### NEI's Master Psychopharmacology Program
#### Study Guide: Basic Neuroscience

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<th>Subtopic</th>
<th>Benchmarks (You Should Be Able To)</th>
<th>Recommended Resources</th>
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| 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 | **Additional Resources**  
| 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**  
**Additional Resources**  
[The Importance of Tonic and Phasic Dopamine Firing in Psychiatric Illnesses (CME animation)](http://cdn.neiglobal.com/content/mpp/studyguide/studyguide_basicneuro.pdf) |

*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 [http://www.neiglobal.com/Members/MPP/MPPOverview/tabid/307/Default.aspx](http://www.neiglobal.com/Members/MPP/MPPOverview/tabid/307/Default.aspx).

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<td><strong>Receptors, Ion Channels, and Enzymes</strong></td>
<td>Differentiate G-protein-coupled receptors from ligand-gated receptors from voltage-sensitive ion channels&lt;br&gt;Differentiate the mechanisms of action and functions of monoamine transporters vs. vesicular monoamine transporters&lt;br&gt;Describe the function of agonists, partial agonists, antagonists, and inverse agonists&lt;br&gt;Identify modulators of ligand-gated ion channels&lt;br&gt;Explain the role of ion channels in neurotransmission&lt;br&gt;Distinguish between voltage-sensitive sodium and calcium channels&lt;br&gt;Differentiate how the various glutamate receptors are regulated&lt;br&gt;Describe the major functions of enzymes</td>
<td>Learning Activities*&lt;br&gt;The Serotonin System: Focus on 5HT3 Receptors (CME animation)&lt;br&gt;Additional Resources**&lt;br&gt;Stahl SM. Stahl's essential psychopharmacology, fourth edition. New York, NY: Cambridge University Press; 2013. (Chapters 2–3)&lt;br&gt;One Neurotransmitter to Rule Them All: The Serotonin Network (CME video)</td>
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<td><strong>Genes, Environment, Symptoms, and Circuits</strong></td>
<td>Describe the relationship between genes, environment, and behavior&lt;br&gt;Describe an endophenotype&lt;br&gt;Explain the concept of epigenetics&lt;br&gt;Identify the major functional areas of the cortex&lt;br&gt;Identify major subcortical regions relevant to psychiatric symptoms and conditions&lt;br&gt;Identify the major projections for monoamines, acetylcholine, and histamine&lt;br&gt;Differentiate the functions of major circuits originating in the cortex&lt;br&gt;Identify brain imaging techniques used in psychiatric research</td>
<td>Learning Activities*&lt;br&gt;The Molecular Mechanisms of Epigenetics (CME animation)&lt;br&gt;Serotonin and its Role as a Command Neurotransmitter (CME animation)&lt;br&gt;Neurobiology of Sleep (CME animation)&lt;br&gt;Additional Resources**&lt;br&gt;Stahl SM. Stahl's essential psychopharmacology, fourth edition. New York, NY: Cambridge University Press; 2013. (Chapter 1)&lt;br&gt;Nature (vs.) and Nurture: Epigenetics and Personalized Medicine (CME video)&lt;br&gt;Basic Neuroscience: From Circuits to Symptoms (CME video)&lt;br&gt;Molecular Neuroscience: From Genes to Mental Health (CME video)</td>
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