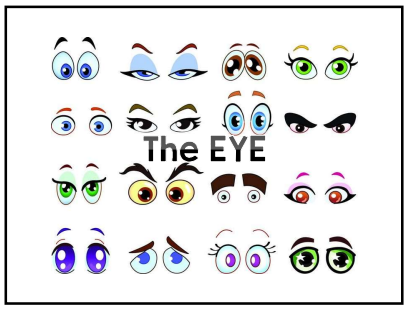
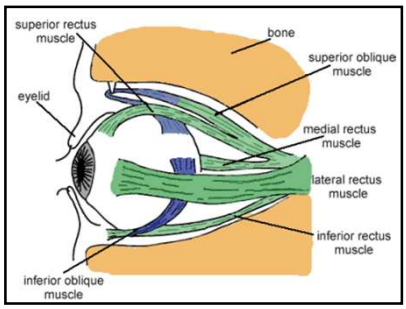
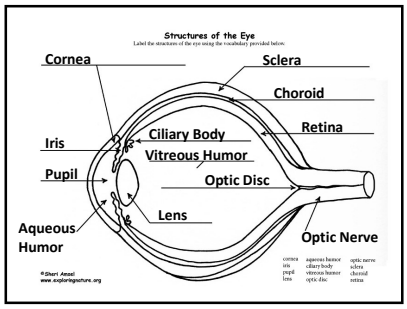


Gross Features

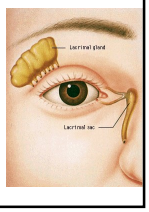
- Stereoscopic Vision (2 eyes) for depth perception
- Size: 1 inch / 2.54 cm diameter
- Six extrinsic eye muscles
  - Superior, Inferior, Lateral, and Medial Rectus
  - Superior and Inferior Oblique





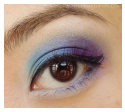
Eye Protection

- Socket: bones
- Eyebrow: catches sweat; UV light
- Lacrimal Gland: antimicrobial fluid



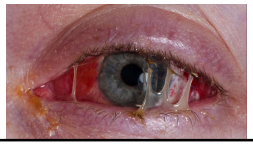
Eyelid (Palpebrae) & Lashes

- Protection against foreign objects
- Distributes tears (keeps eye lubricated)
- Limits light that enters



Conjunctiva

- Lines the lid (palpebral)
- Covers anterior eyeball (bulbar)
- Lacrimal duct provides lubrication



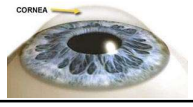
Conjunctivitis

Sclera

- White portion of eye
- Outer fibrous layer – very tough

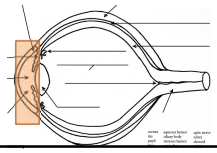
Cornea

- Continuous with Sclera
- Transparent tissue to let light through; bends light
- Covers the pupil & iris



Anterior Chamber

- "Middle Layer" or Choroid
- Posterior to the cornea
- Filled with fluid (aqueous humor)



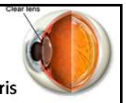
Iris

- Colored portion
- Muscular ring that dilates (opens) & constricts (closes) the amount of light entering the eye
- Located in front of the lens & behind the anterior chamber

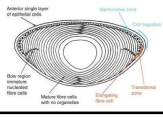
Pupil

- The opening in the iris where light passes through (anatomical space)
- Size of pupil determined by amount of light & closeness of object
- ↑ light = constriction (↓ size)
- ↓ light = dilation (↑ size)

Lens

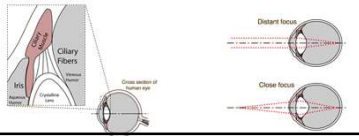


- Located directly behind the iris
- Transparent tissue without blood vessels, nerves, or connective tissue
  - Grows like onion layers



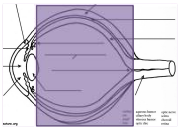
Lens

- Changes in lens thickness allow the eye to focus on objects at different distances
  - Ciliary muscles: controls size of lens
  - Ciliary bodies: produce fluid



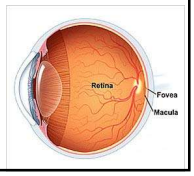
Posterior Chamber

- Posterior to the lens
- Filled with vitreous humor
  - Transparent gel-like fluid



Retina

- Sensory elements that transform light into electrical impulses, carried to brain via the optic nerve



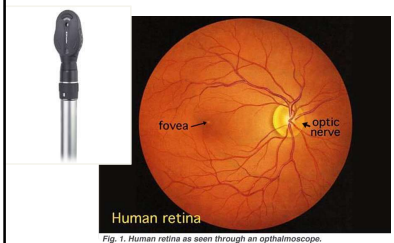


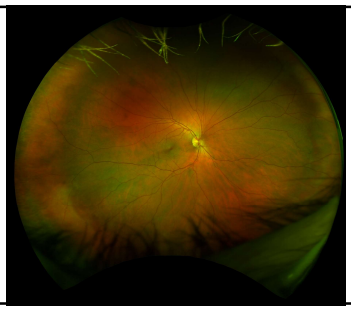
Fig. 1. Human retina as seen through an opthalmoscope.

Parts of the Retina

- Optic Disc – head of the optic nerve
- Vessels – through the disc, nourish the retina
- Macula – contains photoreceptors
  - Rods = black-and-white vision (presence or absence of photons)
  - Cones = color vision (blue, green, & red)

Parts of the Retina

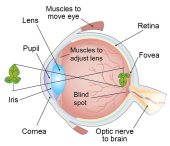
- Tapetum: reflects light; colored
  - In other animals; not in humans



- So – what causes this??

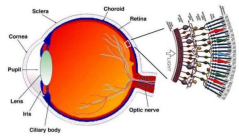
Vision

1. Light enters the eye, is focused on the retina by the lens (upside-down)
   - Focus controlled by iris & ciliary bodies pulling on the lens



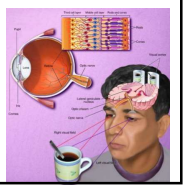
Vision

2. Photoreceptors (rods & cones) respond to light by producing a nervous impulse

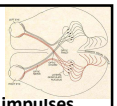


Vision

3. Signals leave the eye through the optic nerve, travels to the visual cortex of the occipital lobe



Vision



4. Visual interpretation of the impulses by the brain = "seeing"

Careers with Vision

- Ophthalmologist
  - M.D. or D.O. (B.S. + 4yrs + 5 years residency)
  - Surgeries and medications
- Optometrist
  - Doctor of Optometry (BS + 4 yrs)
- Optician
  - Fill prescriptions
  - Make frames/fit them
  - High school diploma; apprenticeship, associates degree (2yrs)

Visual Acuity

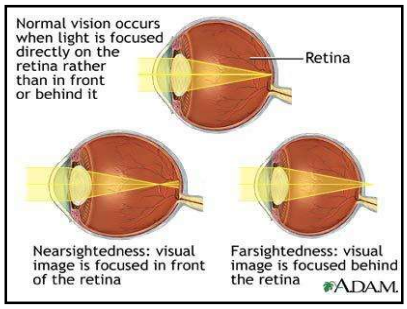
- "Normal" is 20/20 - clear at 20 feet
  - 20/15 means you see clear at 20 ft. what the average person would see at 15 ft. (very good vision)
  - Legally Blind at 20/200 – what you can see at 20 ft. the average person can see at 200 ft. (very poor vision)
- Metric = 6/6 ☺ (6 meters is 19 ft. 8.2 in.... close enough!)

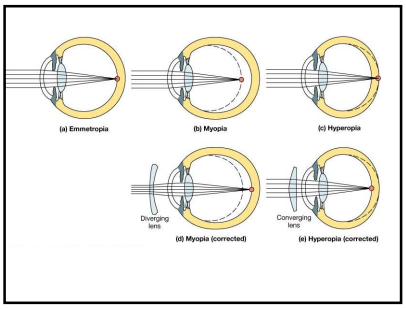
Eye Conditions

- Myopia (Nearsightedness)
  - The eye focuses the image in front of the retina
  - Can occur when the eyeball is too long or the lens is too thick
  - Nearsighted individuals can see objects that are nearby, but not objects that are far away

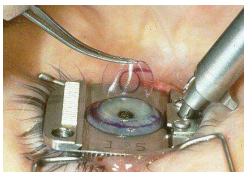
Eye Conditions

- Hyperopia (Farsightedness)
  - The eye focuses the image behind the retina
  - Can occur when the eyeball is too short or the lens is too thin
  - Farsighted individuals can see objects that are far away, but not objects that are nearby
  - As people age, they typically become farsighted as the lens of the eye becomes more rigid, losing its elasticity (Presbyopia)



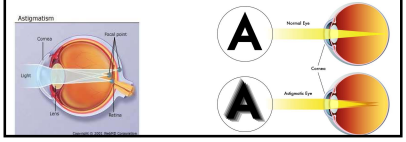


LASIK Eye Surgery



Eye Conditions

- Astigmatism
  - Uneven curvature of cornea or lens
  - Vision is blurred b/c the light is spread out instead of sharply focused on the retina



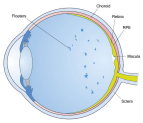
Eye Conditions

- Cataracts
  - Lens becomes cloudy / milky
  - May be caused by exposure to UV light
  - Tends to be progressive, leading to blindness
  - Can be treated with surgery

Eye Conditions

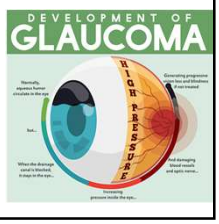
Floaters

- Objects (usually cells) floating around in the vitreous humor
- Very common



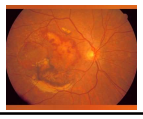
Eye Conditions

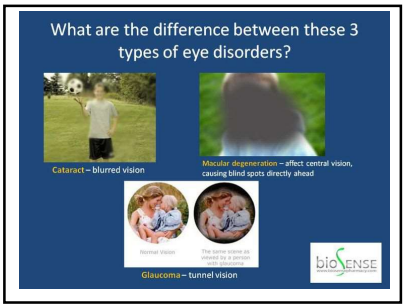
- Glaucoma
  - Abnormally high pressure in the eye due to blocked drainage of the aqueous humor



Eye Conditions

- Macular Degeneration
  - Loss of central vision, used for reading & driving…
  - Most common cause of vision loss in US





Eye Conditions

Hordeolum (Stye)

- Clogged sebaceous gland; traps staphylococcal bacteria
  - "pimple" in the eyelid

Eye Conditions

- Color Blindness
  - Mistakes in photo-pigments in cones
  - Each photo-pigment is sensitive to 1 of 3 primary colors (red, blue, & green)

Ishihara Test

For Colorblindness

If red-green colorblind, will only be able to read 2 of these #s…