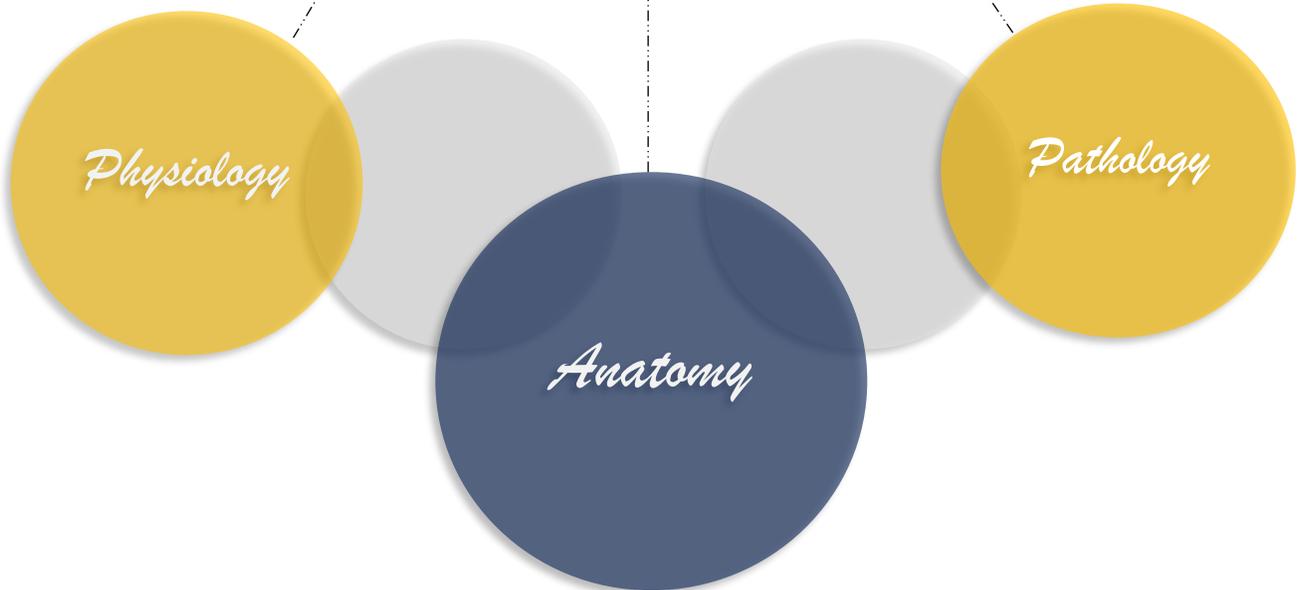


CNS

Test Bank lite



This document includes questions regarding the CNS anatomy, physiology and pathology material covered during the first two weeks

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1. In the dorsal column-medial lemniscal pathway, the cell bodies of the first, second, and third order neurons are located in, respectively:

- A. Dorsal column, nucleus gracilis or cuneatus, thalamus
- B. Dorsal horn, hindbrain, forebrain
- C. Dorsal horn, medulla oblongata, prosencephalon
- D. Dorsal root ganglia, rhombencephalon, telencephalon
- E. Dorsal root ganglia, brain stem, diencephalon

2. A patient presents with lower back pain that radiates to the back of his thigh. He is unable to stand on his heels and reports abnormal sensations across the anterolateral aspect of his leg. MRI scans confirm the diagnosis of a herniated disc. The most likely affected nerve root emerges from the vertebral column directly:

- A. under vertebra L4
- B. above vertebra L4
- C. above vertebra L5
- D. above vertebra S1
- E. A and C

3. Consider the sensory pathways for the following two sensations:

- (1) *Discriminative touch sensations from the left foot*
- (2) *Heat sensations from the right leg*

Choose the correct statement:

- A. Pathways for both sensations ascend in the right half of the spinal cord
- B. Both pathways include a synapse in nucleus gracilis
- C. The first sensation is transmitted to the right frontal lobe, while the second is transmitted to the left frontal lobe

- D. A right hemisection in the spinal cord at the level of the C4 segment would spare (preserve) both sensations
- E. Both pathways include a synapse in substantia gelatinosa

4. Which of the following applies to both the anterolateral pathway and dorsal column-medial lemniscal pathway?

- A. Decussation occurs before reaching the brain stem
- B. First synapse occurs in dorsal root ganglia
- C. Main sensory receptors are free nerve endings
- D. Contralateral loss of sensation occurs as a result of a hemisection above the level of the medulla
- E. Two of the above

5. All of the following statements apply to *first order neurons that transmit discriminative tactile sensations from the arm* EXCEPT:

- A. In the spinal cord, they ascend in the dorsal white column
- B. They synapse with 2nd order neurons in nucleus cuneatus
- C. They form internal arcuate fibers as they decussate
- D. They are pseudounipolar neurons
- E. None of the above

6. In "fight or flight" conditions, the pupil of the eye dilates. The motor impulse that is initiated in the hypothalamus and ultimately causes this pupillary dilation can be best described by which of the following statements?

- A. The impulse will pass through upper and lower motor neurons
- B. No ganglia are present along the course of the impulse
- C. The impulse will pass through a synapse in autonomic nuclei in the brain stem
- D. The impulse will pass through the ventral root of a spinal nerve
- E. The impulse is mainly relayed to neurons in lamina 2 of spinal cord gray matter

7. Choose the incorrect pair of (neuron - location of cell body):
- A. Upper motor neuron of corticonuclear tract - frontal lobe
 - B. Preganglionic parasympathetic neuron in oculomotor nerve - hindbrain
 - C. 3rd order neuron in discriminative touch pathway - thalamus
 - D. 1st order sensory neuron - dorsal root ganglia
 - E. 2nd order neuron in the dorsal column pathway - medulla oblongata
8. Tracing an impulse from the brain to the effector organ, which of the following is NOT part of the motor pathway that will ultimately end in parasympathetic stimulation of the parotid gland?
- A. Motor nuclei in the hypothalamus
 - B. Autonomic nuclei in the lateral horn gray matter
 - C. A synapse outside the CNS
 - D. A preganglionic neuron whose cell body is within the CNS
 - E. A cranial nerve
9. Choose the correct statement regarding the meninges and associated spaces:
- A. The dura mater extends to as far as L2
 - B. The pia mater gives rise to filum terminale externum
 - C. A lumbar puncture needle penetrates all three meningeal layers
 - D. Denticulate ligaments attach the outer two meningeal layers to the spinal cord
 - E. CSF fills the space between arachnoid and dura mater
10. Choose the incorrect pair of (tract - level of decussation):
- A. Lateral corticospinal tract - medulla
 - B. Tract for pain sensation from the arm - spinal cord
 - C. Rubrospinal tract - brain stem
 - D. Pontine reticulospinal tract - spinal cord
 - E. Posterior spinocerebellar tract - No decussation

11. Numbered below are various descending motor tracts:

1. *Lateral corticospinal tract*
2. *Rubrospinal tract*
3. *Vestibulospinal tract*
4. *Medullary reticulospinal tract*

Choose the correct statement:

- A. 1 and 2 cross the midline in the brain stem
- B. Cell bodies of tract 2 are located in the superior colliculus
- C. 3 and 4 both help maintain an upright position
- D. 3 and 4 descend in the anterior white column
- E. 1,2,3 and 4 all descend in the lateral white column

12. A left hemisection at the level of the C4 spinal segment (Brown-Séquard syndrome) is associated with which of the following?

- A. Loss of discriminative touch in the right lower limb
- B. Damage to the lateral corticospinal tract originating from the right frontal lobe
- C. Paralysis of facial muscles on the right side
- D. Loss of pain and temperature sensations from the left lower limb
- E. None of the above

Answers

1. E	4. D	7. B	10. D
2. D	5. C	8. B	11. A
3. D	6. D	9. D	12. B

1. Which of the following is NOT a typical histological feature of neurons one day following irreversible acute hypoxic injury?
 - A. A decrease in cytoplasmic basophilia
 - B. Hyperchromasia
 - C. Cellular swelling
 - D. Shrinkage of nucleus
 - E. Nucleolar disappearance
2. Choose the incorrect pair of (glial cell - reaction to injury):
 - A. Astrocyte - Transformation into gemistocyte
 - B. Microglial cell - Nuclei become elongated
 - C. Schwann cell - Recruitment of microglia
 - D. Astrocyte - Increased cytoplasmic eosinophilia
 - E. Schwann cell - Dedifferentiation
3. All of the following features are true for both neurofibromatosis type 1 and type 2 EXCEPT:
 - A. Both syndromes may give rise to Schwann cell-containing tumors
 - B. The underlying mutation involves a tumor suppressor gene
 - C. Autosomal dominant pattern of inheritance
 - D. Their association with neurofibromas
 - E. None of the above
4. A 48-year-old male patient reports symmetrical motor weakness that had started in his legs and quickly progressed in an ascending manner. History is unremarkable apart from abdominal symptoms several days preceding the onset of motor weakness, suggestive of a *Campylobacter jejuni* infection. With the proper supportive care, the patient manages to recover within 2

weeks. Which of the following is most consistent with this case presentation?

- A. Increased RAGE signaling
- B. Molecular mimicry between bacterial and myelin antigens in the CNS
- C. A polymorphism in the IL-7 receptor
- D. A pattern of segmental demyelination
- E. A mutation causing abnormal myelin turnover kinetics

5. Choose the correct statement about multiple sclerosis:

- A. It predominantly presents in the two extremes of age (very young, and elderly)
- B. It is the most common CNS dysmyelinating disease
- C. Tissue damage is mainly due to cellular immunity
- D. It can be precipitated by rapid correction of hyponatremia
- E. Elevated anti-aquaporin-4 antibody titers are a common finding

Answers

1. C
2. C
3. D
4. D
5. C

❖ Physiology

1. Cell bodies of the serotonergic neurons of the endogenous analgesia system can be found in the:
 - A. Thalamus
 - B. Raphe magnus nucleus
 - C. Periaqueductal gray region
 - D. Spinal cord
 - E. Hypothalamus
2. If an individual sustains an injury that interrupts all ascending tracts in the left half of the spinal cord at the level of the C2 segment, choose the correct combination of lost/normal sensations in the corresponding limb:

Option	Limb	Pain	Fine Touch	Temperature
A.	Right arm	Normal	Lost	Normal
B.	Left arm	Normal	Lost	Normal
C.	Right foot	Lost	Lost	Lost
D.	Left foot	Normal	Normal	Normal
E.	Left foot	Normal	Lost	Lost

3. *"Rapidly adapting sensory receptors that detect pressure and high frequency vibrations, and are located deep in the dermis"*
The previous description is most consistent with:
 - A. Pacinian corpuscles
 - B. Free nerve endings
 - C. Ruffini's end organs
 - D. Merkel's discs
 - E. Muscle spindles
4. *"A sensory receptor that is found everywhere in the skin, and is associated with the anterolateral pathway of somatic sensation"*

Choose the incorrect statement regarding the sensory receptor described in the previous statement:

- A. It may be connected to myelinated or unmyelinated fibers
- B. It can detect temperature or pain
- C. It is unencapsulated
- D. It cannot detect fine touch
- E. A group of these receptors can collectively form the Iggo dome receptor

5. Which of the following best describes the mechanism of referred pain?

- A. Overlap of visceral and somatic spatial representation in the human homunculus
- B. Spread of damage from the viscera to a distant area of skin
- C. Afferent visceral fibers may also synapse with neurons of the somatosensory pathway
- D. Visceral sensory neurons have wide receptive fields that extend to include parts of the skin alongside the viscera itself
- E. None of the above

6. You are focusing on a distant object. The object starts to approach you, and your eyes remain focused on it. Which of the following changes take place as the object approaches your eyes?

Option	Tension in Suspensory Ligaments	Properties of the lens
A.	Increases	Decreased focal length
B.	Decreases	Increased convexity
C.	Increases	Decreased converging power
D.	Decreases	Decreased thickness
E.	No change	No change

7. A normal near point (i.e., nearest point at which an object can still be focused on the retina) is situated 10 cm away from the eye. Which of the following could cause the near point to be farther (at 20 cm for example)?

- A. A more compliant lens
- B. A shorter than normal eye
- C. A more powerful lens
- D. A decrease in cone density in the fovea
- E. None of the above

8. Following stimulation of a rod photoreceptor by light, which of the following is NOT expected to occur?

- A. An increase in phosphodiesterase activity in the rod
- B. Decreased inhibition of bipolar cells
- C. A decrease in rod intracellular $[Ca^{+2}]$
- D. A shift in the rod membrane potential to a more negative value
- E. Closure of cAMP-gated Na^{+} channels in the rod membrane

9. Using a Snellen chart, patients A and B were asked to read and identify different letters to determine their visual acuity. If patient A has 6/12 vision, while patient B has 6/10 vision, choose the correct statement:

- A. At a distance of 12 meters, patient A sees letters that would normally be seen at 6 meters
- B. At any distance, a letter seen by patient B can certainly be seen by patient A at the same distance
- C. A letter normally seen at 12 meters can be clearly seen at 6 meters by both patients
- D. Patient A has better two-point discrimination than patient B
- E. Patient A has more advanced presbyopia than patient B

10. Which of the following changes is NOT expected to accompany accommodation of the eye for near vision?

- A. Decreased tension in the suspensory ligaments
- B. Increased converging power of the lens
- C. Increased contraction of the ciliary muscle
- D. Increased convexity of the cornea
- E. None of the above

11. Damage to the right occipital cortex will prevent perception of visual input from which of the following areas?

1. Nasal half of left retina
2. Nasal half of right retina
3. Temporal half of left retina
4. Temporal half of right retina

- A. 1 and 2
- B. 1 and 3
- C. 2 and 3
- D. 2 and 4
- E. 1 and 4

12. Choose the correct statement:

- A. In dark adaptation, cones are first to adapt by decreasing their sensitivity
- B. Pupillary constriction occurs during light adaptation through contraction of the ciliary muscle
- C. Hyperopia is corrected using glasses with concave lenses
- D. Damage to the occipital cortex abolishes the pupillary light reflex in the contralateral eye
- E. None of the above

Answers

1. B	4. E	7. B	10. D
2. B	5. C	8. E	11. E
3. A	6. B	9. C	12. E