STUDENT NAME: ……..……..

STUDENT NUMBER: ……..

University of Ottawa

ANP 1105C

Midterm #1

Date: October 13, 2009

Duration: 1 hr 20 min

Instructor: Joanna Komorowski

INSTRUCTIONS:

1. **53 multiple choice questions** (1 mark/1 correct answer per question) plus one descriptive question (1 mark). **Total number of marks possible = 54**

2. Please answer the multiple choice questions on the computer sheet that is provided

3. Please **put your name and student number at the top of this page** and at the top of the final page. **Please do not forget to put your course code (ANP 1105C), your surname (last name) and the initials, on the first page of the scantron sheet!!!**

4. Make sure this exam is complete. This exam contains **11 pages.**

5. The excuse of missing a page will not be accepted after the examination.

Good luck!!!!!

1. **Which of the following is true about the smooth endoplasmic reticulum?**

   A. It plays a role in protein synthesis
   B. It is involved in protein degradation
   C. It is involved in steroid hormones synthesis
   D. Both A) and B)

2. **In the small intestine, glucose is transported together with sodium, via:**

   A. secondary active transport
   B. simple diffusion
   C. facilitated diffusion using specific carrier proteins
   D. active transport
   E. endocytosis

3. **Which of the following mature cells is devoid of nucleus?**

   A. Glial cells
   B. Skeletal muscle cells
   C. Red blood cells
   D. Columnar epithelial cells

4. **Which of the following is true about the plasma membrane of human cells?**

   A. Membrane phospholipids contain only polyunsaturated fatty acids
   B. Carbohydrates are usually located on the cytosolic side of the membrane
   C. Peripheral proteins are found mainly on the outer side of the membrane (facing the extracellular fluid)
   D. Plasma membrane contains leaky channels for sodium and potassium

5. **Lysosomes:**

   A. absorb nutrients from digested foods and store them for future use
   B. digest bacteria, viruses and non-useful tissue
   C. provide protection against free radicals and toxins
   D. produce mucus that protects parts of the digestive organs from the effects of powerful enzymes needed for food digestion
   E. secrete buffers in order to keep the pH of the digestive tract close to neutral

6. **In children with the Zellweger syndrome:**

   A. the number of lysosomes is decreased or lysosomes are missing
   B. the number of peroxisomes is decreased or peroxisomes are missing
   C. a specific lysosomal enzyme is missing
   D. a specific mitochondrial enzyme is missing

7. **Select the correct statement regarding epithelial tissue:**

   A. simple squamous epithelium is present where protection from abrasion is important
   B. transitional epithelium is found in the small intestine
   C. the epithelial tissue is avascular
   D. the epithelial tissue is not innervated

8. **Solution X contains 15% NaCl dissolved in water. Solution Y contains 15% NaCl dissolved in water. Which of the following best describes the relative concentrations of these solutions?**

   A. Solution **X** is hypertonic to solution **Y**
   B. Solutions **X** and **Y** are isotonic to each other
   C. Solution **Y** is hypertonic to solution ***X***
   D. Solution **Y** is hypotonic to solution **X**
   E. Both A) and D**)** are correct

9. **Which of the following is true?**

   A. Microtubules are involved in cellular transport
   B. Microtubules are involved in cellular motility
   C. Microtubules are the main contractile filaments of skeletal muscle cells
   D. Both A) and B) are true
   E. All of the above are true

10. **Which of the characteristics of connective tissue is TRUE?**

    A. With some exceptions, it usually has abundant matrix
    B. It usually lines body cavities
    C. It is usually arranged in a single layer of cells
    D. It usually contains keratin fibres

11. **Cell types likely to be found in areolar connective tissue include:**

    A. fibroblasts
    B. macrophages
    C. mast cells
    D. both A) and B)
    E. all of the above

12. **Mitochondria:**

    A. synthesize enzymes involved in detoxification
    B. are self-replicating
    C. are single membrane structures involved in breakdown of ATP
    D. are found only in muscle cells

13. **Which of the following is true?**

    A. Golgi apparatus is well developed in the nerve cells
    B. Nucleosomes connect ribosomal subunits
    C. Vaults are believed to play a role in mRNA transport from the cytoplasm to the nucleus
    D. Nucleoli are involved in cell division

14. Multicellular exocrine glands:

A. secrete their products onto body surfaces and body cavities via epithelium derived ducts
B. produce hormones and secrete them to blood
C. secrete their products onto body surfaces and body cavities via endocytosis
D. all of the above

15. Which of the following statements regarding adipose tissue is true?

A. Brown adipose tissue is usually found in young adults
B. Adipose tissue produces TNF-α linked to insulin resistance
C. Adipose tissue located on arms and legs is more metabolically active than visceral (abdominal) adipose tissue
D. Both B) and C)
E. All of the above

16. Tight junctions:

A. play a role in cell to cell communication
B. are ligand-gated channels
C. prevent passage of molecules through the space between adjacent cells
D. are bound to keratin fibers

17. Which of the following statements is CORRECT regarding diffusion?

A. Molecular weight of a substance does not affect the rate of diffusion
B. The lower the temperature the faster the diffusion rate
C. The rate of diffusion is independent of the diffusion surface area
D. The greater the difference in concentration (concentration gradient) between two sides of the membrane, the faster the rate of diffusion

18. Which of the following characteristics of nerve fibers is TRUE?

A. Group C fibers are capable of saltatory conduction
B. Group C fibers are highly myelinated and have the highest conduction velocities
C. Group B fibers are highly myelinated and have the highest conduction velocities
D. Axons with large cross-sectional area conduct impulses more quickly than axons with a smaller cross-sectional area

19. A neurotransmitter that leads to change in hillock's membrane potential from -70 to -50 mV causes:

A. production of an action potential at the hillock
B. graded potential at the hillock
C. opening of the ligand-gated channels at the hillock
D. hyperpolarization at the hillock

20. Dendrites:

A. store neurotransmitters and release them when stimulated
B. contains centrioles and mitotic spindles needed for cell division
C. have voltage-gated channels that open in response to graded action potential
D. have ligand-gated channels and produce graded potentials

21. Which of the following will occur when an excitatory postsynaptic potential (EPSP) is being generated on the dendritic membrane?

A. Sodium gates will open first, then close as potassium gates open leading to production of an action potential
B. Specific sodium gates will open and an action potential will be produced
C. Specific potassium gates will open and a neuron will become hyperpolarized
D. A single type of channel for sodium and potassium will open leading to greater influx of potassium ions to the nerve cell than sodium ions efflux from the nerve cell
E. A single type of channel for sodium and potassium will open leading to greater influx of sodium ions into the nerve cell than potassium ions efflux from the nerve cell

22. The region of neuron where neurotransmitters are stored is called:

A. dendrite
B. axon terminal
C. soma
D. dendritic spines
E. axon hillock

23. Neuroglia that provide nourishment to neurons are called:

A. Schwann cells
B. astrocytes
C. ependymal cells
D. oligodendrocytes
E. microglia

24. Which of the following is TRUE about the electrical synapses?

A. They allow fast and synchronized response of many cells
B. Their communication is always unidirectional
C. They are observed in cells with gap junctions
D. Both A) and B) are true
E. Both A) and C) are true

25. During an absolute refractory period:

A. sodium gates are opened and potassium gates are closed
B. all of the gates are closed
C. sodium gates are closed and potassium gates are opened
D. sodium and potassium gates are opened

26. Which of the following is true about the saltatory conduction?

A. APs are triggered only under the Schwann cells and the impulse moves slowly along the axon
B. It takes place in dendrites
C. It depends on an intake of salt
D. APs are triggered only at the nodes of Ranvier and the impulse “jumps” from node to node along the axon

27. The point at which α-motorneuron communicates with the skeletal muscle membrane is called:

A. receptor
B. neuromuscular junction
C. sarcolemma
D. axon hillock
E. synapse

28. The main factor(s) contributing to a negative resting membrane potential of neurons is/are:

A. leakage of sodium ions to the neurons
B. negatively charged organic molecules inside the nerve cells
C. leakage of potassium ions out of the neuron
D. Both A) and B)
E. Both B) and C)

29. A neuronal circuit in which a single impulse is transmitted from one neuron to several other neurons is called:

A. reverberating circuit
B. diverging circuit
C. converging circuit
D. oscillating circuit
E. parallel circuit

30. Which of the following is true about the nebulin?

A. It is a contractile protein
B. It is a regulatory protein
C. It is a protein involved in the maintenance of transverse register of myofibrils from the adjacent sarcomeres
D. It is a protein that maintains actin array

31. Which of the following is true about the postsynaptic receptors?

A. All postsynaptic receptors are made of glycolipids
B. Binding of neurotransmitters to the postsynaptic cholinergic receptors always cause opening of ionic channels
C. Binding of neurotransmitters to the postsynaptic cholinergic receptors may cause opening or closing of ionic channels
D. The postsynaptic receptors are stimulated by an influx of ions to the nerve cell

32. When acetylcholine binds to chemically-gated postsynaptic receptors it can:

A. lead to slower opening of channels via G-protein activated second messengers production
B. lead to fast opening of ion channels letting both sodium and potassium move according to their concentration gradient
C. lead to fast opening of voltage-gated channels on the postsynaptic cell membrane
D. A) and B)
E. B) and C)

33. Which of the following statements is TRUE?

A. The afferent nerve fibers carry impulses from the CNS to the effectors
B. Myelination of neuronal axons in the peripheral nervous system is performed by oligodendrocytes.
C. Neurons are characterized by a short lifespan
D. Regions of the brain containing mostly cell bodies and unmyelinated fibres is called a gray matter

34. During the depolarization phase of an action potential, which of the following situations exists?

A. The charge measured inside the membrane is becoming less negative with respect to the outside
B. The neuron is in a relative refractory period and a strong stimulus can cause potassium efflux from this neuron
C. The charge inside the membrane is becoming more negative than the resting potential
D. The membrane potential remains constant

35. After nervous stimulation of the skeletal muscle has ceased, the calcium:

A. is actively pumped into the sarcoplasmic reticulum for storage
B. is actively pumped out of the muscle cell
C. stays bound to the filaments
D. stays in the sarcoplasm

36. All of the following are true of graded potentials EXCEPT that they:

A. are short-lived
B. can form on the dendrites or soma of sensory receptor neurons
C. always cause sodium influx through the voltage-gated channels
D. can be called postsynaptic potentials

37. In a relaxed muscle fiber, which of the following are found in the I zone?

A. thick filaments and cross bridges
B. thick filaments
C. thin filaments
D. both thick and thin filaments

38. Calcium ions binding to ..... in the skeletal muscle cells leads to……..

A.	troponin;	removal of tropomyosin from the active sites on actin
B.	motor unit;	muscle contraction
C.	tropomyosin;	muscle relaxation
D.	myosin	uncovering of the active sites on actin

39. Fused tetanus is:

A. a phenomenon that occurs in striated and cardiac muscle cells
B. a sustained contraction with partial relaxation between stimuli
C. a brief contraction of all the fibres in a motor unit
D. a sustained contraction in which individual twitches cannot be discerned

40. In an isometric contraction, the muscle:

A. shortens while lifting a load and increases tension with increasing load
B. does not change in length but increases in tension
C. lengthens while contracting
D. does not require ATP

41. The basic contractile unit of a skeletal muscle fiber is:

A. a myofibril
B. the sarcoplasmic reticulum
C. a sarcomere
D. a myofilament

42. Which of the following statements is FALSE?

A. Slow-oxidative rather than fast (IIb) muscle fibres predominate in world-class marathon runners
B. Slow oxidative muscle fibres are less powerful than fast glycolytic fibres
C. Most body muscles have a mixture of muscle fibre types
D. Muscle fibres innervated by the same motor neuron are not adjacent to each other
E. Slow-oxidative rather than fast-twitch (IIb) muscle fibres predominate in world-class sprinters

43. The amount of force (tension) developed by a skeletal muscle increases with:

A. an increase in frequency of stimulation
B. an increase in size and number of motor units recruited
C. an increase in calcium availability
D. both A) and C)
E. all of the above

44. Muscle fatigue during intense exercise lasting 30 seconds can be associated with:

A. depletion of carbohydrate stores
B. depletion of phosphocreatine stores
C. depletion of lipid stores
D. lack of oxygen

45. During intense exercise (85% VO2max) lasting 10 min, the main source of energy is/are:

A. blood plasma fatty acids
B. muscle glycogen
C. phosphocreatine
D. ATP stored in muscle cells

46. What is happening during the latent period of muscle contraction?

A. nothing
B. calcium ions are being pumped from the sarcoplasm back to the sarcoplasmic reticuum
C. new contractile proteins are being synthesized
D. calcium ions are beginning to enter the sarcoplasm from the sarcoplasmic reticulum
E. ATP molecules are attaching to myosin heads

47. Amino acids:

A. produce similar amount of energy as fatty acids
B. can be used as energy source during starvation
C. are usually used for energy during short bursts of intense exercise
D. are never used as energy source

48. A motor unit is:

A. a motor neuron plus all of the skeletal muscle fibres it innervates
B. all of the neurons that stimulate a particular muscle
C. the point of contact between the motor neuron and muscle fibre
D. the sarcomere of an individual myofibril

49. An increase in the metabolic activity of the skeletal muscle may be associated with:

A. decreased requirement of ATP
B. greater production of hydrogen ions
C. increased number of mitochondria
D. both A) and B)
E. Both B) and C)

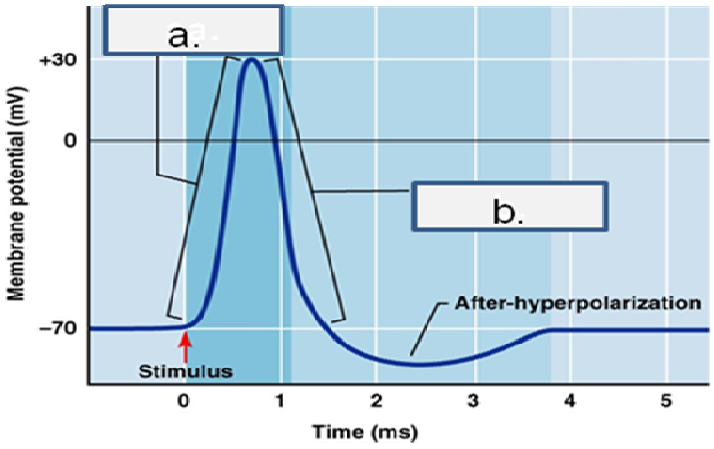
50. What initiates binding of myosin to the uncovered sites on actin?

A. Release of ADP and Pi from the myosin
B. Attachment of ATP to actin
C. Influx of calcium to the cytoplasm
D. Activation of myosin during the hydrolysis of ATP

51.) Slow-twitch muscle fibres as compared with fast-twitch (IIb muscle fibres:

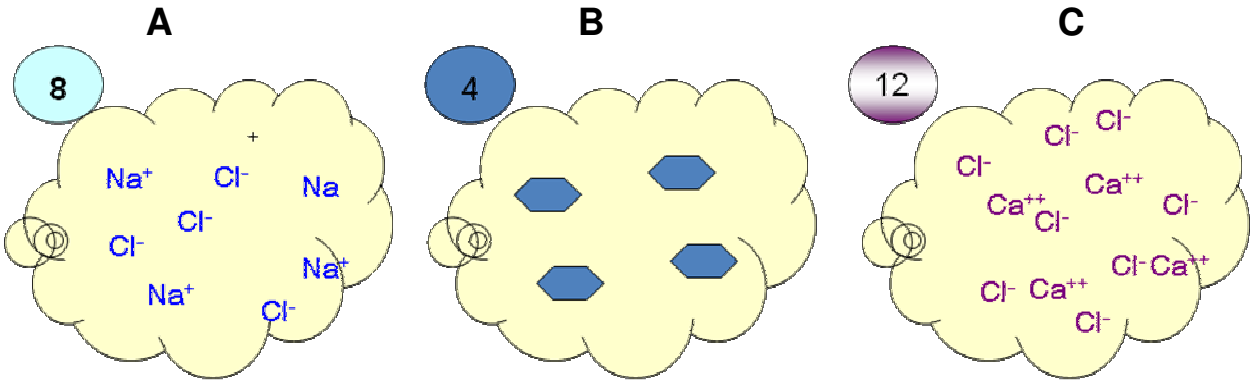
A. are more fatiguable
B. contain less mitochondria
C. are larger
D. contract and relax more slowly

52. Which of the following (a) or (b) represents opening of the voltage gated sodium channels?



Answer a

53. Which of the following (A), (B) or C) represents osmolarity = 3 mOsm?



Answer C

54. Please name the following structures present in the sarcomere (1 mark)