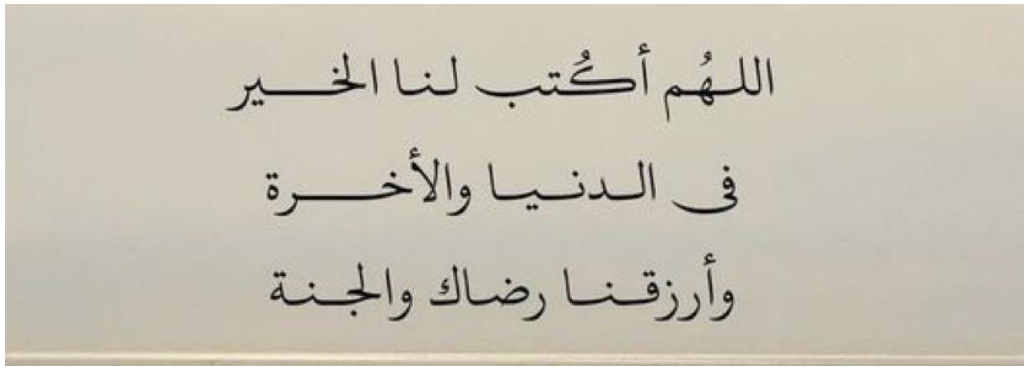
Guyton questions- CNS

By Hind Shaker Suhwail

I didn’t have time to review the file again. Please let me know if you find any mistakes :)



Lecs 1& 2 : somatic sensations

Q1: Pain receptors in the skin are typically classified as which of the following?

A) Encapsulated nerve endings

B) A single class of morphologically specialized receptors

C) The same type of receptor that detects position sense

D) Free nerve endings

Answer:D

Q2. Which of the following best describes the concept of specificity in sensory nerve fibers that transmit only one modality of sensation?

A) Each receptor type responds to multiple sensory modalities

B) Each sensory fiber transmits only one type of sensation

C) Each receptor transmits only motor signals

D) Sensory receptors adapt rapidly

E) All receptors respond equally to stimuli

Answer:B

Q3. Which of the following is an encapsulated receptor found deep in the skin throughout the body, as well as in fascial layers, where it detects indentation of the skin (pressure) and mechanical vibration?

A) Merkel discs

B) Pacinian corpuscles

C) Ruffini endings

D) Meissner corpuscles

E) Free nerve endings

Answer:B

Q4. Which of the following is an important functional parameter of pain receptors?

A) Exhibit little or no adaptation

B) Not affected by muscle tension

C) Signal only mechanical stimuli

D) Located only in the skin

E) Respond only to temperature

Answer: A

Q5. Neurons located in which system transmit localized touch sensation and body position (proprioceptive) sensation?

A) Anterolateral system

B) Dorsal column–medial lemniscal system

C) Corticospinal tract

D) Spinoreticular tract

E) Spinocerebellar tract

Answer: B

Q6. A physiology experiment is conducted in which a glass microelectrode is inserted into a Pacinian corpuscle to record receptor potentials during different levels of pressure applied to the receptor. Increasing the intensity of pressure is most likely to cause which of the following?

A) Increase receptor potential amplitude

B) Decrease receptor potential amplitude

C) No change in receptor potential

D) Hyperpolarization of receptor

E) Block conduction

Answer: A

Q7. Which of the following best describes the concept of specificity in sensory nerve fibers that transmit only one modality of sensation?

A) Frequency coding principle

B) Concept of specific nerve energy

C) Singularity principle

D) Labeled line principle

Answer: D

Q8. The pathway of which system crosses in the ventral white commissure of the spinal cord within a few segments of entry and then courses to the thalamus contralateral to the side of the body from which the signal originated?

A) Anterolateral system

B) Dorsal column–medial lemniscal system

C) Corticospinal system

D) Spinocerebellar system

Answer: C

Q9. The first-order (primary afferent) cell bodies of the dorsal column–medial lemniscal system are found in which structure?

A) Spinal cord dorsal horn

B) Spinal cord ventral horn

C) Dorsal root ganglia

D) Nucleus cuneatus

Answer: C

Q10. A 10-year-old boy cuts his finger with a pocket knife and immediately applies pressure to the damaged area with his other hand to partially alleviate the pain. Inhibition of pain signals by tactile stimulation of the skin is mediated by which type of afferent neurons fro mechanoreceptors?

A) α-type A

B) β-type A

C) δ-type A

D) Type C

Answer: B

Q11. Within the primary somatosensory cortex, the various parts of the contralateral body surface are represented in areas of varying size that reflect which of the following?

A) The relative size of the body parts

B) The density of the specialized peripheral receptors

C) The size of the muscles in that body part

D) The conduction velocity of the primary afferent fibers

Answer: B

Q12. ability to detect two points simultaneously applied to the skin is based on which physiologic mechanism?

A) Presynaptic inhibition

B) Lateral inhibition

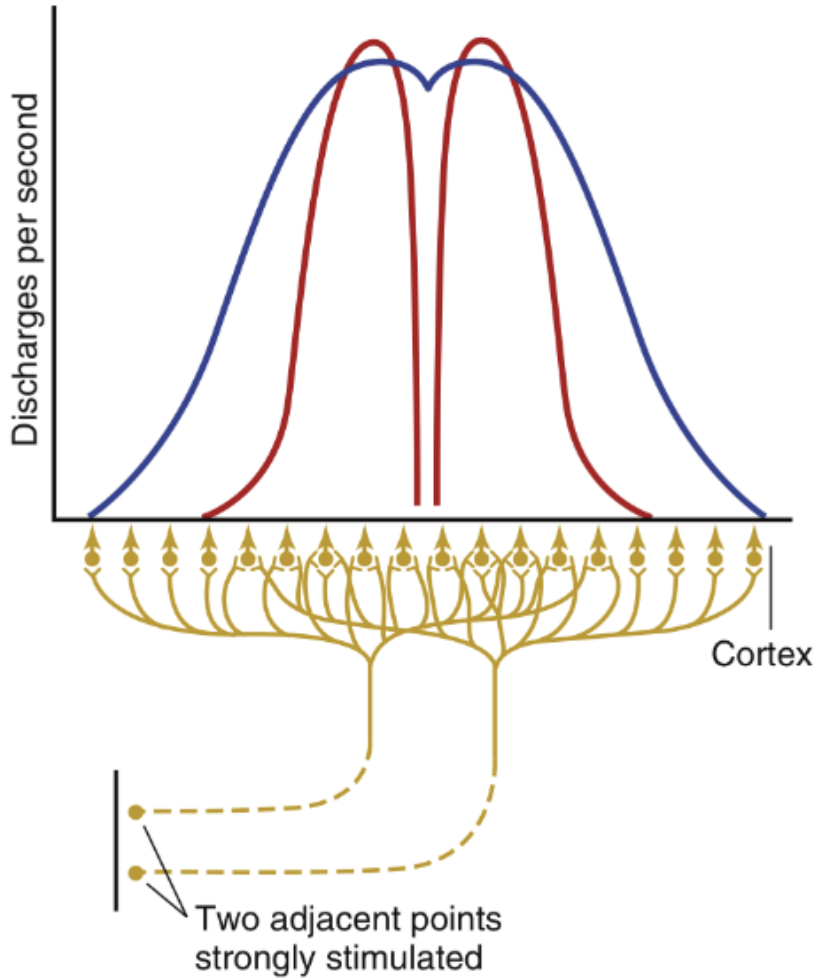
C) Medial inhibition

D) Feed-forward inhibition

Answer: B

. **B)** The process of lateral inhibition, illustrated in the figure below, underlies the ability to discriminate two points simultaneously applied.

TMP13 p. 603



Q13. Which statement accurately describes a feature of temperature sensation by the nervous system?

A) Cold receptors continue to be activated even if skin temperature is lowered well below its freezing point

B) Both cold and warm receptors each have very specific, non overlapping ranges of temperature sensitivity

C) Warm and cold receptors respond to both steady state temperatures and to changes in temperature

D) Temperature receptor function is the result of ion conduction changes and not changes in their metabolic rate

Answer: C

Q14. The sensation of temperature is signaled mainly by warm and cold receptors whose sensory fibers travel in association with the sensory fibers carrying pain signals. Which statement best characterizes the transmission of signals from warm receptors?

A) Warm receptors are well characterized histologically

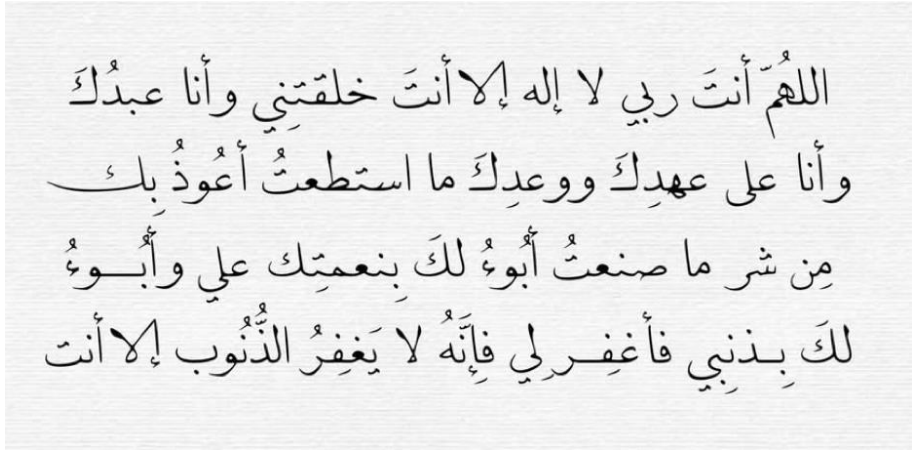
B) Signals from warm receptors are mainly transmitted along slow-conducting type C sensory fibers

C) Warm receptors are located well below the surface of the skin in the subcutaneous connective tissue

D) There are 3 to 10 times more warm receptors than cold receptors in most areas of the body

Answer: B

Lec 3 : pain


اللهُمّ أنتَ ربي لا إله إلا أنتَ خلقتَني وأنا عبدُكَ
وأنا على عهدِكَ ووعدِكَ ما استطعتُ أعُوذُ بِكَ
مِن شر ما صنعتُ أبُوءُ لكَ بِنعمتِك علي وأبُوءُ
لكَ بِذنبي فأغفِر لِي فإنَّهُ لا يَغفِرُ الذُّنُوب إلا أنت

Q1. Which of the following is the basis for referred pain?

A) Visceral pain and skin pain synapse separately

B) Convergence occurs in the thalamus

C) Visceral pain rarely reaches threshold

D) Visceral and somatic pain converge on the same dorsal horn neurons

Answer: D

Q2. Stimulation of which brain region can modulate pain sensation?

A) Superior olivary complex

B) Locus ceruleus

C) Periaqueductal gray (PAG)

D) Amygdala

Answer: C

Q3. A 43-year-old man sustained a lower back injury that causes severe chronic pain. His physician prescribes benzodiazepine sedation medications to help him sleep. Which response best describes why this man has difficulty sleeping without medication?

A) Depression of the amygdala

B) Depression of reticular formation

C) Excitation of the amygdala

D) Excitation of reticular formation

E) Loss of somatic sensations

F) Loss of visceral sensations

Answer: D

Q4. The highest degree of pain localization comes from which of the following?

A) Simultaneous stimulation of free nerve endings and tactile fibers

B) Stimulation of free nerve endings by bradykinin

C) Nerve fibers traveling to the thalamus by way of the paleospinothalamic tract

D) Stimulation of δ-type A fibers

Answer: A

Lec 4 : olfaction & Gustation

Q1. Which substance will elicit the sensation of bitter taste?

A) Aldehydes

B) Alkaloids

C) Amino acids

D) Hydrogen ions

E) Ketones

Answer: B

Q2. Which substance will elicit the sensation of sour taste?

A) Aldehydes

B) Alkaloids

C) Amino acids

D) Hydrogen ions

E) Ketones

Answer: D

Q3. Which taste sensation is the most sensitive (lowest stimulation threshold)?

A) Acid

B) Bitter

C) Salty

D) Sour

E) Sweet

Answer: B

Q4. Which substance is responsible for the umami taste sensation?

A) Acetic acid

B) Potassium tartrate

C) Long-chained organic substances containing nitrogen

D) Fructose

E) Glutamate

Answer: E

Q5. Which type of papillae is located in the posterior part of the tongue?

A) Circumvallate

B) Foliate

C) Fungiform

D) Fungiform and circumvallate

E) Papilla of Vater

Answer: A

Q6. Which type of papillae is located in the folds along the lateral surfaces of the tongue?

A) Circumvallate

B) Foliate

C) Fungiform

D) Fungiform and circumvallate

E) Papilla of Vater

Answer: B

Q7. The first central synapse for neurons transmitting the sweet taste sensation is in which structure?

A) Dorsal sensory nucleus of vagus nerve

B) Nucleus of solitary tract

C) Nucleus of olfactory nerve

D) Nucleus of hypoglossal nerve

E) Nucleus of facial nerve

Answer: B

Lecs 5 , 6 & 7 : vision

Q1. A 10-year-old boy looks at ants through a magnifying glass. He finds that the ants must be 10 centimeters from the convex lens to be in focus. Which value best describes the refractive power of the lens (in diopters)?

A) 0.1

B) 1.0

C) 10

D) 100

E) 1000

Answer: C

Q2. Which of the following best describes the “blind spot” of the eye?

A) Located 5 degrees lateral to the central point of vision

B) The exit point of the optic nerve

C) Contains only rods and thus has monochromatic vision

D) Contains no blood vessels

E) The area where chromatic aberration of the lens is the greatest

Answer: B

Q3. A 6-year-old boy with albinism has reduced visual acuity. What is the most likely cause?

A) Cataracts

B) Hyperopia

C) Myopia

D) Photophobia

E) Presbyopia

Answer: D

Q4. A woman with celiac disease has night blindness. Which deficiency causes this?

A) 2-Monoglycerides

B) Amino acids

C) Free fatty acids

D) Glucose

E) Vitamin A

F) Vitamin B12

Answer: E

Q5. An elderly woman with clear lenses sees well after being given bifocal lenses.

A) Cataracts

B) Glaucoma

C) Hyperopia

D) Myopia

E) Presbyopia

Answer: E

Q6. Light entering the eye passes through which retinal layer first?

A) Inner nuclear layer

B) Outer nuclear layer

C) Outer plexiform layer

D) Photoreceptor layer

E) Retinal ganglion layer

Answer: E

Q7. A student looks from a book to a distant object. What occurs?

A) Thicker lens, contraction of ciliary muscle

B) Thicker lens, relaxation of ciliary muscle

C) Thinner lens, contraction of ciliary muscle

D) Thinner lens, relaxation of ciliary muscle

Answer: D

Q8. Elevated intraocular pressure with eye pain is most likely caused by:

A) Decreased hydraulic resistance of trabecular meshwork

B) Decreased production of aqueous humor

C) Increased hydraulic resistance of trabecular meshwork

D) Increased production of aqueous humor

Answer: C

Q10. Electrical response of rods to light:

A) Action potential

B) Capacitive discharge

C) Depolarization

D) Hyperpolarization

Answer: D

Q11. Cells in layer IV of the primary visual cortex detect orientation of lines.

A) Border cells

B) Complex cells

C) Ganglion cells

D) Hypercomplex cells

E) Simple cells

Answer: E

Q12. Which statement regarding color vision is correct?

A) Green perceived when only green cones stimulated

B) Stimulation ratio of three cones determines color perception

C) White wavelength shorter than blue

D) No cone stimulation produces white

E) Yellow when green and blue stimulated equally

Answer: B

Q13. Which statement is correct about retinal elements?

A) Cones greatly exceed rods

B) Each cone responds to all wavelengths

C) Photoreceptor activation causes hyperpolarization

D) Fovea contains only rods

E) Pigment layer contains photoreceptors

Answer: C

Q14. Hyperopia is usually caused by:

A) Decreased melanin

B) Uneven cornea curvature

C) Eyeball shorter than normal

D) Eyeball longer than normal

E) Lens too powerful

Answer: C

Q15. Axons of ganglion cells synapse in which structure before reaching the primary visual cortex?

A) Lateral geniculate nucleus

B) Medial geniculate nucleus

C) Optic chiasm

D) Optic radiation

E) Superior cervical ganglion

F) Superior colliculus

Answer: A

Q16. Which allows accurate determination of object distance (depth perception)?

A) Monocular vision

B) Retinal image location

C) Stationary parallax

D) Stereopsis

E) Retinal image size

Answer: D

Q17. Which structure provides about two-thirds of the eye's refractive power?

A) Anterior surface of the cornea

B) Anterior surface of the lens

C) Iris

D) Posterior surface of the cornea

E) Posterior surface of the lens

Answer: A

Q18. Which photoreceptor responds to the broadest spectrum?

A) Rod receptors

B) Green cones

C) Blue cones

D) Red cones

E) Pigment layer cells

Answer: A

Q19. Which structure secretes the intraocular fluid (aqueous humor)?

A) Ciliary processes

B) Cornea

C) Iris

D) Lens

E) Trabeculae

Answer: A

Lecs 8 & 9 : Hearing & vestibular system

Q1. Which of the following is the middle ear ossicle that is attached to the tympanic membrane?

A) Columella

B) Incus

C) Malleus

D) Modiolus

E) Stapes

Answer: C

Q2. Which compartment of the cochlea contains the organ of Corti?

A) Ampulla

B) Saccule

C) Scala media

D) Scala tympani

E) Scala vestibuli

Answer: C

Q3. Which of the following best describes when the transmission of sound waves in the cochlea occurs?

A) When the foot of the stapes moves inward against the oval window and the round window bulges outward

B) When the foot of the stapes moves inward against the round window and the oval window bulges outward

C) When the head of the malleus moves inward against the oval window and the round window bulges outward

D) When the incus moves inward against the oval window and the round window bulges outward

E) When the incus moves inward against the round window and the oval window bulges outward

Answer: A

Q4. A 20-year-old soldier sustains a noise-induced hearing loss over a period of 6 months from multiple exposures to loud sounds. Loss of which structure is most likely to contribute to the hearing deficit?

A) Cochlea

B) Inner hair cells

C) Organ of Corti

D) Scala media

E) Scala vestibuli

Answer: B

Q5. Which molecules move from the endolymph into the stereocilia and depolarize the hair cell?

A) Calcium ions

B) Chloride ions

C) Hydrogen ions

D) Potassium ions

E) Sodium ions

Answer: D

Q6. The stereocilia of hair cells are embedded in which membrane?

A) Basilar

B) Reissner's

C) Tectorial

D) Tympanic

E) Vestibular

Answer: C

Q7. Which statement regarding the transmission of auditory information from the ear to the cerebral cortex is correct?

A) Inferior colliculus neurons synapse in the cochlear nuclei

B) Neurons with cell bodies in the spiral ganglion synapse in the inferior colliculus

C) The majority of neurons from the cochlear nuclei synapse in the contralateral superior olivary nucleus

D) There is no crossing over of information between right and left auditory pathways in the brain stem

E) Trapezoid neurons synapse in the cochlear nuclei

Answer: C

Q8. Which event prompts the auditory system to interpret a sound as loud?

A) A decreased number of inner hair cells become stimulated

B) A decreased number of outer hair cells become stimulated

C) Hair cells excite nerve endings at a diminished rate

D) The amplitude of vibration of the basilar membrane decreases

E) The amplitude of vibration of the basilar membrane increases

Answer: E

Q9. Which statement regarding the two types of deafness is correct?

A) Conduction deafness: greater loss for air conduction than bone conduction

B) Nerve deafness: greater loss for bone conduction than air conduction

C) Conduction deafness occurs when cochlea or cochlear nerve is impaired

D) Nerve deafness occurs when structures conducting sound into the cochlea are impaired

E) Loud sounds cause greater loss of low-frequency hearing

Answer: A