Lecture Outline

The Sensory System
A stimulated sensory receptor sends signals in the brain through the thalamus.
Five types of sensory receptors

- **Mechanoreceptors** – stimulated by changes in pressure or body movement
- **Thermoreceptors** –
- **nociceptors** – stimulated by damage or oxygen deprivation to the tissues
- **Chemoreceptors** –
- **Photoreceptors** –
Proprioceptors-

- Sensory receptors located in the ________________

- Mechanoreceptors involved in reflex actions

- Maintain ________________________________

- ___________________ – increase the degree of muscle contraction

- Muscle tone-___________________________

- ___________________ – decrease the degree of muscle contraction
Cutaneous Receptors

- Located in the deepest layer of the ______ and __________________________
- Make skin sensitive to ______________________
- Temperature receptors are ______________________

![Diagram of skin receptors](Image)
Pain Receptors- nociceptors

- **Somatic nociceptors**
  - Skin and skeletal muscle
  - Respond to ________________________________

- ___________________ – react to excessive stretching, oxygen deprivation, or chemicals released by damaged tissues

- Referred pain – ________________________________
Chemical senses- Taste & smell

- Sensitive to ____________________________

- Other chemoreceptors in the body
  - Govern ________________________________
  - Sensitive to the ____________________________
Sense of Taste

○ Sensory receptors located in the ________

• Primarily on the ______________________

• Types of taste sensations___________________________________
How the brain receives taste information

• Molecules in food bind with ____________

• Sense of taste & sense of smell
  □ Both __________________________
  □ Smell can_______________________
  □ Part of what you taste may actually be smell & vice versa
  □ Nerve impulses are generated and _____
    ________________________________
  □ Sensory receiving and memory areas for taste are located in ________________
Senses of Smell

- Dependent on ________________________
  - Located in ________________________
    ____________________________
  - Modified ________________________
  - Olfactory cilia have ____________ for odor molecules
  - The brain distinguishes odors after ______
    ____________________________
  - An odor’s signature is determined by
    ____________________________
Sense of Vision-in eyes

- Accessory Organs of the Eye
  - Eyebrows
  - Eyelids are continuations of the skin-
  - Eyelashes
  - Secretions from sebaceous glands associated with eyelashes
Lacrimial apparatus

- **Lacrimal gland**
- Tears collect in
- Tears drain into the nose by the
Extrinsic muscles-

- Sets of muscles work to oppose each other
- Control these muscles
Anatomy & physiology of the Eye

- Three layers
  - 1. ____________________________
    - White and fibrous
    - _____________is transparent
  - 2. ____________________________
    - Middle, vascularized layer
    - Becomes the _______ towards the front
    - Regulates ____________________________
    - _____________portion of eye
    - The ciliary body is behind the iris
    - Contains the ciliary muscle
    - Controls ____________________________
3. Retina- only layer with

- Rod cells – ________________________________
- Cone cells – ____________________________
- ___________________________ – area of retina where cone cells are densely packed
- Optic nerve – ____________________________
• **Image produced is** ________, ________, and ________

• **Accommodation**
  - ________
  - **Lens must change** __________
    - Controlled by the ________
    - Ciliary muscle is relaxed for a distant object
    - Ciliary muscle contracts to view a near object
a. Focusing

b. Focusing on distant object

c. Focusing on near object
Function of the photoreceptors

- **Rod absorb** ______, ________ & gives us _______________________
  - The light stimulus stops the release of __________________ molecules from the rod
  - Nerve impulses travel to the ___________________
- **Color vision**-three kinds of __________
  - Color blindness is caused by ___________________
Function of the retina

- Three layers of neuron
  - Rod cells and cone cells are located _______________
  - Middle layer contains bipolar cells
  - Innermost layer contains ganglion cells
  - ____________________________ fovea centralis
  - Considerable _________________ occurs in the retina

- Blind spot-
  - No vision is possible in this area
From the retina to the visual cortex

- The optic nerves carry impulses to _________

- Fibers from the optic tracts synapse with _________

- Axons from the thalamus carry impulses to _________

- The right and left visual cortex _________
Functions of the ear-

- Sensory receptors located ____________________
Anatomy of the Ear

0 **Outer ear**
- Pinna
- **Auditory canal**
  - Lined with______________
  - Modified____________________________secret cerumen

0 **Middle ear**
- Begins at the____________________________
- Ends at bony wall with two small openings (Oval & round window)
- Three small bones (ossicles)-
  - Malleus
  - Incus
  - Stapes
  - Auditory tube (eustachian tube____________________________

0 **Inner ear**
- Filled with____________________________
  - Semicircular canals
  - Vestibule
- hearing
  - ______________________________
Sound pathway- the auditory canal

• Sound travels by ________________________________
• Sound waves strike the ____________________________
• Pressure from the tympanic membrane causes the malleus, the incus, and then the stapes, ________________________________
• The __________________ strikes the oval window
• Vibrations from the oval window ________________________________
From the cochlea to the auditory cortex

- **Cochlea**
  - Located in cochlear canal
  - Consists of hair cells which communicate with
  - Nerve impulses begin in the and travel to the brain stem and then the

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### Diagram Details:

- **Cochlea Cross Section**
- **Spiral Organ**
- **Stereocilia**
Sense of Equilibrium

- ________________ in the semicircular canals & vestibule are responsible for equilibrium.
- Communicating with the ______ they help us achieve equilibrium.
- Motion sickness-____________________________________
- Vertigo-___________________________________________
a. Rotational equilibrium: receptors in ampullae of semicircular canal

b. Gravitational equilibrium: receptors in utricle and saccule of vestibule
Effects of Aging on the sensory system

- The lens of the eye ____________________________
- Three visual disorders seen frequently:
  - ____________________________
  - ____________________________
  - ____________________________
- The need for a hearing aid ____________________________
- _________ and the inability to ____________________________
Hearing damage & deafness

- **Conduction deafness**

- **Nerve deafness**

- **Preventing hearing loss**
  - ______________________p. 202
  - ______________________
  - ______________________