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COURSE: PHS 212- SPECIAL SENSES

WRITE SHORT NOTES ON ANY TWO EYE DEFECTS

1. MYOPIA: Myopia occurs when the eyeball is too long, relative to the focusing power of the cornea and lens of the eye. This causes light rays to focus at a point in front of the retina, rather than directly on its surface If you're nearsighted, the first number ("sphere") on your eyeglasses prescription will be preceded by a minus sign (–). The higher the number, the more nearsighted you are. **Near-sightedness**, also known as **short-sightedness** and **myopia**, is an [eye](https://en.wikipedia.org/wiki/Eye) disorder where light focuses in front of, instead of on, the [retina](https://en.wikipedia.org/wiki/Retina). This causes distant objects to be [blurry](https://en.wikipedia.org/wiki/Blurred_vision) while close objects appear normal.

SYMPTOMS: symptoms may include [headaches](https://en.wikipedia.org/wiki/Headache) and [eye strain](https://en.wikipedia.org/wiki/Eye_strain).Severe near-sightedness is associated with an increased risk of [retinal detachment](https://en.wikipedia.org/wiki/Retinal_detachment), [cataracts](https://en.wikipedia.org/wiki/Cataract), and [glaucoma](https://en.wikipedia.org/wiki/Glaucoma).

CAUSES:

**Genetics**

A risk for myopia may be inherited from one's parents.[[]](https://en.wikipedia.org/wiki/Near-sightedness#cite_note-14) [Genetic linkage](https://en.wikipedia.org/wiki/Genetic_linkage) studies have identified 18 possible loci on 15 different chromosomes that are associated with myopia, but none of these loci is part of the candidate genes that cause myopia. Instead of a simple one-gene locus controlling the onset of myopia, a complex interaction of many mutated proteins acting in concert may be the cause. Instead of myopia being caused by a defect in a structural protein, defects in the control of these structural proteins might be the actual cause of myopia. Human population studies suggest that contribution of genetic factors accounts for 60–90% of variance in refraction. However, the currently identified variants account for only a small fraction of myopia cases, suggesting the existence of a large number of yet unidentified low-frequency or small-effect variants, which underlie the majority of myopia cases.

**Environmental factors**

Environmental factors which increase the risk of nearsightedness include insufficient light exposure, low physical activity, near work, and increased year of education. One hypothesis is that a lack of normal visual stimuli causes improper development of the eyeball. Under this hypothesis, "normal" refers to the environmental stimuli that the eyeball evolved to. Modern humans who spend most of their time indoors, in dimly or fluorescently lit buildings which may contribute to the development of myopia. People, and children especially, who spend more time doing [physical exercise](https://en.wikipedia.org/wiki/Physical_exercise) and [outdoor play](https://en.wikipedia.org/wiki/Outdoor_recreation) have lower rates of myopia, suggesting the increased magnitude and complexity of the visual stimuli encountered during these types of activities decrease myopic progression. There is preliminary evidence that the protective effect of outdoor activities on the development of myopia is due, at least in part, to the effect of long hours of exposure to [daylight](https://en.wikipedia.org/wiki/Daylight) on the production and the release of retinal [dopamine](https://en.wikipedia.org/wiki/Dopamine). Nearsightedness is also more common in children with [diabetes](https://en.wikipedia.org/wiki/Diabetes), [Childhood arthritis](https://en.wikipedia.org/wiki/Childhood_arthritis), [uveitis](https://en.wikipedia.org/wiki/Uveitis), and [systemic lupus erythematosus](https://en.wikipedia.org/wiki/Systemic_lupus_erythematosus).

### Types

* Simple myopia: Myopia in an otherwise normal eye, typically less than 4.00 to 6.00 [diopters](https://en.wikipedia.org/wiki/Dioptre).
* Degenerative myopia, also known as malignant, pathological, or progressive myopia, is characterized by marked [fundus](https://en.wikipedia.org/wiki/Fundus_(eye))  This form of myopia gets progressively worse over time. Degenerative myopia has been reported as one of the main causes of [visual impairment](https://en.wikipedia.org/wiki/Visual_impairment).
* [Pseudomyopia](https://en.wikipedia.org/wiki/Pseudomyopia) is the blurring of distance vision brought about by [spasm](https://en.wikipedia.org/wiki/Spasm) of the [accommodation](https://en.wikipedia.org/wiki/Accommodation_(eye)) system
* Nearwork-induced transient myopia (NITM): short-term myopic far point shift immediately following a sustained near visual task
* Induced myopia, also known as acquired myopia, results from various medications, increases in [glucose](https://en.wikipedia.org/wiki/Glucose) levels, [nuclear sclerosis](https://en.wikipedia.org/wiki/Nuclear_sclerosis), or other conditions
* Form deprivation myopia occurs when the eyesight is deprived by limited illumination and vision range, or the eye is modified with artificial lensesor deprived of clear form vision.

## **Prevention**

Some suggest that more time spent outdoors during childhood is effective for prevention.

Glasses and contacts: The use of reading glasses when doing close work may improve vision by reducing or eliminating the need to accommodate. Altering the use of eyeglasses between full-time, part-time, and not at all does not appear to alter myopia progression.

### Medication: [Anti-muscarinic](https://en.wikipedia.org/wiki/Muscarinic_antagonist) topical medications in children under 18 years of age may slow the worsening of myopia.These treatments include [pirenzepine gel](https://en.wikipedia.org/wiki/Pirenzepine" \o "Pirenzepine), [cyclopentolate eye drops](https://en.wikipedia.org/wiki/Cyclopentolate" \o "Cyclopentolate), and [atropine eye drops](https://en.wikipedia.org/wiki/Atropine). While these treatments were shown to be effective in slowing the progression of myopia, side effects included light sensitivity and near blur.

[Scleral reinforcement surgery](https://en.wikipedia.org/wiki/Scleral_reinforcement_surgery) is aimed to cover the thinning posterior pole with a supportive material to withstand intraocular pressure and prevent further progression of the posterior staphyloma. The strain is reduced, although damage from the pathological process cannot be reversed. By stopping the progression of the disease, vision may be maintained or improved.

## **Treatment:** Glasses are commonly used to address near-sightedness. There is no universally accepted method of preventing myopia and proposed methods need additional study to determine their effectiveness. Optical correction using [glasses](https://en.wikipedia.org/wiki/Glasses) or [contact lenses](https://en.wikipedia.org/wiki/Contact_lens) is the most common treatment. Compensating for myopia using a corrective lens.

[Corrective lenses](https://en.wikipedia.org/wiki/Corrective_lens) [bend](https://en.wikipedia.org/wiki/Refraction) the light entering the eye in a way that places a focused image accurately onto the retina. The power of any lens system can be expressed in [diopters](https://en.wikipedia.org/wiki/Diopter), the [reciprocal](https://en.wikipedia.org/wiki/Multiplicative_inverse) of its [focal length](https://en.wikipedia.org/wiki/Focal_length) in meters. Corrective lenses for myopia have negative powers because a divergent lens is required to move the [far point](https://en.wikipedia.org/wiki/Far_point) of focus out to the distance.

### Surgery

Refractive surgery includes procedures which alter the corneal curvature of some structure of the eye or which add additional refractive means inside the eye.

Photorefractive keratectomy :Photorefractive keratectomy (PRK) involves ablation of corneal tissue from the corneal surface using an [excimer laser](https://en.wikipedia.org/wiki/Excimer_laser). The amount of tissue ablation corresponds to the amount of myopia. While PRK is a relatively safe procedure for up to 6 dioptres of myopia, the recovery phase post-surgery is usually painful.

LASIK: In a [LASIK](https://en.wikipedia.org/wiki/LASIK) pre-procedure, a corneal flap is cut into the cornea and lifted to allow the excimer laser beam access to the exposed corneal tissue. After that, the excimer laser ablates the tissue according to the required correction. can potentially result in flap complications and loss of corneal stability (post-LASIK [keratectasia](https://en.wikipedia.org/wiki/Keratectasia))

#### Phakic intra-ocular lens: Instead of modifying the corneal surface, as in laser vision correction (LVC), this procedure involves implanting an additional lens inside the eye (i.e., in addition to the already existing natural lens). While it usually results in good control of the refractive change, it can induce potential serious long-term complications such as glaucoma, cataract and endothelial decompensation.

### Orthokeratology: Orthokeratology or simply Ortho-K is a temporary corneal reshaping process using rigid gas permeable (RGP) contact lenses. Overnight wearing of specially designed contact lenses will temporarily reshape cornea, so patients may see clearly without any lenses in daytime.

### Intrastromal corneal ring segment: The [Intrastromal corneal ring segment](https://en.wikipedia.org/wiki/Intrastromal_corneal_ring_segment" \o "Intrastromal corneal ring segment) (ICRS), commonly used in [keratoconus](https://en.wikipedia.org/wiki/Keratoconus" \o "Keratoconus) treatment now, was originally designed to correct mild to moderate myopia. The thickness is directly related to flattening and the diameter of the ring is proportionally inverse to the flattening of cornea. So, if diameter is smaller or thickness is greater, resulting myopia correction will be greater.

### Alternative medicine:A number of [alternative therapies](https://en.wikipedia.org/wiki/Alternative_medicine) have been claimed to improve myopia, including [vision therapy](https://en.wikipedia.org/wiki/Vision_therapy), "behavioural optometry", various eye exercises and relaxation techniques, and the [Bates method](https://en.wikipedia.org/wiki/Bates_method). Scientific reviews have concluded that there was "no clear scientific evidence" that eye exercises are effective in treating near-sightedness and as such they "cannot be advocated".

## **PRESBYOPIA**

Presbyopia generally is believed to stem from a gradual thickening and loss of flexibility of the natural lens inside your eye  
Presbyopia usually occurs beginning at around age 40, when people experience blurred near vision when reading, sewing or working at the computer. Symptoms include difficulty reading small print, having to hold reading material farther away, [headaches](https://en.wikipedia.org/wiki/Headache), and [eyestrain](https://en.wikipedia.org/wiki/Eyestrain).[]](https://en.wikipedia.org/wiki/Presbyopia#cite_note-NIH2010Pres-1) Different people will have different degrees of problems. It is a type of refractive error along with [nearsightedness](https://en.wikipedia.org/wiki/Nearsightedness), [farsightedness](https://en.wikipedia.org/wiki/Farsightedness), and [astigmatism](https://en.wikipedia.org/wiki/Astigmatism). Diagnosis is by an [eye examination](https://en.wikipedia.org/wiki/Eye_examination).

## **Treatment**

1. **Image capturing in the eye** – Solutions for presbyopia have advanced significantly in recent years, thanks to widened availability of optometry care as well as over-the-counter vision correction.
2. Image processing in the brain – Scientific solutions for overcoming the symptoms of presbyopia were developed in recent years and tested successfully in multiple studies. These solutions are available thanks to significant progress in the understanding of human brain plasticity and the field of [perceptual learning](https://en.wikipedia.org/wiki/Perceptual_learning).

Corrective lenses: [Corrective lenses](https://en.wikipedia.org/wiki/Corrective_lenses) provide a range of vision correction, some as high as +4.0 diopter. People with presbyopia choose convex lens for reading glasses; specialized preparations of convex lens usually require the services of an optometrist.

[Contact lenses](https://en.wikipedia.org/wiki/Contact_lenses) can also be used to correct the focusing loss that comes along with presbyopia. [Multifocal contact lenses](https://en.wikipedia.org/wiki/Contact_lens#Corrective_contact_lenses) can be used to correct vision for both the near and the far. Some people choose contact lenses to correct one eye for near and one eye for far with a method called [monovision](https://en.wikipedia.org/wiki/Monovision).

### Surgery: [Laser surgery](https://en.wikipedia.org/wiki/Laser_surgery) has been done to create multifocal corneas. Concerns with this surgery include people's eyes changing with time.