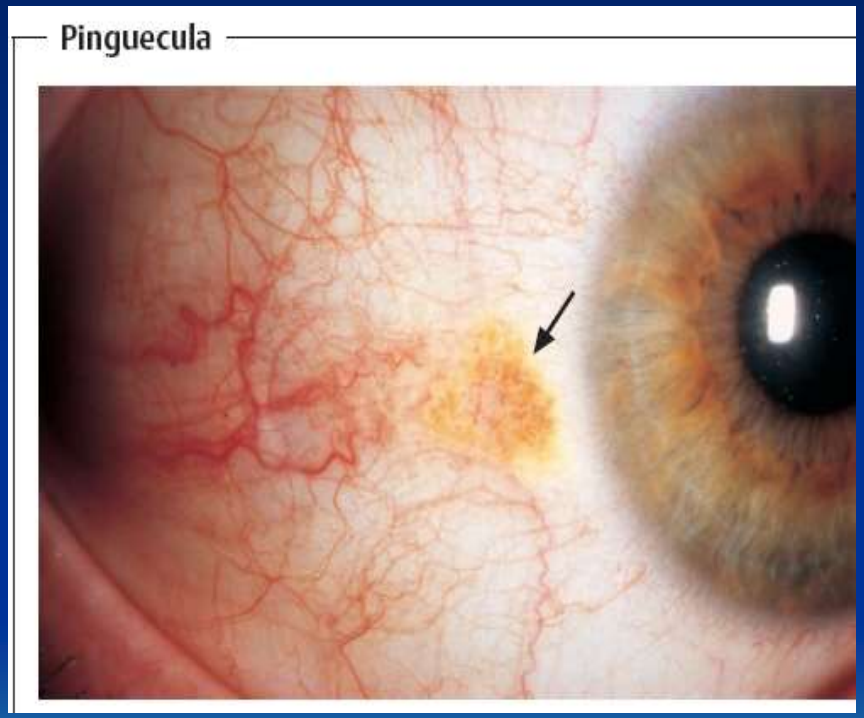


Fig. 4.6

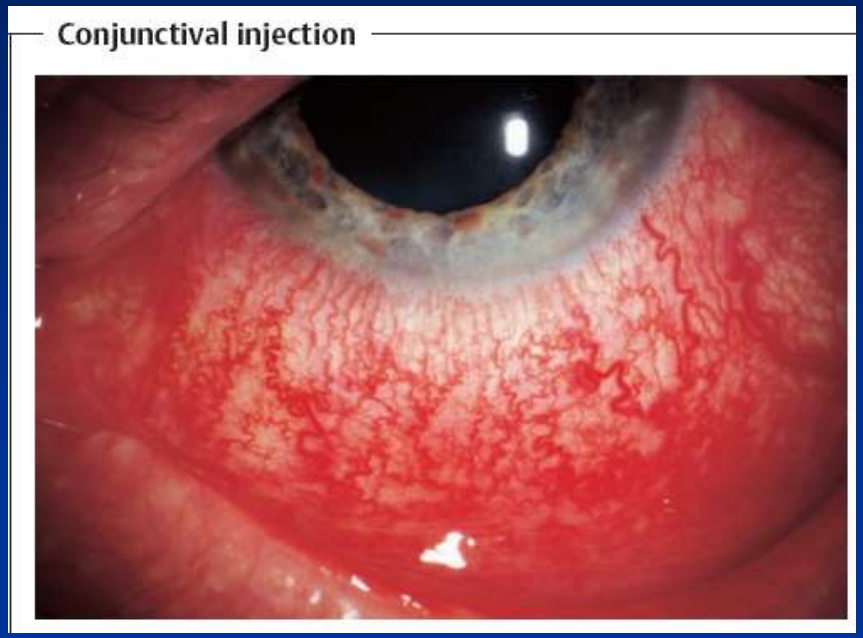
Dystrophic conjunctival disease



Conjunctival disease

- Subconjunctival hemorrhage
- Conjunctival chemosis

Bacterial conjunctivitis



- Profuse purulent discharge in the conjunctival cavity.

Viral conjunctivitis

The presence of follicles and pitechial hemorrhages
Mucosal serous discharge
Unilateral lesion
In case of adenovirus infection: rhinitis,
conjunctivitis, fever, bilateral damage

Allergic conjunctivitis

- Caused by various allergens
- The conjunctiva of the upper eyelid looks like a “cobblestone bridge”.
- Treatment: antihistamine drops cromohexal, apotanol topically.


Thank you for your attention
Please clap and don't ask difficult question