NEUR0010
Weeks 8, 9 Practice Questions

2006-2

30. All of the following are true about Pacinian corpuscles EXCEPT
a) They are very sensitive to vibration.
b) They are located deeper in the skin than Meisner's corpuscles.
c) They are most useful for making fine tactile discriminations like reading braille.
d) They adapt very quickly.

31. Nociceptor activity is carried by activity of
a) A delta fibers
b) free nerve endings
c) Merkle's disks
d) More than one of the above.

32. Which of the following would cause an increase in the amount of cortex "dedicated" to the representation of digit three in an adult monkey?
a) amputation of digit three.
b) amputation of digits two and four.
c) careful training of digit three on a difficult Braille-reading task
d) More than one of the above.
e) All of the above

33. A phantom limb sensation that is evoked by tactile stimulation of the face would most likely be felt in a phantom
a) arm
b) leg
c) genitalia
d) heart

34. All of the following most likely contribute to better tactile acuity in your finger tip compared to your forearm EXCEPT
a) higher density of receptors in the skin of the finger
b) faster conducting axons in the finger
c) smaller receptive fields in the skin of the finger
d) higher cortical magnification factor of the finger

35. Someone drops a red hot orange into your outstretched hand. Order the speed with which the following kinds of information reach your central nervous system from Fastest to Slowest.

A. The orange has a round shape.
B. The orange is hot.
C. The weight of the orange has changed the position of your hand.
D. Your hand is burned badly

a) C, A, B, D
b) C, B, D, A
c) B, A, D, C
d) B, C, A, D
e) A, C, D, B

36. Morphine
a) binds to the same receptors as enkephalins.
b) is an analgesic.
c) binds to the same receptors as endorphins.
d) More than one of the above are true.
e) All of the above are true.

37. Damage to the posterior parietal cortex can lead to
a) hemi-neglect syndrome
b) inability to recognize objects (agnosia)
c) spasticity
d) More than one of the above

38. Unlike most sensory cells we have studied, some nociceptors actually increase their firing rate over time when a constant stimulus is present. In other words they DO NOT adapt, they become more sensitive to stimuli. All of the following are responsible for making a nociceptor more responsive EXCEPT
a) release of histamine
b) axon reflex
c) release of enkephalins
d) bradykinin, prostaglandins, extracellular potassium

39. Which of the following would be MOST effective at alleviating the sensation of pain (analgesic)?
a) stimulating the Raphe nuclei
b) stimulating the intralaminar nuclei
c) stimulating the VP nuclei of the thalamus
d) rubbing a gelatinous substance on the zone of Lissauer

40. The amount of force a muscle generates can be controlled by
a) the frequency of action potentials in a motor neuron.
b) the number of motor units recruited.
c) the size of the action potentials in motor neurons
d) More than one of the above

41. The _____ segments of the spinal cord are enlarged due to the presence of more _____.
a) cervical and lumbar; gray matter
b) cervical and lumbar; white matter
c) thoracic and sacral; gray matter
d) thoracic and sacral; white matter

42. The flexor/crossed extensor reflex is an example of
a) a reflex that requires only one synapse in the central nervous system.
b) a reflex that provides the basic circuitry needed for walking motion.
c) the stretch reflex.
d) a reflex that involves input from the brainstem.

43. The output of neurons in primary motor cortex is determined by activity in
a) premotor cortex
b) basal ganglia
c) cerebellum
d) All of the above

44. Information controlling the muscles of posture travels down
a) the corticospinal tract
b) the ventromedial pathway
c) the medial lemniscus
d) lateral pathway

45. Per Roland's PET scan study demonstrated that
a) premotor areas are activated whenever one thinks of moving.
b) premotor areas are activated whenever one plans a *complex* movement.
c) motor activity can occur without activity in primary motor cortex
d) primary motor cortex is activated when we think of moving.

46. All of the following are signs of damage to the corticospinal tract EXCEPT
a) sign of Babinski
b) resting tremor
c) spasticity
d) weakness (paresis)

47. Parkinson's disease is characterized by all of the following EXCEPT
a) too little dopamine in the striatum
b) akinesia (difficulty initiating movement)
c) rigidity
d) chorea

48. Information on how much force a muscle is generating can be found in the output of
a) the intrafusal fibers
b) C fibers
c) Golgi tendon organs
d) A delta fibers

49. If action potentials in all gamma motor neurons were blocked
a) muscle could not contract
b) the frequency of action potentials in A alpha fibers would decrease
c) the activity of alpha motor neurons would be blocked
d) all activity in the corticospinal tract would stop

50. A cut through the left half of your thoracic spinal cord would cause which of the following symptoms?
a) loss of sensation to touch in your left hand
b) loss of sensation of temperature in your right foot
c) loss of sensation to touch in your right leg
d) inability to move your right toes
e) More than one of the above

2007-2

31. Comparing fast and slow muscle, one finds:
a) slow is stronger than fast
b) slow fatigues more rapidly than fast
c) fast has a greater blood supply
d) fast uses anerobic metabolism and slow uses oxidative metabolism

32. The cell bodies of alpha motor neurons are located in which portion of the spinal cord:
a) lateral column
b) ventromedial column
c) dorsal horn
d) ventral horn

33. All the following statements about motor units are correct EXCEPT:
a) the largest motor units are in eye muscles
b) the motor unit is defined as the alpha motor neuron plus all the muscle fibers it innervates
c) muscle fibers in the motor unit are all either fast or slow
d) the size of the motor unit determines how finely a muscle can be controlled

34. Recruitment increases muscle force because:
a) the number of neurons in a motor unit increases
b) the number of neurons in a motor neuron pool increases
c) the number of active motor neurons increases
d) the number of active gamma motor neurons increases beyond the number of active alpha motor neurons

35. Golgi tendon organs:
a) are in series with muscles and sense muscle force
b) are in series with muscles and sense muscle length
c) are in parallel with muscles and sense muscle force
d) are in parallel with muscles and sense muscle length

36. All of the following are true of the stretch reflex EXCEPT:
a) it is the only monosynaptic reflex
b) the antagonist muscle relaxes due to reciprocal inhibition
c) the alpha motor neuron innervates the same muscle that the 1a sensory information comes from
d) it is mediated by Golgi tendon organs

37. The intrafusal muscle of muscle spindles:
a) is innervated by alpha motor neurons and generates most of the power that moves our limbs
b) is innervated by gamma motor neurons and generates most of the power that moves our limbs
c) is innervated by alpha motor neurons and generates negligible power
d) is innervated by gamma motor neurons and generates negligible power

38. Generally speaking, cerebellar disease causes:
a) paralysis
b) dyskinesia
c) ataxia
d) rigidity

39. All the following statements about Huntington's disease are correct EXCEPT:
a) hypokinetic muscles
b) basal ganglia degeneration
c) in its end stages, dementia is common
d) it is a hereditary disease

40. All of the following are examples of exteroception EXCEPT
a) Proprioception
b) Nociception
c) Thermoreception
d) Mechanoreception

41. Meissner's corpuscles and Merkel's disks
a) are located deeper under the surface of the skin than Pacinian corpuscles.
b) have large receptive fields compared to those of Ruffini endings.
c) are found primarily in glabrous skin.
d) wrap around the base of hair follicles in the skin.
e) More than one of the above.

42. Encapsulations found in Meissner's and Pacinian corpuscles
a) cause more pronounced adaptation in sensory axons they surround.
b) prevent the sensory axons from firing unless there is serious tissue damage.
c) play a role in the somatosensory system's ability to distinguish differences in texture.
d) More than one of the above.

43. All of the following are reasons why we are better at two-point resolution tasks on our finger tips vs. our backs EXCEPT
a) The amount of cortex dedicated to 1 cm2 of skin on the finger is much greater than the amount of cortex dedicated to 1 cm2 of skin on the back.
b) The density of mechanoreceptors is greater in the skin of the finger than in the skin of the back.
c) Magnification factor in the area of cortex representing the finger is greater than that in the area of cortex representing the back.
d) The receptive fields of somatosensory fibers are smaller on the back than on the finger.

44. All of the following would lead to a decreased sensation of pain EXCEPT
a) Blocking of TRPV receptors
b) Stimulation of the periaquaductal gray
c) Blocking of endorphine and enkephalin receptors in the spinal cord
d) Injections of morphine

45. In addition to carrying information about pain, temperature and itch, Adelta and C fibers
a) may also have a mechanoreceptive function that is activated by muscle massage.
b) sense chemical and mechanical changes in muscle as it becomes more active.
c) Play a role in the myotatic (knee jerk) reflex
d) More than one of the above

46-48 (10 points total)
For each lesion, indicate which of the deficits from the list below would most likely be seen. If there are two lines after the lesion that means the two most likely deficits must be listed on the answer sheet. (1 pt each)

A. loss of touch on the left side of the body
B. loss of touch on the right side of the body
C. loss of pain and temperature sensation on the left side of the body
D. loss of pain and temperature sensation on the right side of the body
E. loss of finger control on the left side of the body
F. loss of finger control on the right side of the body
G. loss of stomach and back muscle control on the left side of the body
H. loss of stomach and back muscle control on the right side of the body

46. Destruction of all axons in the dorsal column on both sides of the spinal cord ____; ____ (2pts)

47. A cut through the left half of the cervical spinal cord at C1 ____; ____; ____; ____
(4pts)

48. Destruction of all axons crossing the midline in the medulla ____; _____;____; ____
(4pts)

2008-2

30. Parts of the body with the most accurate 2-point discrimination have
a) representations in cortex that are highly magnified
b) receptive fields that are large
c) receptive fields that are small
d) a & b
e) a & c

31. You are up late studying for a Neuro exam with your roommates when things get a little crazy. Somehow, a scalding hot sweet potato is dropped into your outstretched hand. Put the following sensory signals in order from fastest to slowest.

(A) sharp, stinging pain from hot sweet potato
(B) stretch receptor activation leading to the myotatic reflex in arm
(C) dull aching pain from hot sweet potato that gets more intense over time
(D) information on texture and weight of sweet potato

a) A,B,D,C
b) B,D,A,C
c) D,B,A,C
d) C,B,A,D
e) B,A,D,R,O,O,M,M,A,T,E

32. A-alpha fibers have a conduction velocity that is _____ because they_____
a) slow / have a large diameter and are heavily myelinated
b) slow / have a small diameter and are unmyelinated
c) fast / have a small diameter and are unmyelinated
d) fast / have a large diameter and are heavily myelinated

33. Damage to the left side of the lumbar spinal cord will cause loss of fine touch and propioception in the _____ leg and loss of nociception in the _____ leg.
a) left; left
b) left; right
c) right; right
d) right; left

34. Loss of which sensory modality produces the most harm, often resulting in an early death?
a) vision
b) audition
c) nociception
d) propioception
e) itch

35. If a limb is amputated, the part of somatosensory cortex that used to receive input from that limb
a) will experience massive cell death and disappear.
b) will remain unused.
c) may become sensitive to inputs from neighboring patches of cortex.
d) will crawl out through the nose and go in search of another brain.

43. Golgi tendon organs:
a) sense muscle length and send sensory information on Ia axons
b) sense muscle length and send sensory information on Ib axons
c) sense muscle force and send sensory information on Ia axons
d) sense muscle force and send sensory information on Ib axons
e) more than one of the above

44. You meet a friend at Johnny Rockets and, because you are an aficionado, you take your own engraved Neuro 1 glass mug. As you proudly hold out your bent arm, mug in hand, your friend pours you a brimming mugful of delicious Cajal Cola. All the following statements about your reaction are correct EXCEPT:
a) the biceps muscle in your arm is stretched by the added weight of the cola
b) activity in Ia sensory axons increases
c) the biceps muscle increases contraction
d) the antagonist triceps muscle increases contraction
e) the myotatic reflex is evoked

45. Gamma motor neurons:
a) innervate extrafusal muscle fibers
b) innervate Golgi tendon organs
c) are coactivated with alpha motor neurons projecting to the same muscle
d) activate the crossed extensor reflex
e) activate antagonist muscles to the muscles activated by alpha motor neurons

46. The motor system uses two major feedback loops through the VL nucleus of the thalamus to modulate signals in motor cortex that are sent to the spinal cord. The two major feedback loops we discussed go through:
a) supplementary motor area (SMA) and premotor area (PMA)
b) basal ganglia and cerebellum
c) ventromedial nuclei and corticospinal nuclei
d) red nucleus and superior colliculus
e) spinal cord and brainstem

47. All the following statements about the ventromedial pathways in the spinal cord are correct EXCEPT:
a) they are ventral to the corticospinal tract in the spinal cord
b) they receive input from the vestibular and visual systems
c) they control distal muscles such as hands and fingers
d) lesions can produce symptoms on both sides of the body
e) they are lesioned by a transection of the spinal cord at the level of cervical segment C2

48. Huntington's disease is characterized by:
a) the loss of dopamine neurons
b) resting tremor
c) rigidity
d) dyskinesia
e) excessive hunting

49. Cerebellar disease is generally associated with:
a) ataxia
b) paralysis
c) rigidity
d) dyskinesea
e) weakness

50. Association areas of motor cortex are most involved in:
a) movement execution
b) movement strategy
c) movement tactics
d) the ability to roll the tongue into a tube
e) complex multi-limb funk dance moves

2009-2

28. Proprioceptors
a) send axons through the dorsal column of the spinal cord
b) provide the sensory information required for the myotatic (or stretch) reflex.
c) have axons that synapse on neurons in the intralaminar nuclei of the thalamus
d) More than one of the above
e) All of the above

29.Meissner's corpuscles and Merkel's disks
a) are found more superficially (just beneath the epidermis) in glabrous (non-hairy) skin
b) both demonstrate fast adaptation
c) carry nociceptive signals
d) surround the base of hair follicles and respond when a hair is moved back and forth

30. Your student co-worker at the Ratty throws a scalding hot deep-fried eggroll directly from the frying basket into your hand. Which information would be the first to reach your somatosensory cortex?
a) the hot temperature
b) the pain from tissue damage in your hand
c) the crispy, hard surface of the eggroll
d) the pain from the hot pepper coating on the eggroll
e) the realization that your co-worker, in addition to breaking safety protocol, is not wearing the obligatory hair-net thereby doing even more harm that what was done to your scalded hand.

31. All of the following are true about the sensory fibers innervating your thumb compared to your back EXCEPT:
a) Mechanoreceptor receptive fields are larger on you back than on your thumb.
b) The density of mechanoreceptors is higher on your thumb than on your back.
c) A larger portion of the VP nucleus of the thalamus is dedicated to the sensory fibers from the skin on your thumb compared to an equal sized patch of skin from your back.

d) The axons of sensory fibers innervating the thumb are larger in diameter than axons innervating the back.

32. A worm with very specific tastes invades your spinal cord and eats all the ***cell bodies*** in the dorsal horn of the cervical and thoracic spinal cord. Which deficit would result from the dining habits of this worm?
a) loss of temperature sensation in the hands
b) loss of voluntary movement of the arms
c) loss of touch in the hands
d) loss of proprioception in the hands

33. You are a very tricky virus that has infiltrated the skin of the finger and now you want to find your way to the intralaminar nuclei of the thalamus. Which series of cells and pathways will you be taking on your trip?
a) free nerve ending; dorsal root of spinal nerve; spinothalamic tract; intralaminar nuclei
b) A delta fiber; spinothalamic tract; medial lemniscus; intralaminar nuclei
c) A beta fiber; anterolateral pathway; dorsal column nuclei; intralaminar nuclei
d) A alpha fiber; dorsal horn; medial lemniscus; intralaminar nuclei

34. Phantom limb sensations, removal of a finger causing expansion of the cortical representation of neighboring fingers and training of two fingers leading to the expansion of the cortical representation of these two fingers are all examples of
a) magnification factor
b) plasticity in adult cortex
c) reorganization of connections in the thalamus
d) sprouting of axon terminals in the skin

35. All of the following would decrease the sensation of pain EXCEPT
a) increased activity of cells in the periaqueductal gray matter
b) release of endorphins and enkephalins in the dorsal horn of the spinal cord
c) release of substance P from nociceptors
d) blocking of voltage-gated sodium channels in c-fiber axons

39. A cut through the left half of the thoracic spinal cord would cause
a) loss of touch in the left leg
b) loss of pain and temperature in the left leg
c) inability to move the toes of the right foot
d) inability to move the fingers of the left hand
e) More than one of the above

2010-2

26. Which of the following receptors are located near the surface of glabrous skin and are sensitive to vibrating stimuli?
a) Meisner's corpuscles
b) Pacinian corpuscles
c) Merkel's disks
d) Ruffini's endings

27. The property of adaptation is responsible for all of the following EXCEPT
a) the decreased firing of mechanoreceptors to a constant stimulus
b) sensitivity to vibrating stimuli
c) increased responsiveness to instances when the stimulus is changing
d) the increased firing of nociceptors over time in response to tissue damage

28. A worm with an attitude eats the medial lemniscus on the right side of your Pons. This would lead to loss of
a) touch on the right side of your body
b) touch on the left side of your body
c) temperature sensitivity on the right side of your body
d) temperature sensitivity on the left side of your body

29. Decreased ability to feel pain is associated with loss of
a) A-alpha fibers
b) A-beta fibers
c) c fibers
d) opioid receptors

30. Somatosensory information from your finger enters your central nervous system via the
a) spinal nerves in the lumbar region
b) spinal nerves in the cervical region
c) spinal nerves in the thoracic region
d) trigeminal nerve in the brainstem

31. Which of the following would cause the cortical representation of digit 3 in a monkey to expand?
a) careful training of fine discrimination tasks using digit 3
b) careful training of fine discrimination tasks using digit 2
c) amputation of digit 2
d) More than one of the above

32. One explanation for phantom limb sensations involves a mechanism thought to reside at the level of the
a) somatosensory cortex
b) VP nucleus of the thalamus
c) dorsal column of the spinal cord
d) ventral horn of the spinal cord

33. Release of substance P from nociceptor axons causes all of the following EXCEPT
a) contributes to hyperalgesia
b) causes release of histamine
c) causes swelling of blood vessels
d) causes A beta fibers to decrease their firing rate

34. In a fight for your life you will feel less pain. One of the main reasons for this is
a) increased release of opiates in the spinal cord
b) decreased firing of neurons in the periaqueductal gray (PAG) that project to the Raphe nuclei
c) increased release of enkephalins in the dorsal horn of the spinal cord
d) increased activity of neurons in the intralaminar nuclei of the thalamus

35. After class you are starving; you run as fast as you can to the Ratty in fear they might run out of Count Chocula cereal. Making this sprint the muscles you call into service have the following property:
a) they have high oxidative metabolism
b) they have many mitochondria
c) they fatigue slowly
d) they have a low capillary density

36. The muscles in your legs are driven by motor neurons in the:
a) dorsal horn of the cervical spinal cord
b) ventral horn of the lumbar spinal cord
c) dorsal horn of the sacral spinal cord
d) ventral horn of the thoracic spinal cord

37. The following statements about the motor unit are true EXCEPT:
a) the motor unit is the alpha motor neuron and the muscle fibers it innervates
b) the motor unit is the smallest unit of muscle that can be independently controlled
c) in most cases, there is a single muscle fiber in the motor unit
d) if there is more than one muscle fiber in the motor unit they are all fast twitch or all slow twitch

38. Fasciculations are:
a) the resting tremor common in Parkinson's disease
b) muscle twitches resulting from spontaneous firing of a motor neuron pool
c) an intention tremor
d) movement resulting from spontaneous firing of an alpha motor neuron

39. A Golgi tendon organ is associated with all the following EXCEPT:
a) it is in series with a muscle
b) it senses muscle length
c) it sends signals to the spinal cord via Ib sensory axons
d) they are activated when collagen fibers squeeze axons

40. The function of gamma motor neurons is to:
a) contract skeletal muscle to move a limb about a joint
b) regulate the sensitivity of stretch receptors
c) excite extrafusal muscle fibers
d) initiate the stretch reflex

41. To reinforce the lecture on spinal reflexes, the fun loving neuro 1 TAs make everyone remove their shoes and exit class by crossing an aisle full of thumbtacks. When your left foot steps on a sharp thumbtack, all the following occur EXCEPT:
a) pain is felt in the left foot and this causes the foot to be withdrawn
b) flexors in the left leg are activated
c) the crossed extensor reflex is activated
d) extensors in the right leg are inhibited

42. All the following are descending pathways by which cerebral cortex controls movement EXCEPT:
a) corticospinal tract
b) dorsal column medial lemniscal pathway
c) lateral pathway
d) ventromedial pathway

43. In PET (positron emission tomography) recordings from the human brain it was found that executing a precise sequence of finger movements activates neurons in which cortical areas:
a) M1
b) M1 and SMA
c) M1 and SMA and S1
d) SMA but not M1, S1

44. – 47. In each of these questions a list of clinical symptoms are provided. Your job is to choose the disorder from the list that corresponds best to the symptoms. Write the letter to the left of the disorder on the answer sheet. Each of the disorders listed here can be used once, more than once, or not at all.

A. Alzheimer's disease

B. Basal ganglia disease

C. Cerebellar disease

D. Damage to long motor tracts

E. Locked-in syndrome

F. Multiple sclerosis

44. Poor coordination of movement, decomposition of movement, intention tremor, hypotonia, drunken gait

45. Weakness, paralysis, spasticity, sign of Babinski

46. Involuntary movements, difficulty initiating or continuing or stopping movement

47. Paralysis of all limbs, no facial movements, no speech

49. Quite perturbed at the loss of your two ears, you throw your Neuro1 textbook across the room at Biff who is playing air guitar to, you guessed it, "Freebird." It strikes him in the back and damages the left half of his spinal cord at the lower thoracic level (T 12). **Damage to the left half of the spinal cord at T 12 would cause**

a) loss of movement of the left foot
b) loss of pain sensation in the left foot
c) loss of touch sensation in the right foot
d) More than one of the above
e) All of the above

50. Realizing that you and Biff have serious issues, your RC suggests that you meet with a dean to mediate the dispute. As you walk across the main green toward University hall you reflect on the process of walking. **The basic circuitry behind your rhythmic, left/right walking motor pattern resides in**

a) primary motor cortex
b) supplementary motor cortex
c) the spinal cord
d) the basal ganglia
e) the baseline of "Freebird" (This is a joke. Please laugh but do not put "e" down as a response.)