Unit 6:7 Special Senses

A. Introduction

a. Special senses allow the human body to react to the environment
b. Body able to see, to hear, to taste, to smell, and to maintain balance
c. Senses occur because the body has structures that receive the sensation, nerves that carry the sensory message to the brain, and a brain that can interpret and respond to the message

B. Eye

a. Organ that controls the special sense of sight
b. Receives light rays and transmits the rays to the optic nerve, which carries the rays to the brain where they are interpreted as vision or sight
c. Eye is well protected
    i. Partially enclosed in a bony socket of the skull
    ii. Eye lids and lashes help keep out dirt and pathogens
    iii. Lacrimal glands produce tears
        1. That constantly moisten and cleanse out the eye
        2. Tears flow across eye and drain through the lacrimal duct into nasal cavity
    iv. Conjunctiva
        1. Mucous membrane that protects the eye
        2. Lines the eyelids and covers the front of the eye
        3. Provides protection and lubrication
d. Three main layers of the eye
    i. Sclera
        1. Outermost layer
        2. Tough connective tissue
        3. Frequently referred to as the white of the eye
        4. Maintains the shape of the eye
        5. Extrinsic muscles, responsible for moving the eye within the socket, are attached to the outside of the sclera
        6. Cornea: a circular transparent part on the front of the sclera that allows light rays to enter the eye
    ii. Choroid coat
        1. Middle layer of the eye
        2. Interlaced with many blood vessels that nourish the eyes
        3. Pupil
            a. Hole in the front of the choroids coat
            b. Allows light rays to enter
        4. Iris
            a. Special part of the choroids coat
            b. Colored portion of the eye
            c. It is a muscle that controls the size of the pupil and regulates the amount of light entering the eye
        5. Retina
            a. Innermost layer of the eye

c. Corrective Lenses and surgery
4. If not treated before 8 to 9 years of age, blindness of the affected eye may occur

ii. Astigmatism
1. Abnormal shape or curvature of the cornea that causes blurred vision
2. Corrective lenses (glasses or contact lenses) correct the condition

iii. Cataract
1. Normally clear lens becomes cloudy or opaque
2. Occurs gradually and is usually a result of aging, but may be the result of trauma
3. Symptoms
   a. Blurred vision and halos around lights
   b. Gradual loss of vision
   c. Milky white pupil in later stages
4. Treatment
   a. Surgical removal of the lens
   b. Implanting of an intraocular lens or prescribing glasses or contact lenses corrects the vision and compensates for the removed lens

iv. Conjunctivitis or pink eye
1. Contagious inflammation of the conjunctiva
2. Usually caused by a bacteria or virus
3. Symptoms: redness, swelling, pain, and pus formation
4. Treatment: antibiotics, frequently as eye ointment

v. Glaucoma
1. Condition resulting from an increased intraocular (inside the eye) pressure
2. Caused by an excess amount of aqueous humor
3. Common after age 40 and a leading cause of blindness
4. Tonometer, an instrument for measuring intraocular pressure, is usually used during every eye examination to check for this condition
5. Symptoms: loss of peripheral (side) vision, halos around lights, limited night vision, and a mild aching
6. Treatment
   a. Controlled with medications that decrease amount of fluid produced or improve the drainage
   b. In severe cases, surgery to create an opening for the flow of aqueous humor

vi. Hyperopia or farsightedness
1. Occurs when light rays are not refracted properly and image focuses behind the retina
2. Vision is corrected by the use of convex lenses

vii. Myopia or nearsightedness

e. Middle ear
    i. Small space or cavity in the temporal bone
    ii. Contains three small bones (ossicles): malleus, incus, and stapes
    iii. Bones are connected and transmit sound waves from the tympanic membrane to the inner ear
    iv. Eustachian tube
        1. Tube that connects the middle ear to the pharynx or throat
        2. Allows air to enter the middle ear
        3. Helps equalize air pressure on both sides of the tympanic membrane

f. Inner ear
    i. Most complex portion of the ear
    ii. Oval window: membrane that separates it from the middle ear
    iii. Vestibule: first section that acts as the entrance to the two other parts of the inner ear
    iv. Cochlea
        1. Shaped like a snail's shell
        2. Contains delicate hair like cells that make up the organ of Corti, which is a receptor for sound waves and transmits the impulses from sound waves to the auditory nerve that carries impulses to temporal lobe of cerebrum where they are interpreted as hearing
    v. Semicircular canals
        1. Also located in the inner ear
        2. Contain a liquid and delicate hair like cells that bend when the liquid moves with head and body movements
        3. Impulses from semicircular canals sent to the cerebellum of the brain help to maintain our sense of balance and equilibrium

g. Diseases and abnormal conditions of the ear
    i. Hearing Loss
        1. Classified as conductive or sensory
        2. Conduction loss or deafness
            a. Caused by sound waves not being conducted to inner ear
            b. Causes: wax (cerumen) plug, foreign body obstruction, otosclerosis, infection, or ruptured tympanic membrane
            c. Treatment: eliminate cause, surgery, hearing aids
        3. Sensory hearing loss or deafness
            a. Caused by damage to the inner ear or auditory nerve
            b. Usually cannot be corrected
            c. Cochlear implants can improve severe hearing loss
    ii. Meniere's disease
        1. Collection of fluid in labyrinth of inner ear and a degeneration of hair cells in cochlea and vestibule