

**Readings Study Questions LECTURE 33 (Pain and the midbrain central grey area)
9.01 Fall 2002**

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On Rosenzweig Chapter 8 (pages 235-245): Pain

1. What type of primary sensory neurons respond to painful stimuli? How do they differ? Do they specifically sense “pain” per se? Why or why not?
2. Describe one pathway by which information about painful stimuli reaches the cortex.
3. Where in this circuit do descending cortical projections act to prevent incoming pain signals from reaching the brain? Describe two other mechanisms by which pain can be modulated.
4. What is meant by “placebo analgesia”?

On Rosenzweig Chapter 15 (pages 469-501): Emotions, Aggression, and Stress

1. Why is there variation in the emotional responsiveness of individuals? (what are evolutionary, developmental, or proximal explanations)
2. What did experiments on decorticate dogs suggest about the function of the neocortex in emotion?
3. The emotional effects seen in primates with Kluver-Bucy syndrome (a result of temporal lobe removal) are not the same as the effects of cortex removal. In fact, this syndrome seems to be caused by lesions to the underlying _____ system rather than lesions to the temporal neocortex. List five main structures in this system. Lesions of which one yields effects similar to those seen in Kluver-Bucy syndrome? How did study of a human patient lacking this structure support these findings?
4. Describe three pieces of evidence that suggest, at least in terms of cognitive processing, the brain is not symmetric.
5. Discuss some of the limitations of studies that ascribe aggression in humans to high levels of testosterone.
6. Describe some short term advantages of stress. What are some long-term disadvantages?

On Rosenszweig Chapter 9 (pages 269-279): Taste and Smell

1. For which of the four basic tastes is the basic stimulus transduction mechanism known? What is the specific stimulus that causes depolarization of the sensory receptor cell?
2. What is the correlation between being a “taster”, “nontaster”, or “supertaster” for PTC and the number of tastebuds on your tongue?
3.
 - a. True/False. The ability to perceive the four basic tastes is segregated into different regions of the tongue.
 - b. True/False. Each sensory cell in the tongue can be depolarized by only one taste.
4. Which cranial nerves carry taste information to the brainstem (to be transmitted to the VPM of the thalamus and somatosensory cortex)?
5. Is olfactory information transmitted to the brain via a cranial nerve? How many synapses lie between the sensory cell dendrites in the olfactory epithelium and olfactory cortex?
6. Each olfactory sensory neuron expresses only one kind of olfactory receptor protein (usually, this receptor is specific for molecules with functional groups in a specific configuration). What kind of receptors are they? What is a possible explanation for the discrepancy between the number of olfactory receptor genes we have (~1000) and the number of smells we can discriminate (~5000)?
7. How are the olfactory projections from the nose organized in the olfactory cortex? How does this compare to the topographic map of visual space in the optic tectum?
8. What is the primary role of the VNO in rodents?

From Rosenszweig Chapter 12 (pages 363-398): Sex

1. What hormone is ultimately responsible for masculinization of the brains of XY fetal rats? Where is this hormone synthesized?
2. Describe three differences (dimorphisms) between the brains of male and female animals.
3. What is a possible cellular basis for “androgen insensitivity”? If a rat lacks sensitivity to androgens, will its brain develop with “masculine” or “feminine” characteristics? What about a human? Why?