NEI's Master Psychopharmacology Program

Study Guide: Basic Neuroscience

Subtopic	Benchmarks (You Should Be Able To)	Recommended Resources
Synaptic Neurotransmission	Identify the organelles and their functions Link the anatomic zones of neurons to specific functions Describe the structure and function of the synapse Describe the time course of neurodevelopment Explain neurogenesis, neuronal selection, and neuronal migration Describe the process of synaptogenesis Describe synaptic plasticity Explain the process of competitive elimination Explain the process of excitotoxicity	**Learning Activities*** Normal Neurodevelopment (animation) Stahl's Essential Psychopharmacology, Chapter 1: Chemical Neurotransmission (video) **Additional Resources**** Stahl SM. Stahl's essential psychopharmacology, fifth edition. New York, NY: Cambridge University Press; 2021. (Chapter 1)
Chemical Neurotransmission	Differentiate between the types of neurotransmission Explain the process of signal transduction cascade Explain the process of formation of second messengers Describe how second messenger systems regulate downstream events Describe the processes underlying up- and downregulation of receptors	**Learning Activities*** Stahl's Essential Psychopharmacology, Chapter 1: Chemical Neurotransmission (video) **Additional Resources**** Stahl SM. Stahl's essential psychopharmacology, fifth edition. New York, NY: Cambridge University Press; 2021. (Chapter 1)

*You may choose any 24 non-expired Learning Activities to complete the requirements of the Master Psychopharmacology Program. For the full list of Master Psychopharmacology Program requirements, please visit nei.global/mpp.

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Receptors, Ion Channels, and Enzymes	Differentiate G-protein-coupled receptors from ligand-gated receptors from voltage-sensitive ion channels Differentiate the mechanisms of action and functions of monoamine transporters vs. vesicular monoamine transporters Describe the function of agonists, partial agonists, antagonists, and inverse agonists Identify modulators of ligand-gated ion channels Explain the role of ion channels in neurotransmission Distinguish between voltage-sensitive sodium and calcium channels Differentiate how the various glutamate receptors are regulated Describe the major functions of enzymes	**Learning Activities*** Stahl's Essential Psychopharmacology, Chapter 2: Transporters, Receptors and Enzymes as Targets of Psychopharmacological Drug Action (video) Stahl's Essential Psychopharmacology, Chapter 3: Ion Channels as Targets of Psychopharmacological Drug Action (video) **Additional Resources**** Stahl SM. Stahl's essential psychopharmacology, fifth edition. New York, NY: Cambridge University Press; 2021. (Chapters 2–3)
Genes, Environment, Symptoms, and Circuits	Describe the relationship between genes, environment, and behavior Describe how neurotransmission triggers gene expression Explain the concept of epigenetics Describe the molecular mechanisms of epigenetics Identify the major functional areas of the cortex Identify the major projections for different neurotransmitter systems Identify brain imaging techniques used in psychiatric research	**Learning Activities*** Epigenetics and Mental Illness (animation) Stahl's Essential Psychopharmacology, Chapter 1: Chemical Neurotransmission (video) Stahl's Essential Psychopharmacology, Chapter 6a: Mood Disorders: Key Neurotransmitter Networks (video) **Additional Resources**** Stahl SM. Stahl's essential psychopharmacology, fifth edition. New York, NY: Cambridge University Press; 2021. (Chapter 1) When, Why, and How to Integrate Pharmacogenetic Testing into Clinical Practice (video)

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