

22. May 2014

Examination NEVR2030

There are two types of questions.

SHORT ANSWER QUESTIONS and TRUE or FALSE questions.

Each short answer question requires only a short answer and behind each question is indicated how many points you will get in case of a correct answer. **Simple questions will yield 1 point** and a **higher number of points** indicate that a **more complex** and/or **elaborate** answer is required.

True or false questions always **score 1 point**. You are required to clearly indicate the right answer by writing either **True or False** on your answer document. **Do not add** to the answer in any way, because that may influence the mark you will get.

The exam comprises a total of 45 questions (72 points) on 5 pages (including this cover page).

You have 4 hours to complete the exam.

SHORT ANSWER QUESTIONS

1. Describe the functional differences between inner and outer hair cells. (1)
2. Spiral ganglion cells are bipolar cells that innervate peripheral sensory cells (hair cells in the inner ear) and send an axon into the 8th cranial nerve. In which ganglia do we find comparable neurons that mediate the transfer of touch information? (1)
3. Which role has the cerebellum in controlling movements? (2)
4. Describe briefly the functional relevance of the muscle spindle. (2)
5. Describe the pathways that mediate temperature information from the hand to the primary somatosensory cortex. (3)
6. What is a *mental mechanism* according to Bechtel? How does such a mechanism differ from other biological mechanisms? (3)
7. Can research into the brain show that we do not really have free will or that we should not be held responsible for our actions? (4)
8. Give one piece of evidence for hemispheric lateralization of language. (2)
9. Give a short definition of aphasia. (1)
10. Describe two common symptoms in patients suffering from Alzheimer's disease. (2)
11. Describe one functional outcome parameter/test commonly used to assess the function of the prefrontal cortex. (2)

12. What is the name of the brainstem nucleus that receives direct projections from the primary sensory axons in the gustatory system? **(1)**
13. The taste buds are organized in structures called papillae. Provide the name of the three different kinds of papillae. **(3)**
14. Explain the transduction mechanism of the olfactory sensory neurons, i.e. how the neurons transform chemical energy to electric signals. **(3)**
15. What is the name of the thalamic nucleus that defines the prefrontal cortex? **(1)**
16. Which structure in the brain is most important for procedural learning? **(1)**
17. Name the subcortical structure in the brain most strongly associated with fear perception. **(1)**
18. Why does an axon potential normally travel only in one direction that is away from the soma? **(1)**
19. Describe the main mechanisms that are responsible for the resting membrane potential (ca. -65 mV) in neurons. **(3)**
20. There are three light sensitive elements in the retina. Briefly describe their main functional and organizational differences. **(3)**
21. What is the name of the cranial nerve that innervates the liver? **(1)**
22. Give a short but complete definition of cortex in the central nervous system. **(1)**
23. Name three sensory systems that are involved in balance control. **(3)**

24. Name the two main inputs to the reticular nucleus of the thalamus. (2)

25. Name four chemical modulatory systems in the brain and the main locations of the originating neurons? (5)

Total 52

TRUE/FALSE QUESTIONS

1. The inner ear contains the three auditory ossicles. **True/false**
2. The organ of Corti in the inner ear sits on Reissner's membrane. **True/false**
3. Signing by deaf people depends on the left frontal lobe. **True/false**
4. The Wada test is used to test language fluency. **True/false**
5. Split-brain patients are able to name objects held in the right hand without difficulty.
True/false
6. In the early stages of Alzheimer's disease a volume reduction can be seen in the cerebellum. **True/false**
7. The bitter taste is exclusively detected at the posterior portion of the tongue. **True/false**
8. The primary gustatory cortex is located in the anterior cingulate cortex. **True/false**
9. The notochord contains the signal to induce the folding of the neural tube. **True/false**

10. In the 6 layered cortex, neurons in layer 2 are the oldest neurons (outside in migration).

True/false

11. The olfactory sensory neurons project directly to the thalamus. **True/false**

12. The vomeronasal system is mainly devoted to processing odor information about food.

True/false

13. The muscle spindle is solely composed of nerve tissue. **True/false**

14. The superior colliculus is relevant for vestibulo-ocular reflexes. **True/false**

15. The visual cortex is an important component of the brain reward system. **True/false**

16. The amygdala is essential for episodic memory. **True/false**

17. The membrane of a presynaptic element of a chemical synapse does contain receptor molecules. **True/false**

18. The two internal carotid arteries are the main blood supply of the brainstem. **True/false**

19. Energy is needed to maintain the resting membrane potential. **True/false**

20. LTP induction normally depends on NMDA receptors. **True/false**

Total 20