Special Senses

The Eye

- 1” in diameter
- Protected by orbital socket of skull, eyebrows, eyelashes and eyelids
- Bathed in fluid from LACRIMAL GLANDS – tears empty into nasal cavity
- CONJUNCTIVA – thin membrane that lines the eyelids and covers part of the eye, secretes mucous to lubricate eye
- Wall of the eye made up of three coats

SCLERA

- Outer layer
- White of the eye
- Tough coating, helps maintain shape of eye and protects what’s inside
- Muscles responsible for moving the eye are attached to the sclera – called EXTRINSIC MUSCLES
CORNEA
- Front of sclera – clear part (no blood vessels)
- Transparent so light rays can pass through
- Gets $O_2$ and nutrients through lymph

CHOROID COAT
- Middle layer
- Contains blood vessels
- Opening in front is the PUPIL
- Colored, muscular layer surrounding pupil is IRIS
- INTRINSIC MUSCLES – change size of iris to control amount of light entering through the pupil
LENS
- Crystalline structure located behind iris and pupil
- Elastic, disc-shaped, biconvex
- Situated between the anterior and posterior chambers
- **ACCOMMODATION** – change in the shape of the lens to allow for near and distant vision
- **ANTERIOR CHAMBER** filled with **AQUEOUS HUMOR**, a watery fluid.
- **POSTERIOR CHAMBER** filled with transparent, jellylike substance – **VITREOUS HUMOR**

RETINA
- Innermost layer
- Light rays focus an image on the retina
- The image travels to the cerebral cortex via the **OPTIC NERVE**
- If light rays don’t focus properly on the retina, corrective lenses can bend the light rays as required.
- Retina contains specialized cells – rods and cones
  - **RODS** – sensitive to dim light
  - **CONES** – sensitive to bright light and color
- **OPTIC DISC** – on the retina, known as the blind spot – nerve fibers gather here to form the optic nerve, no rods or cones

### Pathway of Vision

- **Cornea**
- **Pupil** → **Lens (Where light rays are refracted)** → **Retina** → **Rods and Cones (pick up stimulus)** → **Optic Nerve** → **Brain**
The Ear

Hearing and equilibrium
3 parts: Outer, middle and inner ear

Outer Ear
PINNA (AURICLE) – outer ear, collects sound waves
EXTERNAL AUDITORY CANAL – ear canal
CERUMEN – earwax, protects the ear
TYMPANIC MEMBRANE – ear drum, separates outer and middle ear
Middle Ear

- Cavity in temporal bone
- Connects with pharynx by EUSTACHIAN TUBE – which equalizes pressure in the middle ear with outside atmosphere
- Bones in middle ear that transmit sound waves from ear drum to inner ear
  1. MALLEUS (hammer)
  2. INCUS (anvil)
  3. STAPES (stirrup)

Inner Ear

- Contains spiral shaped organ of hearing – the COCHLEA
- The cochlea contains a membranous tube, the cochlear duct – which is filled with fluid that vibrates when sound waves are transmitted by the stapes
- ORGAN OF CORTI – delicate hairlike cells that pick up vibrations of fluid and transmit them as a sensory impulse along the auditory nerve to the brain
- SEMICIRCULAR CANALS – three structures in the inner ear, contain liquid that is set in motion by head and body movements – impulses sent to cerebellum to help maintain body balance (equilibrium).
Pathway of Hearing

External Auditory Canal → Tympanic Membrane

Ossicles (malleus, incus & stapes) → Cochlea

Auditory nerve → Brain
The Nose

- Smell accounts for 90% of taste
- Tissue in the nose, olfactory epithelium, contains specialized nerve cell receptors.
- Those receptors stimulate the Olfactory Nerve to the brain.

The Tongue

- Mass of muscle tissue
- Bumps on the surface are Papillae, they contain the Taste Buds
- Receptors in taste buds send stimuli through 3 cranial nerves to the cerebral cortex
Disorders of the Eye

CONJUCTIVITIS
- Pink eye
- Inflammation of conjunctival membranes in front of the eye
- Redness, pain, swelling and discharge
- Highly contagious
- Rx – antibiotic eye drops

GLAUCOMA
- Excessive intraocular pressure causing destruction of the retina and atrophy of the optic nerve
- Caused by overproduction of aqueous humor, lack of drainage, or aging
- Symps – develop gradually – mild aching, loss of peripheral vision, halo around the light
- TONOMETER – measures intraocular pressure
- Rx – drugs or laser surgery
CATARACTS
- Lens of eye gradually becomes cloudy
- Frequently occurs in people over 70
- Causes a painful, gradual blurring and loss of vision
- Pupil turns from black to milky white
- Rx – surgical removal of the lens

STY (HORDEOLUM)
- Abscess at the base of an eyelash (in sebaceous gland)
- Symp – red, painful and swollen
- Rx – warm, wet compresses

EYE INJURIES
- Tears are effective in cleaning the eye
- If glass or fragments get in eye, cover both eyes and see medical treatment. (DO NOT remove the object)
- COLOR BLINDNESS – cones are affected – genetic disorder that is carried by the female and transmitted to males
Vision Defects

PRESBYOPIA
- Lens loses elasticity, can’t focus on close or distant objects
- Usually occurs after age 40
- Rx - Bifocals

HYPEROPIA
- Farsighted
- Focal point beyond the retina because eyeball too short
- Convex lenses help

MYOPIA
- Nearsighted
- Eyeball too long
- Concave lenses help

ASTIGMATISM
- Irregular curvature of the cornea or lens, causing blurred vision and eye strain
- Rx – corrective lenses

DIPLOPIA – double vision
STRABISMUS (cross-eyes)
- Eye muscles do not coordinate their actions
- Usually in children
- Rx – eye exercises or surgery

OPHTHALMOSCOPE – instrument for viewing inside the eye

SNELLEN EYE CHART – chart that uses letters or symbols in calibrated heights to check for vision defects

Disorders of the Ear

Loud noise and hearing loss – hearing is fragile. Loud noise over a period of time can cause hearing loss.

Symptoms – TINNITUS (ringing in ears) and difficulty understanding what people are saying

OTITIS MEDIA
- Infection of the middle ear
- Often a complication of a common cold in children
- Rx – antibiotics
• If chronic or if fluid builds up – **MYRINGOTOMY** (opening in the tympanic membrane) with tubes inserted will relieve the pressure

**OTOSCLEROSIS**
• Chronic, progressive middle ear disorder
• Stapes becomes spongy and then hardens, becoming fixed and immobile
• Common cause of deafness in young adults
• Rx – stapedectomy and total replacement of stapes

**TINNITUS** – ringing in the ears from impacted wax, otitis media, otosclerosis, loud noise, blockage of normal blood supply to the cochlea, drugs (salicylates)

**PRESBYCUSIS** – deafness due to the aging process, can be helped with the use of hearing aids

Types of hearing loss:
• Conductive – which sounds are prevented from reaching inner ear
• Sensorineural – problem with inner ear or auditory nerve
Disorders of the Nose

RHINITIS

- Inflammation of the lining of the nose with nasal congestion, drainage, sneezing and itching
- Caused by allergies, infection, fumes, odors, emotion, or drugs
- Rx – eliminate causes, antihistamines