

## **QUESTIONS**

### **1.6 Nervous Tissue**

192. Neurons are characterized by:
- (a) irritability
  - (b) contractility
  - (c) conductivity
  - (d) a neuroectodermal origin
  - (e) the possession of processes
193. Neurofibrils are:
- (a) found in almost all nerve cells
  - (b) abundant in perikarya
  - (c) present in neuronal process
  - (d) composed of bundles of neurofilaments and neurotubules
  - (e) visible by light microscopy after impregnation using silver salts
194. The axon hillock is:
- (a) close to the perikaryon
  - (b) the source of origin of the axon
  - (c) close to the axon terminal
  - (d) rich in Nissl bodies
  - (e) restricted to one per neuron
195. Axonic transport and flow:
- (a) is in the direction away from the perikaryon only
  - (b) is in both directions within axons
  - (c) results from the depolarization of the neurilemma
  - (d) has a trophic function
  - (e) has a role in the transport of enzymes and chemicals involved in the formation of neurotransmitters of synapses
196. Post-embryonic neurons:
- (a) do not divide
  - (b) remain in a permanent interphase
  - (c) may undergo changes in volume
  - (d) may undergo changes in the number or complexity of their processes
  - (e) may regenerate to a certain degree
197. Nerve cell bodies have:
- (a) nuclei with pronounced nucleoli
  - (b) mitochondria
  - (c) rough endoplasmic reticulum
  - (d) Golgi bodies
  - (e) synaptic contacts

198. The receptive segment of multipolar neurons include the:
- (a) perikaryon
  - (b) dendrites
  - (c) axons
  - (d) axon collaterals
  - (e) axon terminals
199. Nissl bodies are found in:
- (a) synapses
  - (b) axon hillocks
  - (c) neuroglia
  - (d) sites of smooth endoplasmic reticulum
  - (e) sites of rough endoplasmic reticulum
200. The nucleus of neurons is:
- (a) surrounded by the perikaryon
  - (b) large and regular
  - (c) with a prominent nucleolus
  - (d) palely staining because the chromatin is dispersed
  - (e) found to contain visible sex chromatin in females
201. Axons are:
- (a) processes of nerve cells
  - (b) usually longer than dendrites
  - (c) usually more numerous than dendrites
  - (d) transmitters of impulse towards the perikarya
202. Axons may be:
- (a) myelinated
  - (b) non-myelinated
  - (c) surrounded by oligodendroglia
  - (d) wrapped in Schwann cells
  - (e) up to one meter in length
203. Axons conduct impulses to:
- (a) perikarya
  - (b) other neurons
  - (c) gland cells
  - (d) muscles
  - (e) dendrites of the same neuron

204. Dendrites:
- (a) increase the receptive area of neurons
  - (b) may have more than one synapse
  - (c) are of constant diameter more or less
  - (d) may be myelinated
  - (e) contain neurotubules
205. Dendrites are:
- (a) more numerous than axons
  - (b) able to transmit nervous impulses non-decrementally
  - (c) usually enveloped by Schwann cells in the peripheral nervous system
  - (d) usually longer than axons
  - (e) processes that conduct impulses towards the perikarya
206. Multipolar neurons:
- (a) are the most common type of neuron
  - (b) have more than one axon
  - (c) have more than one dendrite
  - (d) can easily be identified in sections stained with hematoxylin and eosin
  - (e) include the motor neurons of the autonomic nervous systems
207. Bipolar neurons are found in the :
- (a) retina
  - (b) vestibular ganglia
  - (c) cochlear ganglia
  - (d) dorsal root (spinal) ganglia
  - (e) olfactory nasal epithelium
208. Unipolar ('pseudounipolar') neurons:
- (a) lack processes
  - (b) develop from bipolar neurons
  - (c) show partial fusion of processes
  - (d) are found in spinal ganglia
  - (e) are found in cranial ganglia
209. The myelin sheath of axons may be formed by:
- (a) fibrous astrocytes
  - (b) plasmatic astrocytes
  - (c) Schwann cells
  - (d) oligodendrocytes
  - (e) microglia

210. Myelin is:
- (a) a lipoprotein complex
  - (b) preserved in normal wax-embedded nervous tissue
  - (c) preserved after fixation in osmium tetroxide
  - (d) stained black with osmium tetroxide
  - (e) composed of many concentrically arranged cell membranes
211. Schwann cells are:
- (a) found in the peripheral nervous system
  - (b) found in the central nervous system
  - (c) a form of oligodendrocyte
  - (d) enveloping non-myelinated peripheral axons
  - (e) able to envelop more than one axon
212. The myelin sheath of peripheral nerve fibers:
- (a) is stained well with hematoxylin
  - (b) is composed of a series of internodes
  - (c) is composed of concentric, enveloping, plasma membranes of Schwann cells
  - (d) supplies energy to the axon to enable the conduction of impulses
  - (e) permits ion-exchange with the axon in area of the incisures of Schmidt-Lantermann
213. Mesaxons are:
- (a) found within axons
  - (b) found in axon terminals
  - (c) found in the sheath of myelinated axons
  - (d) synonymous with nodes of Ranvier
  - (e) synonymous with Schmidt-Lantermann incisures
214. Non-myelinated nerve fibers:
- (a) are surrounded by a fold of oligodendrocyte or Schwann cell
  - (b) are devoid of neuroglial covering
  - (c) conduct impulses faster than myelinated nerves
  - (d) have nodes of Ranvier
  - (e) are very common in gray matter of the central nervous system
215. Which of the following are visible in light microscope preparations of teased peripheral myelinated nerve fibers stained with osmium tetroxide?
- (a) nodes of Ranvier
  - (b) incisures of Schmidt-Lantermann
  - (c) internodes
  - (d) nuclei of Schwann cells
  - (e) axons

216. Incisures of Schmidt-Lantermann are:
- (a) found in non-myelinated nerves
  - (b) only found in myelinated nerves
  - (c) visible in osmicated preparations only
  - (d) found at nodes of Ranvier
  - (e) formed by invaginations of the endoneurium
217. Incisures of Schmidt-Lantermann are:
- (a) fixation artifacts
  - (b) found in internodes
  - (c) seen in hematoxylin and eosin-stained preparations
  - (d) shearing defects of the lamellae of Schwann cells
  - (e) essential for salutatory conduction
218. Neurokeratin is:
- (a) seen in preparations stained with hematoxylin and eosin
  - (b) seen in osmicated axons
  - (c) seen in the form of a loose network
  - (d) an artifact of preparation
  - (e) formed by the deformation of proteins of the myelin sheath
219. Nodes of Ranvier:
- (a) are only found in peripheral nerves
  - (b) are found in axons of the central nervous system
  - (c) permit saltory conduction and provide greater efficiency in impulse conduction
  - (d) allow transfer of ions between the axolemma and the intercellular space
  - (e) are bounded by paranodal loops of Schwann cells
220. Non-myelinated peripheral nerves in normal histological preparations:
- (a) resemble smooth muscle
  - (b) have elongated nuclei belonging to Schwann cells
  - (c) contain fibers that are all of a similar diameter
  - (d) usually contain some myelinated axons
  - (e) contain fibers that are usually undulating
221. The endoneuril sheath (of key and Retzius) surrounding nerve fibers is:
- (a) visible in light microscopic preparations after ordinary processing
  - (b) stained by impregnation with silver salts
  - (c) composed of a network of delicate reticular fibers
  - (d) derived from neural ectoderm
  - (e) derived from mesenchyme.

222. Neuroglia are:
- (a) adequately stained with hematoxylin and eosin
  - (b) well demonstrated after impregnation with silver salts
  - (c) essential for the normal functioning of neurons
  - (d) more numerous than neurons
  - (e) in synaptic contact with other cells.
223. Neuroglia cells:
- (a) show characteristics of irritability and conductivity
  - (b) are able to divide
  - (c) develop to the greater part from neuroectoderm
  - (d) have extensions that stain well with hematoxylin and eosin.
  - (e) are found in the area of the synaptic cleft.
224. Which of the following are derived from the embryonic neural tube?
- (a) ependyma
  - (b) astrocytes
  - (c) oligodendrocytes
  - (d) microglia
  - (e) neurons.
225. Microglia:
- (a) have densely staining elongated nuclei
  - (b) are the only neuroglia with spherical nuclei
  - (c) originate from mesenchyme
  - (d) may be phagocytic
  - (e) are found in both white and gray matter.
226. Neuroglia can:
- (a) divide after birth
  - (b) differentiate into neurons if necessary
  - (c) develop from neurons
  - (d) change from one sort of glial cell to another sort
  - (e) be found in the peripheral nervous system.
227. Astrocytes:
- (a) line the ventricles of the brain
  - (b) have spherical, lightly staining nuclei
  - (c) form part of the neuropil
  - (d) have pedicels, which terminate on small blood vessels
  - (e) are believed to participate in the blood-brain barrier.

228. Oligodendrocytes:
- (a) are found in gray matter
  - (b) are found in white matter
  - (c) are small than astrocytes
  - (d) have more processes than astrocytes
  - (e) have longer processes than astrocytes
229. Spinal (dorsal root) ganglia are:
- (a) sensory
  - (b) motor
  - (c) autonomic
  - (d) located in intervertebral foramina
  - (e) paired structures.
230. Spinal (dorsal root) ganglia contain:
- (a) perikarya
  - (b) satellite cells
  - (c) fibroblasts
  - (d) T-shaped axons
  - (e) myelinated fibers.
231. Every reflex arc includes:
- (a) a receptor
  - (b) sensory
  - (c) synapses
  - (d) motor neuron
  - (e) effector.
232. Spinal reflex arcs are:
- (a) composed of a series of neurons linking receptors to effectors.
  - (b) may be composed only of motor neurons
  - (c) able to transmit impulses in one direction only
  - (d) able to incorporate a large number of interneurons
  - (e) helped in the transmission of impulse by neuroglia cells.
233. Afferent neurons of spinal reflex arcs are found in the :
- (a) dorsal horn of the spinal cord
  - (b) ventral horn of the spinal cord
  - (c) autonomic ganglia
  - (d) visceral receptors.
  - (e) dorsal root ganglia.

234. Axons of the alpha motor neurons of the spinal cord:
- (a) are myelinated
  - (b) are non-myelinated
  - (c) pass through the dorsal root on their way to the peripheral
  - (d) terminate in skeletal muscle fibers of motor endplates
  - (a) terminate in interfusal fibers of neuromuscular spindles
235. In chemical synapses are found:
- (a) fusion of membrane
  - (b) synaptic cleft
  - (c) concentrations of mitochondria
  - (d) neurofibrils
  - (e) synaptic vesicles.
236. Synapses may be found connecting:
- (a) axon to axon
  - (b) axon to dendritic
  - (c) dendrite to dendrite
  - (d) axon to perikaryon
  - (e) axon to muscle.
237. Synaptic vesicles are:
- (a) transported to the synapse by axonic flow
  - (b) found in electrical synapses
  - (c) more flattened in shape in inhibitory synapses
  - (d) more rounded in shape in excitatory synapses
  - (e) identical in shape in both excitatory and inhibitory synapses.
238. Electric synapses:
- (a) are polarized and can transmit unidirectional impulse only.
  - (b) have junctions similar to gap Junctions
  - (c) are rich in synaptic vesicles
  - (d) transfer impulse more rapidly than chemical synapses
  - (e) are built from neuroglial components.
239. Myoneural junction (motor endplates) have:
- (a) axons
  - (b) dendrites
  - (c) synaptic vesicle
  - (d) mitochondria
  - (e) subneural clefts.



240. The post-synaptic membrane of myoneural junction has:
- (a) synaptic vesicles
  - (b) acetylcholinesterase activity
  - (c) direct contact with the presynaptic membrane
  - (d) many invaginations that penetrate the muscle fiber
  - (e) receptor sites for transmitters.
241. Neuromuscular spindles are
- (a) encapsulated receptors
  - (b) sensory receptors
  - (c) visceral receptors
  - (d) synonymous with motor endplates.
  - (e) able to respond to muscle stretching.
242. Neuromuscular spindle are receptors that:
- (a) have extrafusal fibers
  - (b) have encapsulated, intrafusal fibers
  - (c) receive innervation from large, myelinated, sensory fibers
  - (d) are visible to the naked eye.
  - (e) are longitudinally situated with respect to the muscle.
243. The white matter of the spinal cord contains:
- (a) axons
  - (b) dendrites
  - (c) perikarya
  - (d) neuroglia
  - (e) ependyma.
244. Neuropil is rich in:
- (a) perikarya
  - (b) axons
  - (c) synapses
  - (d) neuroglia
  - (e) connective tissue
245. The neuropil of the spinal cord is
- (a) found in white matter
  - (b) found in gray matter
  - (c) rich in myelinated axons
  - (d) rich in non-myelinated axons
  - (e) rich in ependymal cells.

246. Gamma motor neurons are:
- (a) found in the anterior horn of the spinal cord
  - (b) found in the posterior horn of the spinal cord
  - (c) larger than alpha motor neurons
  - (d) lightly myelinated
  - (e) important in the innervation of neuromuscular spindles
247. Non-encapsulated receptors are:
- (a) of more recent phylogentic origin than encapsulated receptors
  - (b) found only in the skin
  - (c) stained well with hematoxyclin and eosin
  - (d) sensitive to pain
  - (e) sensitive to touch
248. Corpuscle of Vater-Pacini are:
- (a) encapsulated receptors
  - (b) often large enough to be visible to the naked eye
  - (c) exteroceptors
  - (d) touch receptors
  - (e) pressure receptors.
249. Meissner bodies are:
- (a) encapsulated receptors
  - (b) present in joints, muscles and tendons
  - (c) present in the dermis
  - (d) temperature receptors
  - (e) mechanoreceptors, sensitive to touch.
250. Golgi tendons are:
- (a) found in ligaments of joints
  - (b) located in tendons
  - (c) located in aponeuroses
  - (d) encapsulated receptors
  - (e) important in maintaining muscle tension.
251. Ependymal cell in adults:
- (a) found in ligaments of joints
  - (b) located in tendons
  - (c) located in aponeurons
  - (d) encapsulated receptors
  - (e) are neurons

252. Choroid plexuses:
- (a) are present in all ventricles of the brain
  - (b) contain loose, connective tissue of the pia matter
  - (c) are covered with epithelium of neural tube origin
  - (d) are the source of cerebrospinal fluid
  - (e) are part of the blood-brain barrier.
253. The epithelial cells of the choroids plexus in adults:
- (a) microvilli on their free surface
  - (b) tight junctions
  - (c) relatively large numbers of mitochondria
  - (d) cilia
  - (e) many secretory droplets.
254. Cerebrospinal fluid:
- (a) protects the brain from mechanical damage
  - (b) is important in the nutrition of brain cells
  - (c) contains large numbers of cells
  - (d) contains large amount of proteins
  - (e) is absorbed continuously into the venous blood via the arachnoid granulations
255. The dura mater is:
- (a) the most internal of the meninges
  - (b) composed of loose, connective tissue
  - (c) composed of dense, connective tissue
  - (d) continuous with the periosteum of the skull bones
  - (e) lined internally with a simple squamous epithelium.
256. The pia mater:
- (a) is the most external of the meninges
  - (b) is richly vascularized
  - (c) envelops the spinal cord
  - (d) follows the contour of the brain
  - (e) is covered by an external layer of squamous cells.
257. Neurosecretory neurons:
- (a) conduct and transmit nervous impulse
  - (b) secrete hormones
  - (c) are very widespread in their distribution in the body
  - (d) can be identify by special staining techniques
  - (e) are found in the hypothalamus

258. If an axon is severed or badly crushed causing an axon reaction the following changes are seen in the perikaryon:
- (a) swelling
  - (b) dissolution of Nissl bodies
  - (c) displacement of the nucleus to an eccentric more peripheral site
  - (d) disruption of Golgi bodies
  - (e) decrease in ribonucleoproteins
259. Ganglia are:
- (a) found in the central nervous system
  - (b) found in the peripheral nervous system
  - (c) concentrations of perikarya and associated nerve fibers
  - (d) identical in structure and function in both spinal and visceral varieties
  - (e) found in the ear.
260. The cerebral cortex has layers (laminae) that:
- (a) number six in all areas
  - (b) number six in its phylogenetically most advanced areas
  - (c) can be demonstrated after Nissl staining
  - (d) can be demonstrated Golgi impregnation methods
  - (e) can be demonstrated after myelin staining.
261. Golgi type 1 neurons
- (a) contribute to the formation of peripheral nerves
  - (b) usually have long axons
  - (c) have axons that form long fiber tracts in the spinal cord
  - (d) are only found in gray matter
  - (e) are especially numerous in the cerebellar cortex.
262. Golgi type 11 neurons:
- (a) have long axons
  - (b) have short axons
  - (c) are found in the peripheral nervous system
  - (d) are very numerous in the cerebellar cortex
  - (e) are very numerous in the cerebellar cortex.
263. Stellate (granule) cells of the cerebral cortex:
- (a) are Golgi type 11 neurons
  - (b) are intracortical cells found in all the cortical laminae
  - (c) have extensively branched dendrites
  - (d) have short axons
  - (e) have myelinated axons.

264. The largest cells visible in preparation of the cerebral cortex are:
- (a) purkinje cells
  - (b) pyramidal cells
  - (c) bipolar neurons
  - (d) Betz cells
  - (e) multipolar neurons.
265. Pyramidal cells:
- (a) have an apical dendrite that terminates in the molecular layer
  - (b) have the apex of their cell body directed towards the cortical surface
  - (c) include the Betz cells
  - (d) have extremely large numbers of synapses on their dendrites
  - (e) have a single axon that leaves the base of the cell body and extends into the subcortical white matter.
266. Horizontal cells of Cajal are:
- (a) relatively small neurons
  - (b) found in the cerebellar cortex
  - (c) found in the cerebral cortex
  - (d) more common in adults than in infants
  - (e) orientated so that both dendrites and axons are parallel to the cortical surface.
267. Cells of Martinotti are:
- (a) found in the cerebellar cortex
  - (b) bipolar neurons
  - (c) neurons with myelinated axons
  - (d) more common in adults than in infants
  - (e) concerned solely with intracortical connections.
268. The bands of Bailarger are:
- (a) visible to the naked eye
  - (b) white stripes when seen in section of fresh cerebral cortex
  - (c) well seen in sections of cerebral cortex after staining for myelin
  - (d) formed of a large number of horizontally arranged fibers
  - (e) especially well developed in sensory areas of the cerebral cortex.
269. The line of Gennari is :
- (a) seen in the visual cortex
  - (b) formed from an enlarged outer band of Bailarger
  - (c) seen in the homotypical cortex
  - (d) visible to the naked eye in fresh sections
  - (e) found in the visual (striate) cortex.

270. The cerebellar cortex has:
- (a) six distinct layers
  - (b) three distinct layers
  - (c) a superficial molecular layer
  - (d) an inner granular layer
  - (e) pyramid cells.
271. Purkinje cells:
- (a) are the largest neurons of the cerebellar cortex
  - (b) can be demonstrated by silver impregnation methods
  - (c) are typically arranged in a row between the molecular and granular layers
  - (d) have a single axon that enters the white matter
  - (e) are the most numerous cells in the cerebellar cortex
272. The granular layer of the cerebellar cortex
- (a) contains abundant small neurons
  - (b) has neurons with very darkly staining nuclei
  - (c) contains stellate cells
  - (d) has 'clear' areas or glomeruli in which cell bodies of neurons are absent
  - (e) is penetrated by axons of Purkinje cells.