Department of Neuroscience

NTNU – Trondheim
Norwegian University of
Science and Technology

EXAMINATION FOR THE COURSE:
NEVR3001 – Basic Neuroscience

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Examination date: 14 October 2011
Examination time: 9 am. – 1 pm.
ECTS-credits: 7.5

Supporting materials: Dictionary
Standardized language dictionaries (e.g. Norwegian-English/English-Norwegian) can be used, but NOT specialty dictionaries such as medical dictionaries. The dictionaries will be inspected by the invigilator before the start of the examination.

Language of examination: English
Number of pages: 4 (including front page).

Examination results will be made available on Studentweb within the end of:
4 November 2011.

EXAMINATION NEVR3001 "BASIC NEUROSCIENCE"
October 14th, 2011 9 am – 1 pm

Permitted abbreviations:

CNS
DNA
RNA
ATP
SNARE
Vertebral levels
Neurotransmitter receptors (like NMDA-R)

There are 25 short questions and 6 long questions

You must answer ALL short questions (25% total marks)

You must answer FIVE long questions (75% total marks)

Short questions

1. Our cells have the ability to make many more proteins than there are genes in the human genome. How can this be explained?

2. What is the name given to the tool used for accessing and visualising genome annotations and data?

3. Explain the difference between essential and non-essential amino acids.

4. Give two examples of how microRNAs (miRNA) regulate gene expression.

5. How would you describe an open reading frame (ORF)?

6. What is the composition of grey matter and white matter in the CNS?

7. Where would you expect to find connexin?

8. From which amino acid is nitric oxide derived?

9. Where in the brain are protoplasmic astrocytes most commonly found?

10. Name two types of synaptic plasticity.

11. How are neurotransmitter receptors indirectly coupled to ion channels termed?

12. What is the main purpose of neurofilaments?

13. What is the function of microglia in the brain?

14. How would an an upper motor neuron lesion affect a muscle in terms of reflexes?

15. Which cranial nerve carries sensory information from the face?

16. Ischaemic stroke deprives the brain (or part of the brain) of which two essential substances?

17. Name two derivatives of the neural crest.

18. The prosencephalon of the vertebrate brain differentiates into two brain parts (secondary brain vesicles). How are these called?

19. What is meant by a sensory neuron having adaption in response to stimulation?

20. Where in the cortex of the hemisphere do we find the primary representation of visual information? Describe or make a drawing.

21. The sympathetic component of the autonomic nervous system has its major relay centres in the ganglia of the sympathetic trunk. In addition there are three ganglia that mainly innervate the abdominal organs. What is the common name of these three ganglia?

22. What is the name of the ventricle in the diencephalon?

23. What do we mean by cortical representations being topographic, such as somatotopic, tonotopic, retinotopic?

24. How do we define a commissure?

25. Which sulcus provides the divide between the sensory (afferent) and the motor (efferent) domains of the cerebral cortex?

LONG QUESTIONS

1. ATPases serve a number of functions in neurones, including (a) enabling concentration of neurotransmitter into presynaptic vesicles, and (b) as molecular motors. Describe how these two functions are achieved and illustrate your answers with suitable diagrams.

2. Describe some of the morphological and protein apparatus in dendrites necessary for excitatory postsynaptic zones.

3. Astrocytes have a range of physiological functions. Describe briefly at least 6 of these.

4. Describe how a membrane potential is maintained in a steady state.

5. During development of the central nervous system a differentiation occurs into two areas, one that is determined to mediate incoming information and one that will eventually represent the main motor (output) components of the system. The adult position of both components in the spinal cord and in the brainstem at the level of the myelencephalon and metencephalon are strikingly different. Describe these different locations in the adult central nervous system and the main difference in the developmental process that provides the basis for this difference.

6. The autonomic nervous system is divided into two parts. Give the names of the two divisions of the autonomic nervous system, describe their functional differences and detailed organization of the efferent (output) components of both parts, indicating in detail where and how they differ from each other.