EDUCATIONAL-AND-PRACTICAL GUIDE IN OPHTHALMOLOGY

Perm
2023

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"Academician E.A. Vagner Perm State Medical University"
of the Ministry of Healthcare of the Russian Federation

EDUCATIONAL-AND-PRACTICAL GUIDE IN OPHTHALMOLOGY

Approved by
Central Coordination Methodological Council
of Academician E. A. Vagner Perm State Medical University
of the Ministry of Healthcare of the Russian Federation
as Manual for foreign students

Perm
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The publication presents methodological recommendations with illustrations and tests on all topics of the ophthalmology course for students studying in English.

The recommendations are intended for 5th-year students of the Faculty of Medicine.

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Федеральное государственное бюджетное
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имени академика Е.А. Вагнера»
Министерства здравоохранения Российской Федерации

УЧЕБНО-ПРАКТИЧЕСКОЕ РУКОВОДСТВО ПО ОФТАЛЬМОЛОГИИ

Утверждено
центральным координационным
методическим советом ФГБОУ ВО ПГМУ
им. академика Е.А. Вагнера Минздрава России
в качестве учебного пособия
для иностранных студентов

Пермь
2023

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В пособии представлены методологические рекомендации с иллюстрациями и тестами по всем темам курса офтальмологии для студентов, обучающихся на английском языке. Пособие предназначено для студентов 5-го курса лечебного факультета.

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CONTENTS

LESSON 1.
ANATOMY OF THE EYE AND ITS ADNEXA PHYSIOLOGY OF THE VISION

1. Topic: Anatomy of the eye and its adnexa. Physiology of the vision.

2. Academic value: The knowledge of the eye's anatomy and physiology gives an understanding of its pathology, helps to diagnose diseases properly.

3. Aim: Students should know the eye's anatomy and physiology, parts of the visual tract, functions of the adnexal structures and be able to use this knowledge in practice.

4. Questions to study and self-control:

1. The eyeball: its size, weight and layers.
2. External fibrous layer, its functions and anatomy. Specific features of the cornea: its nutrition and translucency.
3. Muscles: functions, innervation and sources of blood-supply.
4. The uveal tract and its parts. Specific features of blood-supply and innervation. Functions of the iris, the ciliary body and the choroid.
5. The retina – the peripheral part of the visual system. 3 neurons of the retina.
6. The visual tract: parts and their features.
7. Internal structures of the eyeball.
8. Chambers of eyeball, aqueous humor circulation and its role in intraocular pressure (IOP).
9. The lens: its anatomy and functions. Age-related changes.
10. The vitreous body and its role.

11. The orbit: wall and borders, their clinical significance. Specific features of the orbit's venous system.

12. Eyelids: anatomy, functions, blood-supply, innervation.

13. The conjuctiva: anatomy, functions, blood-supply, innervation.

14. The lacrimal system: anatomy, physiology, tear production and drainage.

Self-assessment Test

Choose only 1 answer

1. WHAT IS NOT THE PART OF THE LACRIMAL DRAINATIVE SYSTEM…

A. Puncta
B. Canaliculi
C. Lacrimal gland
D. Lacrimal sac
E. Nasolacrimal duct

2. THE ARTERIA OPHTHALMICA IS THE TERMINAL BRANCH OF …

A. Internal carotid artery
B. Lacrimal artery
C. One of the branches of the anterior ciliary artery
D. External carotid artery
E. One of the branches of the posterior long ciliary artery.

3. BLOOD SUPPLY TO THE IRIS IS PROVIDED BY…

A. Posterior short ciliary arteries
B. Posterior long ciliary arteries

C. Central retinal artery
D. External carotid artery
E. All listed

4. THE INFERIOR WALL OF THE ORBIT BORDERS WITH…
A. Maxillary sinus
B. Ethmoid sinus
C. Temporal fossa
D. All listed

5. A TEAR-PRODUCING APPARATUS OF THE EYE IS…
A. Lacrimal gland
B. Lacrimal sac
C. Tear duct
D. Tear points
E. Tear canaliculi

6. WHAT IS THE AVERAGE AXIAL LENGTH OF THE ADULT EYEBALL SPECIFIC WITH EMMETROPIA
A. 20 mm
B. 25 mm
C. 26 mm
D. 24 mm
E. 22 mm

7. WHICH PART OF THE EYEBALL IS SUPPLIED BY ANTERIOR CILIARY ARTERIES?
A. Conjunctiva, sclera
B. Cornea
C. Iris
D. Ciliary body
E. All listed

8. THE LATERAL WALL OF THE ORBIT BORDERS WITH…
A. Anterior cranial fossa
B. Maxillary sinus
C. Frontal sinus
D. Inferior temporal fossa and pterygopalatine fossa
E. All listed

9. THE SUPERIOR WALL OF THE ORBIT BORDERS WITH…
A. Anterior cranial fossa
B. Maxillary sinus

C. Frontal sinus
D. Inferior temporal fossa and pterygopalatine fossa
E. All listed

10. WHAT IS NOT A SPECIFIC FEATURE OF A NORMAL CORNEA?

A. Transparency
B. Sphericity
C. Specularity
D. The presence of vessels in the corneal tissue
E. High sensitivity

11. CHOOSE THE DIAMETER OF THE CORNEA OF AN ADULT…

A. 5 × 6 mm
B. 7 × 8 mm
C. 8 × 9 mm
D. 10 × 11 mm
E. 13 × 14 mm

12. WHICH PART OF THE RETINA HAS THE HIGHEST FUNCTIONAL ABILITY?

A. Optic nerve head
B. Central fossa
C. Periphery
D. Ora serrata
E. None of the above

13. WHAT PASSES THROUGH THE SUPERIOR ORBITAL FISSURE?

A. Oculomotor nerve
B. Abduction and block nerves
C. Ophthalmic nerve (1st branch of trigeminal nerve)
D. Superior ophthalmic vein
E. All listed

14. ABDUCTION IS PROVIDED WITH

A. External rectus muscle
B. Inferior oblique muscle
D. A + B + C
E. A + B

C. Superior oblique muscle

15. THE RETINA IS FORMED FROM…

A. Ectoderm
B. Neuroectoderm
C. Mesoderm
D. A and B are true

16. THE INNERVATION OF THE LACRIMAL GLAND IS PROVIDED BY…

A. Parasympathetic nervous system
B. Sympathetic nervous system
C. Mixed innervation
D. Somatic nervous system

17. LACRIMAL DUCT OPENS IN…

A. Lower nasal passage
B. Middle nasal passage
C. Upper nasal passage

18. NUTRITION OF THE CORNEA IS PROVIDED BY…

A. Regional looped vascular network
B. Central retinal artery
C. Lacrimal artery
D. All listed

19. THE OUTFLOW OF FLUID FROM THE ANTERIOR CHAMBER IS CARRIED OUT THROUGH…

A. Pupil area
B. Lens capsule
C. Trabecule zone
D. Lacrimal canaliculi

20. THE FUNCTION OF THE VASCULAR TRACT IS…

A. Trophic function
B. Light refraction function

C. Light perception function

Draw in your notebook

1. An eyeball in the sagittal plane.
2. Layers of a cornea.
3. Layers of a retina.
4. A fundus.
5. An anterior chamber's angle.

Textbooks and Supplementary Materials

Obligatory:

1. *R. Sihota, R. Tandon*. Parsons' Diseases of the Eye. 22nd ed. – Reed Elsevier India Private Limited. − 2015. – 641 p. (Section I Anatomy and Physiology).

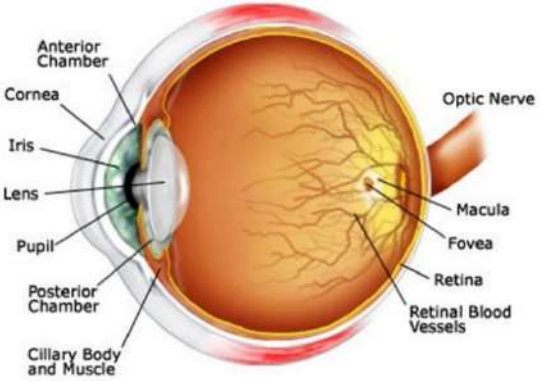
Additional:

1. American Academy of Ophthalmology, Lawrence M. Levine. 2018-2019 Basic and Clinical Science Course, Section 02: Fundamentals and Principles of Ophthalmology. – New York, 2018. − 243 p.

2. K. Rogers. The Eye: The Physiology of Human Perception (The Human Body). 1st ed. – Britannica Educational Publishing in association with Rosen Educational Services. − New York, 2010. – 252 p. Federal State Budgetary Educational Institution of Higher Education.

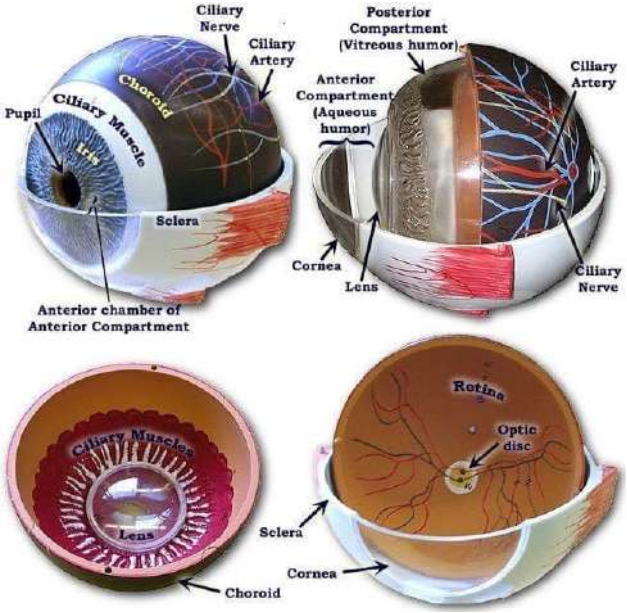
Illustrations to Lesson 1

Eyeball anatomy

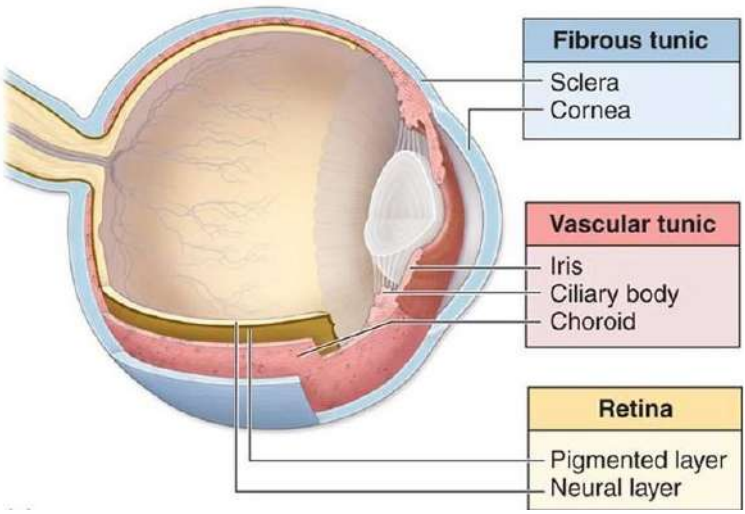


Weight ~ 7,5g
Length ~24,00mm

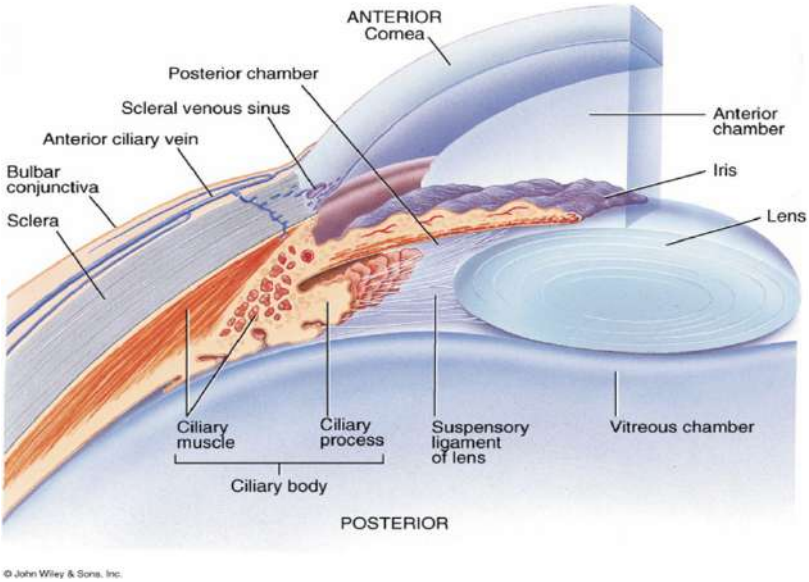
Volume ~ 6,5ml
Equator circumference ~ 75mm



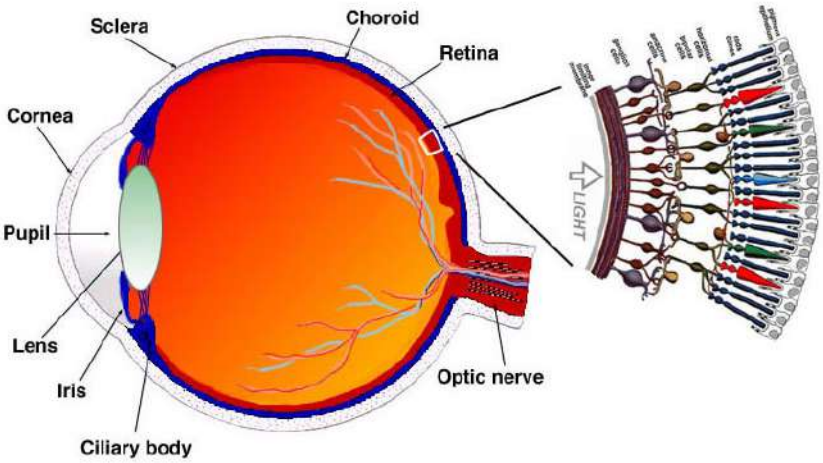
Eye Tunics



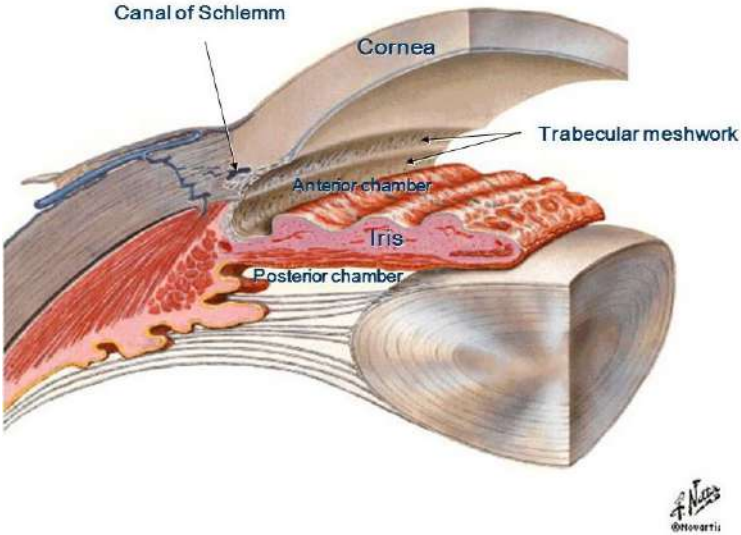
Detail view of the anterior anatomy of the eye



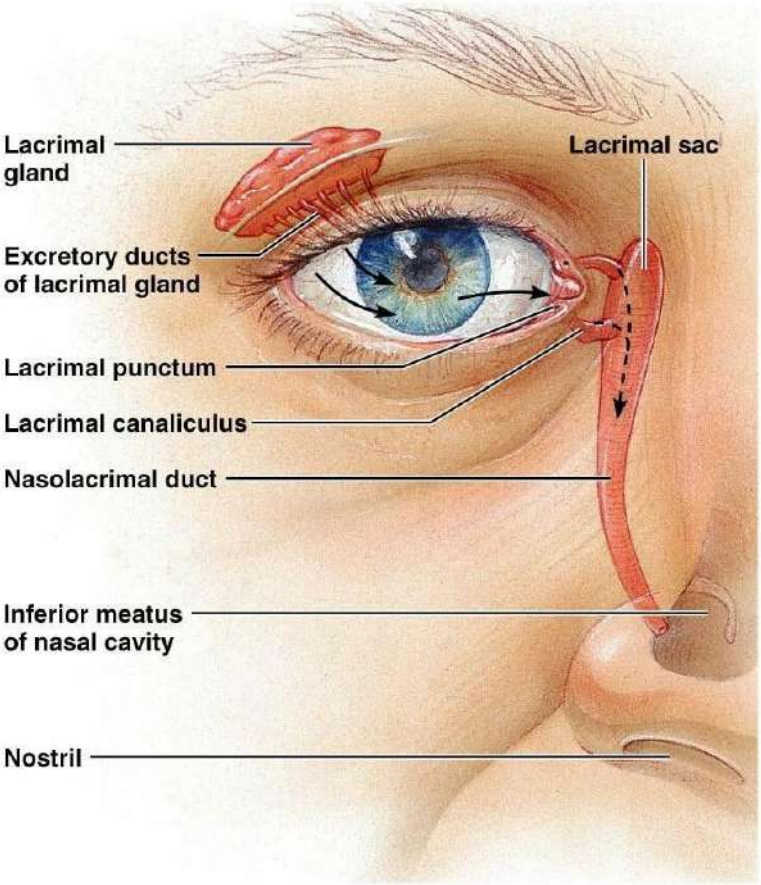
A drawing of a section through the human eye
with a schematic enlargement of the retina



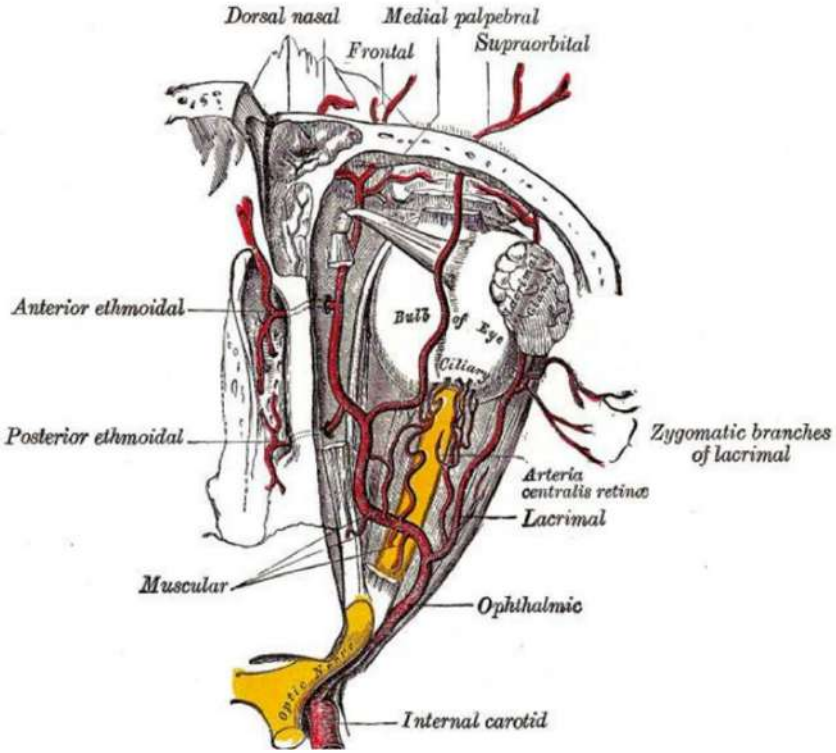
The angle of the eye anterior chamber



Lacrimal apparatus



Eyeball blood supply



LESSON 2.
VISUAL FUNCTIONS AND DIAGNOSTICS IN OPHTHALMOLOGY

1. Topic: Visual functions and diagnostics in ophthalmology.

2. Academic value: students should know the basic methods of examination in ophthalmology to determine pathological changes of the eyeball and its adnexal structures, to make the right diagnosis and to provide a proper treatment.

3. Aim:

Students should know the eye's anatomy and physiology, methods of the visual function's assessment and diagnostics of pathology, modern methods of examination in ophthalmology.

Students should be able to assess visual functions by themselves, to perform the ophthalmoscopy (direct and indirect) and biomicroscopy.

4. Questions to study and self-control:

1. The normal condition of the eyelids: position, movements, eyelashes, meibomian glands' condition, the palpebral fissure width.

2. How to assess the lacrimal system: Schirmer test, fluorescein disappearance test, Jones dye testing (primary and secondary), lacrimal irrigation, dacryocystography.

3. Specific features of the normal conjunctiva. The examination of the superior palpebral and the forniceal conjunctiva.

4. The difference between the conjunctival and the ciliary injection.

5. The slit lamp biomicroscopy of the anterior segment: the purpose and the technique.

6. Specific features of the normal cornea and the iris, shape, diameter, pupils' size and reactions to the light. How to assess the sensitivity of the cornea and the integrity of its epithelium (Fluorescein test).

7. Gonioscopy. What disease requires this investigation to be done obligatorily?

8. The technique of retroillumination from the fundus. Specific features of the normal lens and the vitreum. How to detect their pathology.

9. Ophthalmoscopy. The difference between the direct and the indirect technique. Specific features of the optic nerve head: shape, colour, boundaries. The normal arteriovenous ratio. The macula and its location.

10. Diaphanoscopy. What disease requires this investigation to be done obligatorily?

11. Pupils' reactions and their examination.

12. The assessment of the extraocular muscles' function.

13. Tonometry: its purpose and different methods.

14. The functions of different photoreceptor's types: central, peripheral, colour, mesopic vision, light perception.

15. The definition of the visual acuity. What formula could be used?

16. Subjective and objective methods of the visual acuity's investigation.

17. The peripheral vision, the visual field and its boundaries.

18. Perimetry (visual field testing): approximate method, perimetry, campimetry. The Amsler grid. The visual field's defects. Types of scotomas.

19. Types of hemianopsias and their meaning in the topical diagnostics of the visual tract's pathology.

20. What diseases manifest with visual field's defects?

21. Theories of the colour vision: Young-Helmholtz-Lomonosov theory.

22. Colour vision tests.

23. Congenital disorders of the colour vision (abnormal trichromasia, dichromasia, monochromasia, achromasia). Acquired disorders of the colour vision.

24. Dark adaptation, its assessment and disorders.

Self-assessment Test

Choose only 1 answer

1. VISUAL ACUITY IS…
   A. The ability of the eye to distinguish colors and shades clearly
   B. The ability of the eye to distinguish the objects in the center and on the periphery clearly
   C. The ability of the eye to perceive the space separately the 2 points located from each other at a minimum distance
   D. The ability to perceive the space by a motionless eye

2. WHAT VISUAL ACUITY DOES THE PATIENT HAVE IF HE COUNTS HIS FINGERS AT A DISTANCE OF 3 METERS?
   A. 0,2
   B. 0,3
   C. 0,06
   D. 0,01
   E. 0,6

3. THE NORMAL COLOR PERCEPTION IS CALLED…

A. Normal trichromasia
B. Abnormal trichromasia
C. Dichromasia
D. Monochromasia

4. DISORDER OF LIGHT PERCEPTION IS…

A. Diplopia
B. Hemianopsia
C. Night blindness

5. THE CONDITIONS NECESSARY FOR BINOCULAR VISION ARE…

A. Visual Acuity of the worse-seeing eye not less than 0.4
B. Correct eye position in orbit
C. Equal refraction of two eyes (anisometropia)
D. Preservation of neuromuscular apparatus of both eyes
E. Fusion reflex
F. All listed

6. THE FUNCTION OF LIGHT PERCEPTION IS PROVIDED BY…

A. Layer of bipolar cells
B. Layer of nerve cells
C. Cones
D. Rods

7. THE EXAMINATION OF THE FIELD OF VISION CAN BE CARRIED OUT BY THE FOLLOWING METHODS, EXCEPT…

A. Perimetry
B. The visual acuity testing
C. Campimetry
D. Control Donder's method

8. THE TERM "FIELD OF VIEW" MEANS…

A. Space perceived by the fixed eye
B. Nearest part of space
C. Remote part of the space
D. Space perceived by the moving eye

9. PERIPHERAL VISION PROVIDES…

A. Definition of the form and value of objects
B. Color perception of objects
C. High Central vision
D. Orientation in space

10. NORMALLY, THE MINIMUM ANGLE OF VIEW IS…

A. 1 second
B. 1 minute
C. 1 degree
D. 5 minutes

11. FORMULA OF SNELLEN FOR VISUAL ACUITY DETERMINATION IS…

A. Visus = d/D
B. Visus = D/d
C. Visus = dxD
D. Visus = D–d

12. SCOTOMA IS…

A. The area of loss of the field of view, not related to its boundaries
B. Peripheral part of the field of view
C. Loss of a half of the field of view
D. Loss of a quarter of the field of view
E. Narrowing the boundaries of vision

13. CONES PROVIDE…

A. Peripheral vision, light perception
B. Adaptation to light
C. Central vision, color perception
D. Binocular vision

14. THE CAUSES OF SYMPTOMATIC NIGHT BLINDNESS ARE…

A. Refractive errors
B. Haze refractive (optical) environments
C. Retinal diseases
D. Amblyopia

15. VISUAL ACUITY IS MEASURED IN…

A. Relative units
B. Diopters
C. Millimeters
D. Degree

16. THE CAUSES OF FUNCTIONAL NIGHT BLINDNESS ARE…

A. Obesity
B. Arterial hypertension
C. Arterial hypotension
D. Vitamin A metabolism disorders

17. THE FUNCTION OF LIGHT PERCEPTION IS THE ABILITY OF THE EYE…

A. To distinguish light of different wave lengths
B. To distinguish the shape and details of objects
C. To perceive the light of different brightness
D. All listed

18. BINOCULAR VISION IS…

A. Vision with two eyes
B. Vision with two eyes with fusion of images into a single image
C. Near vision
D. Distant vision
E. Same-time vision of both eyes

19. THE VISUAL FUNCTIONS OF THE EYE ARE…

A. Central vision
B. Peripheral vision
C. Light and color perception
D. Binocular, stereoscopic vision
E. All listed

20. THE COLOR OF THE NARROWEST VISUAL FIELD BORDER IS…

A. Green
B. Blue
C. Red
D. White

21. ACCORDING TO THE HELMHOLTZ' THEORY OF COLOR PERCEPTION THE RETINA HAS THREE COLOR RECEPTORS…

A. Orange, green, blue
B. Green, yellow, red
C. Blue, orange, green
D. Red, green, blue

Write down in your notebook

All methods of examination in ophthalmology.

Textbooks and Supplementary Materials

Obligatory:

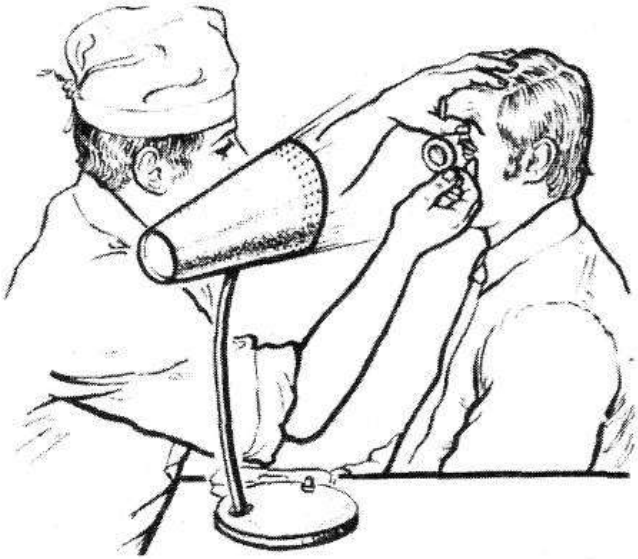
1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited. – 2015. – 641 p. (Section III Ocular Examination Techniques).

Additional

1. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited. – 2020. – 917 p. (Chapter 1 Examination Techniques).

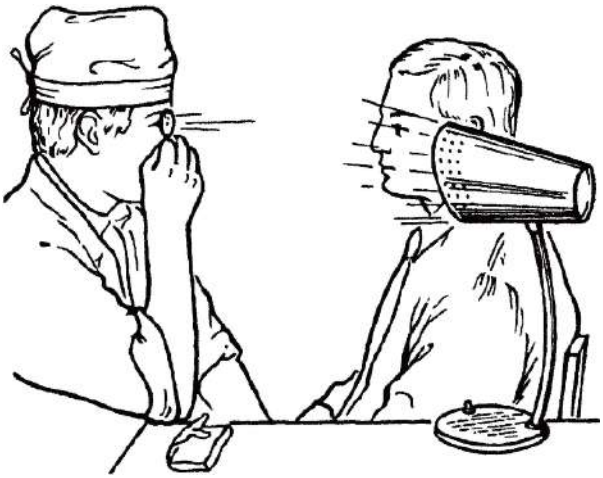
2. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 1 The Eye Examination).

Illustrations to Lesson 2



Method of lateral (focal) examination is used to study the anterior part of the eye.

The study is carried out in a dark room using a table lamp installed to the left and in the front of the patient at a distance of 40-50 cm at the level of the face. A magnifying glass with the power of 13.0 or of 20.0 diopters is also used for ophthalmic inspection.



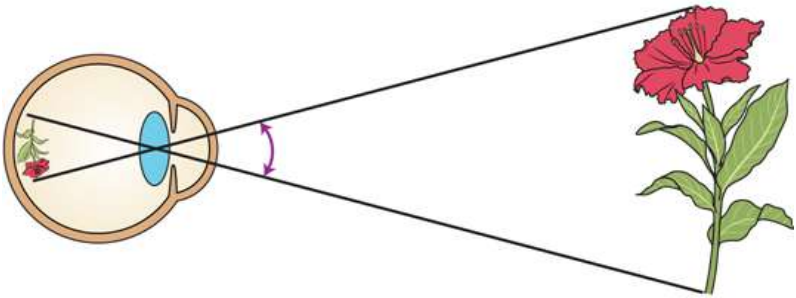
Transmitted light inspection method is applied for the inspection of optically transparent environments of the eyeball (cornea, anterior chamber moisture, lens, vitreous).

Required: lamp, ophthalmoscope.

Five visual functions

1. Central vision
2. Color vision
3. Peripheral vision
4. Twilight vision
5. Binocular vision

Central vision

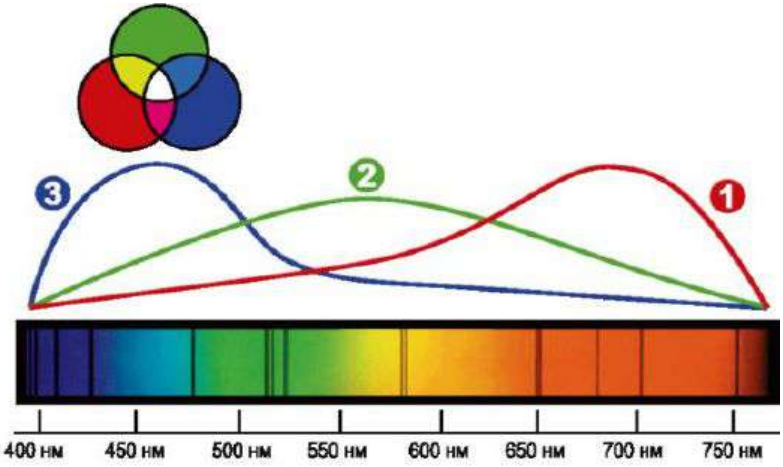


Central vision is characterized by the concept of "visual acuity" (visus) – the ability of the eye to distinguish two points separately with a minimum distance between them. Visual acuity is measured by the angle formed by the rays coming from these points. The smaller the angle, the higher the visual acuity.

In Russia the vision scale normal acuity is marked by «1.0».

Visus OD = 1.0

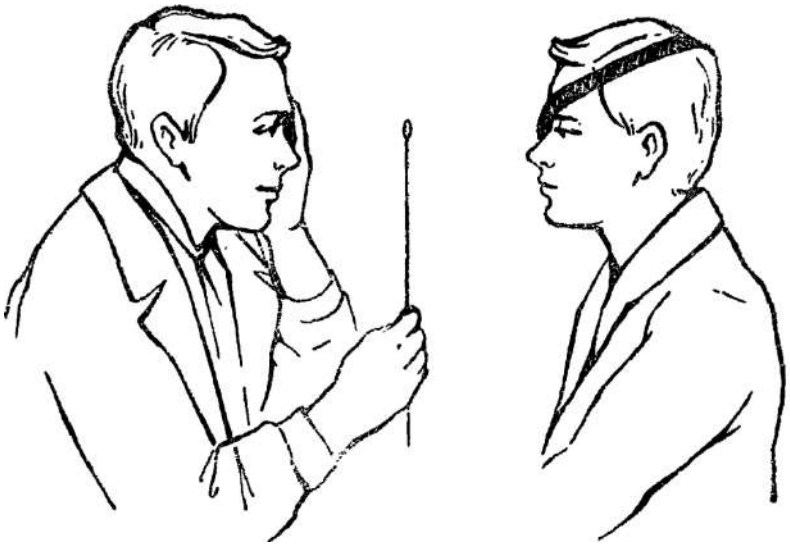
Color vision



Color perception is the ability of the eye to distinguish colors.

Color perception is a function of the cone apparatus of the retina and associated nerve centers. The human eye perceives colors with wavelengths ranging from 380 to 800 nm.

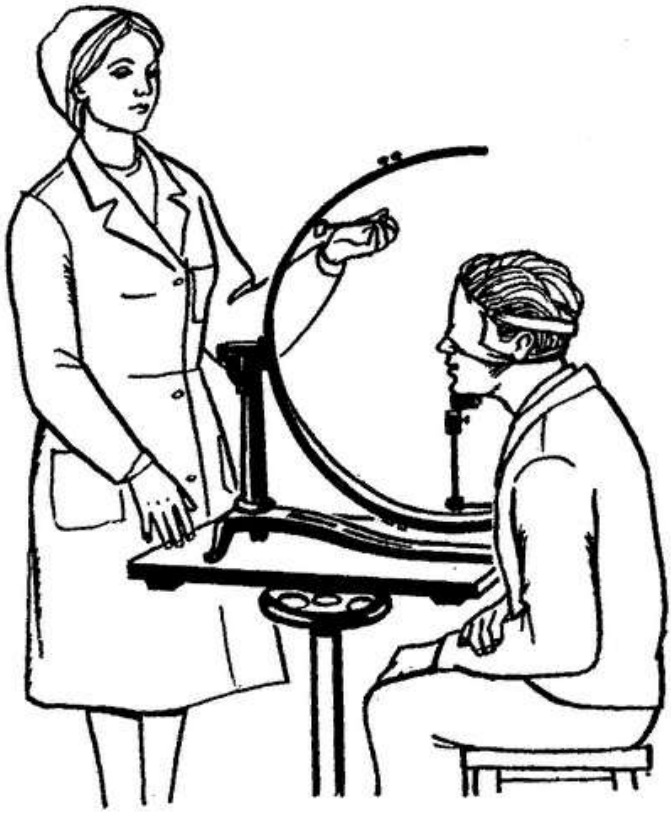
Peripheral vision



Indicative method (by Donders)

The patient is placed with his back to the light, the doctor sits opposite him at a distance of 1 m. The patient closes his eye with his palm, and the doctor closes his one, opposite to the closed eye of the patient.

The patient looks strait at the eye of the doctor and notes the moment of appearance of a pen, finger or other object, which the doctor smoothly moves from the periphery to the center from different sides at the same distance between himself and the patient. The doctor compares the patient's statement with his own normal field vision. In this way the doctor can identify the presence of gross defects.



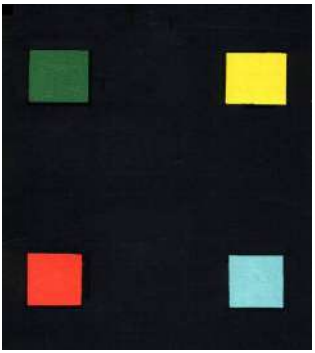
Technique of the perimetry of the Förster

The perimeter of the Förster is a black arc that can be shifted in different meridians. The head of the subject is placed on a stand in such a way that the examined eye is in the center of the arc, the second eye is covered with a bandage. During the entire study the examinee should fix the mark in the center of the device. The doctor moves white or colored marks along an arc in various meridians from the periphery to the center, determining the boundaries of their detection, i.e. the boundaries of the field of vision.

Twilight vision

Kravkov-Purkinje table test

In a darkened room, the Purkinje table is shown to the patient at a distance of 40–50 cm from his eye. Normally, after 30–40 sec., the subject distinguishes between yellow and then blue squares. In violation of color perception, instead of a yellow square, the patient sees a bright spot, and the blue square is not detected at all.



Adaptometer study is used to quantify light sensitivity accurately. The study begins with a preliminary light adaptation to a certain level of illumination. Adaptation lasts 10 minutes and creates an identical zero level for all subjects. Then the light is turned off and at intervals of 5 minutes on the frosted glass, located in front of the eyes of the subject, you should illuminate only the control object (circle, cross, square). The illumination of a particular object is increased until it is seen by the subject. With a 5-minute interval, the examination lasts 50–60 minutes. As the subject adapts, he begins to distinguish the control object at a lower light level. The results of the study are presented in a graph.

LESSON 3.
REFRACTION AND ACCOMMODATION. REFRACTIVE ERRORS

1. Topic: Eye's refraction and its errors, accommodation, presbyopia, modern methods of correction.

2. Academic value:

The knowledge of the physiological optics, refraction errors, their diagnostics and correction is essential for every ophthalmologist.

3. Aim:

Student should know the basics of the eye's optics, the definition of the refraction, the refractive status and the accommodation.

Student should be able to evaluate the refractive status, the accommodation and its amplitude, to choose the proper correction for ametropias and presbyopia.

4. Questions to study and self-control:

1. The refractive power of the eye's optic system.
2. The refractive status and its age-related changes.
3. Refractive errors, the connection between punctum remotum and the position of the principal focus concerning the retinal plane; axial and refractive (convergence) ametropias.
4. The evaluating of the refractive status: a subjective method with a set of lenses, retinoscopy, refractometry.
5. Lenses: types and specific features of corrective lenses.
6. Basic rules for the optical correction in myopia, hyperopia, anisometropia.

7. Alternative methods of correction: contact lenses, refractive surgery.

8. Clinical features of refractive errors. Theories about myopia's progression.

9. Pathologic myopia (myopic degeneration).

10. The definition of astigmatism, its types and correction.

11. Accommodation. The mechanism of accommodation. Age-related changes of accommodation.

12. Presbyopia and its correction.

13. Why is the full optical correction with spectacles contraindicated in high anisometropia?

14. How does the refractive status change after the extraction of the lens?

Self-assessment Test

Choose only 1 answer

1. IN WHAT REFRACTION ARE PARALLEL RAYS OF LIGHT FROM A DISTANT OBJECT BROUGHT TO THE FOCUS ON THE RETINA

A. Emmetropia
B. Myopia
C. Hyperopia
D. Astigmatism

2. WRITE A DEFINITION OF ACCOMMODATION …

3. CHOOSE THE RIGHT DEFINITION OF A CLINICAL REFRACTION…

A. The refractive power of the whole optic system
B. A position of the principal focus concerning the retina
C. A refractive error
D. A method of ametropia's correction

4. CHOOSE THE AVERAGE AXIAL LENGTH OF THE ADULT'S EMMETROPIC EYE…

A. 40 mm
C. 12 mm
B. 24 mm
D. 28 mm

5. CHOOSE THE RIGHT DEFINITION OF ANISO-METROPIA…

A. A difference in refractive errors in both eyes
B. An absence of emmetropia
C. An unequal curvature along the two principal meridians of the cornea
D. None of the above

6. CONVERGING LENSES ARE USED IN…

A. Hyperopia
C. Presbyopia
B. Myopia
D. A and C are correct

7. A PATIENT 40 Y.O. WITH EMMETROPIA REQUIRES SPECTACLES WITH…

A. +3,0 D lenses
C. +4,0 D lenses
B. +1,0 D lenses
D. None of the above

8. CHOOSE THE RIGHT DEFINITION OF PRESBYOPIA…

A. Functional loss of accommodation with aging
B. Type of ametropia
C. Myopia with degenerative changes
D. Spasm of accommodation

9. THE FAR POINT (PUNCTUM REMOTUM) IS…

A. The maximum distance from the eye for which a clear image of an object can be seen
B. The minimum distance for a clear image during the maximum power of accommodation
C. A range of accommodation
D. The distance from the near point to the far point

10. AN ACCOMMODATIVE ASTENOPIA USUALLY APPEARS IN…

A. Presbyopia
B. Myopia
C. Hyperopia
D. Emmetropia
E. All listed

11. THE CHOICE OF THE PRESBYOPIA CORRECTIVE LENS DEPENDS ON…

A. Age
B. Clinical refraction
C. A and B are correct
D. Visual acuity

12. WHAT STRUCTURE HAS THE HIGHEST REFRACTIVE POWER?

A. Lens
B. Cornea
C. Vitreous body
D. Retina

13. CHOOSE THE RIGHT DEFINITION OF ASTIGMATISM…

A. An optical condition of the eye in which light rays from a point source on the eye's visual axis do not focus to a single point
B. Visual acuity differences between the two eyes
C. A disparity in the size of the retinal images formed in both eyes
D. A difference in refractive errors in both eyes of a patient

14. IN HYPEROPIA…

A. The eye doesn't possess enough optical power for its axial length
B. The eye possesses too much optical power for its axial length
C. Light rays focus in front of the retina
D. Light rays focus behind the retina
E. A and D are correct
F. B and C are correct

15. WRITE TWO RECIPES FOR SPECTACLES

A patient with myopia –2,0 D.
A patient with hyperopia +3,0 D.

16. MIXED ASTIGMATISM REQUIRES SPECTACLES WITH…

A. Spherical lenses
B. Cylindrical lenses
C. Spherocylindrical lenses
D. Prismatic lenses

17. IN MYOPIA (NEARSIGHTEDNESS) THE PARALLEL RAYS COMING FROM INFINITY INTERSECT…

A. Behind the retinal plane
B. In front of the retinal plane
C. On the retinal plane
D. None of the above

18. SIMPLE ASTIGMATISM REQUIRES SPECTACLES WITH…

A. Spherical lenses
B. Cylindrical lenses
C. Spherocylindrical lenses
D. Prismatic lenses

19. IN MYOPIA VISUAL ACUITY DECREASES…

A. At long distances
B. At short distances
C. At long and short distances
D. Rapidly

20. THE SIGNS OF MYOPIC DISEASE ARE…

A. Myopic staphyloma
B. The albinotic fundus with few choroidal vessels
C. Fuchs spot in macula
D. Filiform and flaky opacities in the vitreous body
E. All listed

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. 22nd ed. Reed Elsevier India Private Limited, 2015. – 641 p. (Section II Ophthalmic Optics and Refraction).

Additional:

1. Scott E. Brodie American Academy of Ophthalmology. 2018-2019 Basic and Clinical Science Course, Section 03: Clinical Optics. − New York, 2018. – 240 p.

2. American Academy of Ophthalmology, M. Bowes Hamil. 2018-2019 Basic and Clinical Science Course, Section 13: Refractive Surgery. – New York, 2018. – 129 p.

3. Myron Yanoff, Jay S. Duker. Ophthalmology. 5th ed. – Elsevier, 2018. – 1671 p. (Part 2 Optics and Refraction, Part 3 Refractive Surgery).

4. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. − Oxford University Press, USA, 2018. – 1249 p. (Chapter 19 Refractive ophthalmology).

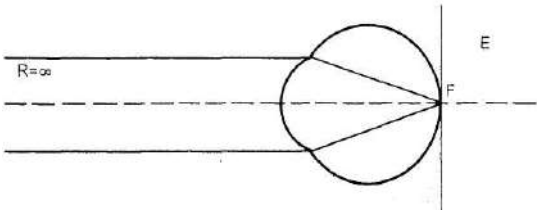
Illustrations to Lesson 3

Physical refraction is the refractive power of the optic system

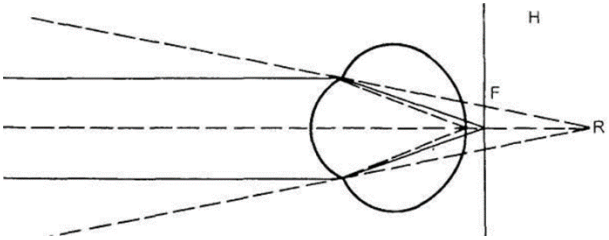
R newborn ~ 80D	R adult ~ 60D
Cornea ~ 42–43D	Cornea ~ 40D
Lens ~ 35–36D	Lens ~ 18–19D
Aqueous humor,	Aqueous humor,
Vitreous body ~ 1–2D	Vitreous body ~ 1–2D

Refractive states of the eyes

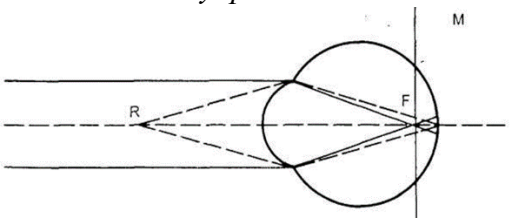
Emmetropia



Hyperopia

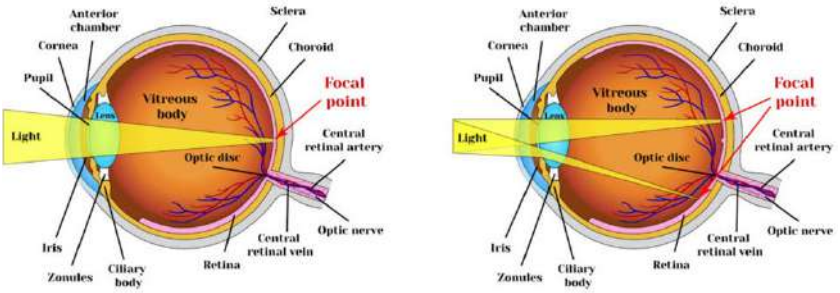


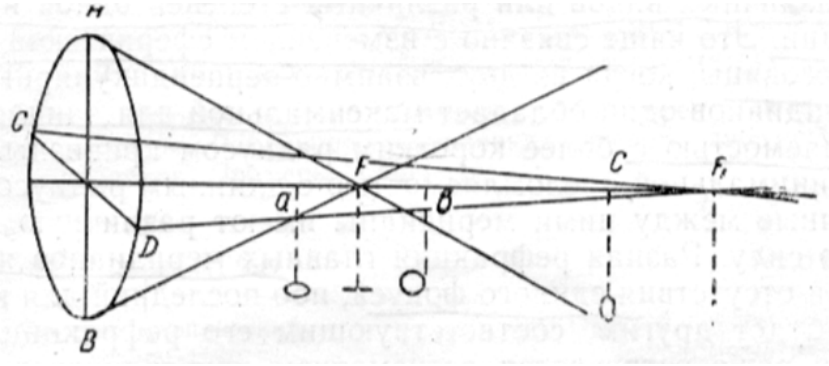
Myopia



Astigmatism – optical system is not spherical

Emmetropia *Astigmatism*



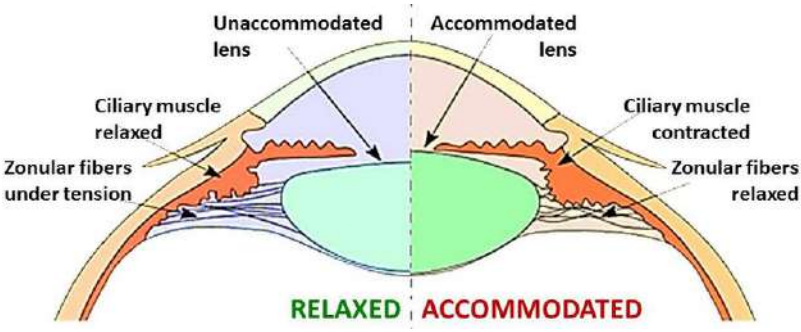


Light rays in astigmatic optic system (Sturm's conoid)

Anisometropia – different refractive errors in the 2 eyes of a patient.

Aniseikonia – disparity in the size of the retinal images formed in the 2 eyes of a patient.

Mechanism of the accommodation



Distant focus Near focus
Relaxed accommodation Strained accomodation

LESSON 4.
BINOCULAR VISION STRABISMUS

1. Topic: Binocular vision. Strabismus.

2. Academic value: The knowledge of strabismus' reasons, its diagnostics and treatment is essential for every ophthalmologist.

3. Aim: Student should know how to assess the binocular vision and its disorders, reasons and diagnostics of paralytic and non-paralytic strabismus, treatment options for strabismus and its common complication – amblyopia.

4. Questions (Topics) to study and self-control:

1. Binocular vision. What does the binocular vision require?

2. Tests for the binocular vision and the stereopsis: the Worth four-dot test, Bagolini striated glasses, the base-out prism test, the Titmus test, synoptophore.

3. The causes of paralytic and non-paralytic strabismus.

4. The differential diagnosis of paralytic and non-paralytic strabismus.

5. The diagnostics and treatment options for non-paralytic strabismus. Basic treatment principles of partially accommodative and fully accommodative strabismus.

6. A surgical treatment of strabismus: weakening and strengthening procedures.

7. Amblyopia: classification, treatment options (occlusion, penalization).

Self-assessment Test

Choose only 1 answer

1. BINOCULAR VISION IS
   A. Vision with two eyes
   B. Two eyes vision with fusion of images into a single image (fusion)
   C. Near vision
   D. Distant vision
   E. Sum of images of both eyes

2. CONDITIONS NECESSARY FOR BINOCULAR VISION ARE…
   A. High visual acuity of both eyes
   B. Correct eye position in orbit
   C. Equal refraction of two eyes (anisometropia)
   D. Preservation of neuromuscular apparatus of both eyes
   E. Fusion reflex
   F. All listed

Write down in your notebook

A table on the differential diagnosis between comitant and paralytic strabismus.

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section V Disorders of Motility).

2. Scott R. Lambert, Christopher J. Lyons. Taylor and Hoyt's Pediatric Ophthalmology and Strabismus. – 5th ed. – Elsevier, 2016. – 1181 p.

Additional:

1. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 2 Optics and Refraction, Part 11 Pediatric and Adult Strabismus).

2. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 18 Strabismus).

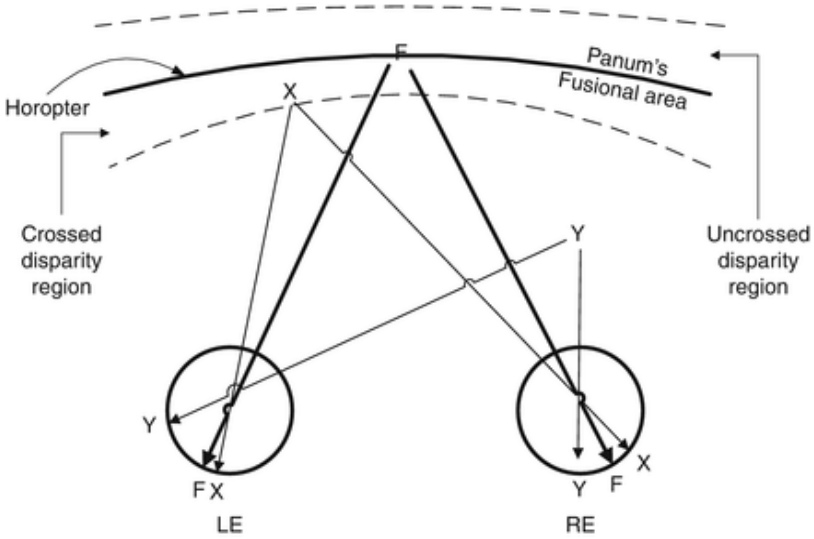
3. American Academy of Ophthalmology, Robert W. Hered. 2018-2019 Basic and Clinical Science Course, Section 06: Pediatric Ophthalmology and Strabismus. – NY, 2018. – 298 p.

4. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 6 Amblyopia and Strabismus).

5. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 17 Strabismus).

Illustrations to Lesson 4

Mechanism of binocular vision



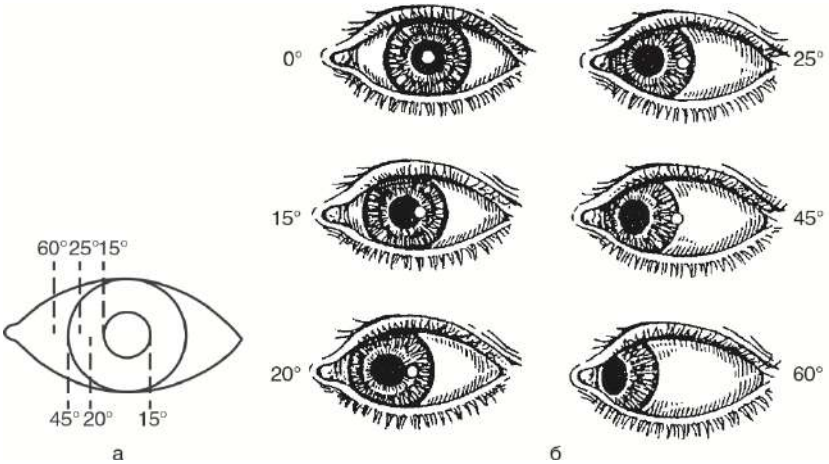
• Corresponding points – central fossa of the retina of both eyes and retinal points symmetrically located in relation to the central fossa.

• Stereoscopic vision of the subject is the main qualitative characteristic feature of binocular vision that allows to determine its place in space, to see in relief, depth and volume.

Images of the outside world are perceived by three-dimensional.

FUSIA – psychophysiological act of fusion in the monocular cerebral cortex images in one.

Determination of the angle of strabismus by Girshberg



• The primary angle is the deflection angle of the squinting eye.
• Secondary angle – non-beaming eye.

LESSON 5.
PATHOLOGY OF EYELIDS, CONJUNCTIVA AND LACRIMAL APPARATUS

1. Topic: Diseases of eyelids, conjunctiva and lacrimal apparatus.

2. Academic value:

The knowledge of diagnostics and clinical features of adnexal structures', its differential diagnosis is essential for every ophthalmologist.

3. Aim:

Student should know clinical features, early diagnostics, basic treatment principles of the most common diseases of the eyelids, the conjunctiva and the lacrimal apparatus.

Student should be able to evaluate the adnexal structures' condition, to perform primary and secondary Jones dye testing and to understand the results of dacryocystography.

4. Questions to study and self-control:

1. The anatomy of the eyelids and the conjunctiva. Anatomical features of the lacrimal apparatus: the production and the drainage system.

2. Congenital malformations of the eyelids, the conjunctiva and the lacrimal apparatus.

3. Functions of the eyelids.

4. Differences between an inflammatory and non-inflammatory edema of the eyelids.

5. The differential diagnosis of chalazion and hordeolum.

6. Probable complications in case of the wrong treatment of hordeolum.

7. Blepharitis: classification, etiology, differential diagnosis, treatment.

8. The connection between the eyelids' pathology and the coexisting somatic pathology.

9. Trachoma: clinical features, WHO grading system, management.

10. Main clinical features of conjunctivitis.

11. Clinical features and the differential diagnosis of different types of conjunctivitis (gonorrheal, diphtherial, bacterial, allergic, viral).

12. Differential diagnosis of benign (hemangioma, dermoid, nevus) and malignant (melanoma) tumours of the conjunctiva.

13. The causes of a watering eye.

14. The differential diagnosis of dacryoadenitis and tumours of the lacrimal gland.

15. Clinical features of acute and chronic dacryocystitis.

Self-assessment Test

Choose only 1 answer

1. INDICATIONS NECESSARY FOR STY HOSPITALIZATION ARE…

A. Increase of body temperature
B. Multiple styes
C. Transition of inflammation to the neighboring parts of the eyelid
D. Abscess or phlegmon of eyelid
E. All listed

2. HORNER'S SYNDROME INCLUDES…

A. Ptosis, Miosis, Enopthalmos
B. Mydriasis, Exopthalmos
C. Ptosis, Mydriasis, Enopthalmos
D. None of the above

3. ANKYLOBLEPHARON IS…

A. Eyelid shortening, inability to close palpebral fissure
B. Partial or complete fusion of the eyelids
C. Absence of eyelids and palpebral fissure
D. Narrowing and shortening of palpebral fissure

4. WHAT ARE NOT THE SYMPTOMS OF STY (EXTERNAL HORDEOLUM)?

A. Painful palpation in the area of inflammation
B. Painless tight and elastic nodule
C. Local hyperemia in the area of hair follicle
D. Purulent rod formation

5. WHAT DISCHARGE IS PRESENT IN BACTERIAL CONJUNCTIVITIS?

A. Purulent yellow-green
B. Serous
C. Watery
D. None of the above

6. PINGUECULA IS…

A. Ptosis of upper eyelids
B. Skin fold of the upper eyelid that covers the medial canthus
C. Yellowish lesions of the conjunctiva, that never impinge on the cornea
D. Dense neoplasm

7. EPICANTHUS IS …

A. Ptosis of upper eyelids
B. Skin fold of the upper eyelid that covers the medial canthus
C. Yellowish lesions of the conjunctiva, that never impinge on the cornea
D. Dense neoplasm

8. DACRYOCYSTITIS IS AN INFLAMMATION OF…

A. Lacrimal gland
B. Lacrimal suc
C. Lacrimal punctum
D. Lacrimal duct

9. WHAT NERVE INNERVATES THE ORBICULAR MUSCLE OF THE EYE (M. ORBICULARIS OCULI)?

A. N.Facialis
B. N.Nasociliaris
C. N.Opticus
D. N.Oculomotorius

10. ACCORDING TO ETIOLOGY BLEPHARITIS IS CLASSIFIED AS…

A. Infectious
B. Allergic
C. Seborrheic
D. Parasitogenic
E. All listed

11. THE PERFECT WAY TO TREAT BLEPHARITIS SUCCESSFULLY IS…

A. Determine the etiology of the disease
B. Systematic, regular treatment
C. Correction of ametropia
D. Rational nutrition
E. All listed

12. MALIGNANT NEOPLASM REFERS TO…

A. Dermoid cyst (mature cystic teratoma)
B. Adenocarcinoma of the meibomian gland
C. Adenoma of the meibomian gland
D. Capillary haemangioma
E. Melanocytic naevus
F. All listed

13. BLOOD SUPPLY FOR THE CONJUNCTIVA IS PROVIDED BY…

A. Posterior short ciliary arteries
B. Posterior long ciliary arteries
C. Anterior ciliary arteries
D. Arches of the palpebral arteries
E. B and D are correct
F. C and D are correct

14. WHAT NERVE INNERVATES THE MUSCLE ELEVATING UPPER EYELIDS (M. LEVATOR PALPEBRAE SUPERIOR)?

A. N. Facialis
B. N. Nasociliaris
C. N. Opticus
D. N. Oculomotorius
E. N. Trigeminus

15. SEBACEOUS AND PERSPIRATORY GLANDS ARE LOCATED…

A. Within the tarsus
B. On the edge of eyelids
C. In the lower transition fold
D. In the upper transition fold

16. WHAT LYMPH NODE MAKES THE LYMPH TUBES OF UPPER EYELIDS FLOW INTO?

A. Auriculares anteriores
B. Submandibulares
C. Occipital
D. Cervical

17. CHALAZION IS…

A. Acute abscess within a meibomian gland
B. Chronic lipogranulomatous inflammation of blocked meibomian glands
C. Acute abscess within lash follicle and its associated glands of Moll or Zeis
D. Deposition of lipids within perivascular xanthoid cells

18. WHAT NERVE PERFORMS MOTOR INNERVATION FOR THE EYEBALL'S MOVEMENTS?

A. N. Facialis
B. N. Nasociliaris
C. N. Opticus
D. N. Oculomotorius

19. TARSAL GLANDS (MEIBOMIAN GLANDS) ARE LOCATED…

A. Within the tarsus
B. In the lacrimal gland
C. In the lower transition fold
D. In the upper transition fold

20. WHAT IS NOT THE PART OF THE LACRIMAL DRAINATIVE SYSTEM?

A. The puncta
B. The canaliculi
C. The lacrimal gland
D. The lacrimal sac
E. The nasolacrimal duct

Textbooks and Supplementary Materials

Obligatory:

1. Ramanjit Sihota, Radhika Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV Diseases of the Conjunctiva, Section VI Diseases of the Adnexa).

Additional:

1. American Academy of Ophthalmology, Jill A. Foster. 2018-2019 Basic and Clinical Science Course, Section 07: Orbit, Eyelids, and Lacrimal System. – NY, 2018. – 190 p.

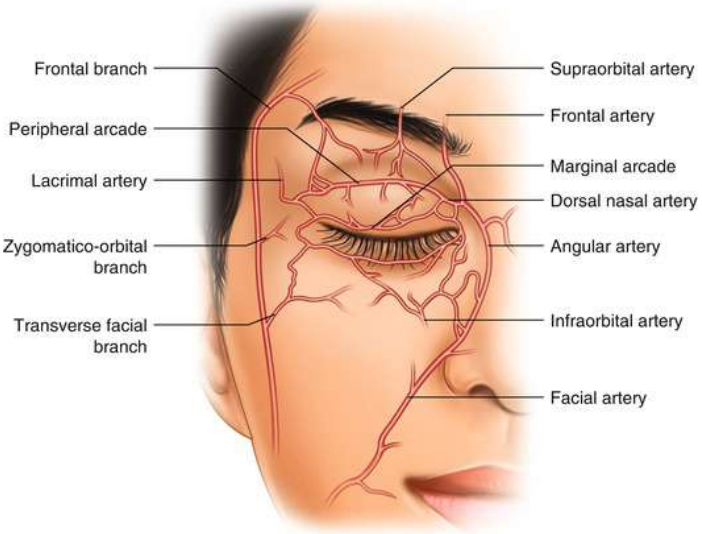
2. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 4 Lids, Chapter 5 Lacrimal, Chapter 6 Conjunctiva).

3. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 2 Eyelids, Chapter 3 Lacrimal Drainage System, Chapter 6 Conjunctiva).

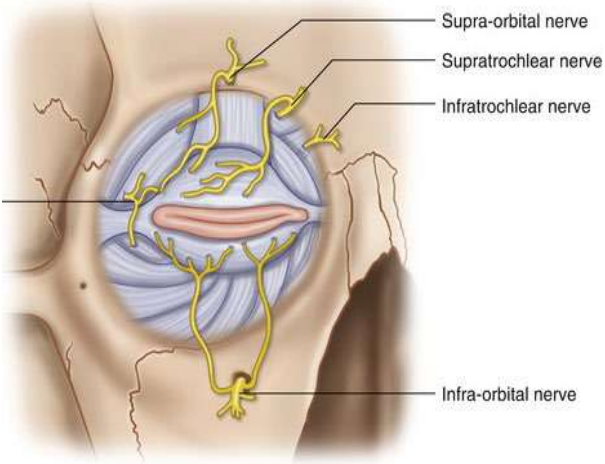
4. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 4 The Red Eye; Chapter 8 Eyelid, Lacrimal, and Orbital Disease).

Illustrations to Lesson 5

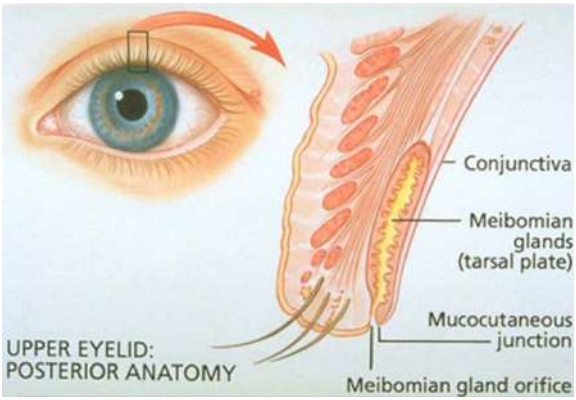
Blood supply of the eyelid

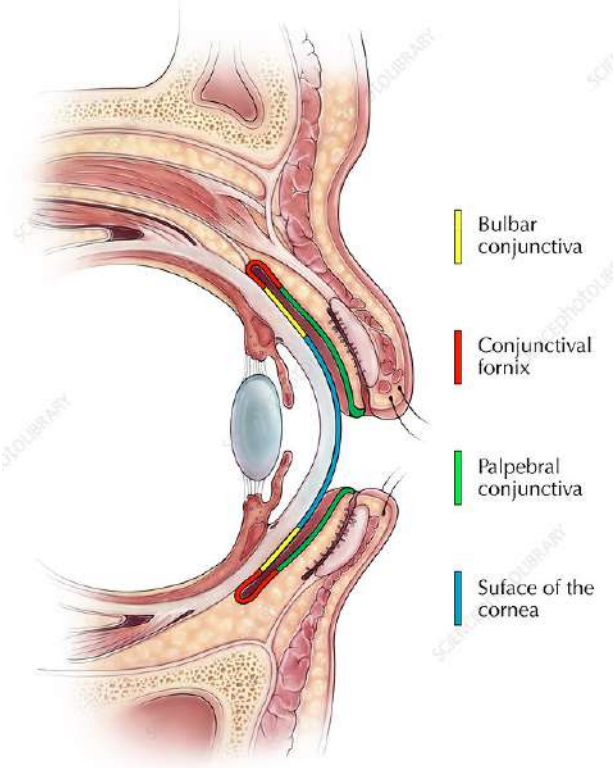


Innervation of the eyelid



Meibomian glands





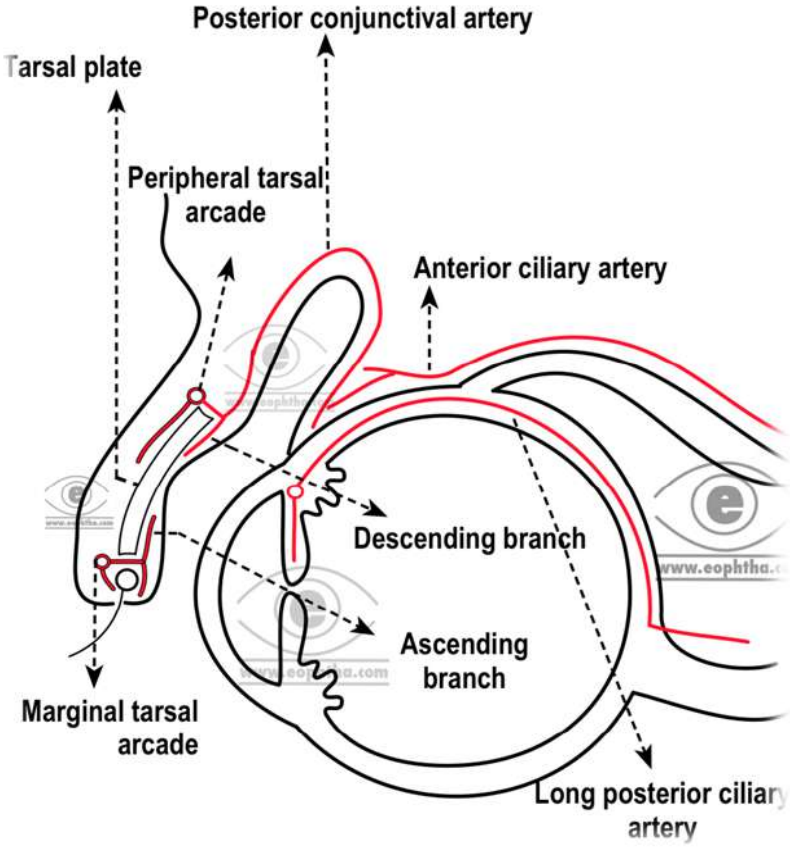
Conjunctiva has three segments:

• **Bulbar conjunctiva** covers the anterior part of the sclera till junction between the sclera and cornea; it does not cover the cornea.

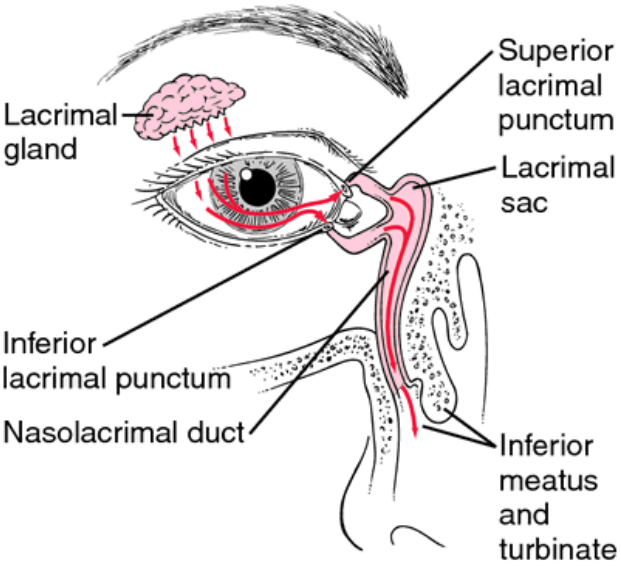
• **Tarsal (Palpebral) conjunctiva** covers the inner surface of both the upper and lower eyelids.

• **Fornix** is the junction of palpebral and bulbar conjunctiva.

Blood supply of the conjunctiva



Lacrimal apparatus



LESSON 6.
PATHOLOGY OF CORNEA AND SCLERA

1. Topic: Diseases of cornea and sclera.

2. Academic value:

The knowledge of the fibrous tunic's anatomy, the histological structure, physiology and the ability to reveal signs and symptoms of miscellaneous diseases, to make a differential diagnosis and to choose a proper treatment is essential for every ophthalmologist.

3. Aim:

Student should know the normal anatomy, congenital malformations, clinical features, diagnostics, treatment options of the most common diseases of the cornea and the sclera.

Student should be able to assess the corneal sensitivity, to perform the slit lamp biomicroscopy of the cornea stained with fluorescein.

4. Questions to study and self-control:

1. The cornea: specific features, functions, the histological structure, the size and shape differences in newborns and in adults, nutritional sources, the sensory innervation.

2. Symptoms of corneal diseases.

3. Signs of corneal diseases (superficial and deep): corneal infiltrates, the ciliary or mixed injection, the reduced corneal sensitivity, the vascularization of the cornea.

The causes of corneal opacities: inflammatory and cicatricial, infectious and sterile. The differential diagnosis.

4. Etiology of keratitis.

5. Classification of keratitis.

6. Principles of treatment of keratitis and their complications.

7. Keratoplasty: types, indications.

8. Phlyctenular keratoconjunctivitis (Mycobacterium tuberculosis).

9. Corneal ulceration: Mooren ulcer, peripheral ulcerative keratitis associated with systemic autoimmune diseases (diagnosis, treatment, outcomes).

10. Clinical features of herpes simplex and herpes zoster keratitis.

11. The sclera: the histological structure, age-related features.

12. Episcleritis, scleritis: etiology, clinical features, treatment.

13. Systemic diseases associated with scleritis.

Self-assessment Test

Choose only 1 answer

1. BAND SHAPED KERATOPATHY IS COMMONLY CAUSED BY DEPOSITION OF…

A. Magnesium salt
B. Calcium salt
C. Ferrous salt
D. Copper salt

2. MEDICINE ALWAYS INDICATED IN CORNEAL ULCER OF ANY ETIOLOGY IS …

A. Corticosteroids
B. Mydriatics
C. Antibiotics
D. Antifungals

3. CORNEAL SENSITIVITY IS DIMINISHED IN…

A. Herpes simplex keratitis
B. Conjunctivitis
C. Fungal keratitis
D. Marginal keratitis

4. THE COLOR OF FLUORESCEIN STAINING IN CORNEAL ULCER IS…

A. Yellow
B. Blue
C. Green
D. Royal blue

5. PHLYCTEN IS DUE TO…

A. Tuberculous keratitis
B. Exogenous allergy
C. Degeneration
D. None of the above

6. THE FIFTH NERVE PALSY (PARALYSIS) RESULTS IN…

A. Ptosis
B. Proptosis
C. Neuropathic keratopathy
D. Lagophthalmos

7. TOPICAL STEROIDS ARE CONTRAINDICATED IN A CASE OF VIRAL CORNEAL ULCER FOR FEAR OF…

A. Secondary glaucoma
B. Cortical cataract
C. Corneal perforation
D. Secondary viral infection

8. THE EXACT DIAGNOSTIC SIGN OF CORNEAL ULCER IS…

A. Ciliary injection
B. Blepharospasm
C. Miosis
D. Positive fluorescein test

9. THE EFFECTIVE TREATMENT OF DENDRITIC ULCER OF THE CORNEA IS…

A. Surface anesthesia
B. Local corticosteroids
C. Systemic corticosteroids
D. Acyclovir ointment

10. HERPES SIMPLEX KERATITIS IS CHARACTERIZED BY…

A. Presence of pus in the anterior chamber (hypopion)
B. No tendency to recurrence
C. Corneal hyposthesia
D. Tendency to perforation

11. BACTERIA ATTACKING NORMAL CORNEAL EPITHELIUM ARE…

A. Neisseria gonorrhea
B. Staphylococcal epidermidis
C. Moraxella lacunata
D. Staphylococcal aureus

12. ADVANCED KERATOCONUS IS LEAST TO BE CORRECTED WHEN TREATED BY…

A. Hard contact lens
B. Rigid gas permeable (RGP) contact lens
C. Spectacles
D. Keratoplasty

13. DEEP LEUCOMA IS BEST TREATED BY...

A. Tattooing
B. Lamellar keratoplasty
C. Keratectomy
D. Penetrating keratoplasty

14. FLEISCHER RING IS FOUND IN…

A. Keratoconus
B. Chalcosis
C. Argyrosis
D. Buphthalmos
E. None of the above

15. CORNEA IS SUPPLIED BY NERVE FIBERS DERIVED FROM…

A. Trochlear nerve
B. Optic nerve
C. Trigeminal nerve
D. Oculomotor nerve

16. MIXED INJECTION IS NOT SEEN IN…

A. Herpetic keratitis
B. Bacterial ulcer
C. Chronic iridocyclitis
D. Catarrhal conjunctivitis
E. Acute iridocyclitis

17. MOST OF THE THICKNESS OF CORNEA IS FORMED BY…

A. Epithelial layer
B. Substantia propria
C. Descemet's membrane
D. Endothelium

18. A 30 YEARS OLD MALE PRESENTS WITH EYE CORNEAL INJURY (HOT METAL FRAGMENT) 5 DAYS AGO, COMPLAINS OF PAIN, PHOTOPHOBIA AND REDNESS OF THE EYE FOR 2 DAYS. WHAT WOULD BE THE MOST LIKELY PATHOLOGY?

A. Corneal ulcer
B. Conjunctivitis
C. Anterior uveitis
D. Corneal laceration

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV Diseases of The Cornea, Sclera).

Additional:

1. American Academy of Ophthalmology, Robert W. Weisenthal. 2018-2019 Basic and Clinical Science Course, Section 08: External Disease and Cornea. – NY, 2018. – 335 p.

2. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 4 Cornea and Ocular Surface Diseases, Part 1 Genetics).

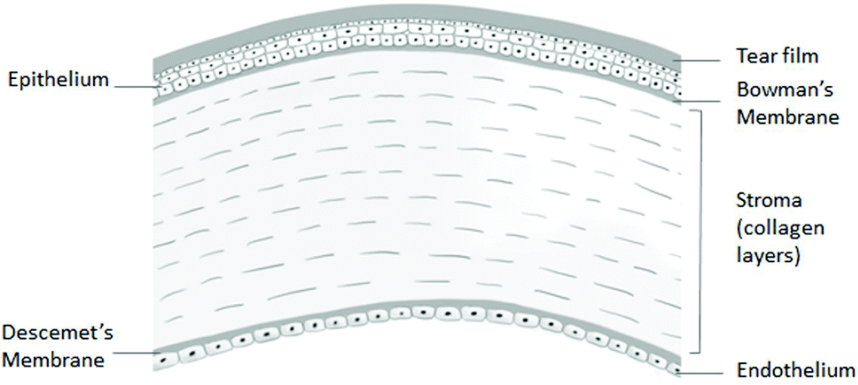
3. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 7 Cornea, Chapter 8 Sclera, Chapter 18

Paediatric ophthalmology: Developmental abnormalities) Nika Bagheri, Brynn Wajda [et al.] (eds.) The Wills Eye Manual. – 7th ed. – LWW, 2016. – 1631 p. (Chapter 4 Cornea).

4. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 7 Cornea, Chapter 8 Corneal Surgery, Chapter 9 Episclera and Sclera).

Illustrations to Lesson 6

Microanatomy of the cornea (5 layers)



Specific features of the cornea to ensure its transparency

- Non-keratinizing multilayer flat epithelium.
- No vessels in the cornea.
- Corneal nerves are devoid of myelin sheath.
- Parallel arrangement of fibers in the corneal stroma.
- High water content in the cornea (up to 85 %).

Nutrition and innervation of the cornea

Power supply:

• marginal vascular loop network of the anterior ciliary arteries
• tear fluid
• intraocular fluid of the anterior chamber of the eye

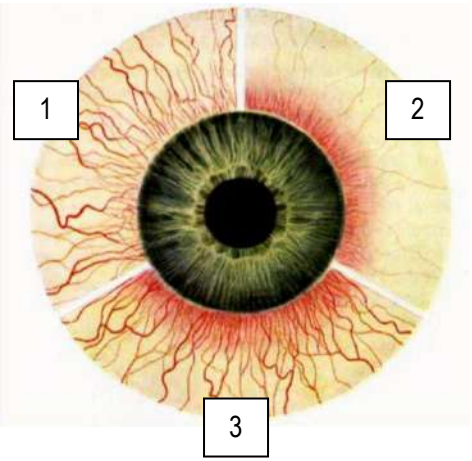
Innervation (sensory):

• long ciliary nerves from the nasociliary nerve (1 branch of the trigeminal nerve)

Common symptoms of keratitis

1) corneal syndrome – photophobia, – blepharospasm, – lacrimation, – eye pain	2) redness of the eye – pericorneal injection 3) reduced visus 4) infiltrate presence

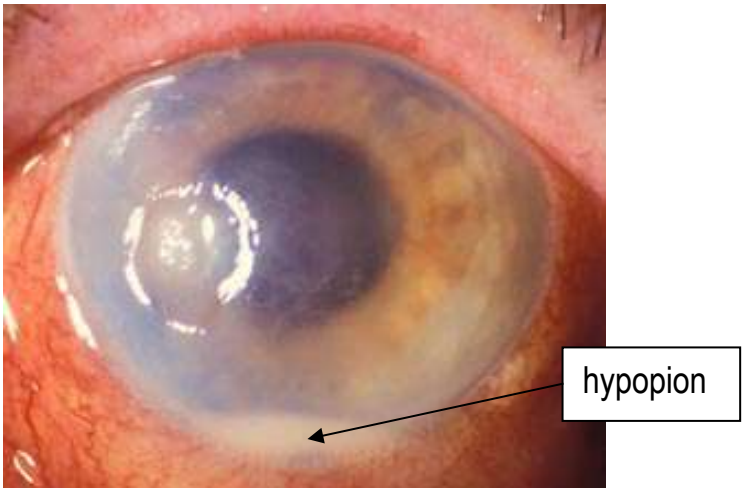
Types of eyeball injection



1. Superficial or conjunctival.
2. Deep or ciliary or pericorneal.
3. Mixed.

Herpetic dendritic keratitis

Corneal ulcer



LESSON 7.
PATHOLOGY OF UVEAL TRACT

1. Topic: Pathology of the uveal tract.

2. Academic value:

The knowledge of the uveal tract's anatomy, the histological structure, physiology and the ability to reveal signs and symptoms of miscellaneous diseases of the uveal tract, to make a differential diagnosis and to choose a proper treatment is essential for every ophthalmologist.

3. Aim:

Student should know clinical features, diagnostics, principles of treatment, outcomes of miscellaneous diseases of the uveal tract (the iris, the ciliary body, the choroid).

4. Questions to study and self-control:

1. Anatomy of the uveal tract.
2. Congenital malformations of the iris, the ciliary body and the choroid.
3. Uveitis: classification, etiology, systemic associations.
4. Signs and symptoms of the anterior segment (the iris and the ciliary body) inflammation.
5. Signs and symptoms of the posterior segment (the choroid) inflammation.
6. The differential diagnosis of acute anterior uveitis and acute angle-closure glaucoma.
7. Laboratory tests in uveitis
8. Topical treatment of anterior uveitis.

9. Complications of uveitis (cataract, glaucoma) and their causes.

10. Melanoma of the uveal tract: clinical features, diagnosis, principles of treatment.

Self-assessment Test

Choose only 1 answer

1. FUNCTIONS OF A CILIARY BODY ARE…

1. Protection
2. Accommodation
3. Production of the aqueous humor (intraocular fluid)
4. Production of tears
5. Photoconductive

A. 1, 2
B. 2, 3
C. 3, 4
B. All listed

2. THE INNERVATION OF THE SPHINCTER OF THE PUPIL IS PROVIDED BY…

A. N. Oculomotorius
B. N. Trigeminus
C. N. Nasociliaris
D. Nerve fiber of truncus sympaticus

3. THE SOURCE OF A BLOOD SUPPLY OF THE CHOROID IS PROVIDED BY…

A. The central artery of the retina
B. Posterior long ciliary arteries
C. Posterior short ciliary arteries
D. Posterior ciliary arteries
E. Anterior ethmoid artery

4. THE NAME OF THE TISSUE DEFECT OF THE IRIS IS DEFINED AS…

A. Coloboma
B. Heterochromia
C. Aniridia
D. Rubeosis

5. CHANGES IN IRIS COLOR ARE NAMED AS…

A. Coloboma
B. Heterochromia
C. Aniridia
D. Rubeosis

6. THE METHOD OF CHOROID'S EXAMINATION IS…

A. Side (focal) lighting
B. Biomicroscopy
C. Ophthalmoscopy
D. Transmitted light examination

7. WHAT ISN'T A SIGN OF IRITIS?

A. Pericorneal injection
B. Changed color of the iris
C. Changed pattern of the iris
D. Corneal edema

8. THE INFLAMMATORY PROCESS IN THE ANTERIOR PART OF THE VASCULAR TRACT IS…

A. Iridocyclitis
B. Chorioretinitis
C. Scleritis
D. Panuveitis

9. WHAT ISN'T A SIGN OF CYCLITIS?

A. Precipitates
B. Opacification of the vitreous body
C. Ciliary soreness
D. Mixed injection

10. CHOOSE A MEDICINE THAT ISN'T PRESCRIBED FOR TOPICAL TREATMENT OF UVEITIS

A. Atropine
B. Antibiotics
C. Pilocarpine
D. Corticosteroids

11. A CLINICAL SIGN OF ANTERIOR UVEITIS IS …

A. Precipitates
B. Ptosis
C. Congestive injection of the eyeball
D. Subluxation of the lens

12. A CLINICAL SIGN OF ANTERIOR UVEITIS IS…

A. Rear synechiae
B. Decreased corneal sensitivity
C. Exophthalmos
D. Hemophthalmos

13. MALIGNANT TUMOR OF THE CHOROID IS…

A. Cystitis
B. Melanoblastoma
C. Adenoma
D. Atheroma

14. MAKE A DIAGNOSIS OF THE PATIENT WITH AN EYE PAIN, REDUCED VISION, PRECIPITATES ON THE CORNEAL ENDOTHELIUM, MIOSIS AND PERICORNEAL INJECTION…

A. Acute conjunctivitis
B. Acute iridocyclitis
C. Acute glaucoma attack
D. Lacrimal sac phlegmon

15. THE MAIN PRODUCERS OF AQUEOUS HUMOR ARE…

A.Vitreous body
B. Processes (cilia) of the ciliary body
C. Iris
D. Choroid

16. BLOOD SUPPLY OF THE CILIARY BODY AND IRIS IS PROVIDED BY…

1. Posterior long ciliary arteries
2. Posterior short ciliary arteries
3. Anterior ciliary arteries
4. Eyelid arteries
5. Central retinal artery

A. 1
B. 1, 2
C. 1, 3
D. All listed

17. THE FIRST AID IN CASE OF ACUTE IRIDOCYCLITIS INCLUDES INSTILLATION OF…

A. Pilocarpine
B. Gentamicin
C. Timolol
D. Atropine

18. WHAT SIGN IS NOT TYPICAL FOR CHOROIDITIS?

A. Photopsia
B. Metamorphopsia
C. Pain in the eyeball
D. In most cases, the inflammatory process involves retina

19. COMPLICATION OF CHOROIDITIS IS…

A. Pupil's occlusion
B. Keratopathy
C. Neuroretinitis
D. Occlusion of the central retinal artery

20. COMPLICATION OF IRIDOCYCLITIS WITH PUPIL'S OCCLUSION IS…

A. Corneal ulcer
B. Secondary glaucoma
C. Optic neuropathy
D. Retinal detachment

Write down in your notebook

Pupil's reflexes and their pathology.

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV Diseases of the Uveal tract, Intraocular Tumors).

Additional:

1. Nika Bagheri, Brynn Wajda [et al.] (eds.) The Wills Eye Manual. – 7th ed. – LWW, 2016. – 1631 p. (Chapter 12 Uveitis).

2. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 7 Uveitis, Part 8 Intraocular Tumors, Part 1 Genetics).

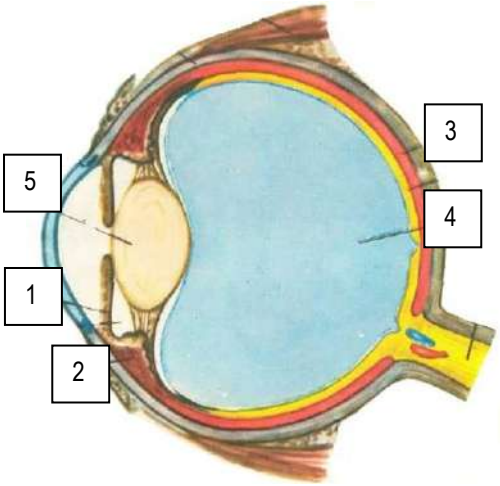
3. American Academy of Ophthalmology, Russel W. Read. 2018–2019 Basic and Clinical Science Course, Section 09: Intraocular Inflammation and Uveitis. – NY, 2018. – 286 p.

4. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 11 Uveitis, Chapter 15 Intraocular tumors, Chapter 18 Paediatric ophthalmology: Uveitis in children, Developmental abnormalities: anterior segment).

5. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 12 Uveitis, Chapter 20 Ocular Tumors).

Illustrations to Lesson 7

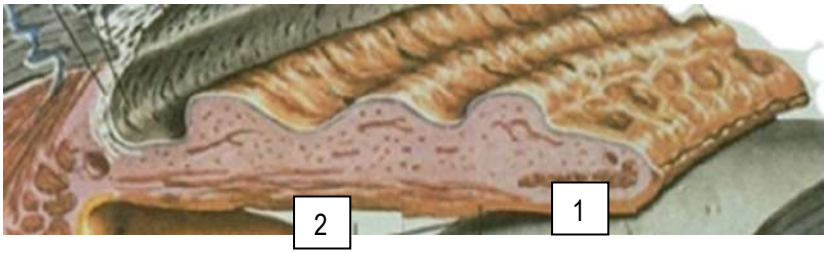
Uveal tract



1. Iris
2. Ciliary body (corpus ciliare)
3. Choroid (chorioidea)
4. Vitreous body
5. Lens

Iris muscles

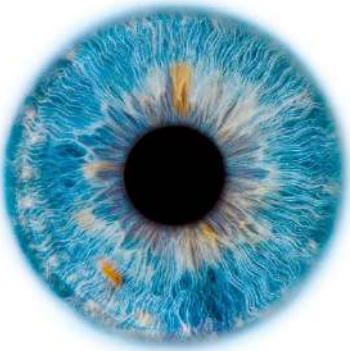
– Iris sphincter muscle (1)
(innervated by the oculomotor nerve)
– Iris dilatator muscle (2) (innervated by the sympathetic nerve)



Sensory innervations of the iris:
the first branch of the trigeminal nerve

Blood supply:
– the anterior ciliary arteries
– the long posterior ciliary arteries

Pupillary responses:
– Direct pupillary reflex
– Consensual pupillary reflex
– Accomodation reflex
– Convergence reflex



Functions of the iris

1. Light diaphragm
2. Part of iridolenticular diaphragm
3. Takes part in humor's outflow
4. Takes part in accommodation
5. Trophic function
6. Thermoregulation

Functions of the ciliary body

1. Takes part in accomodation
2. Produces the aqueous humor
3. Thermal collector
4. Anchors the lens in place

Functions of the choroid

1. Provides nourishment to the outer layers of the retina
2. "Thermal philter"
3. Ophthalmotonus regulation.

LESSON 8.
PATHOLOGY OF LENS

1. Topic: Diseases of the lens.

2. Academic value:

The knowledge of the lens anatomy, histological structure, physiology, clinical features of its diseases, the ability to make a differential diagnosis and to choose a proper treatment is essential for every ophthalmologist.

3. Aim:

Student should know the lens anatomy, physiology, nutritional sources, congenital malformations, clinical features, principles of treatment of lens pathology.

Student should be able to perform a slit lamp biomicroscopy of the lens and to evaluate its changes.

4. Questions to study and self-control:

1. The anatomy of the lens.
2. Congenital malformations of the lens.
2. Classification of cataracts.
3. Acquired cataract and their causes.
4. Age-related cataract: maturity, opacities' locations.
5. Surgical treatment of cataracts. Phacoemulsification.
6. Signs of aphakia.
7. Aphakia and its correction: intraocular lenses (IOL), spectacles, contact lenses.
8. Cataract in systemic diseases.
9. Complications of intumescent and hypermature cataracts.
10. Occupational cataracts and their prevention.

Self-assessment Test

Choose only 1 answer

1. THE HUMAN LENS HAS…
   A. Mesodermal origin
   B. Ectodermal origin
   C. Entodermal origin
   D. From different substrates

2. THE FUNCTION OF THE LENS IS…
   A. Aperture
   B. Aqueous humor's production
   C. Refraction
   D. Light perception

3. THE REFRACTIVE POWER OF THE LENS AT REST ACCOMMODATION IS…
   A. 60 D
   B. 10 D
   C. 20 D
   D. 50 D

4. THE METHOD OF EVALUATING THE TRANSPARENCY OF REFRACTIVE MEDIA OF THE EYE INCLUDES…
   A. Refractometry
   B. Skiascopy
   C. Perimetry
   D. Transmitted light

5. THE HIGHEST REFRACTIVE POWER IS KNOWN AS…
   A. Cornea
   B. Humor of the anterior chamber
   C. Lens
   D. Vitreous body

6. CLINICAL SIGNS OF CATARACT INCLUDE…
   1. Rapid decrease in visual acuity
   2. Gradual decrease in visual acuity
   3. Photophobia
   4. Change in eye refraction towards its increase (myopization)
   5. Blepharospasm

   A. 1, 3
   B. 2, 4
   C. 5
   D. All listed

7. THE LENS IS FED BY…

A. Vessels of the iris
B. Vessels of the ciliary body
C. Choroid
D. Retinal vessels
E. Aqueous humor

8. THE THICKNESS OF THE LENS AND THE AXIAL SIZE OF THE EYE IS DETERMINED BY THE METHOD OF…

A. Biomicroscopy
B. Perimetry
C. Ultrasound examination of the eyeball
D. Ophthalmoscopy
E. Refractometry

9. THE CHANGES OF THE SPHERICITY OF THE LENS RESULT IN…

A. Astigmatism
B. Enhanced refraction
C. Attenuation of refraction
D. No correct answer

10. THE TYPES OF ASTIGMATISM ARE…

A. Direct, indirect
B. Simple, complex, mixed
C. Lenticular, corneal
D. All listed

11. CATARACT IS…

A. Lens displacement
B. Lack of the lens
C. Artificial lens
D. Opacity of the lens

12. ARTIFAKIA IS…

A. Presence of an artificial lens in the eye
B. Lack of the lens
C. Lens displacement
D. Opacity of the lens

13. DURING A TRANSMITTED LIGHT OF THE TRANSPARENT LENS THE PUPIL AREA IS…

A. Black
B. Red
C. Grey
D. No correct answer

14. ALL SIGNS OF THE ABSENCE OF THE LENS ARE TRUE, EXCEPT…

A. Deep anterior chamber
B. Iris trembling
C. Decreased intraocular pressure
D. High degree of hyperopia

15. "MORGAGNIAN CATARACT" IS…

A. Initial stage
B. Immature stage
C. Mature stage
D. Hypermature stage

16. PROGRESSING CATARACTS INCLUDE:

A. Congenital zonular cataract
B. Congenital total cataract
C. Acquired cataract
D. Congenital polar cataract

17. WHAT SYMPTOM IS NOT TYPICAL FOR AGE-RELATED CATARACTS?

A. More common after 55–60 years
B. Always bilateral
C. Always monolateral
D. Progress to complete opacity of the lens

18. WHAT SIGN OF THE LENS IS NOT TYPICAL?

A. Biconvex lens
B. Transparent and elastic formation
C. Fixed to the ciliary body with Zinn ligaments
D. Could be involved in the inflammatory process
E. Refractive power is at rest 18.0–20.0 D

19. THE MAIN TREATMENT OF AGE-RELATED CATARACTS IS…

A. Conservative
B. Surgical
C. Do not require treatment
D. Laser treatment
E. Physiotherapeutic treatment

Textbooks and Supplementary Materials

Obligatory

1. Sihota R., Tandon R. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV The Lens).

Additional

1. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 5 The Lens, Part 1 Genetics).

2. American Academy of Ophthalmology, Sharon L. Jick. 2018–2019 Basic and Clinical Science Course, Section 11: Lens and Cataract. – NY, 2018. – 131 p.

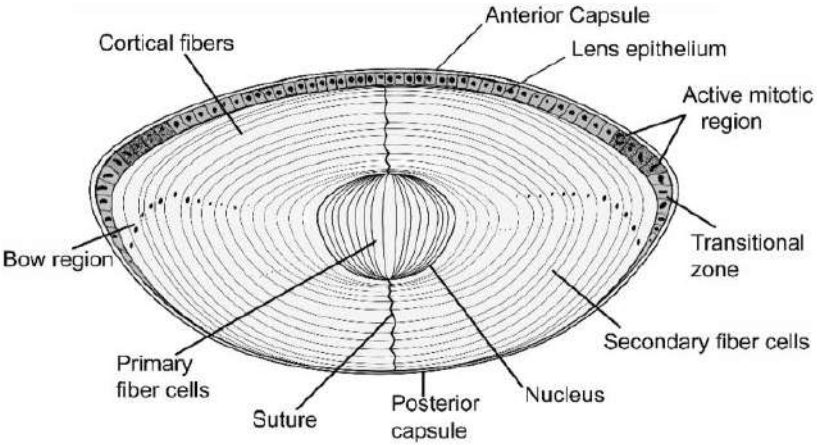
3. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 9 Lens, Chapter 18 Paediatric ophthalmology: Congenital cataract, Developmental abnormalities, Chapter 24 Laser in lens/cataract).

4. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. – 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 3 Chronic Vision Loss: Cataract).

5. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 10 Lens).

Illustrations to Lesson 8

Lens (phakos)



Diameter – 9–10 mm
Thickness – 4,6 mm
Refractive power – 18–20 D (rest accommodation), 33 D (max. accommodation)

Nutrition – aqueous humor.
Innervation is absent.

Functions of the lens:
1. Light transmittance
2. Light refraction (18 D)
3. Takes part in accommodation
4. Part of lens-iris diaphragm

LESSON 9. GLAUCOMA

1. Topic: Glaucoma.

2. Academic value:

The knowledge of the eyeball's hydrodynamics, its regulation, pathophysiology of glaucoma, clinical features of its types and principles of treatment is essential for every ophthalmologist.

3. Aim:

Student should know anatomy and physiology of the anterior chamber angle, outflow pathways of aqueous humour, classification, clinical features, diagnostics, modern principles of treatment of glaucoma.

Student should be able to perform the slit lamp biomicroscopy of the anterior segment, keratometry, ophthalmoscopy and tonometry, to evaluate the glaucomatous damage of the optic nerve, the results of the tonography and the gonioscopy, to make a differential diagnosis of similar diseases.

4. Questions to study and self-control:

1. Intraocular pressure (IOP): regulation, normal range, daily variations.

2. The aqueous humour, its production and outflow pathways. The anatomy of the anterior chamber angle. What is the gonioscopy?

3. How to determine the IOP. Methods: palpation, applanation tonometry, pneumatonometry.

4. The definition of glaucoma. Congenital, primary and secondary glaucoma: their differences and specific features.

5. Clinical features of glaucoma: an increased IOP, visual field defects, changes of the optic nerve head.

6. An evaluation of the optic nerve head. The pathogenesis of glaucomatous optic neuropathy.

7. Primary glaucoma: pathophysiology, classification, stages, IOP level.

8. Clinical features of primary glaucoma: open-angle and angle-closure types.

9. Acute angle-closure glaucoma: mechanisms, diagnosis, treatment. The differential diagnosis of acute anterior uveitis and acute angle-closure glaucoma.

10. Secondary glaucoma and its causes: inflammatory, phacogenic (lens-related), neovascular, traumatic, associated with intraocular tumours.

11. Congenital glaucoma: etiology, risk factors, diagnosis.

12. Medical treatment:

a) Miotics

b) Beta-blockers

c) Alpha-2 agonists

d) Prostaglandin derivatives

e) Carbonic anhydrase inhibitors

f) Osmotic agents

g) Combined preparations.

13. What should a physician do in case of acute angle-closure glaucoma?

14. Laser and surgical treatment: types, indications, techniques.

Self-assessment Test

Choose only 1 answer

1. THE CHOICE METHOD OF TREATMENT OF THE ANGLE CLOSURE GLAUCOMA IS…

A. Surgical peripheral iridectomy
B. Yag-laser iridotomy
C. Trabeculotomy
D. Trabeculectomy

2. TOPICAL ATROPINE IS CONTRAINDICATED IN…

A. Ophthalmoscopy in children
B. Iridocyclitis
C. Corneal ulcer
D. Primary angle closure glaucoma

3. THE NUMBER OF LAYERS IN NEUROSENSORY RETINA IS…

A. 9
B. 10
C. 11
D. 12

4. 100 DAYS GLAUCOMA IS SEEN IN…

A. Central retinal artery occlusion
B. Branch retinal artery occlusion
C. Central retinal vein occlusion
D. Branch retinal vein occlusion

5. RISK FACTORS FOR PRIMARY OPEN ANGLE GLAUCOMA DO NOT INCLUDE

A. Heredity
B. Myopia
C. Age over 40
D. Hyperopia

6. THE METHOD OF THE EXAMINATION OF THE ANTERIOR CHAMBER ANGLE IS…

A. Gonioscopy
B. Ophthalmoscopy
C. Biomicroscopy
D. Campimetry

7. HOW MANY STAGES OF GLAUCOMA DO YOU KNOW?

A. 2
B. 3
C. 4
D. 5

8. THE NAME OF THE SECOND STAGE OF PRIMARY OPEN-ANGLE GLAUCOMA IS…

A. Initial
B. Developed
C. Far-advanced
D. Terminal

9. THE TRIAD OF GRAEFE DOES NOT INCLUDE…

A. Increased intraocular pressure
B. Narrowing of the visual field
C. Changes in the optic nerve
D. Narrowing of anterior chamber angle

10. NORMAL VALUES OF INTRAOCULAR PRESSURE IS…

A. 16–26 mm Hg
B. 16–30 mm Hg
C. 16–33 mm Hg
D. 10–26 mm Hg

11. WHAT METHOD OF MEASURING OF INTRAOCULAR PRESSURE IS NOT APPLIED?

A. Maklakov's
B. Palpation
C. Transpalpebral
D. Intraocular

12. WHICH TYPE OF GLAUCOMA DOES NOT EXIST?

A. Primary open-angle
B. Secondary open-angle
C. Primary closed-angle
D. Mixed

13. WHICH FORM OF SECONDARY GLAUCOMA DOES NOT EXIST?

A. Phacogenic
B. Neovascular
C. Atrophic
D. Neoplastic

14. INFANTILE GLAUCOMA IS AGE APPROPRIATE…

A. Up to 3 years
B. 3–10 years
C. 11–35 years
D. Over 35 years old

15. WHAT IS NOT TYPICAL FOR CLINICAL PICTURE OF CONGENITAL GLAUCOMA?

A. Increase of the size of the eye
B. Reduction of the size of the eye
C. Increase in corneal size
D. Bull-eye

16. WHAT DRUGS FOR THE TREATMENT OF GLAUCOMA ARE NOT USED?

A. Reducing the production of aqueous humor
B. Increasing the outflow of aqueous humor
C. Reducing the outflow of aqueous humor

17. WHAT FORM OF SECONDARY PHACOGENIC GLAUCOMA DOES NOT EXIST?

A. Phacomorphic
B. Phacotopic
C. Phacoatrophic
D. Phacolytic

18. WHICH OF THE FOLLOWING IS NOT THE SYMPTOM OF AN ACUTE GLAUCOMA ATTACK?

A. Injection stagnant
B. Transparent cornea
C. Wide pupil (mydriasis)
D. Small front camera

19. INTRAOCULAR FLUID IS PRODUCED…

A. In the processes of the ciliary body
B. In the iris
C. In schlemm's canal
D. In the cornea

20. PRIMARY OPEN-ANGLE GLAUCOMA IS DANGEROUS DUE TO

A. Asymptomatic course
B. Sudden onset
C. Its frequency
D. Loss of visual acuity

Draw a table in your notebook

A table “The differential diagnosis between acute conjunctivitis, keratitis, acute iridocyclitis and angle-closure glaucoma”.

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV The Glaucomas).

2. Neil T. Choplin, Carlo E. Traverso. Atlas of Glaucoma, Third Edition. – CRC Press, 2014. – 353 p.

Additional:

1. American Academy of Ophthalmology, Christopher A. Girkin. 2018–2019 Basic and Clinical Science Course, Section 10: Glaucoma. – NY, 2018. – 149 p.

2. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 10 Glaucoma, Part 1 Genetics).

3. Nika Bagheri, Brynn Wajda [et al.] (eds.) The Wills Eye Manual. – 7th ed. – LWW, 2016. – 1631 p. (Chapter 9 Glaucoma).

4. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 11 Glaucoma).

5. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. – 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 3 Chronic Vision Loss: Glaucoma).

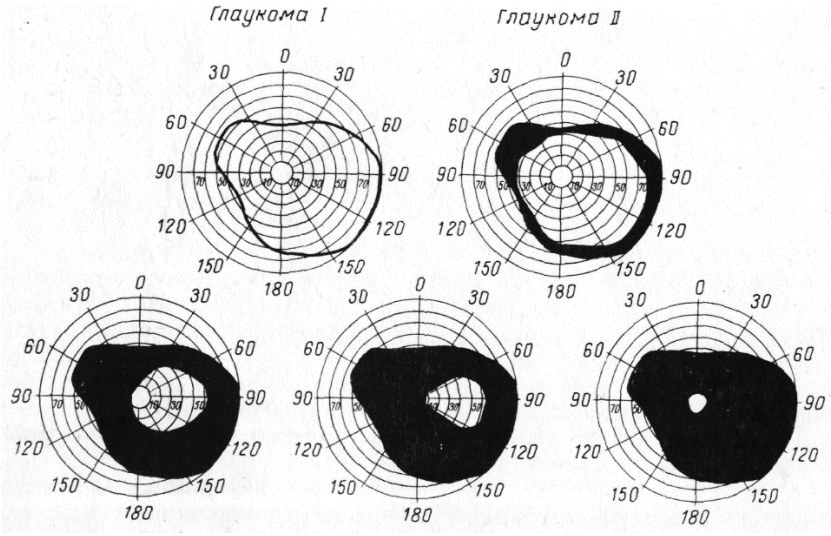
6. Alastair K.O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 10 Glaucoma, Chapter 18 Paediatric ophthalmology: Glaucoma in Children, Chapter 24 Laser in glaucoma).

Illustrations to Lesson 9

Classification of primary glaucoma

Clinical form	Stage	Level of IOP	Dynamics of visual functions
1. *Closed-angle* blockade of anterior chamber angle by iris root, goniosynechiae **2. *Open-angle*** Disorders of outflow via drainage system **3. Mixed**	**I *Early*** Mild changes in paracentral area: constriction, small nasal protuberance; asymmetry, vertically oval cupping. **II *Advanced*** Visual field constricted: 10°on nasal side , up to 15° from centre; edge excavation. **III *Far advanced*** <15° from point of fixation; total edge excavation. **IV *Terminal*** Total blindness or pr. L. in certae with partially transparent mediae	**A** Normal (compencated) <26 mmHg Pt <25 mmHg **B** Moderately increased (subcompensated) <32 mmHg Pt 26 – 32 mmHg **C** High (decompensated) >32 mmHg Pt ≥33 мм.рт.ст	***Stabilized*** ***Non-stabilized***
Glaucoma suspect			
Acute angle closure glaucoma			

Visual field on different stages of glaucoma



Secondary glaucoma

1. Inflammatory
2. Phacogenic:
   - phacotopic
   - phacomorphic
   - phacolytic
3. Vascular:
   - neovascular
   - phlebohypertensive
4. Dystrophic
5. Traumatic:
   - contusive
   - vulnerary
   - radiation-induced
   - postsurgical
6. Neoplastic:
   - intraocular tumors
   - orbital tumors, endocrine ophthalmopathy
7. Corticosteroid induced glaucoma

Hypotensive drugs

Group	Subgroup	Examples
Increasing outflow		
1. Cholinomimetics	M-cholinomimetics	Pilocarpine, Carbacholine
2. Sympathomimetics	α-, β-adrenergic agonists	Epinephrine (adrenalin), Dipivefrine
3. Prostaglandin analogs	Prostoglandin $F_{2\alpha}$	Travoprost (Travatan), Latanoprost (Xalatan), Unoprost (Rescula)
Decreasing aqueous production		
1. Sympathomimetics	α_2-adrenergic agonists	Clopheline (Clonidine), Apraclonidine, Brimonidine
2. Adrenoblockers	$\beta_{1,2}$ – adrenoblockers	Timolol and its analogs
	β_1- adrenoblockers	Betaxolol (Betoptic, Betoptic-C)
	α- и β-adrenoblockers	Proxodolol
3. Carbonic anhydrase inhibitors		Brinzolamide (Azopt), Dorzolamide (Trusopt)
Combination drugs		
1. Pilocarpine + timolol		Fotil, Fotil-forte, TimPilo
2. Pilocarpine + metipranolol		Normoglaucon
3. Proxodolol + clopheline		Proxophelin
4. Timolol + trusopt		Cosopt
5. Timolol + xalatan		Xalacom

LESSON 10. OCULAR TRAUMA

1. Topic: Injuries of an eyeball and its adnexal structures.

2. Academic value:

The knowledge of ocular traumas' signs, first aid's basics, principles of treatment is essential for every physician.

3. Aim:

Student should know the anatomy of an orbit and paranasal sinuses, symptoms and signs of ocular traumas, modern methods of clinical investigations, first aid's basics and principles of treatment in different injuries.

Student should be able to evaluate the condition of the eye, eyelids and surrounding tissues, the orbit and its contents, to do a differential diagnosis of blunt and penetrating traumas, to assess results of X-ray, CT, MRT, to perform an appropriate first aid in case of ocular injuries.

4. Questions to study and self-control

1. Classification of ocular injuries.
2. Clinical features of orbital walls' traumas.
3. Management of lids' and canalicular lacerations.
4. Signs of penetrating traumas of the cornea and the sclera.
5. Diagnosis of intraocular foreign bodies.
6. Complications of penetrating traumas: metallosis (siderosis, chalcosis), sympathetic ophthalmia, iridocyclitis, endophthalmitis, panophthalmitis. Diagnosis, treatment.
7. Treatment of endophthalmitis, panophthalmitis.
8. Blunt trauma: classification, clinical features, treatment.

9. Thermal and chemical injuries: classification, signs.
10. First aid's basics in burns.
11. Outcomes of chemical and thermal injuries.
12. Signs of hemophthalmus.
13. The definition of electric ophthalmia.
14. Methods of removal of intraocular foreign bodies.

Self-assessment Test

Choose only 1 answer

1. ACCORDING TO THE ORIGIN EYE INJURIES COULD BE DIVIDED INTO…

A. Work/occupational injuries
B. Non-industrial/non-work injuries
C. Sports injuries
D. All listed

2. SEVERAL DEGREES COULD BE IDENTIFIED BY THE SEVERITY OF VISUAL IMPAIRMENT…

A. I–II degrees
B. I–III degrees
C. I–IV degrees
D. I–V degrees

3. WHAT IS NOT AN ABSOLUTE SIGN OF AN OPEN GLOBE INJURY?

A. Intraocular foreign body
B. Corneal opening
C. Traumatic cataract
D. Iris opening

4. THE FIRST OUT-PATIENT AID IN CASE OF AN OPEN GLOBE INJURY INCLUDES…

A. Uveal tract reduction
B. Wound irrigation and antibiotics injections
C. Resection of prolapsed tissues and wound sealing
D. Application of aseptic bandage and urgent transportation to the ophthalmological unit

5. COMBINED EYE'S INJURY IS CHARACTERIZED BY…

A. An open globe injury with an intraocular foreign body
B. Visual organ and other organs injures
C. Eyeglobe contusion with an open globe injury
D. All listed

6. WHICH METHOD COULDN'T BE USED TO REVEAL AN INTRAOCULAR FOREIGN BODY?

A. Ultrasound examination
B. Comberg & Baltin method
C. Refractometry
D. All listed is incorrect

7. PLAIN X-RAYS OF AN ORBIT IN CASES OF AN OPEN GLOBE INJURIES ARE REQUIRED…

A. In all cases
B. Only if there is an intraocular foreign body
C. Only if there are symptoms of orbita walls' fracture
D. Only when foreign body is localized behind the eyeglobe

8. EYE'S CONTUSION COULD BE ACCOMPANIED BY…

A. Subconjunctival sclera breakage
B. Intraocular hypotonia
C. Lens luxation
D. All listed

9. SIDEROSIS IS CHARACTERIZED BY…

A. Chromatism around foreign body
B. Change of the iris color
C. Chromatism of the Schlemm canal area
D. All listed

10. SIDEROSIS IS CHARACTERIZED BY…

A. Black colored iris
B. Rust colored iris
C. Grey colored iris
D. Blue colored iris

11. SUNFLOWER OPACITY IN THE LENS IS TYPICAL FOR…

A. Choroidoretinitis
B. Siderosis
C. Copper cataract
D. Diabetic cataract

12. SYMPATHETIC INFLAMMATION IS DEFINED AS…

A. Damaged eye disorder
B. Lens injury
C. Keratitis
D. Undamaged eye disorder

13. SYMPATHETIC INFLAMMATION COULD BE CAUSED BY…

A. Blunt ocular trauma
B. Open globe injures
C. All injures
D. Glaucoma

14. CHOOSE CLINICAL FEATURES OF SYMPATHETIC INFLAMMATION…

A. Serous iridocyclitis
B. Fibrinous-plastic iridocyclitis
C. Neuroretinitis
D. All listed

15. AN ENUCLEATION IS ABSOLUTELY REQUIRED IN CASE OF…

A. Recurrent hemophthalmia with diabetic retinal angiopathy
B. Risk of sympathetic inflammation
C. Exit shrapnel wound of an eyeglobe
D. All listed

16. THE FIRST AID IN CASE OF CHEMICAL BURNS INCLUDES…

A. Profuse irrigation
B. Local application of antibiotics
C. Local anesthesia
D. Local steroids application

17. CHEMICAL BURNS (CAUSED BY ACIDS) ARE ACCOMPANIED BY…

A. Colliquative necrosis
B. Lack of necrosis
C. Coagulative necrosis
D. A and C

18. FIRST-DEGREE BURNS ARE CHARACTERIZED BY…

A. Corneal erosion
B. Corneal opacity
C. Conjunctival necrosis
D. All listed

19. PORCELAINEOUS CORNEA IS COMMON FOR…

A. I degree burns
B. II degree burns
C. III degree burns
D. IV degree burns

Write down in your notebook

1. Absolute and relative signs of the penetrating trauma. First aid.

2. Stages of burn disease, degrees. Treatment (first aid, antidots).

3. Table "Eye structures injury in contusion".

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV Injures to the Eye).

2. F. Kuhn. Ocular Traumatology. – 1st ed. – Springer, 2008. – 545 p.

Additional:

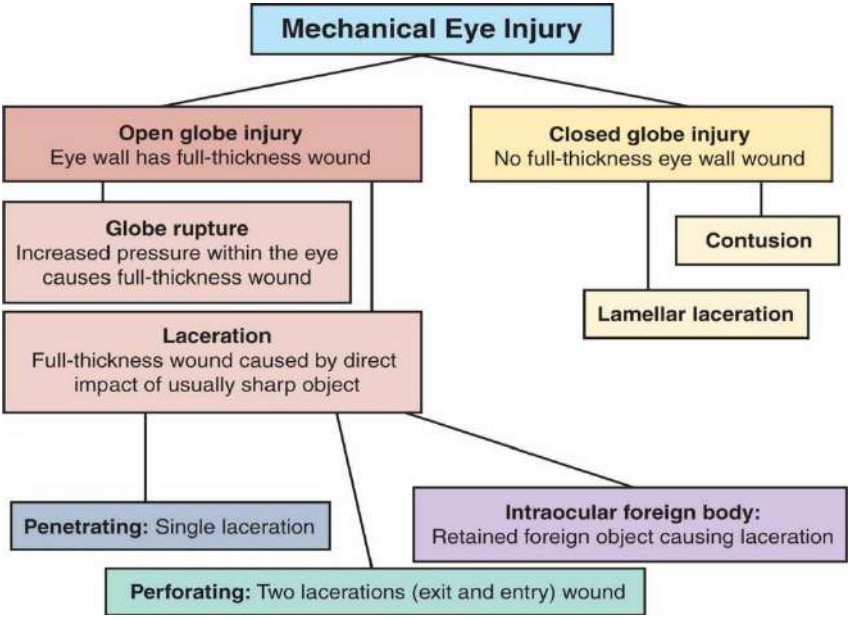
1. Nika Bagheri, Brynn Wajda [et al.] (eds.) The Wills Eye Manual. – 7th ed. – LWW, 2016. – 1631 p. (Chapter 3 Trauma).

2. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 3 Ocular Trauma).

3. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. – 10th ed. – American Academy of Ophthalmology. – Apple Books, 2016. – 288 p. (Chapter 5 Ocular and Orbital Injuries).

4. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 22 Trauma).

Illustrations to Lesson 10



Absolute signs of laceration

– Perforation of the cornea and sclera
– Presence of internal membranes in the wound
– Hole in the iris
– Foreign body inside the eye

Relative signs of laceration

– Hypotony
– Changing the depth of the anterior chamber
– Changing the shape of the pupil
– Hyphema or hemophthalmus
– Clouding of the lens

Roper Hall Classification for Ocular Surface Burns

Grade	Prognosis	Cornea	Conjunctiva/Limbus
I	Good	Corneal epithelial damage	No limbal ischemia
II	Good	Corneal haze, iris details visible	<1/3 limbal ischemia
III	Guarded	Total epithelial loss, stromal haze, iris details obscured	1/3-1/2 limbal ischemia
IV	Poor	Cornea opaque, iris and pupil obscured	>1/2 limbal ischemia

Dua Classification for Ocular Surface Burns

Grade	Prognosis	Clinical findings	Conjunctiva Involvement	Analogue Scale*
I	Very good	0 clock hours of limbal involvement	0%	0/0%
II	Good	< 3 clock hours of limbal involvement	< 30%	0.1-3/1-29.9%
III	Good	Between 3-6 clock hours of limbal involvement	30-50%	3.1-6/31-50%
IV	Good to guarded	Between 6-9 clock hours of limbal involvement	50-75%	6.1-9/51-75
V	Guarded to poor	Between 9 and 12 clock hours of limbal involvement	75-100%	9.1-11.9/75.1-99.9%
VI	Very poor	Total limbus (12 clock hours) involved	Total conjunctiva (100%) involved	12/100%

*The analogue scale records the amount of limbal involvement in clock hours of affected limbus/percentage of conjunctival involvement. The conjunctival involvement should be calculated only for the bulbar conjunctiva, up to including the conjunctival fornices.

LESSON 11. PATHOLOGY OF RETINA AND OPTIC NERVE

1. Topic: Diseases of retina and optic nerve.

2. Academic value:

The knowledge of the retina and the optic nerve anatomy, histological structure, physiology and the ability to reveal signs and symptoms of miscellaneous diseases, to make a differential diagnosis and to choose a proper treatment essential for every ophthalmologist.

3. Aim:

Student should know anatomy, functions, age-related changes of the retina and the optic nerve, clinical features, methods of clinical investigation, principles of treatment of miscellaneous diseases.

Student should be able to perform ophthalmoscopy, to evaluate the condition of the fundus, to make a differential diagnosis.

4. Questions to study and self-control:

1. The anatomy of the retina and the optic nerve.
2. Investigating and imaging techniques for the retina and the optic nerve.
3. Congenital malformations of the retina and the optic nerve.
4. Retinal changes in arterial hypertension.
5. Central retinal artery occlusion, central retinal vein occlusion: causes, symptoms and signs, principles of treatment.
6. Retinal changes in diabetes mellitus.
7. Retinal detachment: classification, clinical features, principles of treatment.

8. Retinitis pigmentosa: clinical features, diagnosis, therapeutic options.

9. Peripheral retinal dystrophies: classification, management.

10. Age-related macular degeneration: non-exudative and exudative, diagnosis, therapeutic options, anti-VEGF therapy.

11. Retinoblastoma: genetics, international classification, clinical features, investigation, treatment.

12. Optic neuritis: etiology, classification, clinical features, treatment, outcomes. The association between optic neuritis and multiple sclerosis.

13. Papilloedema: causes, clinical features, management. Raised intracranial pressure: causes, investigations.

14. Optic atrophy: signs and causes of primary and secondary optic atrophy.

Self-assessment Test

Choose only 1 answer

1. ACUTE ARTERIAL CIRCULATION DISORDERS IN A RETINA AND AN OPTIC NERVE CAN BE CAUSED BY…

A. Spasm
B. Embolism
C. Thrombosis
D. A, B, C

2. THE VEIN THROMBOSIS OF A RETINA IS CHARACTERIZED BY…

A. Decreased vision
B. Retinal edema
C. Hemorrhages
D. Narrowing or loss of a field of vision
E. All listed

3. THE CONSEQUENCES OF RETINAL VEIN THROMBOSIS ARE CHARACTERIZED BY…

A. Secondary degenerative changes of the retina
B. Partial atrophy of the optic nerve
C. Secondary post-thrombotic glaucoma
D. The combination or predominance of one of the following factors

4. THE FOLLOWING OPHTHALMOSCOPIC CHANGES ARE TYPICAL FOR THE FIRST STAGE OF DIABETIC RETINOPATHY (NON-PROLIFIRATIVE)…

A. Hemorrhages into the vitreous body
B. Hemianopsia
C. Neovascularization of the iris
D. Posterior synechiae
E. Macro- and microaneurysms

5. THE CAUSE OF THE DEVELOPMENT OF STAGNANT DISCS OF THE OPTIC NERVES (PAPILLEDEMA) MAY BE…

A. Tumors and tumor-like brain diseases
B. Brain cysts
C. Inflammatory process
D. Brain injury
E. All listed

6. ACUTE DISORDERS OF ARTERIAL BLOOD CIRCULATION IN THE RETINA ARE CHARACTERIZED BY

A. Sharp decrease in sight
B. Retinal vasoconstriction
C. Retinal edema
D. All listed
E. Only A and B

7. THE PHENOMENON OF “CHERRY RED SPOT” IS OBSERVED AT…

A. Neuritis
B. Retina dystrophies
C. Retinal vein thrombosis
D. Central retinal artery occlusion
E. All listed

8. FOR THE PROLIFERATIVE DIABETIC RETINOPATHY THE FOLLOWING OPHTHALMOSCOPIC CHANGES ARE MORE TYPICAL…

A. Micro- and macroaneurysms of vessels of a retina
B. Hemorrhages in vitreous body and retina
C. Proliferative changes, gliosis
D. Detachment of a retina
E. Only B and C
F. All listed

9. A PATIENT WITH DIABETES MELLITUS IS MORE LIKELY TO HAVE THE DISEASE…

A. Sty
B. Chalazion
C. Blepharitis
D. Trophic keratitis
E. Only C and D
F. All listed

10. ON AN INITIAL STAGE OF THE DEVELOPMENT OF PAPILLOEDEMA A VISUAL ACUITY…

A. Does not change
B. Decreases slightly
C. Decreases considerably
D. Falls up to 0

11. THE COLOR OF A DISK AT AN OPTIC NEURITIS IS…

A. Unchangable
B. Hyperemic
C. Pale
D. Wax-like
E. Grey

12. THE RETINAL VESSELS AT AN OPTIC NEURITIS ARE CHARACTERIZED BY…

A. Expansion of arterioles
B. Expansion of venules
C. Expansion of arterioles and venules
D. Narrowing of venules
E. Narrowing of arterioles and venules

13. THE PATIENT WITH DIFFERENT RETINAL PATHOLOGY USUALLY HAS COMPLAINTS, EXCEPT…

A. Decrease in visual acuity
B. Various changes in the field of vision
C. Severe pains in an eye with various irradiation
D. Photopsias
E. Distortion of visible objects

14. WHAT EYE DISEASES LEAD TO DETACHMENT OF A RETINA MORE OFTEN?

A. Myopia (short-sightedness) of high degree with changes on fundus
B. Hypermetropia of average and high degree
C. Acute keratitis
D. Atrophy of an optic nerve
E. Acute iridocyclitis

15. THE SYMPTOMS WHICH ARE NOT TYPICAL FOR THE CENTRAL RETINAL ARTERY OCCLUSION…

A. Acute and considerable decrease in visual acuity
B. Gradual decrease in visual acuity within several days
C. The retina is edematous, milky-white color
D. Symptom of "cherry-red spot"
E. Sharp narrowing of arteries of a retina

16. THE TYPICAL SIGNS OF THE HEREDITARY DYSTROPHIES OF A RETINA ARE…

A. Manifestation of a disease at children's and teen age
B. The progressing decrease in visual acuity, narrowing of fields of vision
C. The progressing hemeralopia (night blindness)
D. All listed

17. THE CAUSE OF THE DEVELOPMENT OF OPTIC NEURITIS IS…

A. Viruses
B. Bacterial flora
C. Toxins
D. Allergy
E. All listed

18. THE RISK OF RETINAL DETACHMENT IS INCREASED IN...

A. Persons with a high degree of myopia
B. Patients after intracapsular cataract extraction
C. Patients after contusion of the eyeball of moderate and severe degree
D. Persons with or without the listed pathology performing heavy physical work associated with prolonged bending of the body
E. Only A and D
F. All of the above

19. TREATMENT OF OPTIC NEURITIS INCLUDES ALL, EXCEPT…

A. Antibacterial therapy
B. Hypotensive therapy
C. Corticosteroids
D. Sanitation of focal infection
E. Dehydration therapy

20. IMPORTANT METHOD OF DETERMINING OF THE CAUSE OF THE RETROBULBAR NEURITIS IS…

A. Gonioscopy
B. Pachymetry
C. Brain MRT
D. Tonometry
E. Skiascopy

Textbooks and Supplementary Materials

Obligatory:

1. R. Sihota, R. Tandon. Parsons' Diseases of the Eye. – 22nd ed. – Reed Elsevier India Private Limited, 2015. – 641 p. (Section IV Diseases of the Retina, Optic Nerve, Intraocular Tumors; Section VII Systemic Ophthalmology).

Additional:

1. American Academy of Ophthalmology, Colin A. McCannel. 2018-2019 Basic and Clinical Science Course, Section 12: Retina and Vitreous. – NY, 2018. – 302 p.

2. Myron Yanoff, Jay S. Duker. Ophthalmology. – 5th ed. – Elsevier, 2018. – 1671 p. (Part 6 Retina and Vitreous, Part 8 Intraocular Tumors, Part 9 Neuro-ophthalmology, Part 1 Genetics).

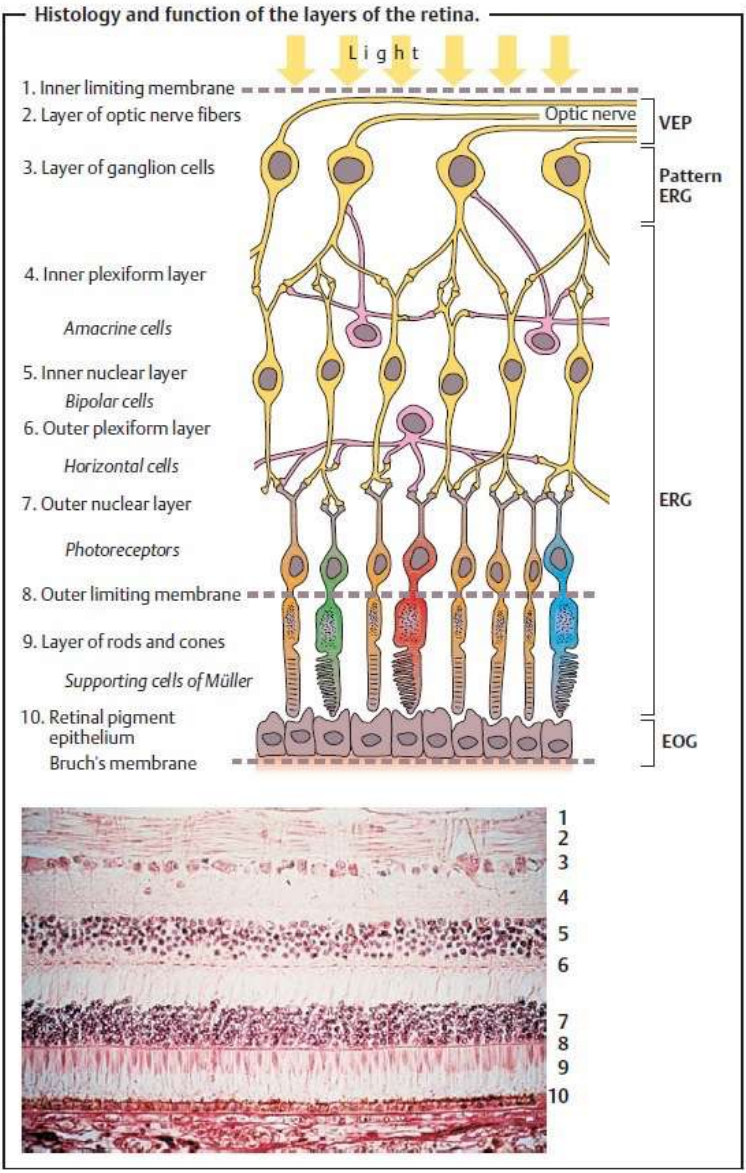
3. Richard C.A., Richard A.H. Basic Ophthalmology: Essentials for Medical Students. – 10th ed. – American Academy of Ophthalmology: Apple Books, 2016. – 288 p. (Chapter 7 Neuro-Ophthalmology; Chapter 9 Ocular Manifestations of Systemic Disease).

4. Alastair K. O. Denniston, Philip I. Murray. Oxford Handbook of Ophthalmology. – Oxford University Press, USA, 2018. – 1249 p. (Chapter 12 Vitreoretinal, Chapter 13 Medical Retina, Chapter 15 Intraocular tumors, Chapter 16 Neuro-ophthalmology, Chapter 18 Paediatric ophthalmology: Retinopathy of prematurity, Developmental abnormalities: posterior segment, Chapter 24 Laser in retina).

5. Nika Bagheri, Brynn Wajda [et al.] (eds.) The Wills Eye Manual. – 7th ed. – LWW, 2016. – 1631 p. (Chapter 11 Retina).

6. John F. Salmon. Kanski's Clinical Ophthalmology. – 9th ed. – Elsevier Limited, 2020. – 917 p. (Chapter 13 Retinal Vascular Disease, Chapter 14 Acquired Macular Disorders, Chapter 15 Hereditary Fundus Dystrophies, Chapter 16 Retinal Detachment, Chapter 19 Neuro-ophthalmology, Chapter 20 Ocular Tumors).

Illustrations to Lesson 11



Classification of retinal changes in hypertension

Grade 0: No changes
Grade 1: Barely detectable arterial narrowing (angiopathy)
Grade 2: Obvious arterial narrowing with focal irregularities (angiosclerosis)
Grade 3: Grade 2 plus retinal hemorrhages, exudates, cotton wool spots or retinal edema
Grade 4: Grade 3 plus papilledema

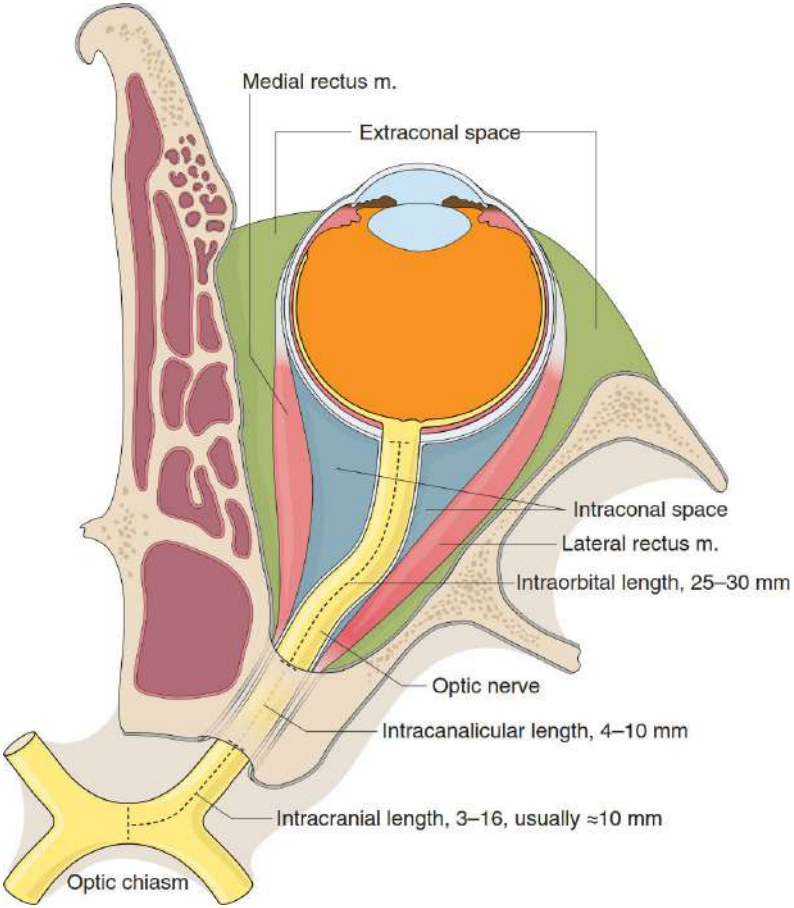
The signs of chronic arteriosclerotic hypertension are also summarized by the Scheie Classification

Stage 1: Widening of the arteriole reflex
Stage 2: Arteriovenous crossing sign
Stage 3: Copper-wire arteries (copper colored arteriole light reflex)
Stage 4: Silver-wire arteries (silver colored arteriole light reflex).

	CRAO CENTRAL RETINAL ARTERY OCCLUSION "eye stroke"	CRVO CENTRAL RETINAL VEIN OCCLUSION "eye dvt"
CLINICAL	Sudden, profound vision loss Painless Monocular	Variable - blurred vision to sudden vision loss Painless Monocular
ETIOLOGY	Embolism Vasculitis Vasospasm Sickle Cell Trauma Glaucoma	Risk factors include: Typical stroke risk factors Hypercoagulable states Glaucoma Compression of the vein in thyroid or orbital tumors
DIAGNOSIS	Retinal pallor Macular cherry red spot +/- Afferent pupillary defect	Optic disk edema Diffuse retinal hemorrhages ("blood-and-thunder")
TREATMENT	Consult ophtho + neurology Case reports of intra-arterial TPA Limited evidence for treatment: possibly digital massage, lowering intraocular pressure	Consult ophtho + neurology No specific treatment

@FOAMpodcast

The optic nerve



The optic nerve is a paired cranial nerve that transmits visual information from the retina to the brain.

The optic nerve carries approximately 1.2 million afferent nerve fibers, which originates in a retinal ganglion cell.

3 layers: dura, arachnoid, pia mater.

4 parts: intraocular (optic nerve head), intraorbital, intracanicular (in the optic canal), intracranial

FINAL TEST "OPHTHALMOLOGY"

Variant 1

1. THE INFERIOR WALL OF THE ORBIT BORDERS WITH…
   A. Maxillary sinus
   B. Ethmoid sinus
   C. Temporal fossa
   D. All of the above

2. TOPICAL ATROPINE IS CONTRAINDICATED IN…
   A. Retinoscopy in children
   B. Iridocyclitis
   C. Corneal ulcer
   D. Primary angle closure glaucoma

3. ON THE FIRST STAGE OF PAPILLEDEMA VISUAL ACUITY…
   A. Could be unchanged
   B. Could be decreased slightly
   C. Could be reduced significantly
   D. Falls to 0

4. PAPILLITIS IS
   A. Inflammation of the intraocular optic nerve
   B. Inflammation of the orbital optic nerve
   C. Inflammation intracanalicular part of the optic nerve
   D. Inflammation of the intracranial optic nerve
   E. Inflammation of all parts of the optic nerve

5. ON A FOUR-POINT TEST THE PATIENT SEES 3 POINTS. WHAT IS HIS VISION?
   A. Binocular
   B. Simultaneous
   C. Monocular, left eye
   D. Monocular right eye

6. MIXED ASTIGMATISM REQUIRES SPECTACLES WITH…

A. Spherical lenses
B. Cylindrical lenses
C. Spherocylindrical lenses
D. Prismatic lenses

7. A 30 YEARS OLD MALE PRESENTS WITH A HISTORY OF INJURY TO THE EYE WITH A LEAF 5 DAYS AGO, PAIN, PHOTOPHOBIA AND REDNESS OF THE EYE FOR 2 DAYS. WHAT WOULD THE MOST LIKELY PATHOLOGY BE?

A. Anterior uveitis
B. Conjunctivitis
C. Fungal corneal ulcer
D. Corneal laceration

8. THE TYPICAL SIGNS OF THE HEREDITARY DYSTROPHIES OF A RETINA ARE…

A. Manifestation of a disease at children's and teen age
B. The progressing decrease in visual acuity, narrowing of fields of vision
C. The progressing hemeralopia
D. Everything listed

9. COMPLICATIONS OF IRIDOCYCLITIS WITH PUPIL'S OCCLUSION ARE…

A. Corneal ulcer
B. Secondary glaucoma
C. Optic neuropathy
D. Retinal detachment

10. AN ENUCLEATION IS ABSOLUTELY REQUIRED IN CASE OF …

A. Recurrent hemophthalm with diabetic retinal angiopathy
B. Risk of sympathetic ophthalmia development
C. Exit shrapnel wound of an eyeglobe
D. All of the above

11. “MORGAGNIAN CATARACT” IS…

A. Initial stage
B. Immature stage
C. Mature stage
D. Hypermature stage

12. WHICH OF THE FOLLOWINGS PASSES THROUGH THE SUPERIOR ORBITAL FISSURE?

A. Oculomotor nerve
B. Abduction and block nerves
C. Ophthalmic nerve
D. Superior ophthalmic vein
E. All of the above

13. INFANTILE GLAUCOMA IS AGE-APPROPRIATE…

A. Up to 3 years
B. 3–10 years
C. 11–35 years
D. Over 35 years old

14. THE PERFECT WAY TO TREAT BLEPHARITIS SUCCESSFULLY IS…

A. To determine the etiology of the disease
B. Systematic, regular treatment
C. Correction of ametropia
D. Rational nutrition
E. All of the above

15. SCOTOMA IS…

A. The area of loss of the field of view, not related to its boundaries
B. Peripheral part of the field of view
C. Loss of a half of the field of view
D. Loss of a quarter of the field of view
E. Narrowed borders of the visual field

16. OPTIC NEURITIS IS CHARACTERIZED BY…

A. Sudden decrease in visual acuity
B. Hyperemia of the optic disc
C. Optic disc edema
D. All of the above
E. Only B and C

17. WHAT IS THE STRABISMUS ANGLE IF THE REFLEX FROM THE OPHTHALMOSCOPE IS LOCALIZED ON THE CORNEA OF THE SQUINTING EYE ALONG THE EDGE OF THE PUPIL?

A. 15
B. 20
C. 30
D. 45
E. 60

18. EXTERNAL EXAMINATION DOES NOT ALLOW TO DIAGNOSE THE FOLLOWING OCULAR PATHOLOGY…

A. Vitreous body
B. Cornea
C. Eyelids
D. Conjunctiva

19. IN HYPEROPIA…

A. The eye doesn't possess enough optical power for its axial length
B. The eye possesses too much optical power for its axial length
C. Light rays focus in front of the retina
D. Light rays focus behind the retina
E. A and D are correct
F. B and C are correct

20. THE EVIDENT DIAGNOSTIC SIGN OF CORNEAL ULCER IS …

A. Ciliary injection
B. Blepharospasm
C. Miosis
D. Positive fluorescein test.

21. WHAT OF THE LISTED CHANGES OF A FUNDUS IS NOT TYPICAL FOR A ECLAMPSIA OF PREGNANT WOMEN?

A. Retinal angiopathy
B. Symptom of "cherry red spot"
C. Retinopathy
D. Neuroretinopathy
E. Nothing from listed

22. TREATMENT OF OPTIC NEURITIS INCLUDES…

A. Antibacterial therapy
B. Corticosteroids
C. Sanitation of focal infection
D. Improving of microcirculation
E. Dehydration therapy
F. All of the above

23. A PATIENT WITH AN EYE PAIN, REDUCED VISION, PRECIPITATES ON THE CORNEAL ENDOTHELIUM, MIOSIS AND PERICORNEAL INJECTION WAS DIAGNOSED WITH…

A. Acute conjunctivitis
B. Acute iridocyclitis
C. Acute glaucoma attack
D. Lacrimal bag's phlegmon

24. CHOOSE CLINICAL FEATURES OF SYMPATHETIC INFLAMMATION…

A. Serous iridocyclitis
B. Fibroid plastic iridocyclitis
C. Neuroretinitis
D. All of the above

25. CATARACTS THAT ARE CAUSED BY ULTRASHORT WAVES COULD BE PREVENTED BY…

A. Safety glasses
B. Shielding installations
C. Ophthalmologist's examinations
D. All is true

26. THE LACRIMAL DUCT OPENS IN…

A. Lower nasal passage
B. Middle nasal passage
C. Upper nasal passage

27. METHOD OF THE INVISTIGATION OF THE ANTERIOR CHAMBER ANGLE IS…

A. Gonioscopy
B. Ophthalmoscopy
C. Biomicroscopy
D. Campimetry

28. WHICH OF THE FOLLOWING ARE NOT THE CAUSES OF BLEPHARITIS…

A. Digestive tract pathology
B. Endocrine and metabolic disorder
C. Helminth invasion
D. Uncorrected refraction anomalies
E. Paresis of oculomotor nerve

29. NORMALLY, THE MINIMUM ANGLE OF VIEW IS…

A. 1 second
B. 1 minute
C. 1 degree
D. 5 minutes

30. BINOCULAR VISION IS …

A. Vision with two eyes
B. Two eyes vision with fusion of images into a single image (fusion)
C. Near vision
D. Distant vision
E. Sum of images of both eyes

31. LOCAL “BLINDING” IRRITATION WITH LIGHT OF THE CENTRAL FOSSA OF THE RETINA OCCURS WHILE USING…

A. Large reflex-free ophthalmoscope
B. Refractometers
C. Ophthalmometers
D. Slit lamps
E. Specular ophthalmoscopes

32. OPHTHALMOSCOPY IS A METHOD OF…

A. Lacrimal system examination
B. Fundus examination
C. Anterior chamber’s angle examination
D. Visual acuity measurement

33. A PATIENT 40 Y.O. WITH EMMETROPIA REQUIRES SPECTACLES WITH…

A. +3,0 D lenses
B. +1,0 D lenses
C. +4,0 D lenses
D. None of the above

34. THE PHENOMENON OF “CHERRY RED SPOT” IS OBSERVED AT…

A. Neuritis
B. Retina dystrophies
C. Retina vein thrombosis
D. Sharp arterial impassability of a retina
E. Everything listed

35. CHOOSE AN ANSWER THAT ISN’T A SPECIFIC FEATURE OF IRITIS…

A. Pericorneal injection.
B. Changed color of the iris.
C. Corneal edema.
D. Changed pattern of the iris.

36. EYE'S CONTUSION COULD BE ACCOMPANIED BY…

A. Subconjunctival sclera breakage
B. Intraocular hypotonia
C. Lens luxation
D. All of the above

37. CLINICAL FEATURES OF CATARACT INCLUDE…

A. Rapid decrease in visual acuity
B. Gradual decrease in visual acuity
C. Photophobia
D. Change in eye refraction towards its increase (myopization)
E. Blepharospasm

38. INDICATE WHAT IS THE AVERAGE AXIAL LENGTH OF THE EYEBALL OF AN ADULT WITH EMMETROPIA…

A. 20 mm
B. 25 mm
C. 23 mm
D. 24 mm
E. 22 mm

39. RISK FACTORS FOR PRIMARY OPEN-ANGLE GLAUCOMA ARE NOT…

A. Heredity
B. Myopia
C. Age over 40
D. Hyperopia

40. ANKYLOBLEPHARON IS…

A. Eyelid shortening, inability to close a palpebral fissure
B. Partial or full coalescence of eyelids
C. Absence of eyelids and palpebral fissure
D. Narrowing and shortening of palpebral fissure

41. VISUAL ACUITY IS...

A. The ability of the eye to distinguish colors and shades clearly
B. The ability of the eye to distinguish objects in the center and on the periphery clearly

C. The ability of the eye to perceive separately the points located from each other at a minimum distance
D. The ability to perceive the space by a motionless eye

42. CAUSES OF OPTIC NEURITIS ARE…

A. Viral
B. Bacterial
C. Toxic
D. Allergic
E. All of the above

43. WHICH OF THE FOLLOWING INDICATORS OF VISUAL ACUITY BELONG TO A HIGH DEGREE OF AMBLYOPIA?

A. 0.04 and below
B. 0.05–0.1
C. 0.2–0.3
D. 0.4–0.5
E. 0.6–0.7

44. WHICH METHOD IS NOT SUITABLE FOR EXAMINING THE CONTENTS OF THE ORBIT?

A. X-ray
B. Ultrasound examination
C. Biomicroscopy
D. Computed tomography

45. CHOOSE THE RIGHT DEFINITION OF ANISOMETROPIA…

A. A difference in refractive errors in the 2 eyes
B. An absence of emmetropia
C. An unequal curvature along the two principal meridians of the cornea
D. None of the above

46. IRRESPECTIVE OF THE ETIOLOGY OF A CORNEAL ULCER THE INDICATED DRUG IS…

A. Corticosteroids
B. Cycloplegics
C. Antibiotics
D. Antifungals

47. THE FOLLOWING OPHTHALMOSCOPIC CHANGES ARE TYPICAL FOR THE FIRST STAGE OF DIABETIC RETINOPATHY…

A. Hemorrhages into the retina and vitreous
B. Hemianopsia
C. Neovascularization of the iris
D. Posterior synechiae, narrowing of arteries and arterioles
E. Macro-and microaneurysms

48. THE NAME OF THE TISSUE DEFECT OF THE IRIS IS…

A. Coloboma
B. Aniridia
C. Heterochromia
D. Rubeosis

49. BY THE SEVERITY OF VISUAL IMPAIRMENT SEVERAL DEGREES COULD BE IDENTIFIED AS…

A. I–II degrees
B. I–III degrees
C. I–IV degrees
D. I–V degrees

50. THE REFRACTIVE POWER OF THE LENS AT REST OF THE ACCOMMODATION IS…

A. 60 D
B. 10 D
C. 20 D
D. 50 D

Variant 2

1. WHICH OF THE FOLLOWING IS NOT THE PART OF THE LACRIMAL DRAINAGE SYSTEM?

A. The puncta
B. The canaliculi
C. The lacrimal gland
D. The lacrimal sac
E. The nasalacrimal duct

2. THE ARTERIA OPHTHALMICA IS THE TERMINAL BRANCH OF…

A. Internal carotid artery
B. Lacrimal artery
C. One of the branches of the anterior ciliary artery
D. External carotid artery
E. One of the branches of the posterior long ciliary artery.

3. BLOOD SUPPLY TO THE IRIS IS PROVIDED BY (2 ANSWERS ARE CORRECT)…

A. Posterior short ciliary arteries
B. Posterior long ciliary arteries
C. Central retinal artery
D. Anterior ciliary arteries
E. All of the above

4. THE INFERIOR WALL OF THE ORBIT BORDERS WITH…

A. Maxillary sinus
B. Ethmoid sinus
C. Temporal fossa
D. All of the above

5. WHICH METHOD COULD BE USED TO DETECT OPACITY IN THE CORNEA?

A. Biomicroscopy
B. Lateral and bifocal illumination
C. External examination
D. All of the above

6. OPHTHALMOSCOPY IS A METHOD OF…

A. Lacrimal system examination
B. Fundus examination
C. Anterior chamber's angle examination
D. Visual acuity measurement

7. CHOOSE METHODS OF INTRAOCULAR PRESSURE'S MEASUREMENT…

A. Palpation
B. Tranaspalpebral
C. Pneumotonometry
D. Maklakoff's tonometry
E. All of the above

8. WHICH METHOD IS NOT SUITABLE FOR EXAMINING THE CONTENTS OF THE ORBIT?

A. X-ray
B. Ultrasound examination
C. Biomicroscopy
D. Computed tomography

9. THE FUNCTION OF LIGHT PERCEPTION IS PROVIDED BY…

A. Layer of bipolar cells
B. Layer of nerve cells
C. Cones
D. Rods
E. C and D are correct

10. THE INVESTIGATION OF PERIPHERAL VISION CAN BE CARRIED OUT BY THE FOLLOWING METHODS, EXCEPT…

A. Perimetry
B. The visual acuity testing
C. Campimetry
D. Control (tentative)

11. THE TERM “FIELD OF VIEW” MEANS…

A. Space perceived by the fixed eye
B. Nearest part of space
C. Remote part of the space

12. PERIPHERAL VISION PROVIDES…

A. The form definition, the value of items
B. Color perception of objects
C. High central vision
D. Orientation in space

13. THE REFRACTIVE STATE IN WHICH PARALLEL RAYS OF LIGHT FROM A DISTANT OBJECT ARE BROUGHT TO FOCUS ON THE RETINA IS…

A. Emmetropia
B. Myopia
C. Hyperopia
D. Presbyopia

14. CHOOSE THE RIGHT DEFINITION OF A CLINICAL REFRACTION…

A. The refractive power of the whole optic system
B. A position of the principal focus concerning the sensitive layer of retina
C. A refractive error
D. A method of ametropia’s correction

15. CHOOSE THE AVERAGE AXIAL LENGTH OF THE ADULT'S EMMETROPIC EYE…

A. 40 mm
B. 24 mm
C. 12 mm
D. 28 mm

16. CHOOSE THE RIGHT DEFINITION OF ANISOMETROPIA…

A. A difference in refractive errors in the 2 eyes
B. An absence of emmetropia
C. An unequal curvature along the two principal meridians of the cornea
D. None of the above

17. PINGUECULA IS…

A. Ptosis of upper eyelids
B. Skin fold of the upper eyelid that covers the medial canthus
C. Yellowish lesions of the conjunctiva, that never impinge on the cornea
D. Dense neoplasm

18. EPICANTHUS IS…

A. Ptosis of upper eyelids
B. Skin fold of the upper eyelid that covers the medial canthus
C. Yellowish lesions of the conjunctiva, that never impinge on the cornea
D. Dense neoplasm

19. DACRYOCYSTITIS IS AN INFLAMMATION OF…

A. Lacrimal gland
B. Lacrimal suc
C. Lacrimal punctum
D. Lacrimal duct

20. WHICH NERVE INNERVATES THE ORBICULAR MUSCLE OF EYE (M. ORBICULARIS OCULI)?

A. N. Facialis
B. N. Nasociliaris
C. N. Opticus
D. N. Oculomotorius

21. TOPICAL STEROIDS ARE CONTRAINDICATED IN A CASE OF VIRAL CORNEAL ULCER FOR FEAR OF…

A. Secondary glaucoma
B. Cortical cataract.
C. Corneal perforation
D. Secondary viral infection.

22. THE EVIDENT DIAGNOSTIC SIGN OF CORNEAL ULCER IS …

A. Ciliary injection
B. Blepharospasm
C. Miosis
D. Positive fluorescein test.

23. THE EFFECTIVE TREATMENT OF DENDRITIC ULCER OF THE CORNEA IS…

A. Surface anesthesia
B. Local corticosteroids
C. Systemic corticosteroids
D. Acyclovir ointment

24. HERPES SIMPLEX KERATITIS IS CHARACTERIZED BY…

A. Presence of pus in the anterior chamber
B. No tendency to recurrence
C. Corneal hyposthesia
D. Tendency to perforate

25. A CLINICAL FEATURE OF ANTERIOR UVEITIS IS…

A. Precipitates.
B. Ptosis.
C. Congestive injection of the eyeball.
D. Subluxation of the lens.

26. THE SIGN OF ANTERIOR UVEITIS IS…

A. Rear synechia
B. Decreased corneal sensitivity
C. Exophthalmos
D. Hemophthalmos

27. MALIGNANT TUMOR OF THE CHOROID IS CALLED…

A. Melanoblastoma
B. Cystitis
C. Adenoma
D. Atheroma

28. A PATIENT WITH AN EYE PAIN, REDUCED VISION, PRECIPITATES ON THE CORNEAL ENDOTHELIUM, MIOSIS AND PERICORNEAL INJECTION WAS DIAGNOSED WITH…

A. Acute conjunctivitis
B. Acute iridocyclitis
C. Acute glaucoma attack
D. Lacrimal bag's phlegmon

29. CATARACT IS…

A. Lens displacement
B. Absence of the lens
C. Artificial lens
D. Clouding of the lens

30. ARTIPHAKIA IS…

A. presence of an artificial lens in the eye
B. Absence of the lens
C. Lens displacement
D. Clouding of the lens

31. DURING A BIOMICROSCOPY OF THE TRANSPARENT LENS, THE PUPIL AREA IS…

A. Black
B. Red
C. Grey
D. No correct answer

32. THE SIGNS OF THE ABSENCE OF THE LENS. EVERYTHING IS TRUE, EXCEPT…

A. Deep anterior chamber
B. Iris trembling
C. Decreased intraocular pressure
D. High degree hyperopia

33. THE TREATMENT OF CHOICE FOR THE OTHER EYE IN ANGLE CLOSURE GLAUCOMA IS

A. Surgical peripheral iridectomy
B. Yag laser iridotomy
C. Trabeculotomy
D. Trabeculectomy

34. TOPICAL ATROPINE IS CONTRAINDICATED IN…

A. Retinoscopy in children
B. Iridocyclitis
C. Corneal ulcer
D. Primary angle closure glaucoma

35. THE NUMBER OF LAYERS IN NEUROSENSORY RETINA IS…

A. 9
B. 10
C. 11
D. 12

36. 100 DAYS GLAUCOMA IS SEEN IN…

A. Central Retinal Artery Occlusion
B. Branch Retinal Artery Occlusion
C. Central Retinal Vein Occlusion
D. Branch Retinal Vein Occlusion

37. COMBINED EYE'S INJURY IS CHARACTERIZED BY…

A. A penetrating injury with an intraocular foreign body

B. Visual organ and other organs injures
C. Blast eyeglobe injury with an open globe injury
D. All of the above

38. WHICH METHOD COULDN'T BE USED TO EVALUATE AN INTRAOCULAR FOREIGN BODY?
A. Medical ultrasound
B. Comberg & Baltin method
C. Refractometry
D. All of the above is incorrect

39. RADIOGRAPH SURVEY OF AN ORBIT IN CASES OF AN OPEN GLOBE INJURIES IS REQUIRED…
A. In all cases
B. Only if there is an intraocular foreign body during anamnesis
C. Only if there are symptoms of orbit walls' breakage
D. Only when glass particle is localized behind the eyeball

40. EYE'S CONTUSION COULD BE ACCOMPANIED BY…
A. Subconjunctival sclera breakage
B. Intraocular hypotonia
C. Lens luxation
D. All of the above

41. OPTIC NEURITIS IS CHARACTERIZED BY…
A. Sudden decrease in visual acuity
B. Hyperemia of the optic disc
C. Optic disc edema
D. All of the above
E. Only B and C

42. CHOOSE THE MAIN FEATURE OF ACUTE OPTIC NEURITIS…

A. Sudden decrease in the visual acuity
B. Narrowing of the peripheral vision
C. Hyperemia of the optic disk
D. Hemorrhage around the optic disk
E. All of the above

43. WHICH OF THE FOLLOWING FEATURES IS TYPICAL FOR THE FIRST STAGE OF PAPILLEDEMA?

A. Sharp decrease in visual acuity
B. Sharp decrease in peripheral vision
C. Pain in the eye
D. The ONH is enlarged, protrudes into the vitreous body, its margins are fuzzy
E. All of the above

44. OPTIC NERVE ATROPHY COULD BE CAUSED BY ALL OF THE FOLLOWING ABOVE, EXCEPT

A. Central nervous system diseases
B. Intoxication, viral infections
C. Hypertension, atherosclerosis
D. Head Injury
E. Diseases of the gastrointestinal tract

45. WHAT IS THE STRABISMUS ANGLE IF THE REFLEX FROM THE OPHTHALMOSCOPE IS LOCALIZED ON THE CORNEA OF THE SQUINTING EYE IN THE MIDDLE BETWEEN THE PUPIL AND THE EDGE OF THE CORNEA?

A. 15
B. 20
C. 30
D. 45
E. 60

46. WHAT IS THE STRABISMUS ANGLE IF THE REFLEX FROM THE OPHTHALMOSCOPE IS LOCALIZED ON THE CORNEA OF THE SQUINTING EYE ALONG ITS EDGE?

A. 15
B. 20
C. 30
D. 45
E. 60

47. ON A FOUR-POINT TEST, THE PATIENT SEES 3 POINTS. WHAT IS HIS VISION?

A. Binocular
B. Simultaneous
C. Monocular, left eye
D. Monocular, right eye

48. ON A FOUR-POINT TEST, THE PATIENT SEES 4 POINTS. WHAT IS HIS VISION?

A. Binocular
B. Simultaneous
C. Monocular, left eye
D. Monocular, right eye

49. ACUTE DISORDERS OF ARTERIAL BLOOD CIRCULATION IN THE RETINA ARE CHARACTERIZED BY…

A. Sharp decrease in sight
B. Retinal vasoconstriction
C. Retinal edema
D. All listed
E. Only A and B

50. THE PHENOMENON OF “CHERRY RED SPOT” IS OBSERVED AT…

A. Neuritis
B. Retina dystrophies
C. Retina vein thrombosis
D. Sharp arterial impassability of a retina
E. Everything listed

TOPICS OF ESSAYS

1. Methods of central vision research.
2. Research methods in peripheral vision.
3. Pupillary reactions. Research methods. Pathology.
5. Subjective and objective methods of examination of visual acuity.
6. Gonioscopy.
7. Intraocular pressure, ways of outflow of intraocular fluid.
8. Research methods in intraocular pressure.
9. Ultrasound examination in ophthalmology.
10. Twilight vision and methods of its research.
11. Color perception and methods of its research.
12. Retina, its histological structure and functions.
13. Refraction, types of refractive errors.
14. Astigmatism, types of astigmatism.
15. Accommodation, its mechanism.
16. Strabismus, diagnostic methods.
17. Treatment of various types of strabismus.
18. The blood supply of the eyelids, especially of the venous outflow.
19. Blepharitis, its types, treatment.
20. Hordeolum, halazion, clinical picture, treatment.
21. Conjunctivitis, types, treatment.
22. Acute and chronic dacryocystitis, treatment.
23. Dacryocystitis in newborns, treatment.
24. Optical coherence tomography in ophthalmology.
25. Computed tomography in ophthalmology.
26. Pachymetry.
27. State of ophthalmic care in India.
28. Private eye pathology in India.
29. Ocular toxoplasmosis.
30. Helminthiasis and the organ of vision.

THE ANSWERS TO THE TESTS

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
1. C	1. C	1. A	1. B	1. E	1. B
2. A	2. C	2. –	2. F	2. A	2. B
3. B	3. A	3. B		3. B	3. A
4. A	4. C	4. B		4. B	4. C
5. A	5. F	5. A		5. A	5. A
6. D	6. D	6. D		6. C	6. C
7. E	7. B	7. B		7. B	7. C
8. D	8. A	8. A		8. B	8. D
9. A	9. D	9. A		9. A	9. D
10. D	10. B	10. C		10. E	10. C
11. D	11. A	11. C		11. E	11. A
12. B	12. A	12. B		12. B	12. C
13. E	13. C	13. A		13. F	13. D
14. D	14. C	14. E		14. D	14. B
15. B	15. A	15. –		15. B	15. C
16. C	16. D	16. C		16. A	16. D
17. A	17. C	17. B		17. B	17. B
18. A	18. B	18. B		18. D	18. A
19. C	19. E	19. A		19. A	
20. A	20. A	20. E		20. C	
	21. D				

Lesson 7	Lesson 8	Lesson 9	Lesson 10	Lesson 11
1. B	1. B	1. B	1. D	1. D
2. A	2. C	2. D	2. C	2. E
3. C	3. C	3. B	3. C	3. D
4. A	4. D	4. C	4. D	4. E
5. B	5. A	5. D	5. B	5. E
6. C	6. B	6. A	6. C	6. D
7. D	7. E	7. C	7. A	7. D
8. A	8. C	8. B	8. D	8. E
9. D	9. A	9. D	9. D	9. F
10. C	10. D	10. A	10. B	10. A
11. A	11. D	11. D	11. C	11. B
12. A	12. A	12. B	12. D	12. C
13. B	13. B	13. C	13. B	13. C
14. B	14. C	14. B	14. D	14. A
15. B	15. D	15. B	15. B	15. B
16. C	16. C	16. C	16. A	16. D
17. D	17. C	17. C	17. C	17. E
18. C	18. D	18. B	18. A	18. F
19. C	19. B	19. A	19. D	19. B
20. B		20. A		20. C

Final Test

Variant 1			Variant 2		
1. A	18. A	35. C	1. C	18. B	35.B
2. D	19. E	36. D	2. A	19. B	36.C
3. A	20. D	37. B, D	3. B, D	20. A	37.B
4. A	21. B	38. D	4. A	21. C	38.C
5. C	22. F	39. D	5. D	22. D	39.A
6. C	23. B	40. B	6. B	23. D	40.D
7. C	24. D	41. C	7. E	24. C	41.D
8. D	25. A	42. E	8. C	25. A	42.E
9. B	26. A	43. B	9. E	26.A	43.D
10. B	27. A	44. C	10. B	27.A	44.E
11. D	28. E	45. A	11. A	28.B	45.C
12. E	29. B	46. B	12. D	29.D	46.D
13. B	30. B	47. E	13. A	30.A	47.C
14. E	31. A	48. A	14. B	31.B	48.A
15. A	32. B	49. C	15. B	32.C	49.D
16. D	33. B	50. C	16. A	33.B	50.D
17. A	34. D		17. C	34.D	

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