Objectives Meds Year 2
Neurophysiology
Tutis Vilis

1. The Eye

- List at least four factors that can influence how well an image is focused on the back of the retina.
- Explain why functional differences between ganglion cells in the fovea and those in the peripheral retina make it is difficult to read by moonlight.
- What are the two functions of a ganglion cell's antagonistic center surround receptive field?

2. The Visual Cortex

- Explain the importance and clinical relevance of the development and organization of the receptive fields of simple and complex cells in primary visual cortex (V1).
- Explain how a lesion at the border between visual areas V2 and V3 can lead to quadrantanopia.
- Contrast the functions of the dorsal (Parietal) and ventral (Temporal) visual streams.

3. The Association Cortex and Memory

- Describe one unique function for each of the three cortical association areas.
- Describe the basis of left-sided neglect.
- Explain the process of consolidating and retrieving the three main types of memory.

4. Muscle Receptors, Spinal Reflexes & Muscles

- Compare the response of spindles and golgi tendon organs to passive stretch and active contraction and the function of their spinal reflexes
- Explain how too much gamma activity can lead to physiological tremor.
- Define the term motor unit.
- Distinguish between fibrillations and fasciculations.

5. Motor Cortex

- Compare the deficits produced by an "upper motor neuron" lesion vs. a "lower motor neuron" lesion.
- Describe the functions of cortico-spinal neurons in initiating a movement and in responding to an unexpected limb perturbation.
- What unique motor functions do each of the followings areas serve: Primary Motor Cortex (area 4), 2: Premotor cortex (lateral area 6), 3:

Supplementary motor cortex (medial area 6), 4: Somatosensory cortex and 5: Parietal association?

6. Cerebellum & Basal Ganglia

- Compare the functions of the mossy and climbing fiber input in motor learning.
- Differentiate the roles and symptoms of the three functional divisions of the cerebellum.
- Using the basic motor circuit of the basal ganglia, describe its role in movement generation.
- Contrast the role of the basal ganglia in Parkinson and Huntington's disease.
- Compare the motor deficits in cerebellar diseases and those of the basal ganglia in Parkinson disease.

7. Auditory Physiology

- What are the functions of the middle ear ossicles?
- In terms of your understanding of how frequency is represented on the basilar membrane, explain how a cochlear implant works.
- What are the cues for sound location? Explain how and when each is used and where they are processed.
- What is the function of each of the higher auditory language regions?

8. Vestibular System and Saccadic Eye Movements

- Compare the functions of the otolith organs and semicircular canals and describe how their anatomy suits these functions?
- Contrast the function of the direct and indirect paths of the vestibular ocular reflex (VOR).
- Describe the brainstem structures responsible for the generation of saccades (the quick phase component of nystagmus).

9. Touch

- Explain the mechanism of the "labeled line" in touch.
- Describe two functions of the dorsal column nuclei.
- Describe the arrangement and roles of the four body maps in the primary somatosensory cortex (S1).

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