MCQ (nerve and muscles)

Choose the best (✓) answer:

1- The energy of muscle contraction is derived from the following except:
   a- ATP.
   b- muscle glycogen.
   c- lactic acid.
   d- Creatine phosphate.
   c

2- The frequency needed to produce tetanus:
   a- is increased by cooling.
   b- is decreased in red muscles.
   c- is increased in fatigue.
   d- is decreased in the pale muscles.
   b

3- Depolarization:
   a- is associated with increase in membrane permeability to Na⁺.
   b- is terminated with closure of voltage activated K⁺ channels.
   c- is followed by muscle relaxation.
   d- is caused by K⁺ efflux.
   a

4- Action potential:
   a- is a graded potential.
   b- is produced by sub threshold stimulus.
   c- starts with repolarization caused by outward movement of Cl⁻.
   d- is conducted slower in thin nerve fibers.
   d

5- RMP of a nerve:
   a- is caused by equal distribution of ions along both sides of the membrane.
   b- is caused by selective permeability of the membrane to the ions.
   c- Na⁺ - K⁺ pump has no role in RMP.
   d- is caused mainly by inward movement of Na⁺ ions.
   b

6- As regard conduction of action potential in a nerve:
   a- in thick myelinated nerve fibers can reach up to 120 meter / second.
   b- can be increased by increase calcium.
   c- can be increased by cooling.
   d- is conducted with decrement.
7- Pale (fast) fiber:
   a- contains much blood capillaries.
   b- doesn't show fatigue.
   c- contains low concentration of myoglobin.
   d- depends on aerobic oxidation.

8- About cellular sheath (sheath of Schwann):
   a- It acts as an electric insulator around the nerve fiber.
   b- It surrounds the axons of all neurons inside and outside the CNS.
   c- It is responsible for the color of the white matter of the spinal cord.
   d- It is essential for regeneration of the damaged nerve fibers.

9- Myelin sheath:
   a- Present in the myelinated and unmyelinated nerve fibers.
   b- Formed of lipoprotein complex and acts as electric insulator.
   c- It is formed of successive wrappings of the membrane of Schwann cells.
   d- It is the cause of decreased conduction of nerve impulse.

10- Chronaxia:
   a- is the minimal stimulus which produce response after relatively long time.
   b- is the minimal time needed by the strong stimulus to produce response.
   c- is the time required to stimulate the nerve by a minimal stimulus.
   d- is the time required to stimulate the nerve by a stimulus which is double rheobase.

11- During depolarization:
   a- voltage activated Na\(^+\) channels open.
   b- the membrane becomes impermeable to Na\(^+\).
   c- when membrane potential reaches -55 m.v Na\(^+\) & K\(^+\) fluxes occur at the same time.
   d- K\(^+\) ions diffuse outside.

12- The resting membrane potential is caused by:
   a- Diffusion of K\(^+\) ions outside the nerve fibers.
   b- Diffusion of Na\(^+\) ions inside the nerve fibers.
   c- Opening of the chemically activated ion channels.
   d- Opening of the voltage activated ion channels.

13- To measure resting membrane potential:
   a- We use a special voltmeter or cathode ray oscilloscope (CRO).
b- We put the two electrodes outside the nerve fiber.
c- We stimulate the nerve by an effective stimulus.
d- We put the two electrodes inside the nerve fiber.

14- Repolarization:
   a- Occurs at first gradual then becomes fast.
   b- Results from closure of sodium gates and opening of potassium gates.
   c- is represented by the ascending limb of the spike.
   d- is followed by appearance of response.

15- Continuous conduction:
   a- occurs in myelinated nerve fibers.
   b- occurs by jumping of charges from one node of Ranvier to another.
   c- is relatively slow 0.5-2.0 meter / second.
   d- occurs in the neuro-muscular junction.

16- Saltatory conduction:
   a- occurs in unmyelinated nerve fibers.
   b- may reach up to 120 meter / second.
   c- occurs by jumping from one neuron to another.
   d- decreases gradually with distance till it disappears.

18- In monophasic action potential:
   a- One electrode is put inside and the other is put outside the same nerve fiber.
   b- The spike is a large wave of short duration.
   c- The spike is followed by positive after potential then negative after potential.
   d- The ascending limb of the spike is due to $K^+$ efflux.

19- Local excitatory state is characterized by the following except:
   a- its magnitude is directly proportional with the intensity of the sub-minimal stimulus.
   b- does not obey all or non rule.
   c- can be summated.
   d- propagated without decrement.

20- About A fibers all are true except:
   a- They have the greatest diameter.
   b- They conduct impulses with the greatest velocity (10-120 met./sec)
   c- They include somatic sensory and motor fibers.
   d- They are very sensitive to local anesthetic drugs.
21- In all or non rule:
   a- A minimal stimulus produces a maximal response.
   b- The response in a single nerve fiber increases with increase intensity of stimulus.
   c- The nerve trunk either respond maximally or not respond at all.
   d- Minimal stimulus produces minimal response.

22- Excitation contraction coupling involves all the following except:
   a- Release of Ca^{++} from troponin.
   b- Formation of cross bridges between actin and myosin.
   c- Spread of depolarization along the transverse tubules.
   d- Hydrolysis of ATP to ADP.

23- Muscle fatigue is due to:
   a- Inability of the action potential to spread over the muscle.
   b- Failure of transmission in the motor nerve.
   c- Failure of neuro-muscular transmission.
   d- Depletion of energy stores.

24- An-electrotonus :
   a- is a localized area of depolarization.
   b- results from stimulation by effective galvanic current.
   c- is associated with decreased excitability.
   d- used to stimulate the nerve fibers

25- Nerve block is produced by:
   a- Sever cooling.
   b- Strong catelectrotonus.
   c- Decrease Ca^{++} ions.
   d- Increased Na^{+} ions.

26- Which of the following has the lowest conduction velocity:
   a- A α fibers.
   b- A β fibers.
   c- B fibers.
   d- C fibers.

27- The function of tropomyosin in skeletal muscle include:
   a- binding to myosin during contraction
b- acting as a relaxing protein at rest by covering the binding sites on actin.
c- sliding on actin to produce shortening.
d- releasing Ca\(^{++}\) after propagation of action potential.

**28- Contraction of skeletal muscles:**

a- produces more work when the muscle contracts isometrically than when the muscle contracts isotonically.
b- depends on external Ca\(^{++}\).
c- decrease in magnitude with rapid repeated stimulation.
d- does not depend on action potential.

c

**29- The motor end plate potential is produced by:**

a- opening of Na\(^{+}\) channels.
b- opening of Na\(^{+}\) channels then opening of K\(^{+}\) channels.
c- opening of Na\(^{+}\) and K\(^{+}\) channels at the same time.
d- opening of Ca\(^{++}\) channels.

c

**30- Nerve block is produced by all the following except:**

a- local anesthetics.
b- excessive cooling.
c- deep pressure.
d- strong cat-electrotonus.

d

**31- As regard neuro-muscular transmission all are true except:**

a- it shows fatigue due to depletion of acetylcholine vesicles.
b- occurs from nerve to muscle i.e. one way conduction.
c- it is stimulated by succinyl choline.
d- it is blocked by botulinum toxins.

c

**32- Red (slow) fibers are characterized by the following except:**

a- contains much blood capillaries.
b- glycogen stores is low.
c- contains high concentration of myoglobin.
d- depends on anaerobic oxidation.

d

**33- Neuromuscular transmission is blocked by:**

a- prostigmine.
b- increase Ca\(^{++}\) ions.
c- acetylcholine.
d- succinylcholine.
d
34- All about the Sarcomere are true except:
a- is the distance between myosin and actin.
b- is the distance between two Z membranes.
c- is the contractile unite of the muscle.
d- shorten when the muscle contracts.
a
35- Excitability of nerve fibers:
a- is increased by decreased temperature.
b- is increased by decreased Na⁺.
c- is decreased by decrease Ca²⁺ ions.
d- is completely lost by local anesthetic drugs.
d