

Neuroscience Sample Items

1. A 43-year-old man sustains a wound to the lateral neck. This results in weakness of elevation and retraction of the shoulder on the ipsilateral side and difficulty turning the head up and toward the contralateral side. No sensory changes are present. Which of the following nerves most likely has been injured?
 - (A) Axillary
 - (B) Lateral cord of the brachial plexus
 - (C) Phrenic
 - (D) Spinal accessory
 - (E) Suprascapular
2. An investigator is studying normal sleep patterns in healthy men and women. Saccadic motions of the eyes are seen approximately 90 minutes after the volunteers fall asleep. Which of the following is most likely to be observed in the volunteers during this period of saccadic eye movements?
 - (A) Difficulty awakening
 - (B) An EEG pattern resembling that of the walking state
 - (C) Hyperactive muscle tone
 - (D) Increased movements
 - (E) Irregular respiratory rhythm
3. Drug X applied to a nerve axon decreases the duration of the action potential without affecting the resting potential or peak amplitude of the action potential. Which of the following is the most likely mechanism of action of Drug X?
 - (A) Block of voltage-dependent Na^+ permeability
 - (B) Decrease in the rate of Na^+ inactivation
 - (C) Decrease in voltage-dependent Na^+ permeability
 - (D) Increase in the rate of voltage-dependent changes in K^+ permeability
 - (E) Inhibition of the Na^+-K^+ pump
4. A 65-year-old man has loss of pain and temperature sensation on the right side of the face and from the neck down on the left. Examination shows partial paralysis of the soft palate, larynx, and pharynx, and ataxia, all on the right. The most likely cause of these findings is thrombosis to which of the following arteries?
 - (A) Basilar
 - (B) Right posterior inferior cerebellar
 - (C) Left posterior inferior cerebellar
 - (D) Right superior cerebellar
 - (E) Left superior cerebellar
5. A 45-year-old man has a progressively severe headache. Fundusoscopic examination discloses blurred margins and bulging of the optic discs. The retinal veins are engorged and show no pulsatile flow. Which of the following is the mechanism most likely to explain these findings?
 - (A) Acute occlusion of the retinal artery
 - (B) Demyelination of the optic nerve
 - (C) Increased intracranial pressure
 - (D) Inflammation of the anterior chamber
 - (E) Inflammation of the optic nerve
6. A 4-month-old boy is brought to the physician by his mother for a well-child examination. He is at the 98th percentile for head circumference. Physical examination shows dilation of the scalp veins and spasticity of the lower extremities. The physician suspects excessive cerebrospinal fluid accumulation in the ventricular system of the brain. The source of this fluid is most likely which of the following?
 - (A) Choroid plexus
 - (B) Dura mater
 - (C) Pia mater
 - (D) Roof of the third ventricle

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7. A 68-year-old woman is brought to the physician by her husband because of strange behavior. The previous evening, she had gotten up suddenly from the dinner table and started to undress in front of guests. Further questioning discloses a 1-year history of a progressive change in behavior. She writes everything down on a notepad; otherwise, she forgets. She cannot remember the names of her four grandchildren or the date of her wedding anniversary. These symptoms are most likely associated with a deficit in which of the following?
- (A) Acetylcholine
 - (B) Dopamine
 - (C) Glucose 6-phosphate dehydrogenase
 - (D) Insulin
 - (E) Serotonin
8. A 50-year-old man has had gradually progressive hand weakness. He has atrophy of the forearm muscles, fasciculations of the muscles of the chest and arms, hyperreflexia of the lower extremities, and extensor plantar reflexes. Sensation is not impaired. Which of the following is the most likely diagnosis?
- (A) Amyotrophic lateral sclerosis
 - (B) Dementia, Alzheimer type
 - (C) Guillain-Barré syndrome
 - (D) Multiple cerebral infarcts
 - (E) Multiple sclerosis
9. An 8-year-old boy is brought to the physician by his mother because he is not paying attention in class. His mother says that his teacher has described his in-school behavior as “frequently stopping what he is doing and then blinking and making chewing movements.” His mother has noticed that he sometimes “stares off into space” and seems to be daydreaming. Physical examination shows no abnormalities. An EEG during one of the episodes shows generalized spike-and-wave bursts at 3 Hz per second. This patient most likely has which of the following types of seizures?
- (A) Absence
 - (B) Akinetic
 - (C) Complex partial
 - (D) Generalized tonic-clonic
 - (E) Myoclonic
10. A previously healthy 18-year-old man is brought to the emergency department because of fever, a poorly localized headache, and a stiff neck for 12 hours. The symptoms were preceded by nasal congestion, muscle aches, and chills 3 days ago. His temperature is 38.7°C (101.6°F). Physical examination shows nuchal rigidity and photophobia. There is no papilledema. Neurologic examination shows no focal findings. Which of the following is the most likely diagnosis?
- (A) Acute meningitis
 - (B) Classic migraine
 - (C) Cluster headache
 - (D) Idiopathic intracranial hypertension
 - (E) Subarachnoid hemorrhage
 - (F) Temporal arteritis
 - (G) Tension-type headache

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11. A 36-year-old woman comes to the physician because of a 10-month history of difficulty falling asleep due to a crawling sensation in her legs. She has to get up several times during the night to relieve the feeling. The symptoms started shortly after she delivered her son 1 year ago. She says her husband complains because she has become a “jumpy” sleeper, and her movements sometimes wake him up. Physical examination shows no abnormalities. Which of the following is the most likely diagnosis?
- (A) Amyotrophic lateral sclerosis
 - (B) Multiple sclerosis
 - (C) REM sleep behavior disorder
 - (D) Restless legs syndrome
 - (E) Sleep myoclonus
12. A 53-year-old woman dies 4 days after an automobile collision. She sustained multiple injuries including a femoral fracture. Widespread petechiae are found in the cerebral white matter at autopsy. Which of the following is the most likely cause of these findings?
- (A) Acute respiratory distress syndrome
 - (B) Contrecoup injury
 - (C) Fat embolization
 - (D) Septicemia
 - (E) Subdural hematoma
13. A 23-year-old woman with chronic hepatic disease is brought to the physician because of a 6-month history of progressive behavioral and personality changes, difficulty walking, clumsiness of her arms and legs, and slurred speech. Physical examination shows facial dystonia and dysarthria. There is intention tremor, rigidity, and ataxia of all extremities. Slit-lamp examination shows a brownish ring around the cornea of both eyes. Which of the following abnormalities in plasma is most likely in this patient?
- (A) Decreased calcium concentration
 - (B) Decreased ceruloplasmin concentration
 - (C) Decreased transferrin concentration
 - (D) Increased ammonium concentration
 - (E) Increased ketones
 - (F) Increased lactate concentration
14. A new drug is developed that prevents the demyelination occurring in the progress of multiple sclerosis. The drug protects the cells responsible for the synthesis and maintenance of myelin in the central nervous system. These cells are most likely which of the following?
- (A) Astrocyte
 - (B) Ependymal cell
 - (C) Microglial cell
 - (D) Oligodendrocyte
 - (E) Schwann cell
15. A 47-year-old man with Down syndrome is brought to the physician by his sister because of an 8-month history of regression in his abilities. The sister describes a gradual decline in his language skills and progressive fearfulness. The patient no longer remembers songs that he has known for years, and he does not wish to participate in family activities anymore. Pathologic examination of the brain would most likely show which of the following in this patient?
- (A) Deposits of long-chain fatty acids
 - (B) Intracellular arylsulfatase A
 - (C) Lewy bodies and nigral atrophy
 - (D) Neuronal plaques and tangles
 - (E) Perivenular inflammatory cells

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16. A 29-year-old man who emigrated from Scotland 3 years ago is brought to the emergency department because of severe shortness of breath for 2 hours. He has a debilitating condition that began 2 years ago with an odd sticky feeling of his skin, but physical examination at that time showed no abnormalities. His condition has progressed to include severe major depressive disorder, dementia, unsteady gait, difficulty walking, and impaired coordination. He now is confined to a wheelchair and has severe dementia and the inability to speak. There is no family history of a similar condition. On arrival, his respirations are 24/min, and he dies shortly thereafter. At autopsy, examination of the brain shows a spongiform encephalopathy. Which of the following is the most likely diagnosis?
- (A) Dementia, Alzheimer type
 - (B) Frontotemporal dementia
 - (C) Parkinson disease
 - (D) Pick disease
 - (E) Variant Creutzfeldt-Jakob disease
17. A 52-year-old woman comes to the physician because of gradual loss of feeling in her feet during the past 6 months. She is a portrait painter. She has a 23-year history of hypertension and a 20-year history of type 2 diabetes mellitus. Menopause occurred 1 year ago. She has smoked 2 packs of cigarettes daily for 30 years. She took an oral contraceptive for 20 years. Current medications include hormone replacement therapy, diuretics, and an oral hypoglycemic agent. Her blood pressure is 135/85 mm Hg. Sensation to pinprick is decreased over both feet. Which of the following is the strongest predisposing risk factor of this new finding?
- (A) Hypertension
 - (B) Long-term exposure to paint fumes
 - (C) Long-term use of exogenous hormones
 - (D) Long-term use of tobacco
 - (E) Type 2 diabetes mellitus
18. A 49-year-old woman comes to the physician because of a 3-month history of waking at night because of pain and numbness of her right hand. She reports that shaking her hand decreases the severity of the pain. She has been cutting hair at a beauty salon 6 days weekly for 35 years. Examination of the right hand shows tenderness with palpation and distal tingling on percussion of the volar wrist. Prolonged forcible palmar flexion of the right wrist produces tingling. Which of the following is the most likely diagnosis?
- (A) Carpal tunnel syndrome
 - (B) Early rheumatoid arthritis
 - (C) Osteoarthritis
 - (D) Stress fracture
 - (E) Tendinitis
19. A 65-year-old woman has had double vision, difficulty keeping her eyes open, and diffuse weakness for the past several months. She has bilateral ptosis that worsens with sustained upward gaze, limited horizontal and vertical movements in both eyes, and nasal speech. Her symptoms and signs improve transiently following intravenous injection of edrophonium. An abnormality is most likely to be found in which of the following structures?
- (A) Anterior horn cell
 - (B) Motor cortex
 - (C) Neuromuscular junction
 - (D) Peripheral nerve
 - (E) Skeletal muscle

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20. A 21-year-old woman comes to the physician 2 weeks after being involved in a motor vehicle collision that occurred when she fell asleep while driving. She says that during the past 2 years she has had several incidents of falling asleep at inappropriate times, including while walking. She also reports intermittent loss of muscle tone while awake and occasional sleep paralysis. She does not snore. Physical examination shows no abnormalities. Polysomnography shows a sleep latency of less than 5 minutes and four sleep-onset REM periods. Which of the following is the most likely diagnosis?
- (A) Chronic insomnia
 - (B) Narcolepsy
 - (C) Restless legs syndrome
 - (D) Sleep apnea
 - (E) Sleep bruxism

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Answer Form for Neuroscience Sample Questions

(Questions 1–20)

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| 1. _____ | 11. _____ |
| 2. _____ | 12. _____ |
| 3. _____ | 13. _____ |
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| 10. _____ | 20. _____ |

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Answer Key for Neuroscience Sample Questions

(Questions 1–20)

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|-----|---|-----|---|
| 1. | D | 11. | D |
| 2. | B | 12. | C |
| 3. | D | 13. | B |
| 4. | B | 14. | D |
| 5. | C | 15. | D |
| 6. | A | 16. | E |
| 7. | A | 17. | E |
| 8. | A | 18. | A |
| 9. | A | 19. | C |
| 10. | A | 20. | B |