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Biology 358 — Neuroanatomy
First Exam

Please **print your name clearly** on the back of the last page of this exam. Please read the instructions preceding each section carefully.

You must answer *all* questions on this exam. Because statistics demonstrate that, on average, between 2-5 questions on every exam are ambiguous enough to come out "aberrant" on an item analysis the total number of points possible on this exam is 106. However, grades will be calculated out of a possible 100 points, assuming that 2-3 questions on this exam are aberrant.

Section 1: Lower and Moderate-level thinking skills according to Bloom.

Diagram labeling. The following pages are unlabeled diagrams of either spinal cord or some portion of the brain. Utilizing the blue marker supplied to you, label the following structures on the diagram. **Outline the area in the diagram where the structure would be found, and then extend a line from the diagram out to the white margin. (You need to do this on one side only)**. In the white margin label the outlined segment with the number found to the left of the structures listed below. **However, if the structure is not found on the segment because of inaccurate or inadequate information** put the number in the margin *of the picture in question* and mark the structure **NFOS** (not found on segment). (2 points each)

HBS-1: Transverse section through the cervical region of the spinal cord

1. SON processes that are arranged according to the lateral-medial rule.

2. PRT

3. Tract that is arranged according to the medial lateral rule and would carry sensory information only from levels inferior to T_6 that is interpreted as what, when and where by the somesthetic cortex.

4. Descending motor tract that decussates at the level of exit from the cord and whose UMN somas are distributed 20-30% from the premotor cortex of the frontal lobe, 33-40% from the primary motor cortex, and 20% from the primary somesthetic cortex of the parietal lobe.

5. SON for the tract that is arranged according to the medial lateral rule and would carry sensory information only from the upper 6 thoracic spinal nerves and all cervical spinal nerves that is interpreted as what, when and where by the somesthetic cortex.

6. Tract that carries unconscious proprioception and whose FON only enter the cord between L_1 and T_1, synapse with the SON in the Dorsal Column of Clarke (a.k.a. Nucleus Dorsalis), and ascend to the ipsilateral cerebellum.

HBS-3: Transverse section through the lower medulla

7. Two nuclei contribute to the formation of this tract: the caudal magnocellular nucleus and the rostral parvocellular nucleus

8. This tract is responsible for positioning the head and movements of the head in response to sensory input. This tract is also responsible for the positioning of the head with regards to balance.

9. Spinal tract of the trigeminal nerve

10. Sensory tract that decussates twice.

11. Spinal tract nucleus of the trigeminal nerve

HBS-5: Transverse section through the medulla at the level of the medial lemniscus and rostral to the decussation of the pyramids.

12. This tract is responsible for positioning the head and movements of the head in response to sensory input. This tract is also responsible for the positioning of the head with regards to balance.

13. Spinal tract of the trigeminal nerve

14. Two nuclei contribute to the formation of this tract: the caudal magnocellular nucleus and the rostral parvocellular nucleus

15. Spinal tract nucleus of the trigeminal nerve

HBS-7: Transverse section through the mid-brain region of the medulla

16. TON processes that are arranged according to the lateral-medial rule.

17. SON processes of the pathway that carries information sensory information that is interpreted as what, when and where by the somesthetic cortex.

18. Two nuclei contribute to the formation of this tract: the caudal magnocellular nucleus and the rostral parvocellular nucleus

19. Inferior cerebellar peduncle

20. Middle cerebellar peduncle

Section 2: Higher-level thinking skills according to Bloom.

Answer the following questions on the accompanying blank sheets of paper. *You must answer all of the questions below. Please put only 1 question per page*. (15 points each)

21. Compare and contrast the pyramidal and extrapyramidal motor tracts.

22. One of the long ascending sensory pathways is described as carrying information that is interpreted by the primary somesthetic cortex as "what, where and when." What is this tract, and why is this pathway described in this manner?

23. You are given a transverse section of some section of the CNS that we have studied in class, but the level of the section is unknown. List *at least* five structures that you would look for that would tell you what level of the CNS you were in.

Section 3: Higher-level thinking skills according to Bloom.

You must answer *one of the two questions that follow*. These questions are what I term "think questions" — questions that are designed to do the following:

a. Reason through the information given you and determine how this information applies to the information covered thus far in class.
b. Apply the information covered thus far in class in order to solve a complex problem.
c. Determine whether or not you are able to provide a logical and concise explanation for your answer to the problem.

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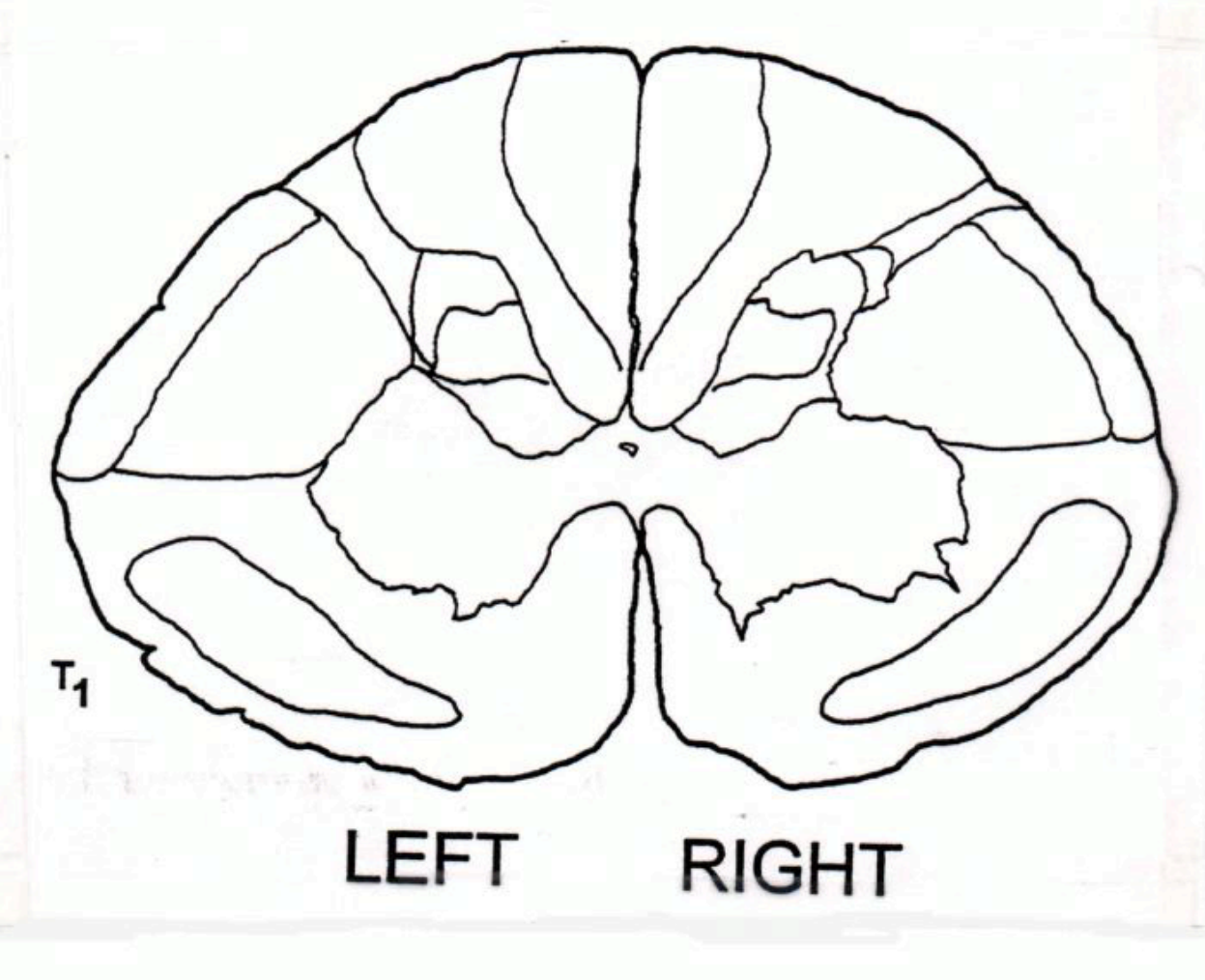
24. (10 points) On the diagram below, shade in the location of a *single, continuous, unilateral* lesion that would account for the following neurological deficits
    a. no Babinski sign present
    b. atrophy of the flexor muscles of the left hand
    c. deficit in slow pain, crude touch and pressure from the right leg

    (10 points) On the last page of this exam provide a logical, detailed explanation for your answer.

    NOTE: Right and left labels on this diagram denote anatomical right and left <u>for the patient</u>!



25. (10 points) Shade in the location of the lesion or lesions in the above drawing that will account for *only* the following neurological deficits.

    a. deficit in conscious proprioception, vibration and two-point discrimination from spinal segments C2-T6 on the left side
    b. deficit in pain and temperature on right side of the entire body
    c. deficit in unconscious proprioception from C7 to C2 on the left side of the body (pretend that there is some way of determine a loss of unconscious proprioception)

    (10 points) On the last page of this exam provide a logical, detailed explanation for your answer.

NOTE: Right and left labels on this diagram denote anatomical right and left for the patient!