Vision

Anatomy of Sight
Vision and Light

• Vision - perception of light emitted or reflected from objects in the environment

• Visible light
  – electromagnetic radiation with wavelengths from 400 to 750 nm
  – must cause a photochemical reaction to produce a nerve signal
    • radiation below 400 nm; energetic, kills cells
    • radiation above 750 nm; too little energy to cause photochemical reaction
External Anatomy of Eye

- Superciliary ridge
- Eyebrow
- Eyelashes
- Palpebral fissure
- Lateral commissure
- Tarsal plate
- Pupil
- Superior palpebral sulcus
- Upper eyelid
- Iris
- Sclera
- Medial commissure
- Lower eyelid
- Inferior palpebral sulcus

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Tunics of the Eyeball

- Fibrous layer - sclera and cornea
- Vascular layer - choroid, ciliary body and iris
- Internal layer - retina and optic nerve
Aqueous Humor

Produced by ciliary body, flows to posterior chamber through pupil to anterior chamber - reabsorbed into canal of Schlemm
Ophthalmoscopic Exam of Eye

- Macula lutea - cells on visual axis of eye (3 mm)
  - fovea centralis - center of macula; finely detailed images due to packed receptor cells
- Direct evaluation of blood vessels
Test for Blind Spot

- Optic disk = blind spot
  - optic nerve exits posterior surface of eyeball
  - no receptor cells
- Blind spot - use test illustration above
  - close eye, stare at X and red dot disappears
- Visual filling - brain fills in green bar across blind spot area
Conjunctiva

- Transparent mucous membrane lines eyelids and covers anterior surface of eyeball except cornea
- Richly innervated and vascular (heals quickly)
Lacrimal Apparatus

- Tears flow across eyeball help to wash away foreign particles, help with diffusion of O₂ and CO₂ and contain bactericidal enzyme.
Photoreceptor Cells

- **Posterior layer of retina - pigment epithelium**
  - purpose is to absorb stray light and prevent reflections

- **Photoreceptors**
  - rod cells (night - scotopic vision)
    - outer segment - stack of coinlike membranous discs studded with rhodopsin pigment molecules
  - cone cells (color - photopic vision)
    - outer segment tapers to a point
Histology
Layers of Retina
Schematic Layers of the Retina
Visual Projection Pathway

- Uncrossed (ipsilateral) fiber
- Crossed (contralateral) fiber
- Optic radiation
- Occipital lobe (visual cortex)
- Superior colliculus
- Lateral geniculate nucleus of thalamus
- Optic tract
- Pretectal nucleus
- Optic chiasm
- Optic nerve
- Fixation point

- Right eye
- Left eye
Extrinsic Eyes Muscles

- 6 muscles inserting on eyeball
  - 4 rectus, superior and inferior oblique muscles
- Innervated by cranial nerves III, IV and VI
Innervation of Extrinsic Eye Muscles