

PHYSIOPATHOLOGIE EN NEUROLOGIE ET PSYCHIATRIE

Vendredi 29 Novembre 2013

Durée total de l'examen : 2 heures

Vous devez répondre aux deux sujets. PENSEZ à indiquer votre numéro d'étudiant sur les deux feuillets de réponse (pages 2 et 3).

Total examination duration: 2 hours

You must respond to the two exams topics. REMEMBER to indicate your student number on both examination papers (pages 2 and 3).

Numéro étudiant/
Student number : _ _ _ _ _

MCQ exam (20 pts)
Test duration: 1 hour

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This exam contains 40 multiple choice questions, each worth 0.5 points.

Indicate with a cross the correct response(s) for each question. Each question could have several correct answers. Make sure that your answer is clearly marked.

MCQ exam

Mark your answers on the answer sheet (page 2 of the second document)

1. Obsessive-compulsive disorder is associated with malfunctions in several processes, including:

- a) cognitive flexibility
- b) behavioral inhibition
- c) motivation
- d) error detection
- e) self-agency

2. Several brain targets are considered for deep brain stimulation in the management of resistant forms of obsessive-compulsive disorder, including:

- a) orbitofrontal cortex
- b) anterior cingulate cortex
- c) subthalamic nucleus
- d) caudate nucleus
- e) amygdala

3. Obsessive-compulsive disorder is associated with functional abnormalities within several brain regions of interest, including:

- a) orbitofrontal cortex
- b) ventral striatum
- c) cerebellum
- d) hippocampus
- e) anterior cingulate cortex

4. Major depression is characterized by disturbances in the hypothalamic-pituitary-adrenal axis, including:

- a) increased concentrations of CRF in the CSF
- b) attenuated elevation of plasma ACTH levels in response to CRF
- c) higher plasma cortisol levels in response to dexamethasone
- d) lower plasma cortisol levels in response to spironolactone
- e) lower plasma cortisol levels in response to the combined dexamethasone/CRF test

5. Endocannabinoid deficiency is associated with disturbances in the hypothalamic-pituitary adrenal axis, including:

- a) increased mRNA levels of glucocorticoid receptors in the hippocampus
- b) increased corticosterone levels in response to restraint stress
- c) lowered corticosterone levels in baseline condition
- d) increased mRNA levels of CRF in the hypothalamus
- e) lowered mRNA levels of ACTH receptors in the adrenal

6. The central dopaminergic pathways comprise:

- a) The nigro-striatal pathway
- b) The meso-accumbens pathway
- c) The cortico-striatal pathway
- d) The meso-cortical pathway

7. Among the following symptoms which are less or no responsive to levodopa

- a) Tremor
- b) Postural instability
- c) Akinesia
- d) Gait and balance dysfunction
- e) Dementia

8. The plasma half-life of levodopa is

- a) 1 – 1.5 h
- b) 3 – 5 h
- c) 5 – 8 h
- d) 10 – 15 h

9. Rasagiline is

- a) A selective dopamine D2 receptor antagonist
- b) An irreversible monoamine oxidase (MAO)-B inhibitor
- c) A reversible MAO-B inhibitor
- d) A reversible MAO-A and MAO-B inhibitor
- e) An amphetamine derivative

10. Which of the following statements about monoamine oxidase (MAO) enzyme distribution are true?

- a) MAO-B are highly represented in the brain
- b) MAO-A are highly represented in the brain
- c) MAO-A are highly represented in the gastrointestinal tract
- d) MAO-B are highly represented in blood platelets
- e) MAO-A are not present in the liver

11. Which of the following statements concerning the Catechol-O-methyltransferase (COMT) enzyme are true?

- a) COMT participate in the metabolism of levodopa and dopamine
- b) COMT degrade dopamine into 3-O-methyldopa
- c) COMT degrade levodopa into 3-O-methyldopa
- d) 3-O-methyldopa facilitates the transfer of levodopa across the blood brain barrier
- e) Selegiline is a selective COMT inhibitor

12. Which of the following statements are true? In parkinsonian patients, the association of an COMT and levodopa:

- a) Increases the bioavailability of the levodopa
- b) Worsen the quality of life
- c) Reduces the fluctuations of plasma-levodopa levels
- d) Reduces motor fluctuations by increasing the “OFF” periods
- e) Provides a continuous dopamine-receptor stimulation

13. Which are the 4 clusters of PTSD symptoms

- a) Re-experiencing
- b) Cognition alteration
- c) Avoidance/forgetting
- d) Hyper-arousal
- e) General anxiety

14. Which functional and structural changes corresponds to PTSD

- a) Hypoactivation of the prefrontal cortex
- b) Hyperactivation of the prefrontal cortex
- c) Reduced hippocampal volume
- d) Increased amygdala volume
- e) Hyperactivation of the amygdala

15. Risks factors for PTSD

- a) Blood cortisol levels
- b) Previous traumatic experience
- c) Hyperactivation of the amygdala
- d) Family history of PTSD
- e) History of drug abuse

16. Following extinction learning, which are the behavioral procedure used to evaluate if fear memory has been permanently erased?

- a) Re-extinction
- b) Spontaneous fear recovery
- c) Context dependent fear renewal
- d) Safety learning
- e) Reinstatement

17. What are the perineuronal nets

- a) A subpopulation of excitatory neurons
- b) A highly organized form of proteoglycans
- c) A subpopulation of inhibitory neurons
- d) Glial cells
- e) Elements of the extracellular matrix

According to the fifth version of the Diagnostic and Statistical Manual of Mental Disorders, what are the two criteria required to diagnose Autism Spectrum Disorders ?

- a) Deficits in social communication and social interaction
- b) Co-morbidity with epilepsy
- c) Restricted and repetitive behaviours
- d) Auditory hallucinations
- e) Anorexia nervosa

18. What items can be related to the notion of ASD ?

- a) Neurodevelopmental disorder
- b) Sex ratio: 4 girls for 1 boy
- c) Appearance of atypical behaviours during adolescence
- d) Co-morbidity with deafness
- e) Co-morbidity with mental retardation

19. The main difference between High Functioning Autism and Asperger Syndrome is:

- a) Social skills development
- b) Motor development
- c) Intellectual abilities development
- d) Language development
- e) Sensory development

20. The general principles of the Exchange and Development Therapy are:

- a) to solicit and encourage exchange during play sessions
- b) to reduce distractibility
- c) to limit unwanted behaviours and to reinforce wanted behaviours
- d) to use visual supports to make the sequence of daily activities predictable and understandable
- e) to avoid distractors in order to reduce sensory hyperresponsiveness

21. Studies of change detection processes have highlighted:

- a) A brain hypo-reactivity to change in individuals with ASD
- b) A brain hyper-reactivity to change in individuals with ASD
- c) Existence of an atypical change detection process acting in several sensory modalities in individuals with ASD
- d) Atypical involvement of the cingulate region in ASD, a region known to be involved in the orientation of attention towards potentially relevant information
- e) Atypical involvement of the cingulate region, a region known to be involved in the orientation of attention to potentially irrelevant information

22. Multiple sclerosis is a disease :

- a) with a chronic course
- b) affecting the peripheral nervous system
- c) Inflammatory
- d) inherited
- e) affecting preferentially the elderly.

23. Cognitive disturbances in multiple sclerosis :

- a) occur usually in the later stages of the disease ;
- b) increased the risk of unemployment ;
- c) concern mainly language
- d) are characterized by information processing speed impairment
- e) spared executive functions

24. Cognitive disturbances in multiple sclerosis:

- a) correlate weakly with lesion load on MRI
- b) correlate with cortical atrophy on MRI
- c) do not correlate with white matter involvement on MRI
- d) : correlate with deep gray matter atrophy on MRI
- e) correlate specifically with frontal lobe lesion load on MRI

25. Brain compensation during a cognitive task performed normally by a patient with multiple sclerosis:

- a) explains cognitive reserve
- b) is due to brain reserve
- c) is characterized by additional recruitment of cerebral areas
- d) is dependent of diffuse brain tissue injury
- e) is limited by increase of cognitive load

26. Parkinson's disease (PD).

- a) PD is related to the degenerescence of dopaminergic neurons of the substantia nigra pars reticulata
- b) The intra striatal decrease of dopamine level is responsive of the overactivity of the internal pallidum
- c) The intra striatal decrease of dopamine level is responsive of the overactivity of the motor thalamus
- d) The intra striatal decrease of dopamine level is responsive of the overactivity of the subthalamic nucleus
- e) The intra striatal decrease of dopamine level is responsive of an excessive synchronization of the internal pallidum neurons

27. Parkinson's disease and akinesia pathophysiology

- a) According to the Alexander and Crutcher model of basal ganglia, akinesia is related to the overactivity of the external pallidum
- b) According to the Mink model of basal ganglia, the direct striato-pallidal pathway allows selection of the appropriate motor program.
- c) According to the Mink model of basal ganglia, the indirect striato-pallidal pathway inhibits competing motor programs.
- d) Overactivity of the subthalamic nucleus induces akinesia
- e) Overactivity of the motor thalamus induces akinesia

28. Levodopa-induced dyskinesia (LID).

- a) Neuronal activity of the motor thalamus is strongly decreased during LID in comparison to the neuronal activity recorded in normal monkey.
- b) LID are related to the fact that L-dopa treatment is discontinuous (pulsatile dopamine receptors stimulation)
- c) Neuronal activity of the internal pallidum is normalized by L-dopa intake in the monkey exhibiting LID.
- d) LID can be suppressed by long term high frequency stimulation of the subthalamic nucleus in human
- e) Apomorphine dramatically decreases neuronal activity of the internal pallidum of the monkey during LID.

29. Pathophysiology of dystonia.

- a) Bicuculline injections within the substantia nigra pars reticulata can induce cervical dystonia in the monkey
- b) Dystonia spasms are frequently associated with an increase of neuronal activity of the internal pallidum
- c) Dystonia spasms are frequently associated with an increase of neuronal activity of the motor thalamus
- d) Intra striatal lesions are frequently associated with dystonia in human as well as in monkey
- e) During dystonia, dramatic changes of proprioceptive mapping are observed within the premotor cortex after striatal lesions.

30. Pathophysiology of choreic syndroms.

- a) According to the Mink model, choreic movements are related to an increase of the direct striato-pallidal pathway activity
- b) According to the Mink model, choreic movements are related to a decrease of the surround inhibition within the internal pallidum
- c) Regarding to the neuronal activity of the external pallidum of parkinsonian patients, the external pallidum activity of patients with Huntington disease is increased
- d) Choreic movements are probably related to an overactivity of the thalamo-cortical pathway
- e) The primum movens of Huntington disease consist of the degenerescence of the striatal medium spiny cells

31. At brain level, functional MRI technique (fMRI) allows to directly measure:

- a) Electric activity
- b) Oxygene consumption
- c) Hemodynamic response
- d) Glucose consumption
- e) All the answers (a, b, c and d)

32. The advantages of the functional MRI technique (fMRI) are:

- a) Its non-invasive nature
- b) Its excellent temporal resolution
- c) Its signal coming from the arterial system
- d) Its excellent spatial resolution
- e) All the answers (a, b, c and d)

33. At cerebral network level, what are the possible compensatory phenomenon?

- a) The recruitment of the homolog areas
- b) The increase of the recruitment of brain areas which are relevant for the motor or cognitive function studied in the protocol
- c) The decrease of the recruitment of brain areas which are relevant for the motor or cognitive function studied in the protocol
- d) Setting up the diaschisis
- e) All the answers (a, b, c and d)

34. At brain level, the Diffuse Tensor Imaging technique (DTI) is useful because it allows to:

- a) Make the difference between isotropic and anisotropic environment
- b) Reveal fiber tracts
- c) Quantify the loss of connection fibers in the brain of patients with neurological disease
- d) Make the difference between mobile and motionless protons
- e) All the answers (a, b, c and d)

35. In patients with Multiple Sclerosis (MS), Parkinson's disease or at MCI stage (Mild Cognitive Impairment) of Alzheimer's disease, the increase of tissue damage is associated with:

- a) A decrease in BOLD signal in brain areas which are relevant for the motor or cognitive function studied in the protocol
- b) The preservation of the same cerebral pattern of activation than in healthy subjects
- c) An increase in BOLD signal in brain areas which are relevant for the motor or cognitive function studied in the protocol
- d) No modification in functional connectivity between cerebral networks
- e) None of the answers a, b, c and d

36. The prefrontal cortex has different main regions :

- a) A dorsolateral part
- b) A temporal part
- c) An orbitofrontal part
- d) A cingulate part
- e) A premotor part

37. The dorsolateral prefrontal cortex is concerned with tasks that require :

- a) Long-term memory
- b) Short-term memory
- c) Procedural memory
- d) Consciousness of information processing
- e) Neural mechanisms of praxis

38. Working memory involves:

- a) A phonological loop
- b) A visual sketchpad
- c) Hippocampal information processing
- d) The occipital cortex
- e) A central executive

39. The orbitofrontal cortex

- a) Is involved in motivational aspects of behavior
- b) Is involved in socialization
- c) Is involved in cognitive flexibility
- d) Its lesion induce perseveration
- e) Its lesion could induce behavioral disinhibition

40. The anterior cingulate cortex

- a) Has a cognitive and an affective part
- b) Plays a role in explicit memory
- c) Its lesion could induce akinetic mutism
- d) Plays a role in attentional processes
- e) Is involved in pathophysiology of Tourette syndrome