

Neurophysiology exam

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- young boy is using both of his hands to play with his toys. Which of the following statements regarding the motor cortex as coordination of movement of his hands is correct:
- A. The premotor area is responsible for the execution of skeletal muscle movements.
- B. The primary cortex is responsible for the planning of movements that are carried by the premotor area.
- C. Contractions elicited by the supplementary area are often unilateral rather than bilateral.
- D. More than half of the entire primary motor cortex is concerned with controlling the muscles of the hands and speech.
- E. Excitation of a single motor cortex neuron usually excites a specific muscle rather than a specific movement.
- Answer: d

- A 73-year-old patient with a history of atherosclerosis suffered from a stroke that affected Broca's area. Which of the following would describe the manifestations correctly:
- A. The patient would have expressive aphasia.
- B. The patient would be able to formulate words without meaning.
- C. The patient would have receptive aphasia.
- D. Broca's area is located in the posterior part of the brain close to the somatosensory cortex.
- E. The patient can speak whole words.
- Answer: A

- Pyramidal cells typically give rise to the corticospinal tract which is responsible for movement, in which layer are they located:
- A. Layer 1.
- B. Layer 2.
- C. Layer 3.
- D. Layer 4.
- E. Layer 5.
- Answer: e

- Which of the following statements falsely describes the relationship between brain areas and their corresponding manifestations in the event of a lesion:
- A. Broca's area: expressive aphasia.
- B. Voluntary eye movement area: the eyes tend to lock involuntarily onto specific objects, an effect controlled by signals from the occipital visual cortex.
- C. Hand skills area: motor aphasia.
- D. Primary motor area: paralysis of the affected part.
- Answer: d

- Which of the following statements is false regarding the motor pathways:
- A. Giant pyramidal cells, called Betz cells, have the most rapid rate of transmission of any signals from the brain to the cord.
- B. Dynamic pyramidal neurons are responsible for the rapid development of force.
- C. Static pyramidal neurons are responsible for maintaining the force of contraction.
- D. Corticospinal axons that decussate at different levels of the spinal cord via the anterior white commissure form the lateral corticospinal tract.
- E. Corticospinal axons that do not decussate at the level of the medulla form the anterior corticospinal tract.
- Answer: d

- Regarding the putamen circuit, choose the correct order of the **indirect pathway** along with the final result (GPi: Globus pallidus internus), (GPe: Globus pallidus externus), (SNr: Substantia nigra reticulata):
- A. Cortex - striatum -> GPi/SNr -> thalamus -> cortex / Inhibition of thalamic neurons.
- B. Cortex -> striatum -> GPe -> STN -> GPi/SNr -> thalamus -> cortex / Inhibition of thalamic neurons.
- C. Cortex -> striatum -> GPi/SNr -> thalamus -> cortex / Excitation of thalamic neurons.
- D. Cortex -> striatum > GPe -> STN -> GPi/SNr -> thalamus -> cortex / Excitation of thalamic neurons.
- Answer: b

- in the context of the putamen circuit, which of the following is false regarding each structure of the brain and the corresponding neurotransmitter it secretes:
- A. Cortex: Glutamate.
- B. Substantia nigra compacta: Dopamine.
- C. Subthalamic nucleus: GABA.
- D. Globus pallidus externus: GABA.
- Answer: c

- A 34-year-old patient came to the clinic with symptoms of rapid jerky movements that occur involuntarily and without purpose as well as progressive mental deterioration, what are the pathophysiological changes that explain his symptoms:
- A. Subthalamic nucleus degeneration.
- B. Caudate and putamen degeneration.
- C. Substantia nigra degeneration.
- D. Thalamus degeneration.
- Answer: b

- Which of the following manifestations is falsely matched with the corresponding lesion:
- A. Substantia nigra lesion: Parkinson Disease.
- B. Putamen lesion: Chorea.
- C. Globus pallidus lesion: athetosis.
- D. Subthalamus: Cognition impairment.
- E. Posterior parietal cortex: agnosia.
- Answer: d

- If a lesion were to occur in the dorsal spinocerebellar tract, all of the following signals would be compromised except:
- A. Status of muscle contraction.
- B. Degree of tension on the muscle tendons.
- C. Efference copy of the anterior horn motor drive.
- D. Positions and rates of movement of the parts of the body.
- E. Forces acting on the surfaces of the body.
- Answer: e

- Choose the false statement regarding the deep cerebellar nuclei:
- A. The deep cerebellar nuclei are: the dentate, interposed, and fastigial, found on each side of the cerebellum.
- B. All of the input directed to the cerebellum eventually reaches the deep nuclei in the form of inhibitory signals followed shortly by excitatory signals.
- C. Deep nuclei receive signals from the deep sensory afferent tracts to the cerebellum.
- D. From the deep nuclei, output signals leave the cerebellum and are distributed to other parts of the brain.
- Answer: b

- The functional unit of the neuronal circuit centers on:
- A. A single very large Purkinje cell and a corresponding deep nuclear cell.
- B. Multiple large Purkinje cells and a corresponding deep nuclear cell.
- C. Granular cells and a corresponding Purkinje cell.
- D. A single very large granular cell and a corresponding Purkinje cell.
- Answer: a

- Which of the following sentences correctly describes the complex spikes that occur in the cerebellum:
- A. It is produced by mossy fibers where a single impulse will cause a single prolonged action potential in each Purkinje cell.
- B. It is produced by climbing fibers where multiple impulses will cause a single prolonged action potential in each Purkinje cell.
- C. It is produced by mossy fibers where multiple impulses will cause a single prolonged action potential in each Purkinje cell.
- D. It is produced by climbing fibers where a single impulse will cause a single prolonged action potential in each Purkinje cell.
- Answer: d

- All of the following are considered deep nuclei of the cerebellum except:
- A. Fastigial.
- B. Inferior olivary.
- C. Dentate.
- D. Interposed.
- Answer: b

- Which of the following pairs are falsely matched:
- A. Vestibulocerebellum: coordinates timing of sequential movements.
- B. Spinocerebellum: coordinates reciprocal contractions of agonist and antagonist muscles in the peripheral portions of the limbs, especially in the hands, fingers, and thumbs.
- C. Cerebrocerebellum: coordinates planning of sequential movements.
- D. Spinocerebellum: most of the vermis and the intermediate zones.
- E. Vestibulocerebellum: flocculonodular cerebellar lobes and adjacent portions of the vermis.
- Answer: a

- A 68-year-old patient came to the neurology clinic. Physical examination shows extreme incoordination of complex purposeful movements of the hands, fingers, and feet and of the speech apparatus. You suspect a lesion in the cerebellum, which of the following parts is likely to be damaged?
- A. Spinocerebellum.
- B. Vestibulocerebellum.
- C. Cerebrocerebellum.
- D. Red nucleus.
- Answer: C

- Which of the following statements is true:
- A. Unopposed pontine reticular nuclei activation causes powerful inhibition of antigravity muscles throughout the body.
- B. Unopposed medullary reticular nuclei activation causes powerful excitation of antigravity muscles throughout the body.
- C. All the vestibular nuclei function in association with the medullary reticular nuclei to control the antigravity muscles.
- D. Stimulation of a single point in this portion of the red nucleus causes contraction of either a single muscle or a small group of muscles.
- Answer: b

- Damage to which of the following structures specifically leads to loss of dynamic equilibrium:
- A. The flocculonodular lobes.
- B. The primary motor cortex.
- C. The red nucleus.
- D. The vermis.
- Answer: A

- Which of the following areas is responsible for comparing intended movements with actual movements followed by sending corrective output signals to the cortex through the thalamus and to the red nucleus:
- A Cerebrocerebellum.
- B. Spinocerebellum.
- C. Vestibulocerebellum.
- D. Rubrospinal tract.
- Answer: b

- Activation of the bulboreticular facilitory area is achieved by all of the following except:
- A. Pain transmitted through the fifth cranial nerve.
- B. Acetylcholine secreted by the gigantocellular neurons of reticular formation.
- C. Serotonin secreted by nuclei of the raphe.
- D. Norepinephrine secreted by locus ceruleus.
- Answer: c

- Which of the following nuclei is falsely paired with the corresponding function:
- A. Lateral hypothalamic area: thirst and hunger.
- B. Supraoptic nucleus: vasopressin release.
- C. Ventromedial nucleus: satiety.
- D. Paraventricular nucleus: Decreased heart rate.
- Answer: d

- A lesion in which of the following areas would lead to increase in weight and inability to reach satiety:
- A. Lateral hypothalamic area.
- B. Mamillary body.
- C. Peripherical nucleus.
- D. Ventromedial nucleus.
- E. Suprachiasmatic nucleus.
- Answer: d

- The amygdala is related to all of the following except:
- A. Sexual activities.
- B. Several types of involuntary movement.
- C. Patterns of rage and punishment.
- D. Olfaction, auditory and visual association areas.
- E. GI stimulation.
- Answer: e

- If a sensory experience does not elicit a sense of either reward or punishment, repetition of the stimulus over and over leads to almost complete extinction of the cerebral cortical response, this is known as:
- A. Reinforcement.
- B. Desensitization.
- C. Habituation.
- D. Negative feedback.
- Answer: c

- Which of the following sentences concerning the negative memory is correct:
- A. The greater share of our memories is positive rather than negative.
- B. Negative memories are associated with incoming information that cause consequences such as pain, that's why we tend to forget it.
- C. Habituation is a type of negative memory.
- D. It results from the facilitation of the synaptic pathways, and the process is called memory sensitization.
- Answer: c

- The memory that results from chemical changes in either the synapse presynaptic terminals or the synapse postsynaptic membrane is:
- A. Short-term memory, which includes memories that last for seconds or at most minutes.
- B. Intermediate long-term memories, which last for days to weeks but then fade away.
- C. Long-term memory, which, once stored, can be recalled up to years or even a lifetime later.
- D. Working memory, which includes mainly short-term memory that is used during the course of intellectual reasoning.
- Answer: b

- Memory of all of the following is related to declarative memory except:
- A. the surroundings.
- B. meaning of the experience.
- C. time relationship.
- D. skills developed for driving a car.
- Answer: d

- A 23-year-old male patient came to the neurology clinic. He was involved in a road traffic accident which lead to multiple brain injuries. It was noted by the doctor that there was a loss of memory access to events and information learned prior to the injury, also, the patient's hearing was unaffected and he could recognize different words but is still unable to arrange these words into a coherent thought. Which of following areas were injured:
- A. Thalamus and prefrontal cortex.
- B. Broca's area and thalamus.
- C. Wernicke's area and broca's area.
- D. Wernicke's area and thalamus.
- Answer: d

- Which of the following is correctly paired:
- A. Agraphia: inability to read.
- B. Alexia: inability to write.
- C. Dyslexia: difficulty in learning about written language.
- D. Lesion in Wernicke's area: expressive aphasia.
- Answer: d

- Which of the following sentences regarding REM sleep is false:
- A. Occurs in episodes of 5-30 minutes that occupy about 25% of the sleep time in young adults.
- B. It is an active form of sleep usually associated with dreaming.
- C. Muscle tone throughout the body is exceedingly depressed, indicating strong inhibition of the spinal muscle control areas.
- D. Heart rate and respiratory rate usually become irregular, which is characteristic of the dream state.
- E. As the person becomes more rested through the night, the durations of the REM bouts decrease.
- Answer: e

- Which of the following is correctly paired:
- A. Quiet wakefulness: beta waves.
- B. REM sleep: alpha waves.
- C. Stage 4 slow wave sleep: theta waves.
- D. Stage 1 sleep: low voltage spindles.
- E. Stage 2 and 3 sleep: delta waves.
- Answer: d

- A 7-year-old boy came to the neurology clinic with his mother. The mother complained that her child experiences periods of decreased attention, where he is awake but doesn't respond when called. These episodes last a few minutes before he returns to normal. Additionally, she sometimes notices him blinking rapidly. Which type of seizures do you suspect:
- A. Absence seizure.
- B. Generalized tonic-clonic seizure.
- C. Focal seizure.
- D. Grand mal seizure.
- Answer: A

- All of the following increase the excitability of the abnormal "epileptogenic" circuitry enough to precipitate attacks in generalized tonic clonic seizures except:
- A. Strong emotional stimuli.
- B. Fever.
- C. Acidosis and depressed breathing.
- D. Loud noises and flashing lights.
- E. Fever and drugs.
- Answer: c

- Which type of waves occur in very deep sleep, in infancy, and in persons with serious organic brain disease:
- A. Alpha waves.
- B. Beta waves.
- C. Theta waves.
- D. Delta waves.
- Answer: d

THE END

Taken from karamology website.

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