جامعة الفرات الأوسط
كلية التقنيات الصحية و الطبية
قسم تقنيات فحص البصر

م.م غيث حسين علي

صحة عينية / المرحلة الثانية

L1

Introduction: review of anatomy & physiology the eye

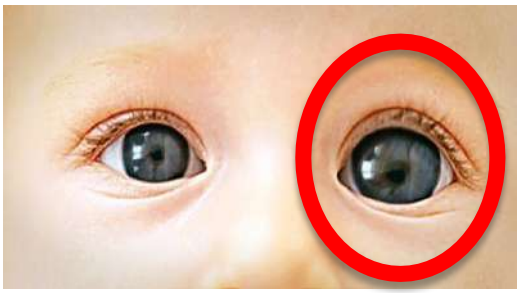
❖ Development of the Eye after Birth

- At birth, the eye is relatively large in relation to the rest of the body.
- The eye reaches full size by the age of 8 years.
- Visual acuity developed until the age of 20 years.
- The lens continues to enlarge throughout the life.
- The iris has a bluish color due to little or no pigment on the anterior surface.
- During early infant life, the cornea & sclera can be stretched by raised IOP → enlargement of the eye.
- Normal axial of the eye is 21-24mm (2.4cm)
  - Elevated intraocular pressure with onset in the first year of life it called congenital glaucoma.
  - Eyes consist of globe (eyeball, extraocular muscles) and adnexa (lacrimal gland and sac).

- **Refractive power depends on two factors:**

1. Surfaces: cornea and lens
2. Axial length:

- **Hyperopia**: image falls behind the retina due. Most common in children
- **Myopia**: image fells in front of the retina.
- **Emmetropia**: image falls on the retina. Risk of myopia with time.

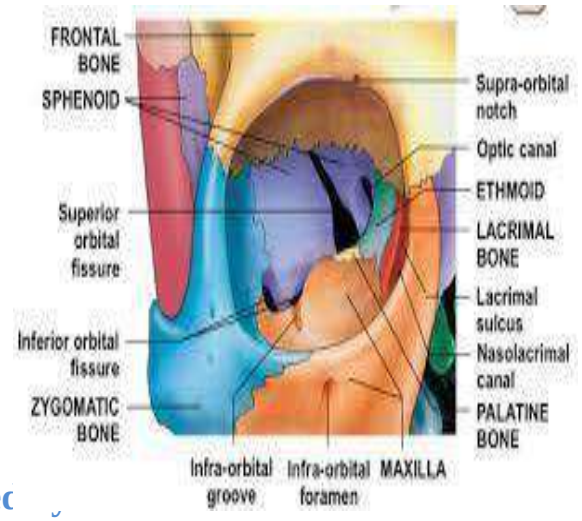


Parents came to the clinic complaining that their newborn has smaller right eyeballs. In fact, the left eye is enlarged due to increased ocular pressure. Unilateral glaucoma in pediatric groups tends to clinic earlier than bilateral glaucoma.

❖ The Orbit

● **Seven bones contribute the bony orbit and surrounded by nasal sinuses.**

1. Maxilla
2. Zygomatic
3. Frontal
4. Ethmoid
5. Lacrimal
6. Sphenoid
7. Palatine bone



● **The orbital wall, pear-like shaped, formed**

❖ Extraocular Muscles

● **Anatomy**

- **Six muscles**: Four recti & two oblique muscles.
- All are supplied by III Oculomotor nerve **except**
  - Superior oblique by Trochlear (SO4) -muscle of reading-
  - Lateral rectus by Abducens (LR6)
    - The **recti** are attached **in front** of the equator, unlike the obliques attach behind the equator.

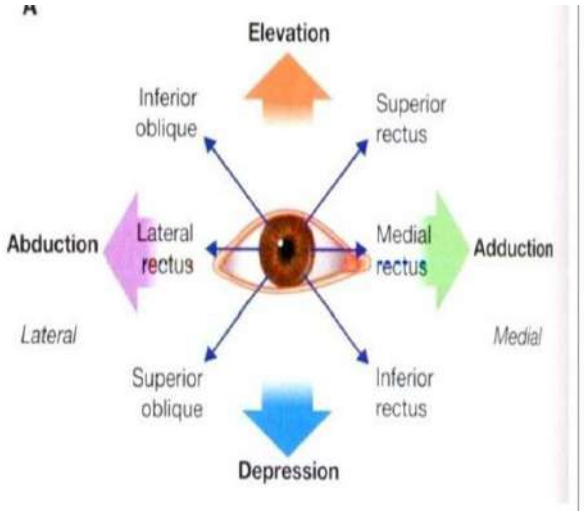
● **Notes:**

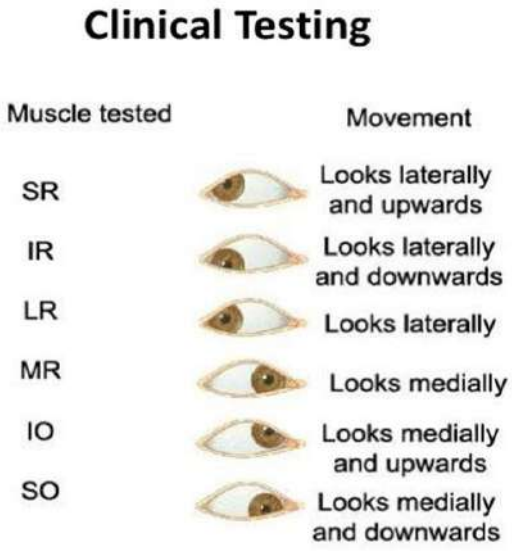
1- Superior oblique is the most superior muscle in the orbit.

2- Medial recti are a strong muscle that keeps the eye in its normal position. During sleep, the eye tends to move laterally due to the relaxation of the medial recti. It‟s important that during preoperative assessment of a patient with strabismus. Check the angle of deviation before injecting anesthetic drugs; the eyes changes angles during sleep.

3- **Abducens nerve** is the only nerve passing through the **cavernous sinus**. A trauma at this structure will cause: **medial squint**

Muscles	Primary action	Secondary action
Superior rectus	Elevation	Adduction, Intorsion
Inferior rectus	Depress	Adduction, Extortion
Medial rectus	Adduct	-
Lateral rectus	Abduct	-
Superior oblique	**Intorsion**	**Abduction, Depression**
Inferior oblique	**Extortion**	**Abduction, Elevation**





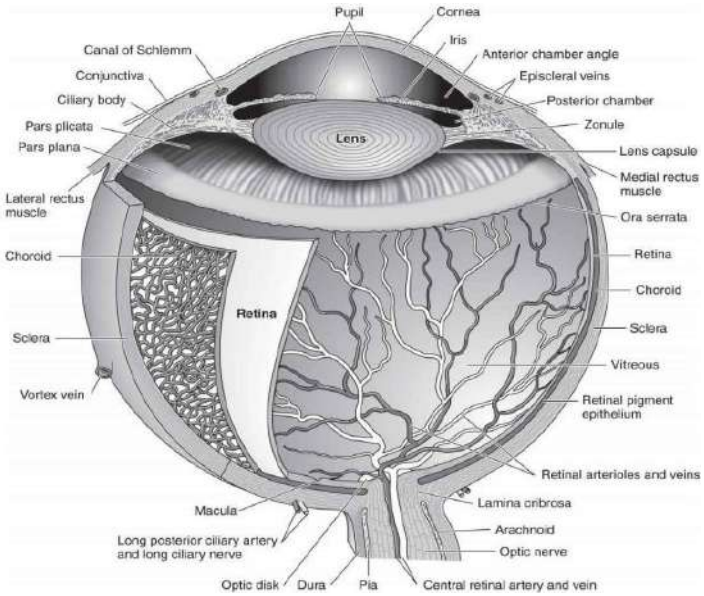
❖ The Chambers of the Eye:

Consists of two chambers:

- The anterior chamber, in front of the iris
- The posterior chamber, immediately behind the iris.

These two chambers communicate through the pupil and are filled with clear aqueous humor. The aqueous humor is secreted by the non-pigmented epithelium of the ciliary body and drained through the Schlemm's canal.

- The vitreous cavity: filled by gel-like structure.



❖ The Globe

Coats of the Eye:

A. Fibrous coat "outer protective coat - protective layer - external":

- Made up of the sclera (posterior opaque part) and the cornea (anterior transparent part). Both are formed of collagenous fibers with different arrangement.
- Lamina cribrosa (check the image above) is the area of the sclera that is pierced by the nerve fibers of the optic nerve.

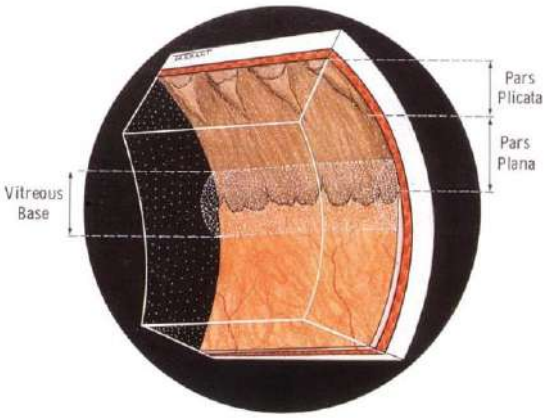
- Cornea is in contact posteriorly with the aqueous humor.
- "the cornea is stronger than the sclera due to her special collagenous arrangement"

B. Vascular pigmented coat "middle vascular coat" / Uveal tract:

- Consists from behind forward, of the iris, ciliary body and choroid.
  - **The choroid** is composed of an outer pigmented layer and an inner, highly vascular layer.
  - **The ciliary body** is continuous posteriorly with the choroid, and anteriorly, it lies behind the peripheral margin of the iris.
- It is subdivided into three parts:

C. Inner layer:

- composed of the optic nerve and the retina.
- The retina extends forward to within 6 mm of the limbus.
- Lenses attached to ciliary body by zonular fibers about 70,000 in number.
- Power length in cornea 42 db while in lens 18.



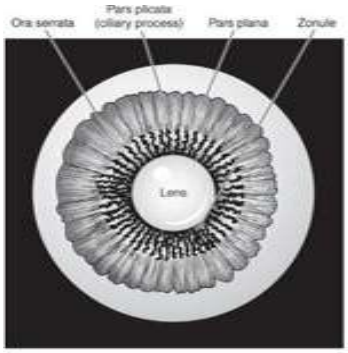


Figure 1–11. Posterior view of ciliary body, zonule, lens, and ora serrata.

❖ **Conjunctiva:** (transparent membrane covering sclera) :

1. **Bulbar conjunctiva**: covers the scler

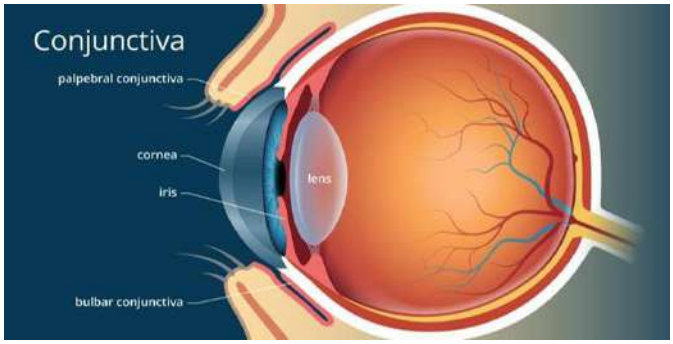
Conjunctiva

Transparent membrane covering sclera

1- Palpebral Conjunctiva (orbital cavity septum)**:** covers the eye lid. It contains accessory gland which responsible for tear secretion while lacrimal gland a reflex secretion).

2- Bulbar Conjunctiva: covers the anterior part of the sclera

3- Forniceal Conjunctiva.

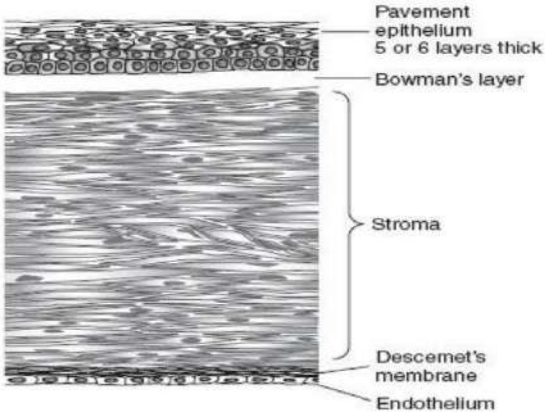


❖ Cornea

- It‟s a 500 – 530 micron thick transparent avascular tissue.

➢ The anterior corneal take the oxygen from direct exposure However most of the corneal take it from acquis fluid posteriorly *<u>It has 5 layers</u>*

- Epithelium
- Bowman's membrane
- Stroma
- Descemet's membrane
- Endothelium



❖ Iris and Pupil:

The iris is a thin, contractile, pigmented diaphragm with a central aperture, the pupil. It is positioned in front of the lens, dividing the anterior chamber from the posterior chamber, each of which contains aqueous humor that passes through the pupil. The iris has **two muscles:**

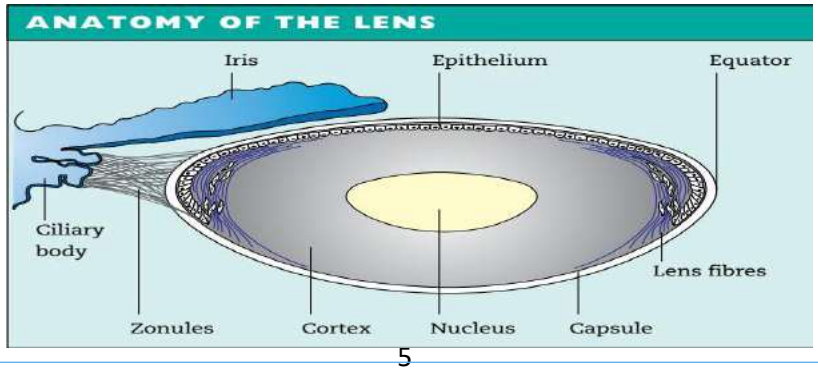
1) **Dilator pupillae**: dilation of pupil supplied by sympathetic fibers.
2) **Sphincter pupillae**: constriction of pupil supplied by parasympathetic fibers from the oculomotor nerve.

❖ The Lens:

● The lens is a transparent, **avascular**, biconvex structure enclosed in a transparent capsule.

● It‟s encircled by the ciliary processes. Anterior to the lens is the aqueous and posterior to it is the vitreous.

● Crystalline lens is the only structure continuously grows throughout life. By the age of 40 the lens become less elastic (increase in refractive index) that could develop a condition called nuclear sclerosis which is an early stage of cataract.



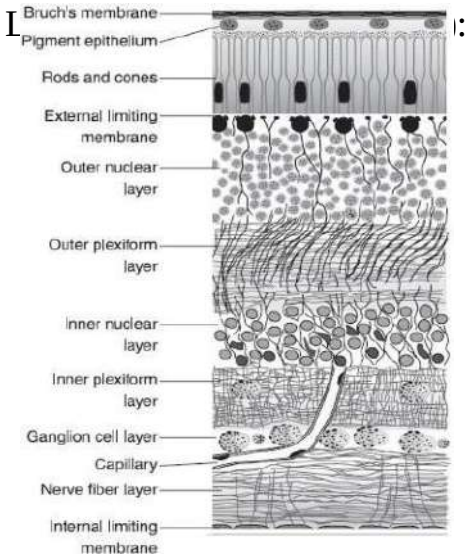
● **The lens consists of an**

1. **Elastic capsule**: envelops the lens.
2. **Cuboidal epithelium**: confined exclusively to the **anterior** surface of the lens.
3. **Lens fibers**, which are formed from the cuboidal epithelium at the equator of the lens.

❖ Retina and Vitreous:

● **Main function**: its responsible of changing photon power into action potential through photoreceptors

1. Retinal pigment epithelium
2. Photoreceptor layer
3. Outer limiting membrane
4. Outer nuclear layer
5. Outer plexiform layer inner
6. Inner nuclear layer
7. Inner plexiform layer
8. Ganglion cell layer
9. Nerve fiber layer
10. Internal limiting membrane



❖ Optic Nerve

● Contains around 1.2 million nerve fibers, which are axons of the retinal ganglion cells. The length of optic nerve in these structures:

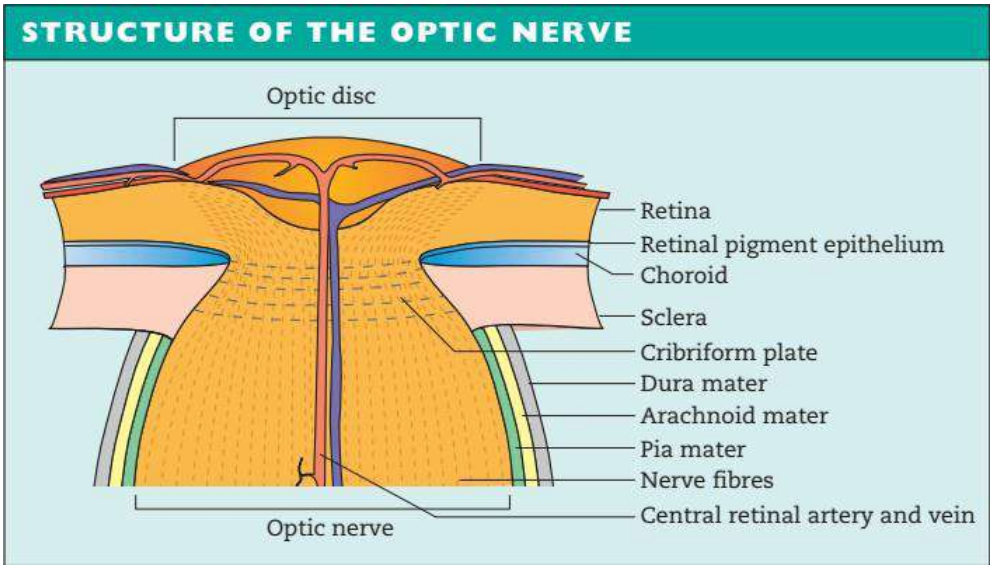
- 1 mm in the globe.
- 25 mm in the orbit.
- 9 mm in the optic canal.
- 16 mm in the cranial space
- Partial decussation occurs and about 53% of the fibers cross to form the optic tracts (if pt have carotid lesion will develop binasal hemianopia)

● The optic nerve leaves the retina about 3 mm to the **medial side** of the macula lutea by the optic disc. The optic disc is slightly depressed at its center, where it is pierced by the **central retinal artery**. At the optic disc, is a **complete absence** of rods and cons, so that the optic disk is insensitive to light and is referred to as the “blind spot”.

● Optic disc: the terminal part of the optic nerve where ganglion cells fibers leaves the eye.

● Optic cup: a central depression whethin the optic disc.

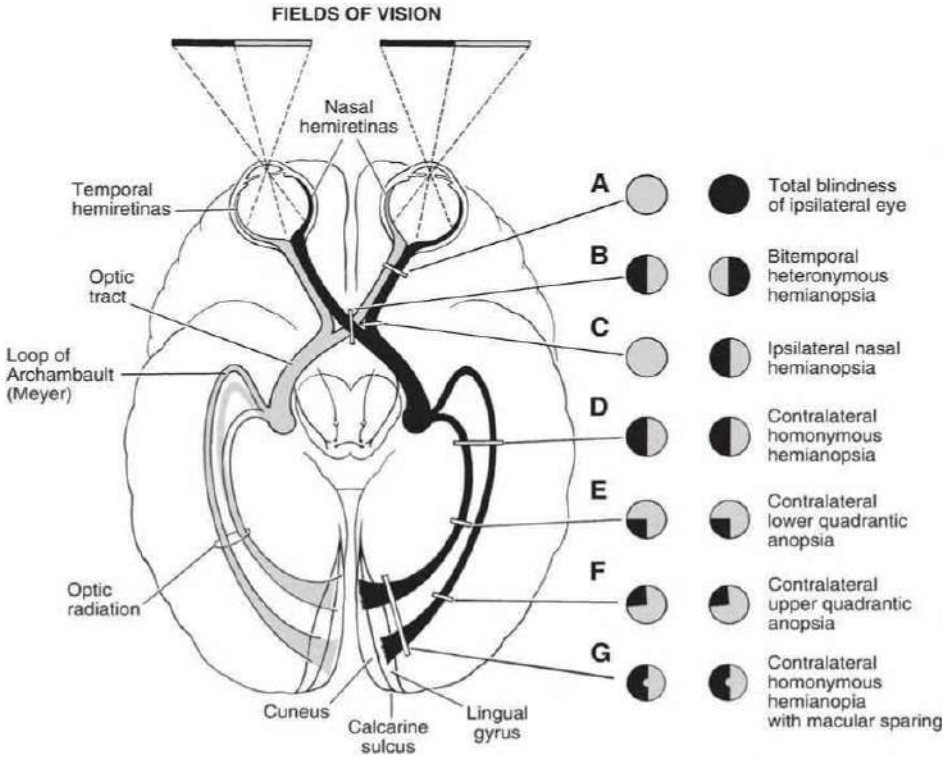
● The normally cup-disk ratio is 3/10. Measurement is crucial to diagnose certain diseases like glaucoma.



❖ The Visual Pathway:

Formed by three neurons

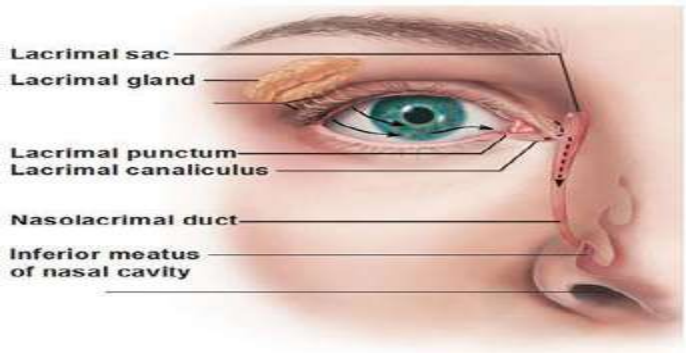
1. Bipolar cell, lies within the retina.
2. Ganglion cell, synapse in lateral geniculate body.
3. Third neuron terminates in visual cortex.



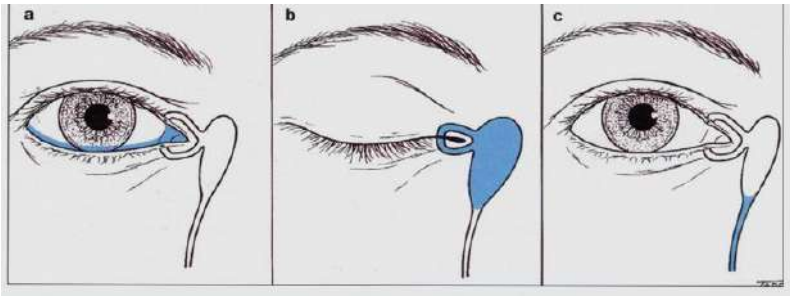
❖ The Lacrimal Apparatus- Adnexa:

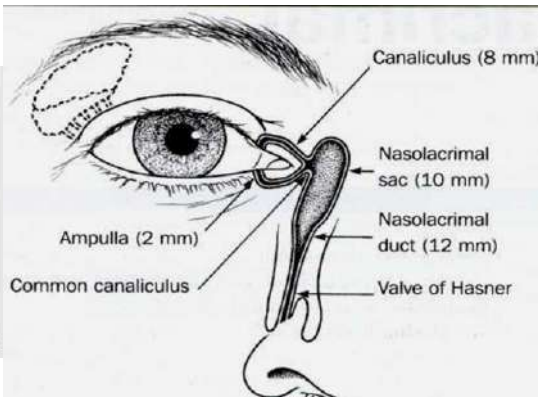
● Lacrimal gland secretes tears into the upper fornix of the conjunctival sac which are spread over the surface of the cornea as a tear film by blinking of the lids.

● **The cascade**: Punctum □ canaliculi □ nasolacrimal sac □ nasolacrimal duct □ inferior meatus



- Tear film. 3 layers consist of:
  1- Mucin gel layer: produced by conjunctival goblet cells
  2- Aqueous layer: produced by lachrymal gland
  3- Oil layer: Meibomian glands





❖ The Intraocular Pressure:

- The pressure within the eye is maintained at a steady level by continuous formation & drainage of aqueous.
- Aqueous is secreted by the ciliary epithelium → posterior chamber → anterior chamber (through the pupil) → drained through the anterior chamber angle.
- The normal intra ocular pressure is from 10-21 must be higher than epi-scleral vein which is 9 to have the ability to drain from trabulcar meshwork.
- High IOP almost always due to an obstruction of aqueous outflow.
- Ocular Hypertension: high IOP with no optic disk damage.
- Papilledema: bilateral disk edema with high ICP

❖ Optics of the Eye:

The eye is like a camera. Light must have a clearly pathway to be clearly focused on the sensory receptors of the retina, i.e., Clear cornea, anterior chamber, lens and vitreous cavity. The Refractive power of the eye is about 58 - 62 diopters.

- The cornea is the major refracting element of the eye with a power of approximately 40 diopters. If the curvature is greater in one meridian than the other→ Astigmatism.

- The refractive power of the lens is about 17-21 diopters at rest. Accommodation able to change the power of the lens markedly depends on age
- Optic chiasm objective:

1. To visualize the object seen by the two eyes into a 3D image.
2. Single image received by the two eyes to be transferred and translated by the visual cortex.

❖ VISION:

The retina:

- The central retina contains yellow pigment, Xanthophyll, the so called macula luteal (yellow spot).
- It is divided into retinal pigment epithelium & neurosensory retina.
- Photoreceptors contains visual pigment which consists of a large protein (opsin) attached to retinal (vitamin A aldehyde).

- Light splits the opsin from the retinal with initiation of a graded electrical potential → Transmitted through the visual pathway to be processed in the visual cortex (occipital lobe) → vision sense.(transform chemical to electrical symptoms)
- Visual Pathway: Three neurons

1. Bipolar cell, lies within the retina.
2. Ganglion cell, synapse in lateral geniculate body.
3. Third neuron terminates in visual cortex.

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L2

History & Examination of the eye

- Taking a good history can help to focus your examination and indicate what investigations are needed. It can also help you to understand the impact of the condition on the patient and pinpoint any difficulties they may have adhering to treatment.

- This is also your opportunity to focus on the patient as a person and to form a relationship of trust, respect and mutual understanding.

➢ How to structure history taking

To ensure you don't miss anything important, structure your history taking carefully. Ask about:

- Personal and demographic data
- Reason for visit or presenting complaint
- History of presenting complaint
- Past eye history
- General medical history
- Family eye history
- Medication history
- Allergy history
- Social history

➢ Top tips for taking a good history

- Introduce yourself to the patient – this creates a friendly environment.
- Respect the patient's privacy and confidentiality while taking the history
- Ask questions that are direct, simple and clear. Avoid using medical terms and explain things in ordinary language as much as possible.
- Be a good listener. Avoid interrupting or rushing the patient. Show them that you are listening and paying attention: make eye contact as appropriate and ask if you are not sure about something they said. It is often useful to use open questions (e.g., how are you?) and closed questions (e.g., yes/no answers) to help focus the discussion.

- Try to see things from the patient's point of view and make an effort to understand them and their circumstances, especially when these are very different from your own.
- Be aware that patients who are older, or who have disabilities (including hearing impairment, speech difficulties or a learning disability) may need a bit more time or may struggle to express themselves. This may cause them some anxiety, so remain patient and reassure them that you are there to listen.

➢ Personal and demographic data

Ask the patient's personal details:

- Name, for identification, filing and patient follow-up
- Address and mobile phone number, for follow-up and to identify patients from areas with endemic diseases
- Age and gender, for noting down and ruling out any diseases associated with different age groups and/or sex
- Language
- Disability
- Patient's occupation, daily tasks and hobbies.

- Recording the age, gender, language and disability status of patients allows you to monitor who is, and is not, coming to your eye clinic or hospital. Compare these figures with the population to identify groups that are under-represented, e.g., girls with other disabilities, and plan ways to reach out to them.

- Understanding a patient's occupation, daily tasks (e.g., looking after grandchildren) and hobbies is helpful for finding out a patient's visual needs and understanding any eye manifestations or symptoms as a result of occupational hazards.

➢ Reason for visit/Presenting complaint

Ask the main reason why the patient has come to seek an eye examination.

Record the main presenting symptoms in the patient's own words and in a chronological order. The four main groups of symptoms are:

1. Red, sore, painful eye or eyes (including injury to the eye)
2. Decreased distance vision in one or both eyes, whether suddenly or gradually
3. A reduced ability to read small print or see near objects after the age of 40 years
4. Any other specific eye symptom, such as double vision, swelling of an eyelid, watering or squint.

➢ History of presenting complaint

This is an elaboration of the presenting complaint and provides more detail. The patient should be encouraged to explain their complaint in detail and the person taking history should be a patient listener. While taking a history of the presenting complaint, it is important to have potential diagnoses in mind. For each complaint, ask about:

- Onset (sudden or gradual)
- Course (how it has progressed)
- Duration (how long)
- Severity
- Location (involving one or both eyes)
- Any relevant associated symptoms
- Any similar problems in the past
- Previous medical advice and any current medication.

➢ Past eye history

Ask for detail about any previous eye problems

- **History of similar eye complaints in the past.** This is important in recurrent conditions such as herpes simplex keratitis, allergic conjunctivitis, uveitis and recurrent corneal erosions
- **History of similar complaints in the other eye** is important in bilateral conditions such as uveitis, cataract
- **History of past trauma to the eye** may explain occurrence of conditions such as cataract and retinal detachment
- **History of eye surgery.** It is important to ask about any ocular surgery in the past such as cataract extraction, muscle surgery, glaucoma, or retinal surgery
- **Other symptoms**. Ask whether the patient has any other specific eye symptoms.

➢ General medical history

Ask about any current and past medical conditions. These include conditions such as diabetes, hypertension, arthiritis, HIV, asthma and eczema.

➢ Family eye history

It is important to ask the patient whether any other member of the family has a similar condition or another eye disease. This can help to establish familial predisposition of inheritable ocular disorders like glaucoma, retinoblastoma or congenital eye diseases, diabetes and hypertension.

➢ Medication history

Ask about present and past medications for both ocular and medical conditions. Don't overlook any medications that the patient may have stopped taking some time ago. Some medications are important in the etiology of ocular conditions.

It is also helpful to ask whether the patient has been able to use the medication as prescribed (their compliance). If a medication is ineffective, you want to know whether the patient is actually using the medication as prescribed, for example glaucoma medications.

➢ Basic eye examination includes:

- Inspection and palpation
- Visual acuity test
- Pupillary reflex
- Color vision
- Confrontation test
- Ophthalmoscopy examination

➢ Inspection:

- The lids, conjunctiva, cornea and sclera
- Iris and pupils
- lacrimal apparatus

➢ The eyelids

- Drooping, the upper lid normally covers only the upper margin of the Iris.
- Infection
- Tumors or
- Other abnormalities..... No edema or crusting.

The distance between the upper and lower eyelids is called the palpebral fissure.

➢ Conjunctivae

- signs of inflammation (i.e. injection or dilatation of its blood vessels(
- unusual pigmentation
- nodes
- swelling or haemorrhage

The normal conjunctiva should be pink and only a small number of vessels should be visible.

➢ The sclera

- Nodules
- Hyperemia
- Discoloration

The normal color should be white. In dark-skinned individuals, the sclera may be slightly muddy in color.

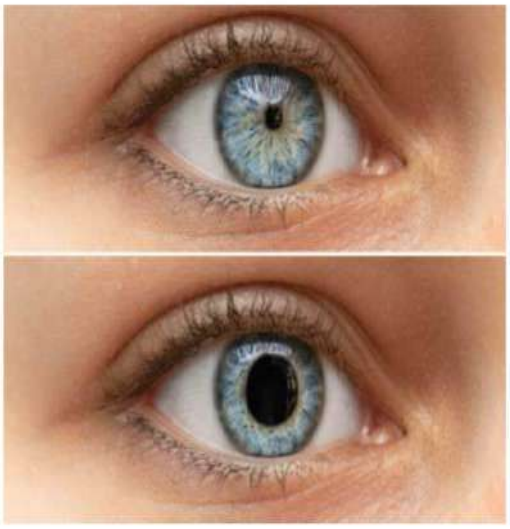
- The cornea should be clear and transparent.

➢ The pupils

- Equal in size, round and reactive to light and accommodation.
- Inequality in papillary size (called anisocoria)

- Pupillary dilatation (mydriasis) is associated with sympathomimetic agents, glaucoma or dilating drops.

- Pupillary constriction (miosis) is seen with parasympathomimetic drugs, inflammation of the iris and drug treatment of glaucoma.



➢ The iris

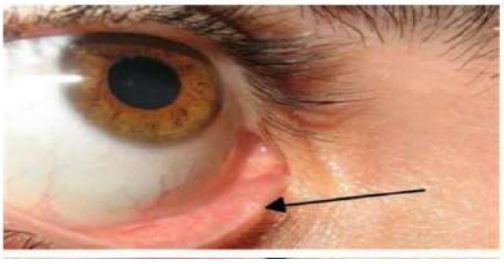
- Color
- nodules
- vascularity

Normally, iris blood vessels cannot be seen with the naked eye.

➢ lacrimal apparatus

- Punctum is only seen.

epiphora is tearing due to obstruction to flow through the punctum.



- Check for blockage of the nasolacrimal duct by pressing the lacrimal sac gently against the inner orbital ring.
- If blockage is present, material may be expressed through the punctum.

➢ Visual acuity test:

- This is usually done by using Snellen's chart
- Patient should be 6 meter away from the chart
- One eye should be covered while the opposite one is being examined

➢ Colour vision:

- it is tested by Ashihar chart

➢ Confrontation test:

- This test is used to check visual field where it is compared to that of the examiner

➢ Ophthalmoscopic examination:

- By using an ophthalmoscope the entire posterior segment can be examined concentrating on retina and fundus for any abnormal pathologies

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L3

Certain Ophthalmic terms (terminology)

Common terms, tests, treatments, diseases & conditions, anatomy eye doctors' use. These definitions may help you understand them better.

- **Amblyopia:** Also called lazy eye. Decreased vision in one eye that leads to the use of the other eye as the dominant eye. A problem most commonly associated with children.
- **Astigmatism:** An eye condition where the eye cannot focus light uniformly in all directions resulting from an irregular curvature of the cornea, the crystalline lens, or the eye itself. It results in mild to moderately blurred vision and/or eyestrain.
- **Bi-Focal Lenses:** Lenses that use two different distinct powers in each lens, usually for near and distance correction.
- **Cataracts:** A cataract is a clouding of the crystalline lens of the eye that makes it hard for light to pass through and be focused properly. In a normal eye, the crystalline lens is almost transparent, however injury, age or disease can cause the lens to eventually lose its clarity. When the lens becomes 'opaque,' it is called a cataract. Treatable by surgery.
- **Color deficiency:** A lack of ability to distinguish certain colors. Commonly called "color blindness", the most common form of color deficiency is the inability to distinguish shades of red and green.
- **Conjunctivitis:** An eye condition caused by the inflammation of the conjunctiva, or clear membrane covering the white part of the eye and lining of the eyelids. The eyes will often appear swollen and red while also feeling gritty. It is often viral and may be contagious. There are actually 20 different types of conjunctivitis – from fairly common strains that usually pose no long-term danger to you or your child's vision – to types that are resistant to antibiotics. Call or see your doctor to treat conjunctivitis.
- **Cornea:** The transparent, multi-layered front part of the eye that covers the pupil and iris. It provides most of the eye's optical power.

- **Dry Eye Syndrome:** An eye condition that presents itself as itching, burning, and irritation of the eyes, is often called "dry eye syndrome". It is one of the most common problems treated by eye care professionals. It is usually caused by the breakdown (or deficiency) in the tears that lubricate the eyes. As we age, our bodies produce less oil to seal the eyes' watery layer.

- **Floaters and Spots:** A generalized term used to describe small specks moving subtly but noticeably in your field of vision. A floater or a spot is likely a tiny clump of gel or cells in the vitreous – the clear, jelly-like fluid inside your eye. Aging, eye injury and breakdown of the vitreous are the main causes of floaters and spots. If you notice a sudden increase in the number you see, call your eye care professional.

- **Glaucoma:** A common cause of preventable vision loss when excessive pressure within the eye damages the optic nerve. Treatable by prescription drugs or surgery.

- **High(er) Index:** A dense lens material that results in thinner, lightweight lenses than standard plastic. Index refers to index refraction which is the speed that light travels through the lens. Higher index lenses are available from 1.56 to 1.74 (the higher the number, the thinner the lens). They are beneficial for stronger prescriptions.

- **Multi-Focal Lenses:** Multi-focal lenses let you focus on two or more distances through the same lens (usually distance, intermediate, and near). Also known as Bifocals, Tri-focals, Multi-focals.

- **Optic Nerve:** A bundle of nerve fibers that carries messages from the eyes to the brain.

- **Photochromic lenses:** Refers to lenses that automatically change from clear to dark in the presence of ultraviolet (UV) radiation.

- **Photophobia:** Also called "light sensitivity", this is a condition that can have many underlying causes, and can be prompted by many medications. Protection from bright light is critical for anyone with this condition.

- **Plastic 1.50:** This is a lens material often used for minor prescriptions. Very few lenses are made from glass today, since glass is heavier, thicker, and can shatter. Also referred to as standard index.

- **Polarized lenses:** This type of lens includes an invisible "polarized" filter that helps to cut down on blinding glare from reflective surfaces like water and snow for increased visual acuity (sharpness) in bright light conditions.

- **Polycarbonate lenses:** A lens material that is thinner, lighter, and more impact resistant than standard plastic. Polycarbonate lenses are the standard for children's eyewear.
- **Presbyopia:** Condition in which the ageing crystalline lens (at around age 40) becomes less able to change shape to focus light at all distances, especially near vision. Can be corrected with reading glasses, bifocals, or progressive lenses. Additional symptoms include eyestrain, headaches, and squinting.
- **Progressives:** Bi-focal or multi-focal lenses with no visible lines where the lens power gradually changes from distance to near. Also called PALs (Progressive Addition Lenses).
- **Pterygium:** A raised growth on the eye that is most often directly related to overexposure to the sun. Dry, dusty conditions may also contribute to development of these growths. Protecting your eyes from UV radiation is a critical preventive measure.
- **Pupil:** The opening in the center of the iris that changes size to control how much light is entering the eye.
- **Refraction:** Test to determine an eye's refractive error and the best corrective lenses to be prescribed.
- **Retina:** Part of the rear two-thirds of the eye that converts images from the eye's optical system into impulses that are transferred by the optic nerve to the brain. Consists of layers that include rods and cones.
- **Sclera:** The white part of the eye – composed of fibrous tissue that protects the inner workings of the eye.
- **Single-Vision:** Types of lenses that correct one vision problem, like near or farsightedness.
- **Snellen Chart:** This is the commonly seen eye care chart often topped by a large letter "E" used in eye examinations. This measures your eye's visual acuity, or the ability to see sharp detail clearly.
- **Strabismus:** Sometimes called "crossed eyes" in young children, this condition is the lack of coordination between the eyes, such as one or both eyes turning in, out, up or down.
- **Ultraviolet radiation (UVR):** Commonly referred to as "UV Rays", these are light waves that consist of both UVA and UVB rays from the sun. Without proper protection, chronic exposure to UV rays can lead to various eye conditions and damage.

- **UV Protection:** Relates to a lens' ability to filter out harmful rays of the sun. It is recommended that glasses block 100% of both UVA and UVB rays to minimize eye damage from the sun's rays.
- **Visual Acuity:** Assessment of the eye's ability to distinguish object details and shape – numerically expressed as 20/20.
- **Accommodation** the ability of the eye to change its focus from distant to near objects; process achieved by the lens changing its shape.
- **Blind Spot**

  (1) a small area of the retina where the optic nerve enters the eye; occurs normally in all eyes.

  (2) any gap in the visual field corresponding to an area of the retina where no visual cells are present; associated with eye disease.
- **Choroid** the layer filled with blood vessels that nourishes the retina; part of the uvea.
- **Ciliary muscles** the muscles that relax the zonules to enable the lens to change shape for focusing.
- **Ciliary processes** the extensions or projections of the ciliary body that secrete aqueous humor.
- **dilation a process** by which the pupil is temporarily enlarged with special eye drops (mydriatic); allows the eye care specialist to better view the inside of the eye.
- **Macula** the small, sensitive area of the central retina; provides vision for fine work and reading.
- **Macula:** The part of the retina responsible for the sharp, central vision needed to read or drive.
- **Macular Degeneration:** A group of conditions that include a deterioration of the macula causing a loss of central vision needed for sharp, clear eyesight. It is a leading cause of vision loss and blindness in those 65 years of age and older. Macular Degeneration is also called AMD or ARMD (age-related macular degeneration).
- **Fovea** the central part of the macula that provides the sharpest vision.
- **Fovea:** A tiny spot in the center of the retina that contains only cone cells. This area is responsible for our sharpness of vision.

- **Iris:** The pigmented (colored) membrane that lies between the cornea and the crystalline lens that controls the size of the pupil.
- **Iris** the colored ring of tissue suspended behind the cornea and immediately in front of the lens; regulates the amount of light entering the eye by adjusting the size of the pupil.
- **Lens** the transparent, double convex (outward curve on both sides) structure suspended between the aqueous and vitreous; helps to focus light on the retina.
- **Crystalline Lens:** The eye's natural lens located directly behind the iris. It has the ability to change shape to focus light rays onto the retina.
- **Fundus** the interior lining of the eyeball, including the retina, optic disc, and macula; portion of the inner eye that can be seen during an eye examination by looking through the pupil.
- **Hyperopia:** A condition where distant objects are seen clearly, yet objects close up are seen less clearly. Also commonly referred to as "farsighted."
- **Hyperopia** farsightedness; ability to see distant objects more clearly than close objects; may be corrected with glasses or contact lenses.
- **Myopia** nearsightedness; ability to see close objects more clearly than distant objects; may be corrected with glasses or contact lenses.
- **Myopia:** A condition where distant objects appear less clearly and those objects up close are seen clearly. Also commonly referred to as "nearsighted."
- **Intraocular pressure (iop)** pressure of the fluid inside the eye; normal iop varies among individuals.
- **Low vision** visual loss that cannot be corrected with eyeglasses or contact lenses and interferes with daily living activities.
- **Optic cup** the white, cup-like area in the center of the optic disc.
- **Rods and cones:** These are cells inside the eye used by the retina to process light. Rods are used for low light levels (night vision), cones are used for sharp visual acuity and color perception.
- **Rods, rod cells** one type of specialized light-sensitive cells (photoreceptors) in the retina that provide side vision and the ability to see objects in dim light (night vision). Also see cones.
- **Cones, cone cells** one type of specialized light-sensitive cells (photoreceptors) in the retina that provide sharp central vision and color vision. also see rods.

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م.م غيث حسين علي

L4+5

Primary eye care

Primary eye care is the provision of appropriate, accessible, and affordable care that meets patients' eye care needs in a comprehensive and competent manner. Primary eye care provides the patient with the first contact for eye care as well as a lifetime of continuing care.

Aims of Primary Eye Care

- To change the pattern of eye care services, currently often limited to the central hospitals and eye units in the cities, to countrywide blindness prevention programmers.

Components of primary eye care

- Eye health education
- Symptom identification
- Visual acuity measurement
- Basic eye examination
- Diagnosis
- Timely referral

The eight essential elements of PHC are as follows:

1. Education concerning main health problems
2. Promotion of food supply and good nutrition
3. Adequate supplies of safe water and basic sanitation
4. Maternal and child health and family planning
5. Immunization against major infectious diseases
6. Prevention and control of local endemic diseases
7. Appropriate treatments of common diseases and injuries
8. Provision of essential drugs.

Preventable causes of blindness:

Currently there are estimated to be approximately 140 million children with active trachoma which could be prevented if water supplies and sanitation were improved, as has occurred in Europe where trachoma used to be endemic.

- Intersectoral collaboration between health workers, water engineers and environmental officers is essential for the control of trachoma. As trachoma principally affects poor, disadvantaged communities the principle of even distribution of resources is also highly relevant. Community participation needs to be encouraged for the control of trachoma

Treatable causes of blindness:

There are many eye diseases which, if detected early, can be treated to prevent blindness (e.g., trichiasis from trachoma, early diabetic retinopathy). There are other conditions, such as cataract, where sight can be restored by appropriate surgery.

Eye diseases requiring treatment:

In many countries eye diseases (such as conjunctivitis, mild trauma, watery eyes, etc.) are among the commonest health problems presenting to primary level health workers.

Essential components of primary

1. Promotive
2. Preventive
3. Curative
4. Rehabilitative eye care

Promotive eye care

1. Creating and awareness of the blinding diseases existing in the community and the ways of preventing or curing it.
2. How to use the available recourses to overcome the problems.

Preventive eye care

1. Motivation of individuals and their communities to participate in blindness prevention activities.
2. Social and community development that promotes health
3. Change of behavior and environment

Curative activities

1. To carry out treatment procedures for simple common diseases that lead to blindness or impaired vision if not treated e.g., corneal ulcers, refractive errors etc.
2. First aid treatment for eye injuries.
3. Timely referral to secondary level.
4. Identification of potentially blinding disease conditions for proper management
5. Identification of curable blinding diseases e.g., cataract and referral for treatment

Rehabilitative activities

Target group: Incurably blind people

- What can the primary eye care workers do to them?
- They should be assured that they are not completely useless

Basic equipment essential for PEC program

• Snellen's chart and pinhole

• Hand magnifying lens

• Good source of light (Torch with batteries)

• Eye dressings

• Teaching materials

Different Types of Primary Eye care Programs that can be used in the community:

• Depend on the need of the local community and available resources

1. Need assessment Programs
2. Screening for blinding diseases.
3. Comprehensive care Eye camps
4. Outreach Surgical Camps
5. Health Education Programs

Who Guidelines for Primary Eye Care

1. Conditions to be recognized and treated by a trained primary health care worker.

• Conjunctivitis and lid infections (Acute conjunctivitis, Ophthalmia neonatorum, Trachoma, Allergic and irritative conjunctivitis, Lid lesions, e.g., stye and chalazion)

• Trauma (Subconjunctival hemorrhages, Superficial foreign body, Blunt trauma)

• Blinding malnutrition

2. Conditions to be recognized and referred after treatment has been initiated.

• Corneal ulcers

• Lacerating or perforating injuries of the eyeball

• Lid lacerations
• Entropion/trichiasis
• Burns: chemical, thermal

3. Conditions that should be recognized and referred for treatment

• Painful red eye with visual loss
• Cataract
• Pterygium
• Visual loss; <6/18 in either eye

Primary eye care services include:

• Educating patients about maintaining and promoting healthy vision.
• Performing a comprehensive examination of the visual system.
• Screening for eye diseases and conditions affecting vision that may be asymptomatic.
• Recognizing ocular manifestations of systemic diseases and systemic effects of ocular medications.
• Making a differential diagnosis and definitive diagnosis for any detected abnormalities.
• Performing refractions.
• Fitting and prescribing optical aids, such as glasses and contact lenses.
• Deciding on a treatment plan and treating patients' eye care needs with appropriate therapies.
• Counseling and educating patients about their eye disease conditions.
• Recognizing and managing local and systemic effects of drug therapy.
• Determining when to triage patients for more specialized care and referring to specialists as needed and appropriate.
• Coordinating care with other physicians involved in the patient's overall medical management.
• Performing surgery when necessary.

Primary eye care should be provided by, or supervised by, qualified physicians (Ophthalmologist/ Optometrist OD) who have the following competencies:

• To discover and discern abnormal states from normal.
• To diagnose disease conditions.
• To relate general medical conditions and symptoms to possible eye diseases.

- To triage and manage effectively eye diseases and conditions, or refer patients for specialized treatment.
- To coordinate with other physicians and health care professionals to meet general health care needs.
- To develop a treatment plan and take care of the large majority of eye care needs encountered in the general population.
- To perform surgery when necessary.
- Primary eye care physicians generally assume responsibility for coordinating eye care services to optimize a patient's visual function. Coordination involves interacting with, referring to, and consulting with other physicians and health professionals, specialists, and community programs.

Primary Eye Care Medicines

- Tetracycline 1% eye ointment
- Chloramphenicol 0.5% eye drops
- Vitamin A capsules
- Silver nitrate 1% eye drops

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L 6+7

Screening procedures in ophthalmology

Definition:

- Screening is the presumptive identification of individuals in a defined population at risk likely to be affected by an asymptomatic or subclinical condition that can be benefited by being further investigated.

- The Commission on Chronic Illness, USA in 1951, defined screening as:
"The presumptive identification of disease or defect by the application of tests, examinations or other procedures which can be applied rapidly to sort out apparently well persons who probably have a disease, from those who probably do not."

- A screening test is not intended to be diagnostic - persons with positive or suspicious findings must be referred to their physicians for diagnosis and treatment."

Uses of Screening:

- Case Detection.
- Control of Disease.
- Research
- Health Education

Purpose of Screening:

- Reducing disease burden
- Classifying people to likelihood of having a particular disease
- Identifying high risk groups who need further evaluation.

Types of Screening:

- The process of screening can be accomplished in different ways, by using different methods :

1- MASS SCREENING:

This method involves the examination of the whole population for the detection of the disease

2- TARGETED OR HIGH RISK SCREENING:

This method is more effective and includes only individuals who are at a high risk of suffering from an ailment

3- OPPORTUNISTIC SCREENING:

Here, only the individuals attending a hospital or a specified health center with an unrelated complaint are examined for the disease of interest.

- Screening may be undertaken for one or more diseases at the same time by using one or a combination of tests This can be

Classified as:

1) Monophasic Screening: Where only one disease condition is screened at a point in time.

2) Multiphasic Screening: More than one disease condition can be screened at the same time.

Principles of screening:

- Some essential criteria that should be met before instituting a screening programme were postulated by Wilson and Jungner in 1968. They laid out what were later referred to as the

Ten Commandments of Screening:

1) The condition should be an important public health problem

2) The natural history of the condition from the latent to manifest disease should be adequately under- stood

3) There should be a recognizable latent or early asymptomatic stage of the disease, during which identification will lead to improved prognosis or outcome.

4) There should be an accepted and effective treatment for the patients with recognized disease

5) Facilities for full diagnostic work up and treatment should be available

6) There should be a suitable test available which should be valid

7) The test should be acceptable both to the public as well as the professionals.

8) There should be an agreed policy on whom to treat as patients, including the management of borderline disease.

9) Case finding should be a continuous process.

10) The cost of early diagnosis and treatment should be economically balanced in relation to the total expenditure on medical care

The principles of screening can be discussed by classifying them as:

a) Disease criteria
b) Test criteria
c) Diagnostic and treatment infrastructure

Disease criteria:

The different disease criteria are as follows

1) Seriousness of disease

2) Natural history of the disease

3) Availability of effective treatment

Test criteria:

Any screening test contemplated should satisfy the following criteria:

1) The test should be cheap.

2) The test should be simple and easy to do.

3) The safety of the test is very important. Invasive procedures are thus generally unsuitable for screening purposes. The tests should impose minimal discomfort on the patients

4) The reliability of the screening test needs to be carefully considered.

   Reliability can be affected in different ways:

   a) Individual biological variation.
   b) Instrument error.
   c) Observer recording

5) The level of validity of a screening test is also an important determinant.

Examples of Screening Programmes in Ophthalmology:

a) Preschool Vision Screening for Amblyopia and Strabismus
b) 'Screening' for refractive errors in school children
c) Cataract screening
d) Glaucoma Screening
e) Diabetic Retinopathy Screening
f) Retinopathy of prematurity screening
g) Retinoblastoma screening

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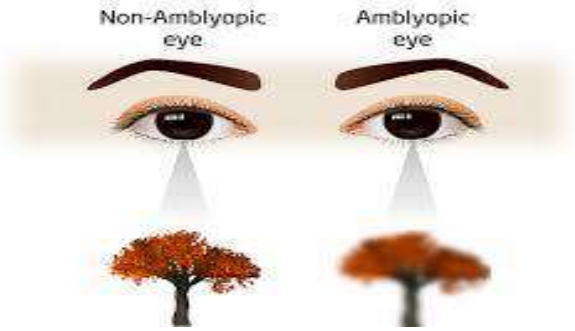
L3

Certain Ophthalmic terms (terminology)

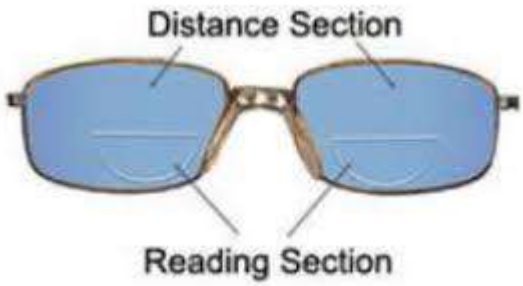
العملي محاضرة (3)

Amblyopia



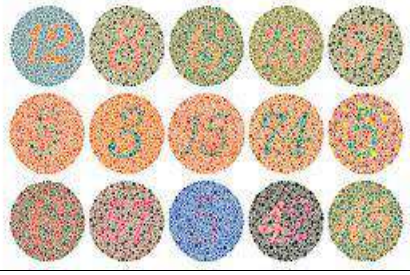
Astigmatism

Bi-Focal Lenses



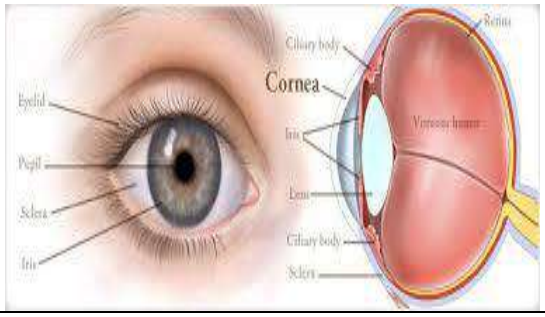
Cataracts

Color deficiency

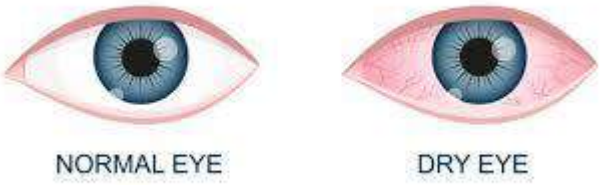


Conjunctivitis

Cornea

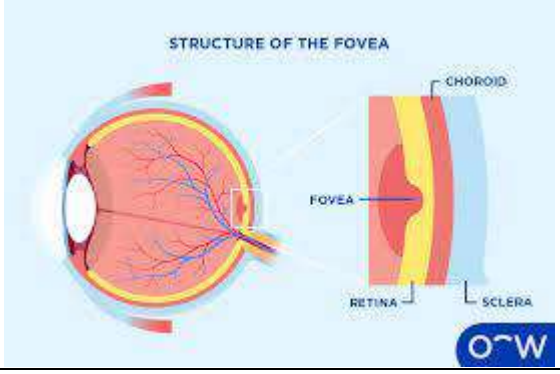


Dry Eye Syndrome

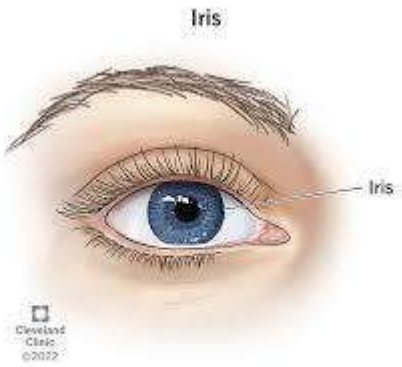


Floaters and Spots

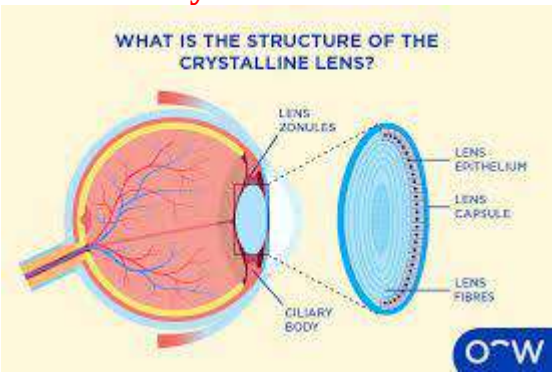
Fovea



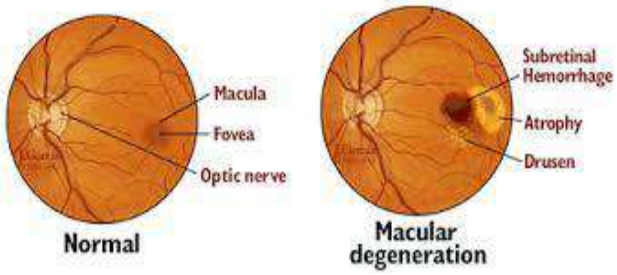
Iris



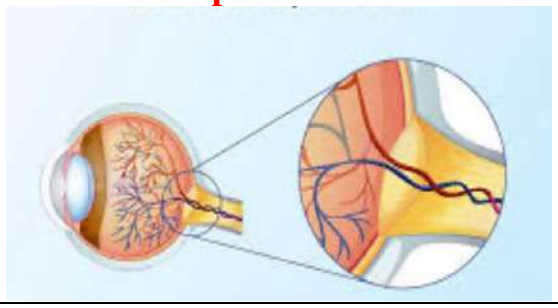
Crystalline Lens



Macular Degeneration



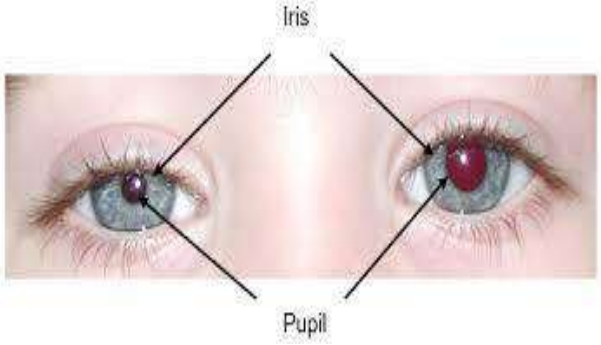
Optic Nerve



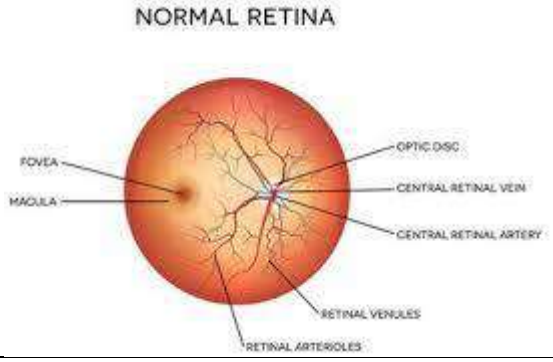
Polarized lenses

Pterygium

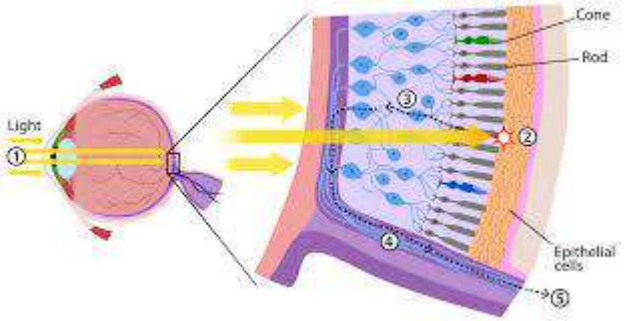
Pupil



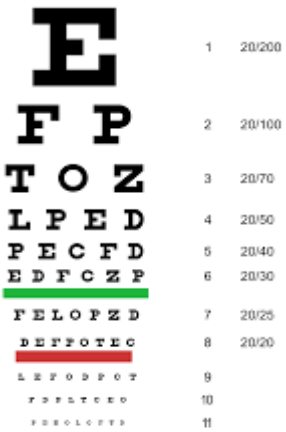
Retina



Rods and cones



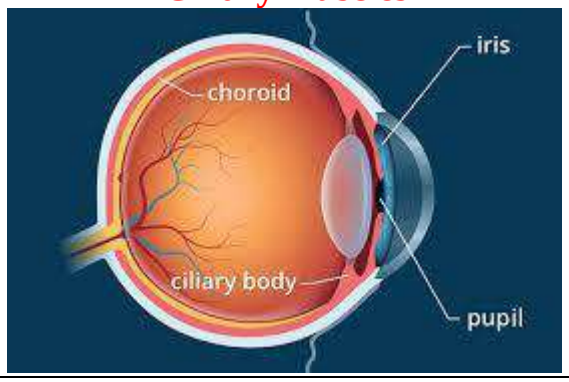
Snellen Chart



Strabismus

UV Protection

Ciliary muscles



Low vision

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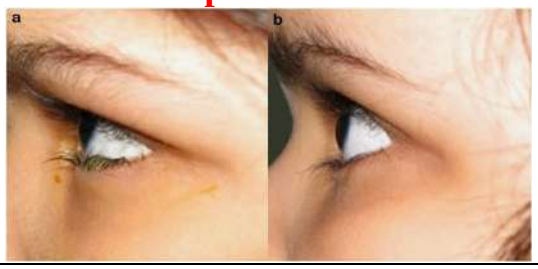
L (4+5)

Primary eye care

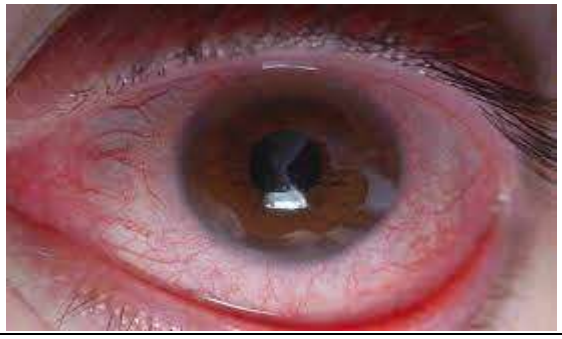
العملي محاضرة (4+5)

Eye dressing 	**Eye dressing** 
Symptoms of trachoma 	**Tetracycline 1% eye ointment** 
Entropion trichiasis 	**Conjunctivitis** 
Lid lacerations 	**Stye** 

Chloramphenicol eye drop

Silver nitrate eye dropes

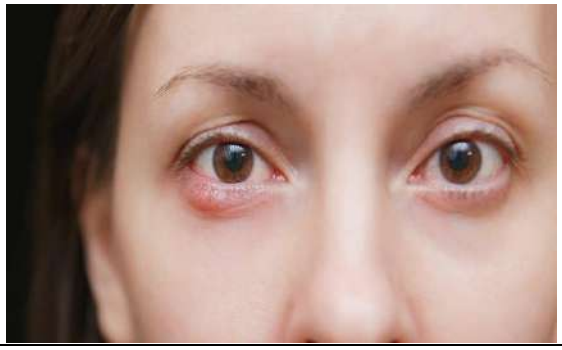
Burns chemical



Corneal ulcers

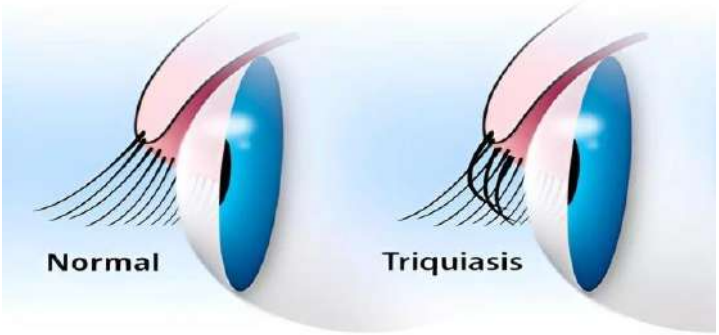
Eye ointment

Chalazion



Vitamin A capsules

Entropion trichiasis

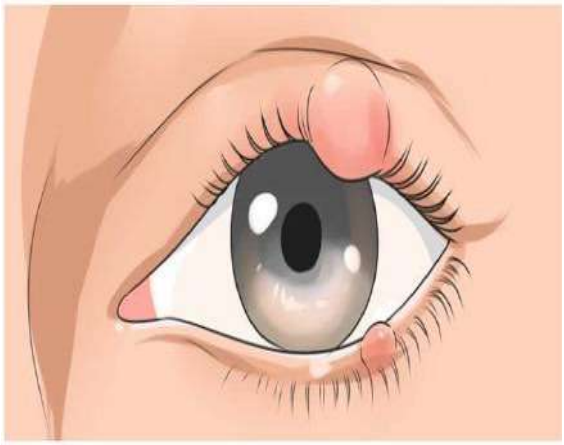


Trachoma

Lid lesions

Chalazion and stye

Chalazion - Meibomium Gland Obstruction



Stye - Hordeolum