Biomed 370- Brain and Behavior
Final Exam, May 7, 2003

Match the following types of memory by their descriptions to their anatomical correlate:

1. Remembering a phone number for 30 seconds, without rehearsing
2. Remembering the list of negative symptoms of schizophrenia that the TAs reviewed last week
3. Remembering how to ride a bike
4. Remembering what a television is

   A. basal ganglia
   B. temporo-parietal association cortex
   C. medial temporal lobe
   D. prefrontal cortex
   E. primary motor cortex

Questions 5-7
A wife brings her husband into the ER, distraught that her husband is “acting funny.” They were out raking leaves, when all of a sudden, she noticed that her husband looked sort of “lost.” He asked her several times what day it was, and the wife became concerned. As you walk into the cubicle, you note an elderly man in no apparent distress. As you start to take a history, the patient is unable to recall why he is in the emergency room, or any events from the past 24 hours. Upon further questioning, you note that while the patient recognizes his wife and daughter, he is unable to name his son-in-law, whom he met 2 years ago. In fact, he is unable to recall any events from the past two years, including the Patriots winning the SuperBowl. He has never had any of these symptoms prior to this occasion. He is able to name a stethoscope and watch.

5. The loss of ability to recall that the Patriots won the Superbowl or that his daughter got married is an example of

   A. anterograde amnesia
   B. retrograde amnesia
   C. Alzheimer’s dementia
   D. frontal temporal dementia
6. You leave the cubicle to discuss the case with your attending, and when you reenter the room, the patient does not remember having met you, just 5 minutes before. Though you had oriented him after your exam, he still is unable to describe where he is or what day it is. His inability to recall who you are is an example of
   A. anterograde amnesia
   B. retrograde amnesia
   C. frontal lobe dementia
   D. working memory deficit

7. In this case, the patient was able to name a stethoscope and a watch. If he HAD NOT been able to recall the words for inanimate objects, which part of his brain would we be most concerned about?
   A. basal ganglia
   B. lateral-temporal cortex
   C. frontal eye field cortex
   D. dorsolateral cortex
   E. Broca’s area

8. Which of the following pathologies is NOT associated with mild-moderate Alzheimer’s disease?
   A. neurofibrillary tangles
   B. amyloid plaques
   C. hippocampal atrophy
   D. atrophy of neostriatum
   E. loss of cholinergic neurons

9. The ventral compartment of Mayberg’s neuroanatomical model of mood regulation includes all of the following structures EXCEPT:
   A. hypothalamus
   B. subgenual cingulate
   C. hippocampus
   D. anterior thalamus
   E. inferior parietal cortex

10. True or False: Depression is associated with an decrease in both dorsal limbic and ventral paralimbic activity
    A. True
    B. False
11. While almost all neurotransmitters have been implicated in the pathology of depression, certain symptoms of depression including decreased appetite, diminished sex drive, poor impulse control are most closely associated with a decrease in:

A. Serotonin
B. Acetylcholine
C. Dopamine
D. GABA
E. Glutamate

12. Which one of the following is NOT a DSMIV symptom of depression?

A. feelings of guilt
B. recurrent thoughts of death/suicidal ideation
C. apathy/anhedonia
D. pressured speech
E. depressed mood

13. Imagine there is a creature called a green groggle, that has an internal “weight set-point” controlled by the hypothalamus, much like humans. The groggle’s weight is currently set at 8kg. Being a cruel (but scientific) medical student you force-feed the groggle until he weighs 25 kg, and then put a lesion in the ventromedial hypothalamus. You provide unlimited access to food and you now allow the groggle to feed at his own will. What will most likely happen?

A. The groggle will eat more and more until he weighs 35+ kg
B. The groggle will maintain his current weight of 25 kg
C. The groggle will eat less than before, and maintain a weight of 15 kg
D. The groggle will eat less and maintain his original weight of 8kg
E. The groggle will eat less and less and waste away

14. True or false: As a person gains weight (fat mass), his circulating level of leptin decreases.

A. True
B. False
15. Injection of leptin into the ventricles of rats have been shown to decrease the level of what hypothalamic chemical?
   A. serotonin
   B. Neuropeptide Y
   C. orexin
   D. CCK
   E. glucose

16. All of the following factors are important in short-term control of feeding EXCEPT:
   A. taste and smell
   B. minute-to-minute changes in blood glucose levels
   C. CCK
   D. gastric distention
   E. minute-to-minute changes in blood leptin levels

Questions 17-19
E.K. is a 16 year old girl who is brought into your clinic by her mother, who is concerned about her daughter’s eating habits. She notes that though E.K. has always been a picky eater, she has recently become very restricted in the kinds of food she will eat. Though E.K. had been having regular menstrual cycles since the age of 14, she has not had a period in the last 3 months. E.K. has not lost any weight, although she has not gained weight in the past two years, despite having grown several inches. Her ideal body weight is 110 pounds, and E.K. currently weighs 85 pounds.

17. Anorexia nervosa is characterized by the refusal to maintain what percentage of the person’s ideal body weight?
   A. 75%
   B. 80%
   C. 85%
   D. 90%
   E. 95%

18. One theory behind the pathogenesis of anorexia nervosa is that there is a disturbance in serotonin levels. In underweight anorexics, measured levels of serotonin metabolites are found to be:
   A. low
   B. normal
   C. high
19. Appropriate therapy for anorexia nervosa includes all of the following EXCEPT:
   A. cognitive behavioral therapy
   B. refeeding with a nasogastric tube
   C. SSRIs
   D. hospitalization and strict monitoring of food intake
   E. intraventricular injections of leptin

20. K.M. is a 73 y.o. man who suffered a stroke last week and has since not been able to move his left arm and his gaze is fixed continually to the right. The stroke damaged which of the following areas?
   A. left primary motor cortex
   B. right primary motor cortex
   C. left primary motor cortex and right frontal eye field
   D. left primary motor cortex and left frontal eye field
   E. right primary motor cortex and right frontal eye field

21. A malnourished man with a blood alcohol level of 0.12 is brought into the emergency room. He is started on IV fluids with dextrose (sugar) and the next week is noted to have mammillary body infarcts on MRI. What vitamin should have been administered in the ER before dextrose was given?
   A. riboflavin
   B. vitamin A
   C. vitamin C
   D. thiamine
   E. vitamin E

22. Peripheral effects of nicotine include all of the following EXCEPT:
   A. increased heart rate
   B. decreased blood pressure
   C. increased metabolic rate
   D. lipolysis
   E. skeletal muscle relaxation

23. Chain smokers find it necessary to “dose” themselves often with nicotine, because the half-life of nicotine is approximately:
   A. 20 minutes
   B. 2 hours
   C. 12 hours
   D. 24 hours
   E. 2 days

24. True or false: Drugs which with slower routes of absorption tend to be more addictive because they provide a slow and constant stimulation of the reward pathway.
   A. True
   B. False
25. Symptoms of drug withdrawal are most likely mediated by which structure?
   A. hippocampus
   B. amygdala
   C. locus ceruleus
   D. prefrontal cortex
   E. red nucleus

26. Nicotine has a wide variety of effects on neurotransmitter systems— which of the following effects of nicotine is correct?
   A. decreased GABA activity → anxiety relief
   B. increased acetylcholine activity → improvement of short-term memory
   C. increased norepinephrine activity → reduction in heart rate
   D. A and B only
   E. B and C only

27. Which of the following characteristics of cigarettes are thought to drive smoking behavior?
   A. Nicotine levels in the blood rise slowly and have a long half-life
   B. Nicotine use results in remarkably little tolerance compared to other addictive drugs
   C. The acute effects of nicotine wear off quickly, so the smoker needs to reach for another cigarette
   D. Smoking reduces the overall chance of psychiatric illness
   E. None of the above

28. Common signs/symptoms of nicotine withdrawal include all of the following EXCEPT:
   A. Decreased appetite and heavy sleeping
   B. Decreased heart rate
   C. Irritability, frustration and anger
   D. Depressed mood
   E. Anxiety

29. Which of the following medications have been shown to help with smoking cessation?
   A. Fluoxetine
   B. Haldol
   C. Bupropion
   D. Amitriptyline
   E. None of the above

30. The effects of clonidine in aiding smoking cessation involves:
   A. Activation of alpha-2 receptors, inhibiting the locus ceruleus
   B. Direct antagonism of beta-2 nicotinic acetylcholine receptors
   C. Inhibition of MAO oxidase
D. Increased activity of the metabolic pathways leading to nicotine breakdown
E. None of the above

31. Which of the following enzymes is involved in the synthesis of dopamine from dopa?
   A. tyrosine hydroxylase
   B. dopamine beta-hydroxylase
   C. DOPA decarboxylase
   D. phenylethanolamine N-methyltransferase
   E. dopamine-makingase

32. When comparing the side effects of atypical antipsychotics and typical antipsychotics, atypicals have a lower incidence of tardive dyskinesia because they have less action on the:
   A. corticospinal tract
   B. premotor cortex
   C. motor cortex
   D. striatum
   E. cerebellum

33. True or False: Chronic cocaine use leads to upregulation of the dopaminergic system, and hence depressive symptoms.
   A. True
   B. False

34. A young woman is brought into the emergency room unconscious, and she has a laceration on her head. Your initial imaging modality should be:
   A. CT with contrast
   B. CT without contrast, but with a “bone window”
   C. MRI with contrast
   D. MRI without contrast
   E. Plain X-ray

35. Which of the following is not considered to be a “negative” symptom of schizophrenia?
   A. Loss of recreational interests
   B. Poverty of speech
   C. Neglect of grooming and hygiene
   D. Inattentiveness during testing
   E. Aggressive, agitated behavior

36. True or false: The positive symptoms of schizophrenia are related to a hyperactivity of the mesocortical dopamine neurons.
   A. True
   B. False
A 35 year old woman presents to your office with complaints of blurred vision and a 4 day history of right-sided weakness. She has had episodes of vision problems in the past, and 2 years ago suffered from “numbness” in the fingers of her left hand for several weeks. She has otherwise been well, with no other complaints except for a few times where she has fallen and received scrapes and bruises. You order imaging, as seen above.

37. What type of image is this?
   A. CT with contrast
   B. CT without contrast
   C. T2 weighted MRI
   D. FLAIR MRI
   E. PET scan

38. With her history of symptoms, and the above images, you suspect she most likely has:
   A. multiple small vessel hemorrhages
   B. severe cortical atrophy due to dementia
   C. severe hydrocephalus with leakage into the deep white matter
   D. demyelination of the deep white matter
   E. multiple sites of ischemia due to emboli

39. You interview the family of a 35 year old man who was involved in a motor vehicle accident one year ago. His wife complains that he is not his normal self, and has been embarrassing her at parties with socially inappropriate behavior. He is loud, sometimes rude, and often makes up stories that everyone else knows to be false. Before you even review his brain imaging, you suspect that he has a lesion in which structure?
   A. Dorsolateral cortex
43. You correctly note that there are at least 3 bright signals in the area near the gray-white junction in the infarct. (See arrow). These most likely represent:
   - A. Normal calcifications of the choroid plexus
   - B. Small areas of hemorrhage in the infarct
   - C. Bony fragments from the skull
   - D. Edema
   - E. Metal fragments

44. Which accompanying symptom would we most likely expect to see in this patient?
   - A. Left sided weakness of the leg
   - B. Left sided weakness of the face and arm
   - C. Aphasia
   - D. A and B
   - E. All of the above

45. What is the area by the black arrow?
   - A. A small area of subarachnoid hemorrhage
   - B. Calcified pineal
   - C. Calcified dendritic spine
   - D. Calcified choroid plexus
   - E. None of the above

Questions 46-50
Match the following neurotransmitter with the pharmaceutical agonist:

46. Dopamine
47. Acetylcholine
48. Serotonin
49. GABA
50. Glutamate

   - A. pyridostigmine
   - B. PCP
   - C. levodopa
   - D. phenocarbital
   - E. fluoxetine

51. True or False: People who suffer from OCD are not typically aware that their obsessions and compulsions are excessive or unreasonable.
   - A. True
   - B. False
52. Which of the following symptoms would we expect to see in the patient who’s axial MRI is shown above?
   A. Apathy
   B. Aphasia
   C. Severe deficits in procedural memory
   D. A and B only
   E. All of the above

Questions 53-54

53. What is the structure by the black arrow?
   A. Pineal
   B. Thalamus
   C. Head of the caudate
   D. Nucleus accumbens
   E. Fornix
54. What is the structure by the white arrow?
A. Mammillary bodies
B. Fourth ventricle
C. Cerebral aqueduct
D. Third ventricle
E. Lateral ventricle

Questions 55-58
Match the memory disturbance with the corresponding image

55. Episodic memory

56. Semantic and episodic memory

57. Procedural memory

58. Working memory

59. Stimulating which area of the brain is most likely to produce pleasurable sensations?
A. Nucleus accumbens
B. Dawson’s fingers
C. Putamen
D. Suprachiasmatic nucleus
E. Insular cortex
INDIVIDUAL SCORES REPORT

Test: Bio 370 final 03
Grade:
Score: 83.33% (60.00 of 72.00)

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<td>72. ANSWER_KEY 72</td>
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SUMMARY: 60.00 of 72.00 83.33 -