Lecture #11 Basal Ganglia

Question 1: What is the genetic or biochemical cause of most instances of Parkinson's disease?

a) Somatic mutation of the Pk1 gene

b) Unknown

c) Intracellular damage due to low intracellular Ca++

d) Genetic mutation of the Pk1 gene

e) Methylation of the Pk1 gene

Lecture #11 Basal Ganglia

Question 2: Excitatory glutamate output projects from which basal ganglia neuron type, nuclear division, or nucleus, etc.?

a) globus pallidus external segment

b) subthalamic nucleus

c) globus pallidus internal segment

d) D1 striatal projection neurons

e) D2 striatal projection neurons

Lecture #11 Basal Ganglia

Question 3: How is adenylate cyclase activity (in response to dopamine) affected in striatal projection neurons expressing D1 receptors vs those expressing D2 receptors, respectively?

a) Increased vs decreased

b) Increased vs increased

c) Unaffected vs increased

d) Decreased vs increased

e) Decreased vs decreased

Lecture #11 Basal Ganglia

Question 4: Which provide the main input to the internal segment of the globus pallidus (GPi)?

a) Substantia nigra pars reticulata (SNr) neurons

b) Substantia nigra pars compacta (SNc) neurons

c) Subthalamic nucleus (STN) neurons

d) D1 striatal projection neurons

e) D2 striatal projection neurons

Lecture #11 Basal Ganglia

Question 5: Which lists the indirect pathway through the basal ganglia via the correct structures in the correct order?

a) neocortex>striatum>globus pallidus external segment>ventral thalamus>neocortex

b) neocortex> ventral thalamus >globus pallidus internal segment>striatum>neocortex

c) neocortex>substantia nigra >ventral thalamus>neocortex

d) neocortex>striatum>globus pallidus external segment>subthalamic nucleus>globus pallidus internal segment>ventral thalamus>neocortex

e) neocortex>striatum>globus pallidus internal segment>ventral thalamus>neocortex

Lecture #11 Basal Ganglia

Question 6: The output from the globus pallidus external segment (pars externa) is which?

a) Dopaminergic

b) GABA-ergic

c) Axons that project to spinal cord motor neurons and interneurons

d) Glutamatergic

e) Axons ending primarily in motor cortex

Lecture #11 Basal Ganglia

Question 7: Which is the LEAST likely sign of Parkinson's disease?

a) Bradykinesia

b) Intention tremor

c) Hypometria in gait

d) Akinesia

e) Resting tremor

Lecture #11 Basal Ganglia

Question 8: The output from the globus pallidus internal segment (pars interna) is which?

a) Dopaminergic

b) Glutamatergic

c) Axons ending primarily in motor cortex

d) Axons that project to spinal cord motor neurons and interneurons

e) GABA-ergic

Lecture #11 Basal Ganglia

Question 9: What is the early motor sign of Huntington's disease?

a) Uncontrolled movements or chorea

b) Intention tremor and/or decomposition of movement

c) Bradykinesia or akinesia

d) Tremor

e) Oculomotor paresis and/or saccadic suppression

Lecture #11 Basal Ganglia

Question 10: The output from D1 receptor expressing striatal projection neurons is which?

a) Enkephalinergic

b) Glutamatergic excitatory

c) GABA-ergic inhibitory

d) Neuromodulatory, either excitatory of inhibitory depending on context

e) Dopaminergic excitatory

Lecture #11 Basal Ganglia

Question 11: The two main output targets of the striatum of the basal ganglia are which?

a) Substantia nigra pars reticulata (SNr) and subthalamic nucleus (STN)

b) Substantia nigra pars compacta (SNc) and substantia nigra pars reticulata (SNr)

c) Substantia nigra pars compacta (SNc) and subthalamic nucleus (STN)

d) External and internal segments of the globus pallidus (GPe and GPi)

e) Internal segment of the globus pallidus (GPi) and substantia nigra pars reticulata (SNr)

Lecture #11 Basal Ganglia

Question 12: Which neurotransmitter is supplied by structures that lie one just dorsal to the crus cerebri and the other in the midbrain tegmentum, ventrally near the midline?

a) Histamine

b) Dopamine

c) Serotonin

d) Norepinephrine

e) Acetylcholine

Lecture #11 Basal Ganglia

Question 13: What is the most likely function of the hyperdirect pathway?

a) Providing a pinpoint focus of inhibition to block a specific response commanded by the direct pathway

b) Shortening the latency of excitatory signals through the direct pathway

c) Inhibitory sculpting of direct pathway excitation

d) Stronger excitation of movement than the direct pathway

e) Roughly equivalent in excitation of movement to direct pathway activation

Lecture #11 Basal Ganglia

Question 14: What is a (are) major direct output(s) of the substantia nigra pars reticulata and internal segment of the globus pallidus?

a) Spinal cord ventral horn

b) Motor cortex

c) Substantia nigra pars compacta and external segment of the globus pallidus

d) Ventral thalamus

e) Association cortex

Lecture #11 Basal Ganglia

Question 15: Which lists the direct pathway through the basal ganglia via the correct structures in the correct order?

a) neocortex>substantia nigra>ventral thalamus>neocortex

b) neocortex>striatum>globus pallidus external segment>subthalamic nucleus>globus pallidus internal segment>ventral thalamus>neocortex

c) neocortex>ventral thalamus>globus pallidus internal segment>striatum>neocortex

d) neocortex>striatum>globus pallidus external segment>ventral thalamus>neocortex

e) neocortex>striatum>globus pallidus internal segment>ventral thalamus>neocortex

Lecture #11 Basal Ganglia

Question 16: What neurological disorder is most closely associated with loss of the subthalamic nucleus?

a) Huntington's disease

b) Parkinson's disease

c) Essential tremor

d) Tardive dyskinesia

e) Hemiballism

Lecture #11 Basal Ganglia

Question 17: What is the main neurotransmitter of the substantia nigra pars reticulata neurons?

a) D1

b) GABA

c) Glutamate

d) Dopamine

e) D2

Lecture #11 Basal Ganglia

Question 18: Which provide the main input to the external segment of the globus pallidus (GPe)?

a) D1 striatal projection neurons

b) D2 striatal projection neurons

c) Subthalamic nucleus (STN) neurons

d) Substantia nigra pars reticulata (SNr) neurons

e) Substantia nigra pars compacta (SNc) neurons

Lecture #11 Basal Ganglia

Question 19: What is the most direct early cause of the signs of Huntington's disease?

a) Loss of D1 receptor expressing striatal projection neurons

b) Loss of substantia nigra pars compacta dopamine neurons

c) Loss of D2 receptor expressing striatal projection neurons

d) Loss of substantia nigra pars reticulata dopamine neurons

e) Loss of neurons throughout cerebral cortex

Lecture #11 Basal Ganglia

Question 20: The two main output nuclei of the basal ganglia are which?

a) Substantia nigra pars reticulata (SNr) and subthalamic nucleus (STN)

b) Substantia nigra pars compacta (SNc) and substantia nigra pars reticulata (SNr)

c) External and internal segments of the globus pallidus (GPe and GPi)

d) Substantia nigra pars compacta (SNc) and subthalamic nucleus (STN)

e) Internal segment of the globus pallidus (GPi) and substantia nigra pars reticulata (SNr)

Lecture #11 Basal Ganglia

Question 21: Which is the hyperdirect pathway?

a) Striatum to substantia nigra pars compacta

b) Cerebral cortex to substantia nigra pars reticulata

c) Cerebral cortex to substantia nigra pars compacta

d) Cerebral cortex to subthalamic nucleus

e) Striatum to substantia nigra pars reticulata