

Special Senses
BIO 42
Human Biology

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Learning Objectives

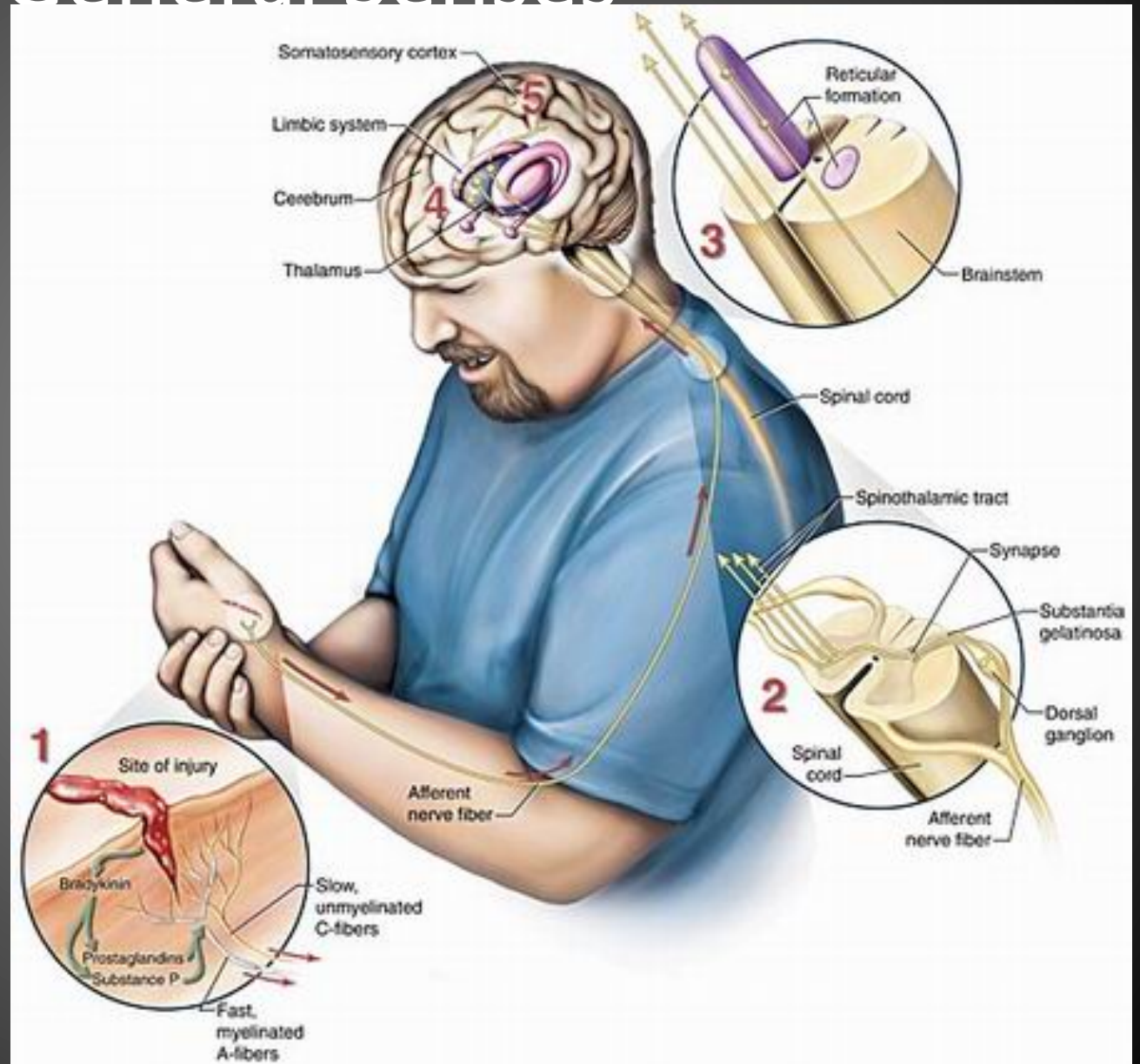
- ✓ Describe the general vs. special senses
- ✓ Describe the physiology of chemical senses
- ✓ Identify the structures of the ear and eyes
- ✓ Understand the pathways of sound and light
- ✓ Identify the common visual impairments
- ✓ Differentiate cones vs. rods

General Senses vs. Special Senses

- Pain
- Temperature
- Touch and Pressure
- Vision
- Hearing and balance
- Smell
- Taste

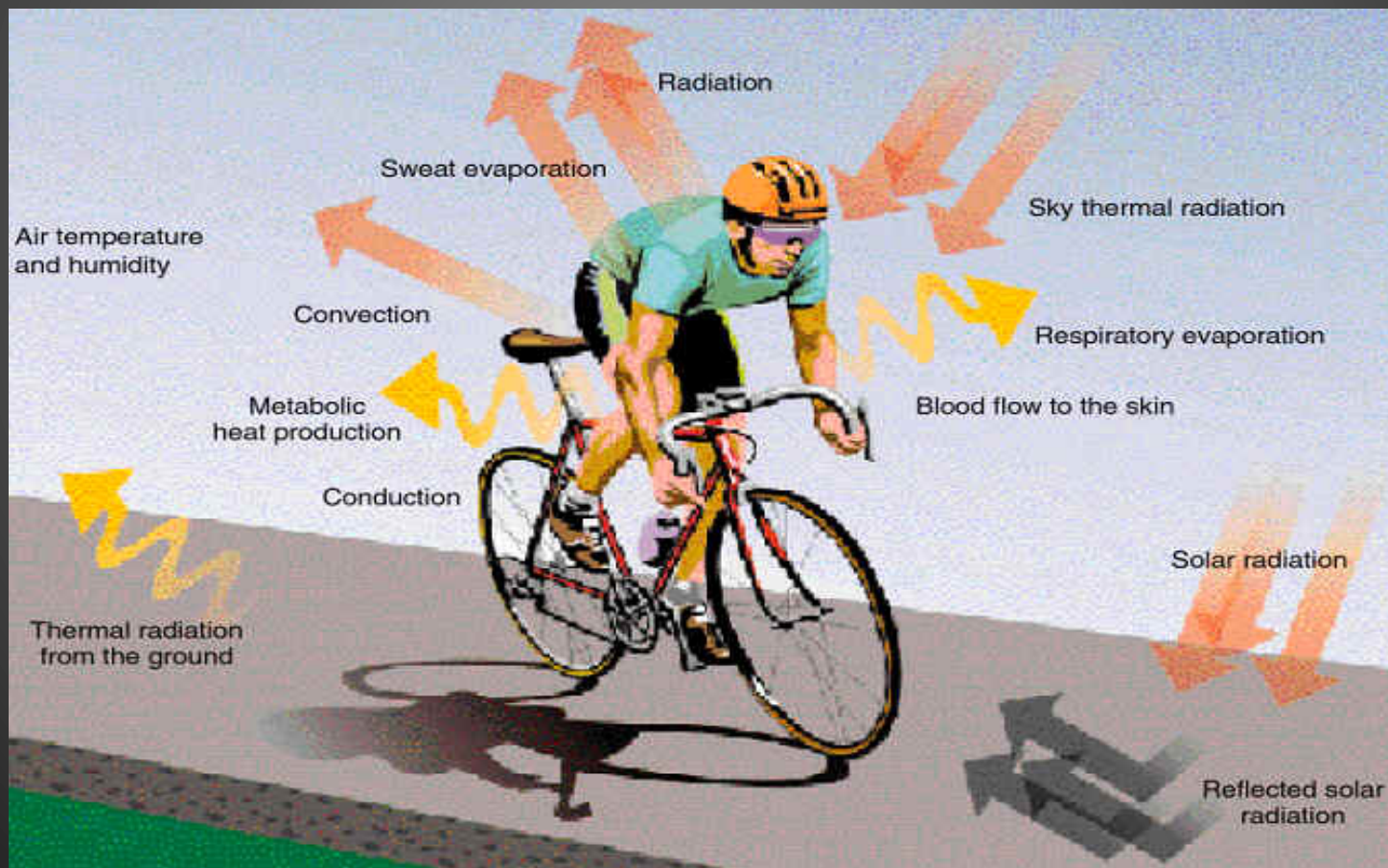
General Senses

- Pain



General Senses

- Temperature



General Senses

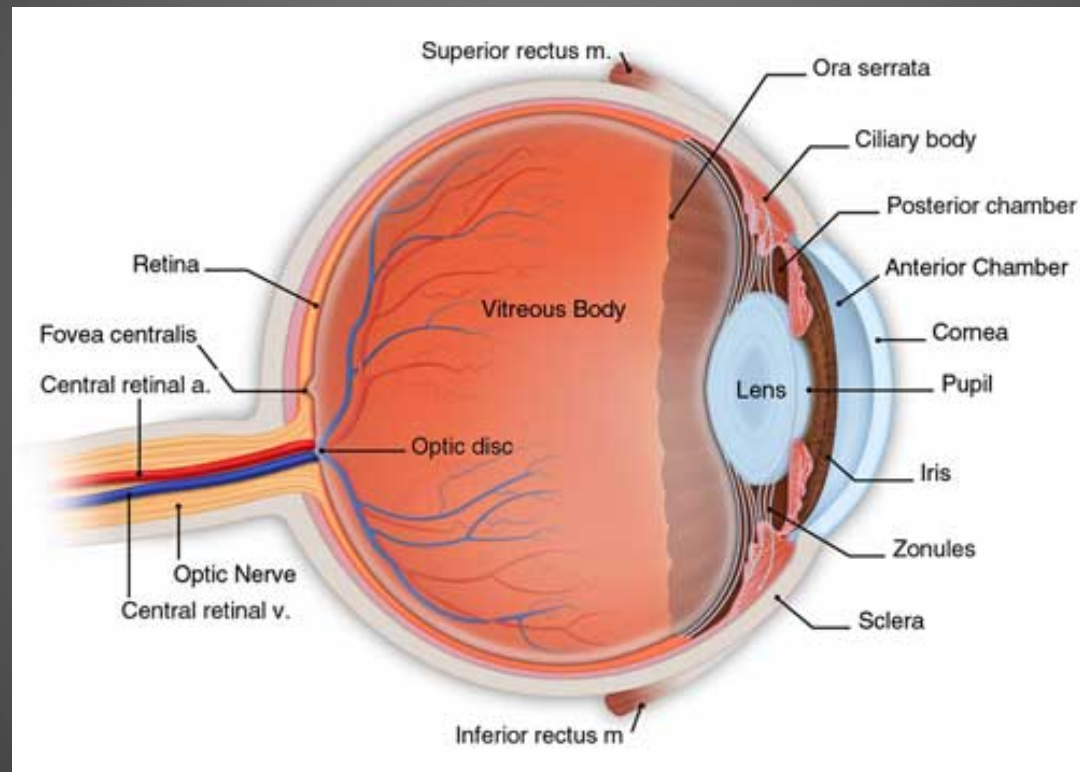
- Touch and Pressure



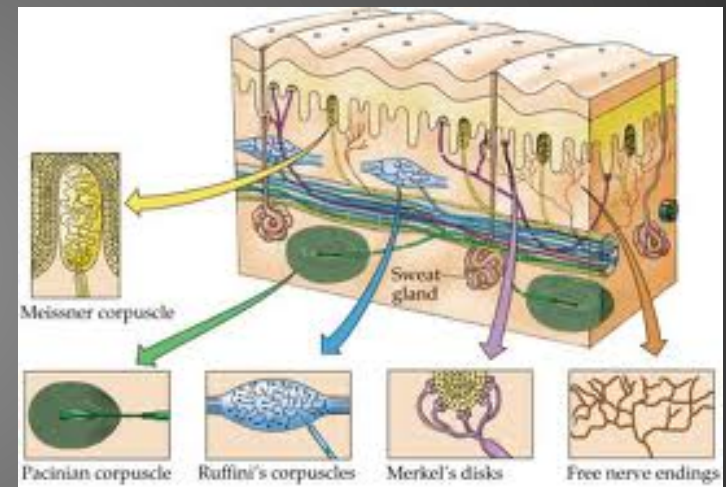
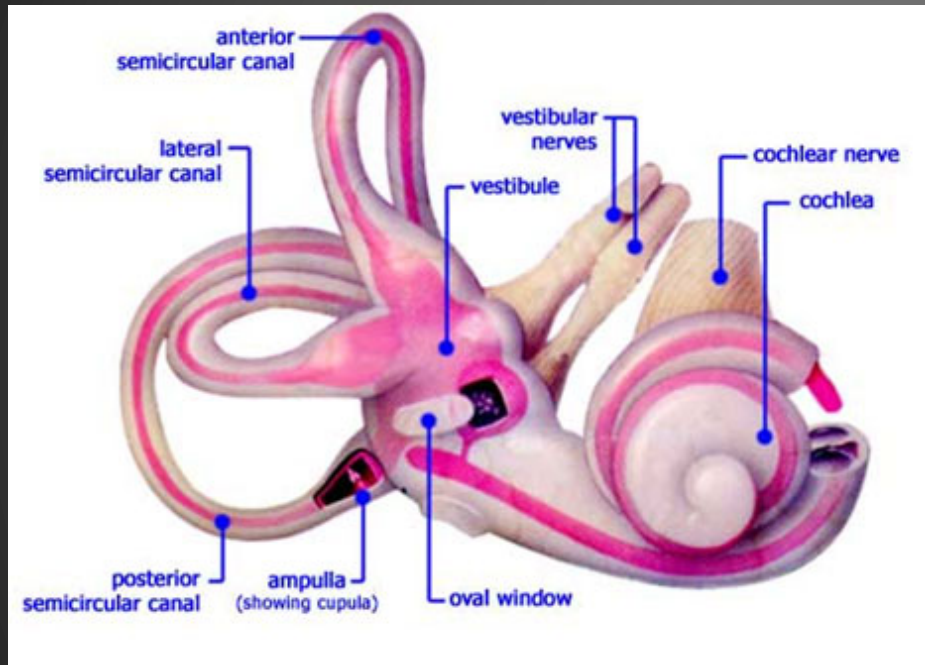
Special Senses

- Photoreceptors - vision
- Mechanoreceptors – hearing and balance
- Chemoreceptor – smell and taste

Photoreceptors / Vision

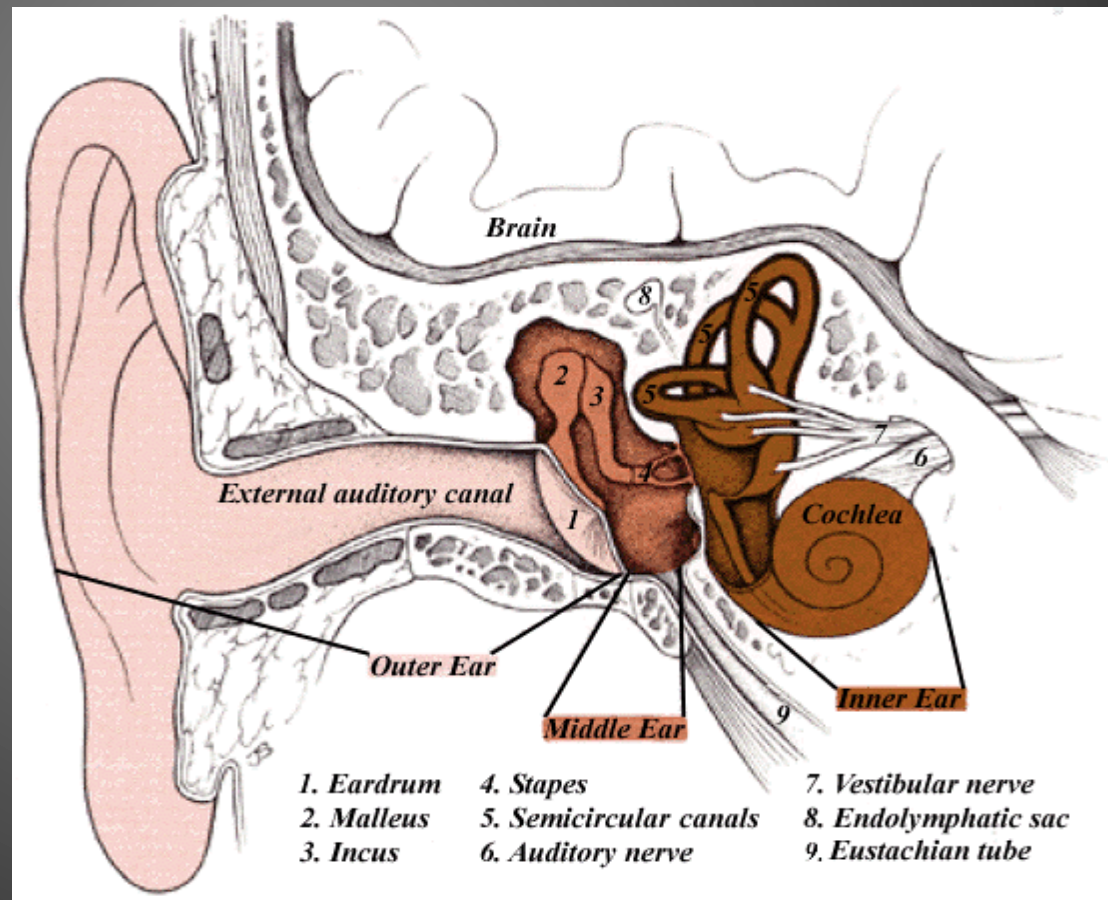


Mechanoreceptors



Mechanoreceptors

- Equilibrium and Hearing



Cutaneous Mechanoreceptors

- Ruffini's end organs – detect deep tension in the skin
- Meissner's corpucles – detect changes in texture (slow vibrations)
- Pacinian corpucles – detect rapid vibrations
- Merkel's disc – detect sustained touch and pressure
- Hair follicles

Chemoreceptors

- Smell



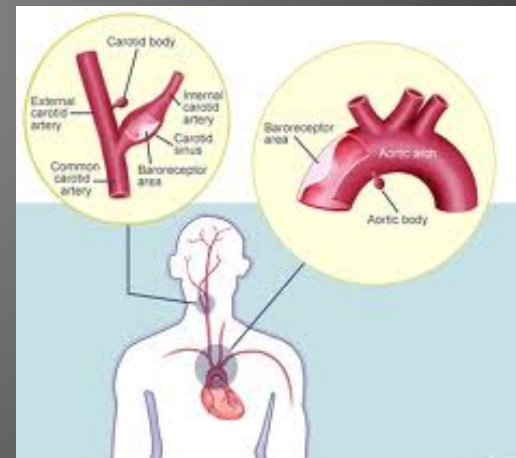
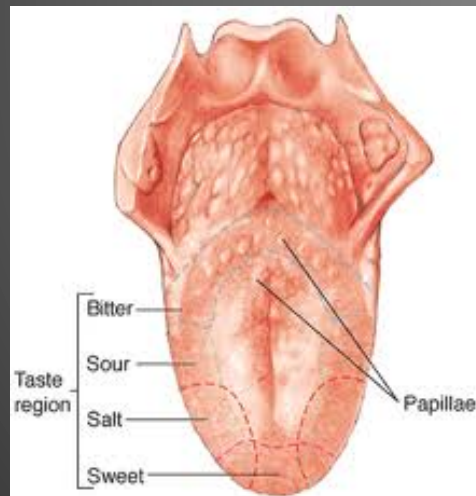
Chemoreceptors

- Taste



Chemoreceptors

- Central Chemoreceptors
- Peripheral Chemoreceptors



- Olfactory – the sense of smell
- Gustatory – the sense of taste

Ears

- It controls the functions of hearing as well as balance
- Three main sections
 1. External ear
 2. Middle ear
 3. Inner ear

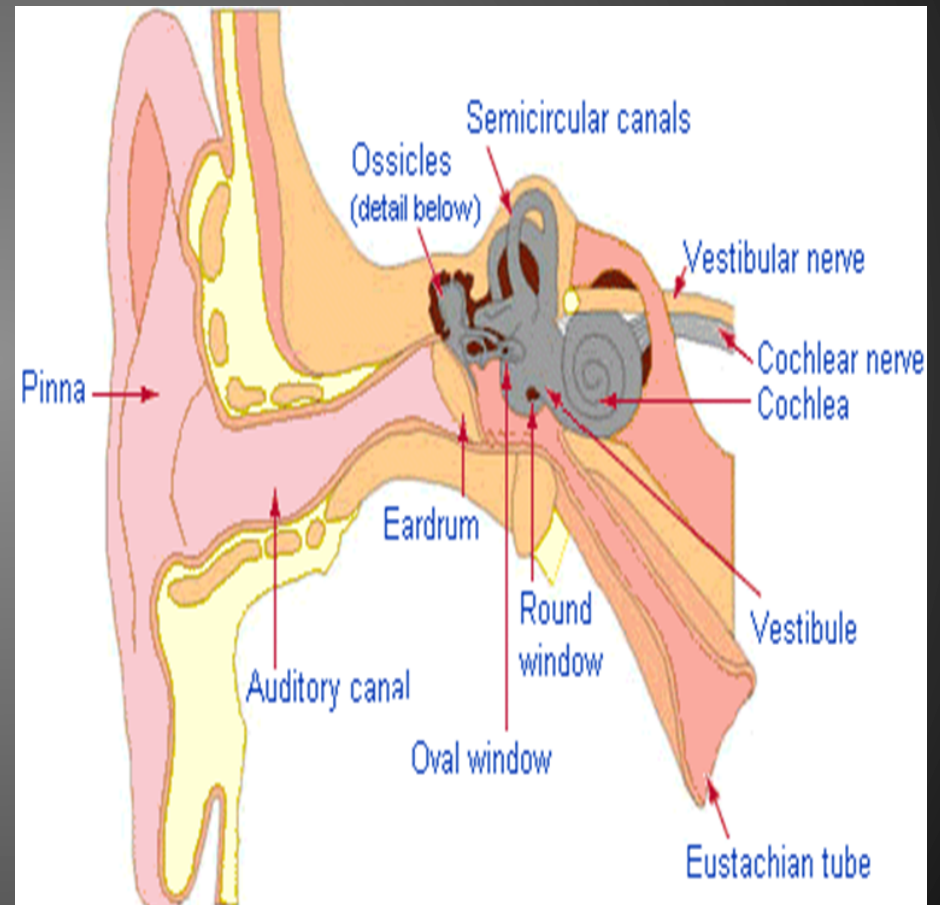
Anatomy of the Ear

- Outer ear
- Middle ear
- Inner ear



Ears (Outer/External Ear)

- presence of glands that secrete a waxy substance called cerumen (earwax), which slows the growth of microbes
- tympanic membrane separates the outer/external ear from the middle ear and this vibrates when sound hits it

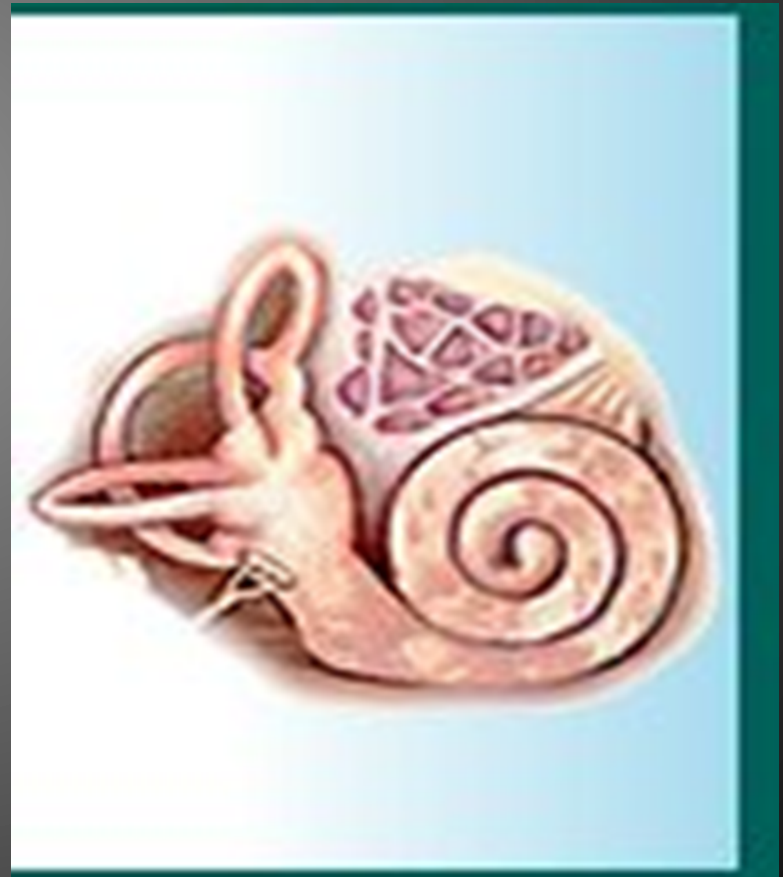


Ear (Middle Ear)

- contains the three small bones called ossicles
 1. Malleus – vibrates from the tympanic membrane
 2. Incus – vibrated by the malleus
 3. Stapes – moved by the incus and pushes the fluid in the vestibule of inner ear

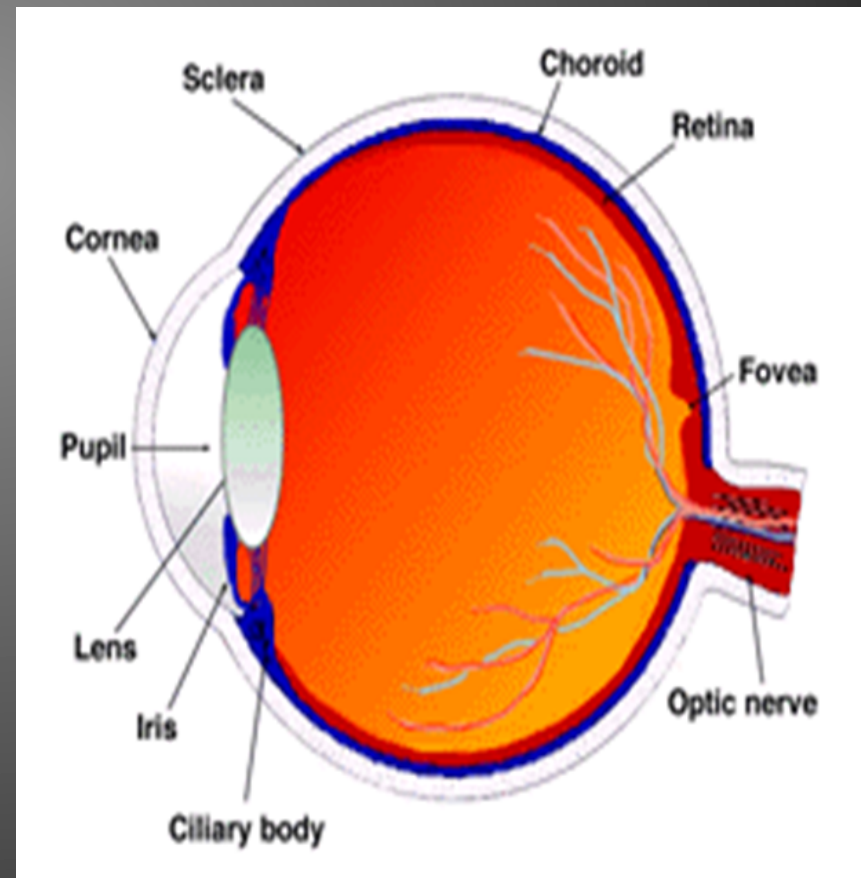
Ear (Inner Ear)

- vibrations continue into the cochlea
- shaped like a snail



Eyes

- works like a camera
- protected by a bony socket in the skull



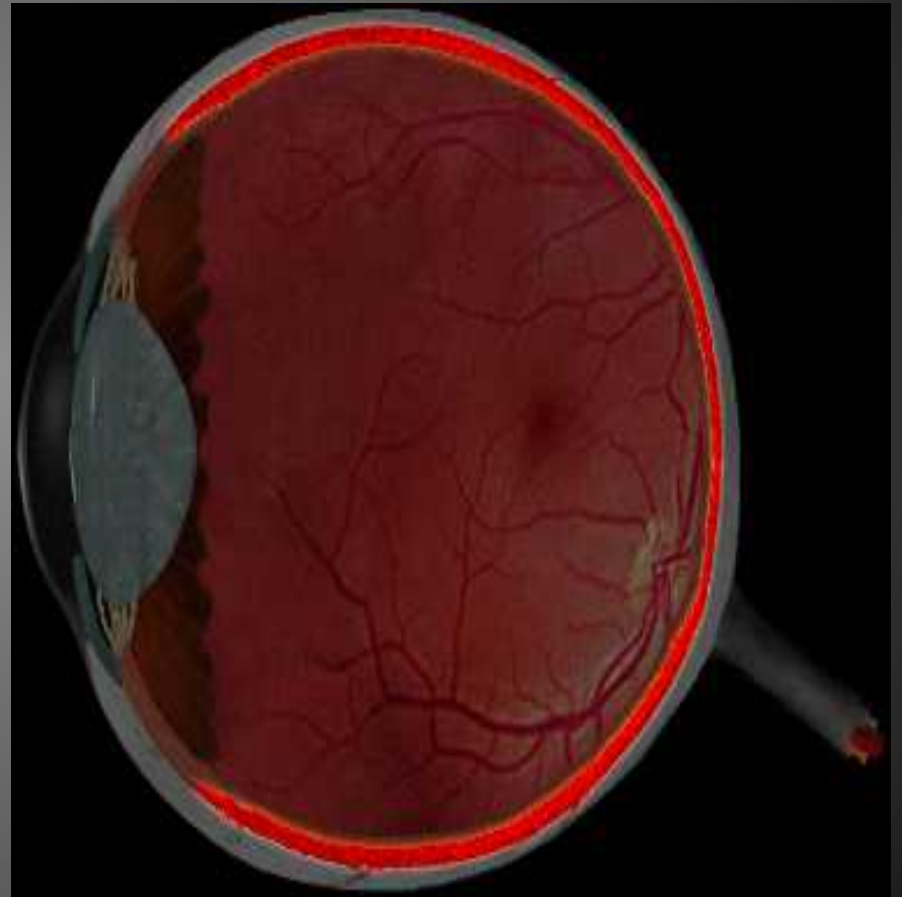
Parts of the eye

- Sclera – tough fibrous white outermost layer and gives shape to the eye
- Highlighted in white



Parts of the eye

- Choroid – covering with nonreflective pigmented middle layer (contains blood vessels) that prevents light from reflecting within the eye (highlighted in red)



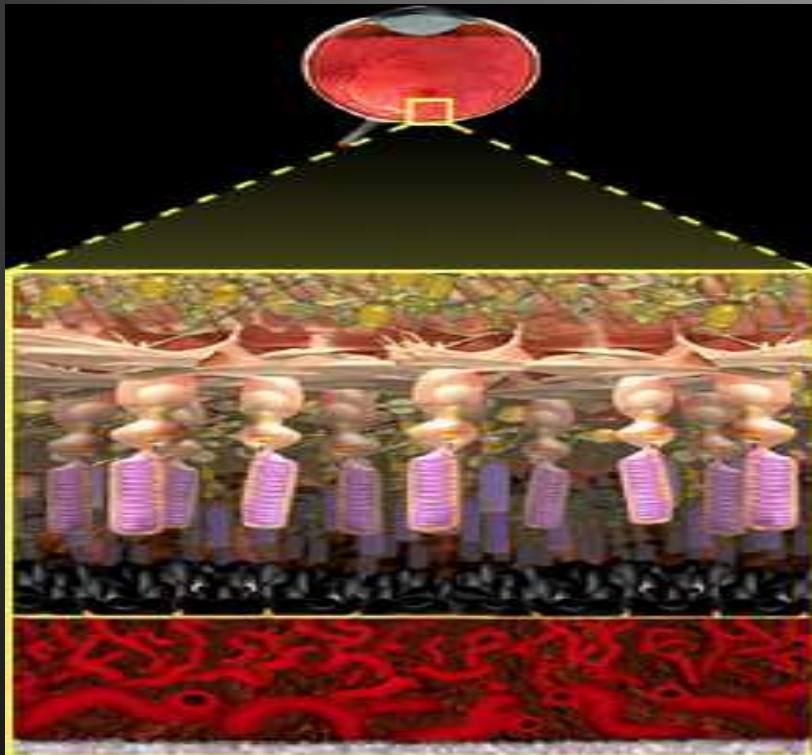
Parts of the eye

- Retina – is the innermost layer and contains the photoceptors
 1. Cones
 2. Rods



Cones vs. Rods

- Cones – are sensitive to color and function best in well lighted areas
- Rods – are very sensitive to light and function best in dark or dim light vision (they help us see at night)



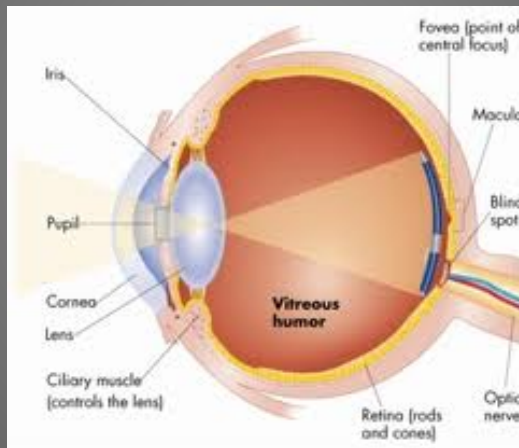
Path of light through the eye

- Light passes through the parts of the eye that refract the light rays; cornea, aqueous humor, lens, vitreous humor, and onto the retina
- Light focuses onto the retina is transformed into nerve impulses by the rods and cones (photoreceptors) and sent to the brain via optic nerve to interpret signals

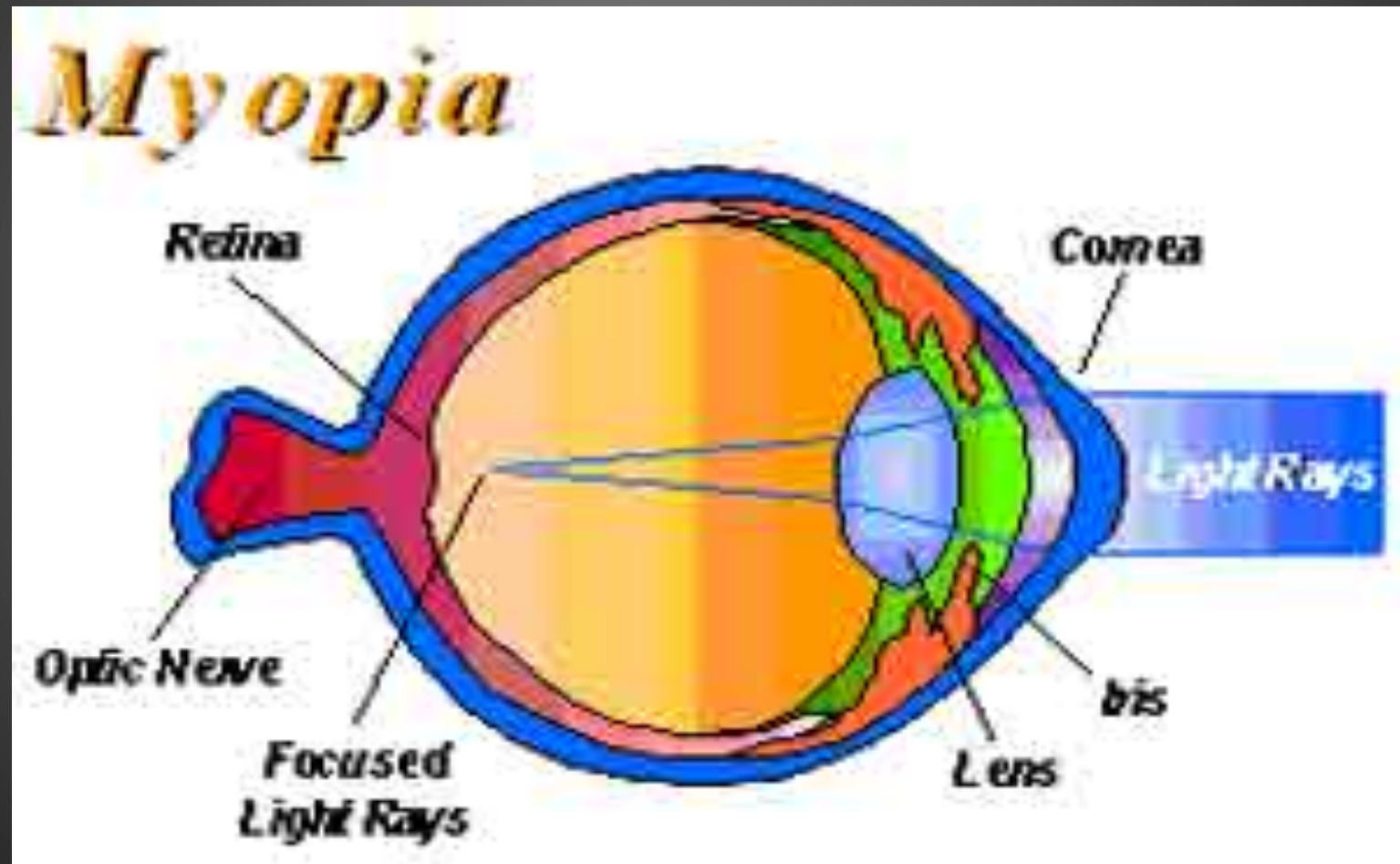
Common Visual Impairments

- Nearsightedness
- Farsightedness
- Astigmatism

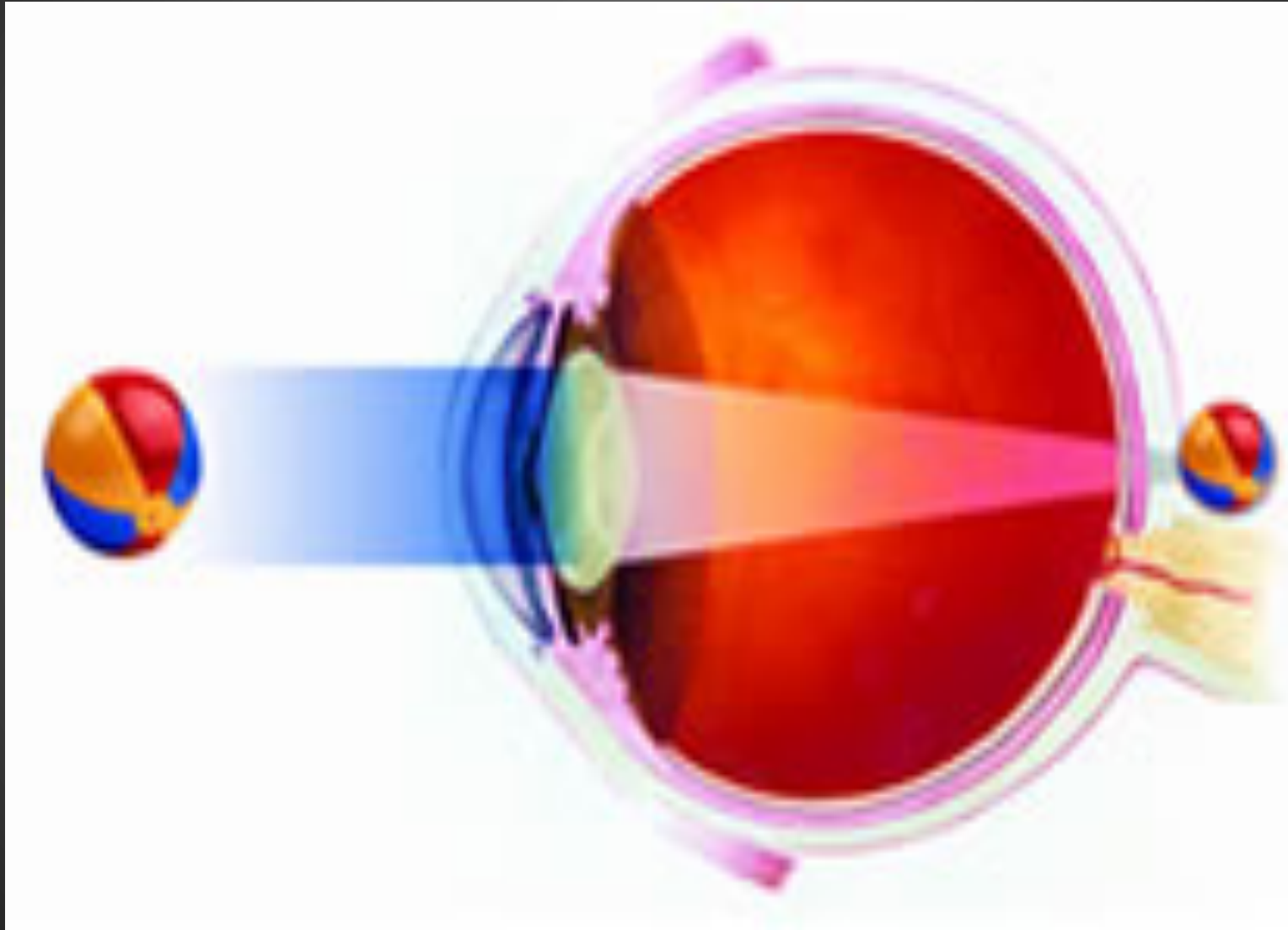
Normal pathway of light into the eye



Myopia (nearsightedness)

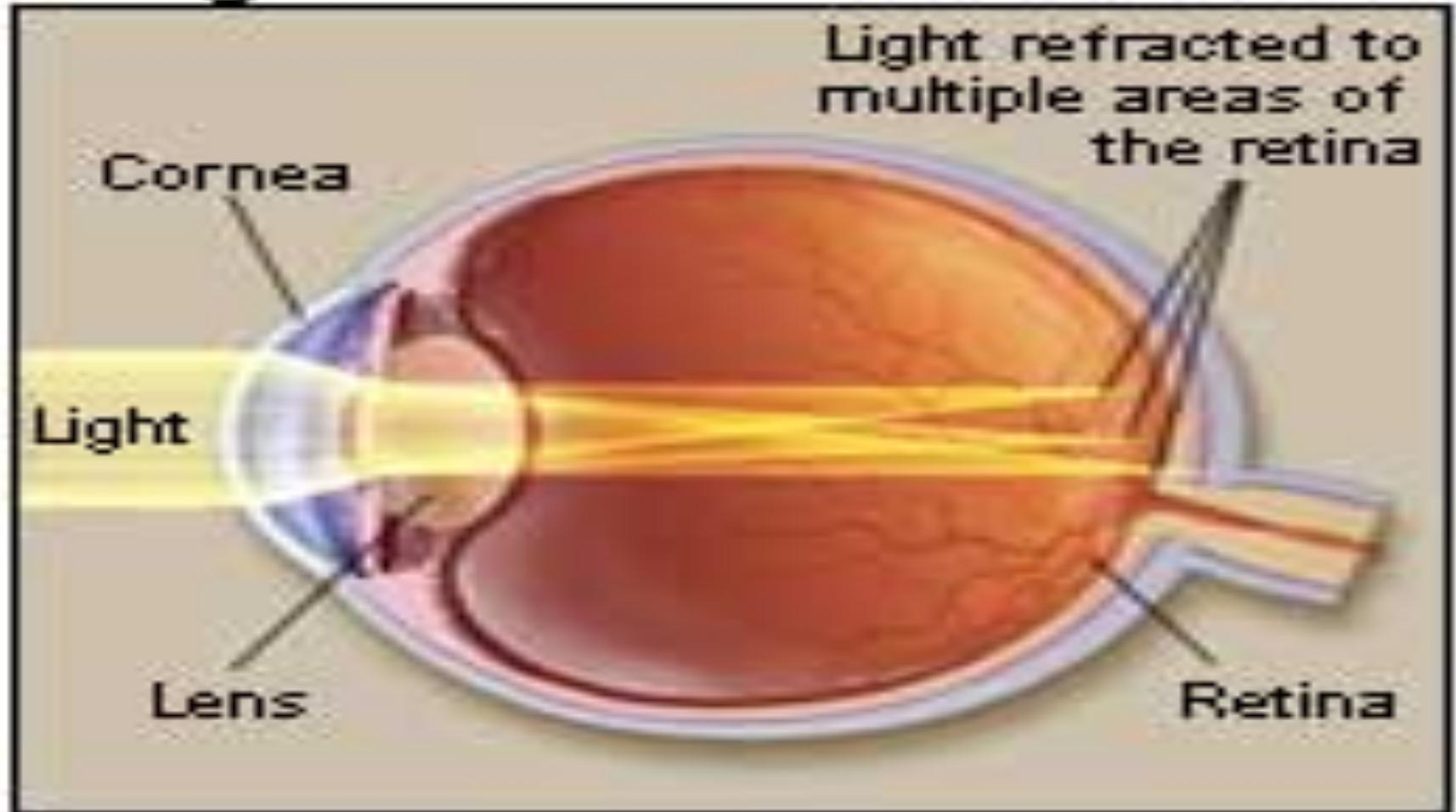


Hyperopia (farsightedness)



Astigmatism

Astigmatism



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References

- Ireland, K.A. (2011). *Visualizing Human Biology (3rd ed.)*. Danvers, MA: Wiley & Sons Inc