

**A. Nervous Multiple Choice, 1pt each**

1. Lipofuscin

- A. Increases in old neurons**
- B. Decreases in old neurons
- C. Accumulates around the nucleus
- D. Is produced by ribosomes

2. Cold receptors in skin are likely

- A. Multipolar
- B. Bipolar
- C. Unipolar**
- D. Anaxonic

3. Which glial cell is affected by multiple sclerosis?

- A. Satellite cells
- B. Oligodendrocytes**
- C. Schwann cells
- D. Astroglia

4. The posterior column at T7 is made of

- A. Gracile fasciculus only**
- B. Gracile and cuneate fasciculus
- C. Posterior spinocerebellar tract
- D. Tectospinal tract

5. The external abdominal oblique is innervated by

- A. Iliohypogastric nerve**
- B. Ilioinguinal nerve
- C. Pectoabdominal nerve
- D. Musculocutaneous nerve

6. The soma of a mature neuron lacks

- A. Endoplasmic reticulum
- B. Lipofuscin
- C. Lysosomes
- D. Centrioles**

7. Circle where the dura mater attaches to the skull (Multiple answers, 2pts)

- A. Foramen ovale
- B. Hypoglossal canal
- C. Sella turcica**
- D. Foramen magnum**
- E. Perpendicular plate
- F. Zygomatic suture
- G. Crista galli**

## **B. Nervous T/F, 1 pt each**

**F** 1. Centripital myelination occurs in the peripheral nervous system

**T** 2. Unmyelinated nerve fibers contact Schwann Cells in the PNS

**T** 3. Myelin increases conduction speed up to 100x

**F** 4. The central nervous system contains endoneurium

**F** 5. Damaged PNS nerves can't regenerate

## **C. Nervous free response**

1. What are Nissl bodies and how are they useful? (2 pts)

Neurofibrils compartmentalize the rough ER into dark-staining regions called Nissl bodies that are unique to neurons for identification

2. How do virus get to the soma? (1 pt)

Fast retrograde transport

3. Describe the regeneration of a damaged nerve (4 pts)

Degeneration of severed fiber as macrophage cleans up; Axon stump forms multiple growth processes; Schwann cells, basal lamina, neurilemma form regeneration tube; Growth process finds regeneration tube, fiber regrows

4. Contrast the structure of the sympathetic and parasympathetic divisions of the nervous system, 5 differences. (5 pts)

Sympathetic: Thoracolumbar origin, ganglia near spinal cord, short preganglionic fiber, long postganglionic fiber, extensive neural divergence, widespread and general effects

Parasympathetic: Craniosacral origin, ganglia near target, long preganglionic fiber, short postganglionic fiber, minimal neural divergence, specific and local effects

5. Why do people see flashes of light when rubbing their eyes? (1 pt)

Labeled line code transmits all stimulants as visual signals, so motion is interpreted visually as flashes of light

6. ALS likely results from a buildup of? (1 pt)

Glutamate

7. Describe the 5 neurotransmitter categories and give one example of each (8 pts)

Acetylcholine: Acetylcholine

Amino acids: GABA, glycine, etc.

Monoamines: Epinephrine, dopamine, etc.

Neuropeptides: Enkephalin, Substance P, etc.

Gasotransmitters (Gases): NO, H<sub>2</sub>S, etc.

8. What is anomic aphasia? (1 pt)

Person can speak and understand speech, but cannot recognize pictures or writing

9. Describe the 5 stages of sleep (5 pts)

Stage 1 – Drowsiness, relaxed, majority alpha waves

Stage 2 – Light sleep, sleep spindles

Stage 3 – Moderate sleep, theta and delta waves appear, vital signs fall

Stage 4 – Slow wave sleep, delta waves, vital signs at lowest level

REM – Vital signs increase, sleep paralysis

10. Give 3 functions of the reticular formation (3 pts)

Possible answers: Somatic motor control, cardiovascular control, pain modulation, sleep, habituation

11. Describe the generic neuronal path from sensation to movement. (5 pts)

Sense organ

First order neuron (sensory neuron)

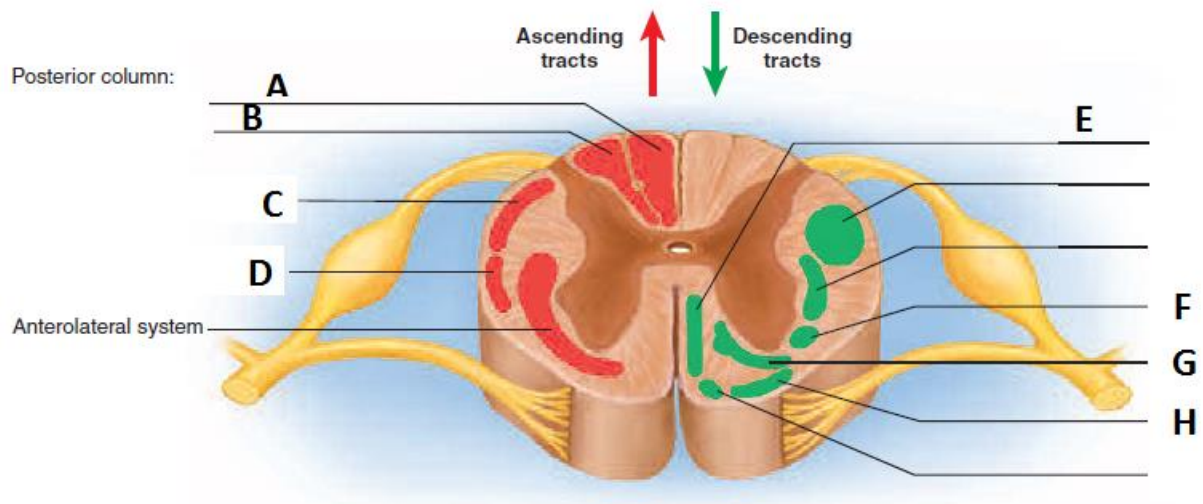
Second order neuron ending in the thalamus

Third order neuron to cerebral cortex

Upper motor neuron from cerebral cortex or brainstem

Lower motor neuron ending in muscle

#### D. Nervous Diagrams, 1 pt each

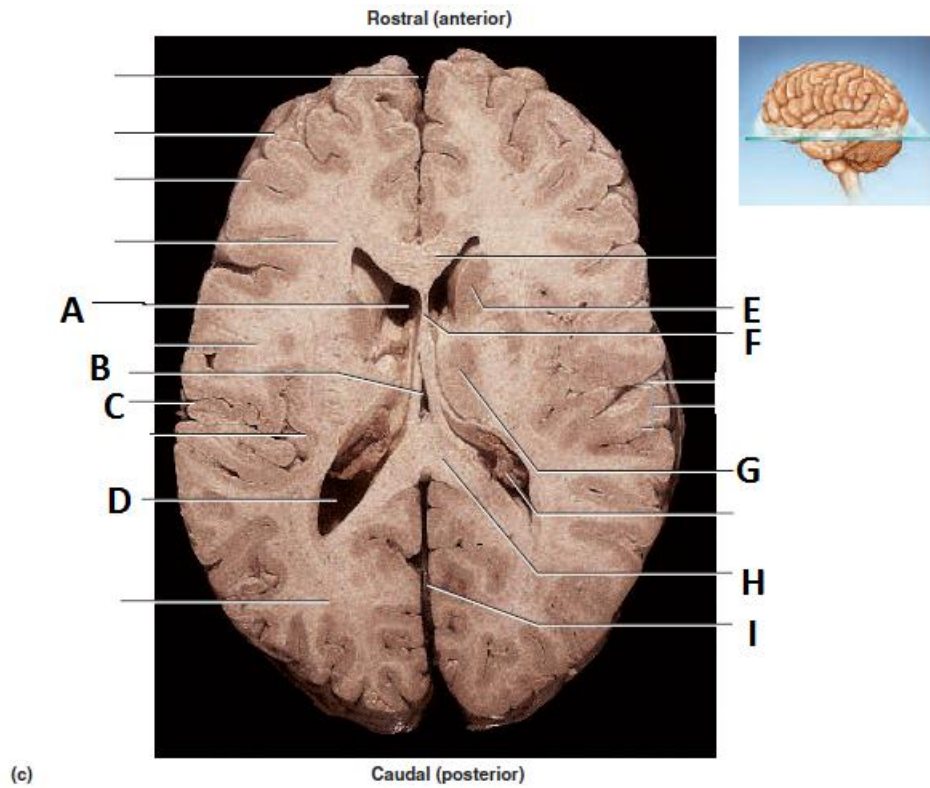


A. Gracile fasciculus

B. Cuneate fasciculus

C. Posterior spinocerebellar tract

- D. Anterior spinocerebellar tract
- E. Anterior corticospinal tract
- F. Tectospinal tract
- G. Medial reticulospinal tract
- H. Lateral reticulospinal tract



- A. Lateral ventricle
- B. Third ventricle
- C. Lateral sulcus
- D. Lateral ventricle
- E. Caudate nucleus
- F. Septum pellucidum
- G. Thalamus
- H. Corpus callosum
- I. Longitudinal fissure

**E. Sense organ T/F, 1 pt each**

- T 1. A receptor doesn't have to be a sense organ
- F 2. Proprioceptors are phasic receptors
- F 3. Receptive fields are smallest in the back
- T 4. Hair receptors are phasic receptors
- T 5. Merkel discs exist in the stratum basale

**F. Sense organ free response**

1. Contrast the functions of primary and secondary afferent muscle spindle fibers (2 pts)

Primary: Sensitive to muscle fiber length and rate of change

Secondary: Sensitive to muscle fiber length

2. Why do heart attack patients feel pain in both the skin and the heart? (1 pt)

Pain travels to T1-T5 and merges with other signals. The brain can't tell the difference, and because the skin has pain receptors, the sensation is detected there.

3. What bone and what parts of it does the olfactory mucosa cover? (3 pts)

Ethmoid; Superior concha, cribriform plate

4. Describe how inner hair cells function. (4 pts)

Sound pushes down on the basilar membrane. The stereocilia bend towards the tallest one. The tip link opens the ion gate on the shorter hair it's connected to, allowing potassium ions to depolarize it, sending a signal to the cochlear nerve cells. When the sound stops, stereocilia bend the other way and repolarize

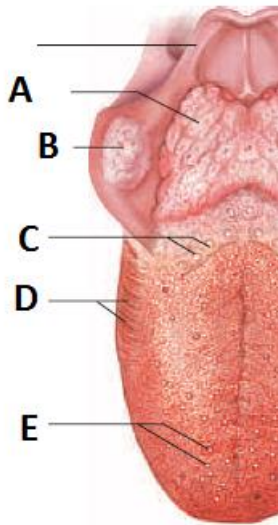
5. Describe how glaucoma leads to blindness (3 pts)

Obstructed scleral venous sinus causes aqueous humor buildup. The pressure drives the lens back and pressures the vitreous body that presses the retina against the choroid. Retinal cells die from poor blood supply, causing blindness.

6. What is the purpose of pupil constriction? (1 pt)

Minimize spherical aberration

**G. Sense organ diagrams, 1 pt each**



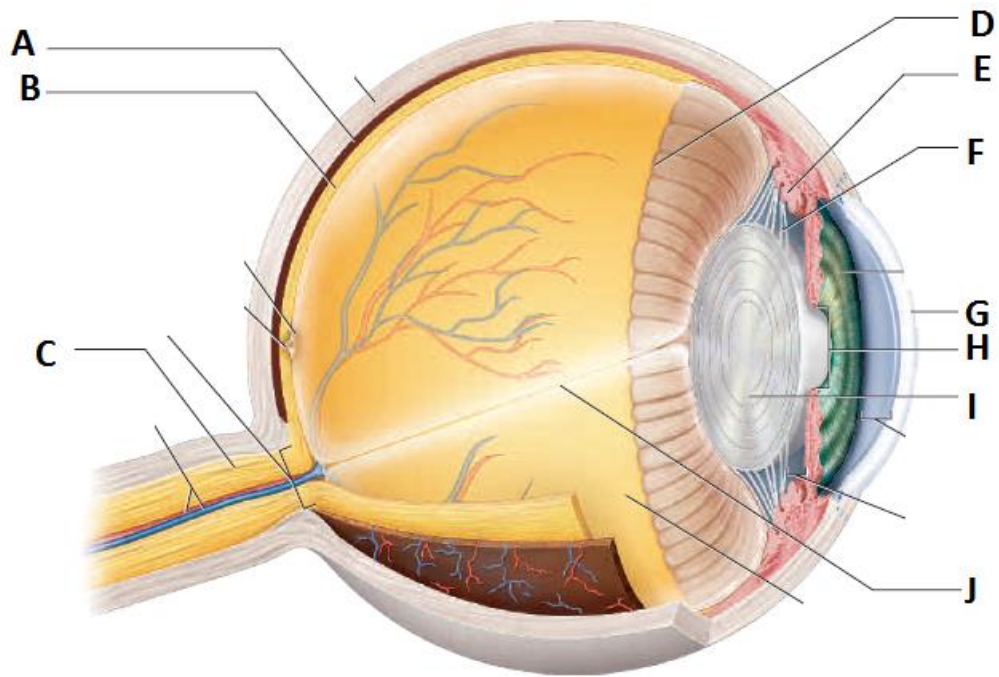
A. Lingual tonsil

B. Palatine tonsil

C. Vallate papillae

D. Foliate papillae

E. Fungiform papillae



- A. Choroid
- B. Retina
- C. Optic nerve
- D. Ora serrata
- E. Ciliary body
- F. Suspensory ligament
- G. Cornea
- H. Pupil
- I. Lens
- J. Hyaloid canal

#### H. Endocrine multiple choice, 1 pt each

1. Which one promotes secretion of growth hormone?

- A. Gonadotropin
- B. GH-releasing hormone**
- C. Somatostatin
- D. Somatotropin

2. The thymus mainly regulates the

- A. Immune system**
- B. Reproductive system
- C. Endocrine system
- D. Nervous system

3. What does the adrenal medulla not secrete?

- A. Norepinephrine
- B. Dopamine
- C. Acetylcholine
- D. Serotonin**

4. Hepcidin functions in

- A. Liver cell proliferation
- B. Iron homeostasis**
- C. Vitamin E regulation
- D. Vasodilation

5. Most monoamines are made of

- A. Phenylalanine
- B. Arginine
- C. Tyrosine**
- D. Tryptophan

6. Hyperparathyroidism causes (multiple answers)

- A. Kidney stone formation**
- B. Excess sodium retention
- C. Soft, fragile bones**
- D. Increased heat production
- E. Increased blood calcium level**
- F. Increased blood glucose levels

#### I. Endocrine T/F, 1 pt each

- T 1. The hypodermis has endocrine functions
- T 2. The posterior lobe does not synthesize oxytocin
- F 3. Thyrotropin promotes secretion of pentaiodothyronine
- T 4. The pituitary gland produces mostly growth hormone
- F 5. Humans use melanocyte-stimulating hormone to darken skin color



### **J. Endocrine Free Response**

1. What does the thyroid secrete mainly and what effect does the hormone have? (3 pts)

Thyroid hormone (T3 AND T4), increase body metabolic rate (calorigenic effect), raise heart rate, respiratory rate, appetite, etc.

2. Give an example of neuroendocrine cells. (1 pt)

Chromaffin cells, etc.

3. Describe the three chemical classes of hormones (3 pts)

Steroid hormones – derived from cholesterol

Peptide hormones – chains of amino acids

Monoamines – made from altered amino acids

4. List the 3 classes of corticosteroids and their respective functions. (6 pts)

Mineralocorticoids – regulate electrolyte balance

Glucocorticoids – regulate metabolism of glucose and other organic fuels

Sex steroids – developmental and reproductive functions

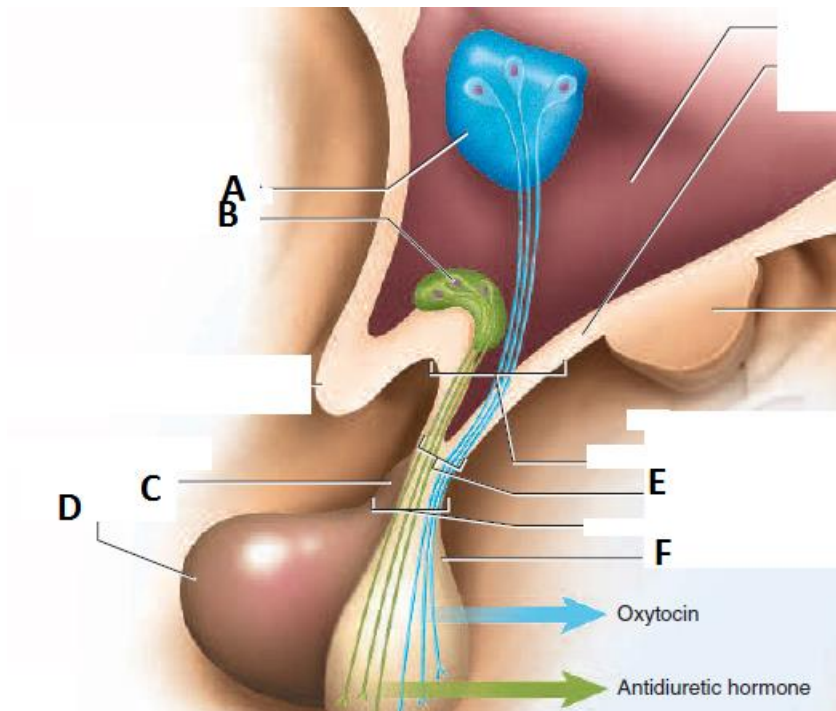
5. What is Graves Disease caused by? (1 pt)

Autoantibodies mimic TSH on the thyroid, causing hypersecretion.

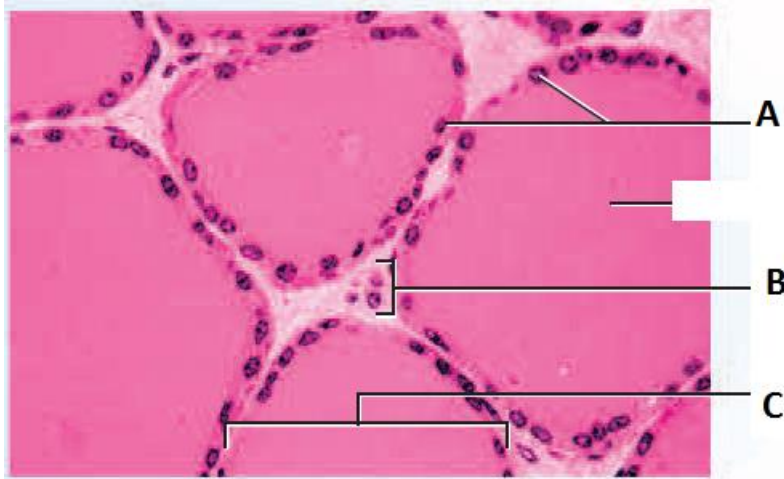
6. Pseudohypoaldosteronism is a genetic disorder caused by ineffective aldosterone receptors. What symptoms might a patient with this disorder show? (3 pts)

Hyperkalemia, salt wasting, volume depletion, hypertension, elevated levels of aldosterones (Although effects cover a wide range in reality compared to theory) (Get 3 out of 5)

K. Endocrine Diagrams, 1 pt each



- A. Paraventricular nucleus
- B. Supraoptic nucleus
- C. Pars tuberalis
- D. Anterior lobe / Adenohypophysis
- E. Hypothalamo-hypophyseal tract
- F. Posterior lobe / Neurohypophysis



Histology of thyroid where thyroid hormone is made

A. Follicular cells

B. C cells / Parafollicular cells

C. Follicle