Lab Activities 16, 17, & 18

Olfaction & Taste
Vision
Hearing & Equilibrium

Portland Community College
BI 232
Lingual Papilla

- Papilla are epithelial projections on the superior surface of the tongue
- **Circumvallate papilla** contain about 100 taste buds
- **Fungiform papilla** contain about 5 taste buds
- **Filiform papillae** provide friction that helps the tongue move objects around in the mouth, but do not contain taste buds
Taste Receptors

• Taste buds contain spindle-shaped cells
• **Basal cells:** produce daughter cells that mature in stages
• **Gustatory cells:** extend microvilli into the surrounding fluids through a taste pore
  • Contain the taste receptors
Taste Bud
Histology
Gustatory Discrimination

1. Umami: “Beef”
2. Salty
3. Sweet
4. Bitter
5. Sour

- Substances must be dissolved (saliva) for the chemically gated ion channels to open
- Olfaction is very important in taste
Lab Activity 17

Vision
(b) Horizontal section of right eye
Ciliary body

1. Ciliary processes
   - Ciliary epithelium
   - Secretes aqueous humor
2. Ciliary muscle
   - (intrinsic eye muscle)
3. Suspensory ligament of the lens

A = anterior chamber
P = posterior chamber
(c) A photograph of the retina as seen through the pupil.
Extrinsic Eye Muscles

- **Superior oblique**: primarily rotates the top of the eye toward the nose and secondarily moves the eye downward
  - **Trochlea**: Ligament sling
- **Superior rectus**: primarily moves the eye upward and secondarily rotates the top of the eye toward the nose
- **Lateral rectus**: moves the eye away from the nose
Extrinsic Eye Muscles

- **Medial rectus**: moves the eye toward the nose
- **Inferior oblique**: primarily rotates the top of the eye away from the nose and secondarily moves the eye upward
- **Inferior rectus**: primarily moves the eye downward and secondarily rotates the top of the eye away from the nose
(c) Anterior view, right eye
Extrinsic Eye Muscles
Intrinsic Eye Muscles of the Iris

- Pupils constrict (Parasympathetic)
  - Close vision and bright light
- Pupils dilate (Sympathetic)
  - Distant vision and dim light
Histology of the Retina

(a) Cellular organization of the retina
Refraction

- Light is bent when it passes from one medium to another medium with a different density
- Light passes through these before it hits the retina:
  - Cornea
  - Aqueous humor
  - Lens
  - Vitreous humor
Focal Point & Focal Distance

• **Focal Point**: The specific point of intersection on the retina.

• **Focal distance**: The distance between the center of the lens and its focal point. Determined by two factors:
  1. Distance from the object to the lens
  2. Shape of the lens
Focal Distance

• **Distance** from the object to the lens: the closer an object is, the greater the focal distance

• **Shape of the lens**: the rounder the lens, the more refraction occurs, so it has a shorter focal distance
Accommodation is an alteration in the curvature of the lens of the eye to focus an image on the retina.

- **Near objects**: Lens becomes rounder.
- **Distance objects**: Lens becomes flatter.
Accommodation

- **Emmetropia** is normal vision.
- The image will be focused on the retina’s surface.
Accommodation Problems

- **Myopia:** Nearsighted
- The eyeball is too deep or the curvature of the lens is too great
- The focal point is in front of the retina, so distance objects are blurry
- Corrected with a diverging lens
Accommodation Problems

- **Hyperopia**: Farsighted
- The eyeball is too shallow or the curvature of the lens is too flat
- The focal point is behind the retina, so near objects are blurry
- Corrected with a converging lens
Astigmatism

- The degree of curvature in the cornea or lens varies from one axis to another (is uneven or wavy)
- This causes light to focus on more than one area of the retina creating a blurry image.
Convergence

- When an object moves closer, the eyes rotate inward to maintain the focal point
Lab Activity 18

Hearing & Equilibrium
Middle Ear Ossicles (Bones)

- Malleus
- Incus
- Stapes
• The stapes strikes the oval window of the cochlea
Vestibular Complex
- Stapes pushes on fluid of vestibular duct at oval window
- At helicotrema, vibration moves into tympanic duct
- Fluid vibration dissipated at round window which bulges
- The central structure is vibrated (cochlear duct)

Cochlea Uncoiled

- oval window
- vestibular duct
- helicotrema
- round window
- tympanic duct
- Cochlear duct containing the Organ of Corti
Organ of Corti
Types of Hearing Loss

- **Conductive hearing loss** occurs when sound is not conducted efficiently through the outer ear canal to the eardrum and the bones of the middle ear.
- **Sensorineural hearing loss** occurs when there is damage to the inner ear (cochlea) or to the nerve pathways from the inner ear to the brain.
Weber & Rinne Tests

- **Weber test**: determines if hearing loss is present in one ear, but does not distinguish conductive and sensorineural deafness
- **Rinne test**: Evaluates an individual’s ability to hear sounds conducted by air or bone
- Used together, these test can distinguish between the two types of hearing loss
Weber Test

- Ring tuning fork and place on center of head. Ask the subject where they hear the sound.
- **Interpreting the test:**
- Normally, the sound is heard in the center of the head or equally in both ears.
- Sound localizes toward the poor ear with a conductive loss
- Sound localizes toward the good ear with a sensorineural hearing loss
Rinne Test

- Place the vibrating tuning fork on the base of the mastoid bone.
- Ask patient to tell you when the sound is no longer heard.
- Immediately move the tuning fork to the front of the ear
- Ask the patient to tell you when the sound is no longer heard.
- Repeat the process putting the tuning fork in front of the ear first
Rinne Test

- Normally, someone will hear the vibration in the air (in front of the ear) after they stop hearing it on the bone.
- **Conductive hearing loss**: If the person hears the vibration on the bone after they no longer hear it in the air.
The End