

Module 1: Neuronal Structure, Function and Psychopharmacology

Introduction

Recent advances in our understanding of neuronal structure and functioning have led to changes in the way we look at health and illness. Principles of neurotransmission and second messenger generation are essential to our understanding of the biological basis for psychiatric illnesses and treatments. Psychiatric Mental Health Nurse Practitioners need a thorough understanding of the concepts of pharmacokinetic and pharmacodynamic actions.

Topics

- Structure and Function of Neurons
- Internal Operations and the Functioning of a Neuron
- Synaptic Neurotransmission and the Anatomically Addressed Nervous System
- Signal Transduction and the Chemically Addressed Nervous System
- Neurophysiology and Neurochemistry
- General Principles of Psychopharmacology
- Concepts in Pharmacological Management
- PMHNP role in pharmacological management
- Other pharmacological considerations
 - Medications used to treat Schizophrenia and other Psychotic disorders
 - Medications used to treat Mood disorders and Bipolar Affective Disorders
 - Medications used to treat Mood disorders and Unipolar Affective Disorders and Depressive disorders
 - Medications used to treat Anxiety disorders
 - Medications used to treat Attention Deficit Disorder/ Attention Deficit Hyperactivity Disorder

Learning Objectives

Upon completion of this module, participants should be able to:

1. Describe the structure and function of a neuron, including its subcellular organelles and anatomic zones.
2. Discuss important features of protein synthesis.
3. Describe the basic mechanisms of neuronal transmission.
4. Elaborate on characteristics of the anatomically addressed nervous system in terms of neurodevelopment, neurogenesis, and neuronal selection.
5. Outline the processes of neuronal migration and synaptogenesis.
6. Identify the role of synaptic plasticity in formation of a synapse.
7. Discuss the importance of elimination of synapses in a developing brain.
8. Discuss principles of chemical neurotransmission, including volume neurotransmission and excitation-secretion coupling.
9. Cite the role of signal-transduction cascades as related to messenger systems and gene expression.

Required Content and Readings

Please follow the suggested order outlined for the selected materials.

1. Read chapters 1-3 of Stahl's *Essential Psychopharmacology*. The topics covered in each chapter are listed below:
 - Chapter 1 Structure and function of neurons
 - Chapter 2 Synaptic Neurotransmission
 - Chapter 3 Signal transduction and the chemically addressed nervous system
 2. Review the following videos to get an overview of the location, structure and function of neurons including a demonstration of how neurotransmitters work as the molecular basis for memory.
 - [How neurons work](#) – Discovery Channel Video on YouTube
 - [Functions of Neurotransmitters](#) - Discovery Channel Video on YouTube
 - [How neurons work- How the brain works and the molecular basis of memory – Dr. Paul Wiseman, McGill University iTunes video podcast.](#)
 - [Fear and Memory by Dr. Karim Nader, McGill University iTunes video podcast](#)
 3. Read chapter 3, pages 91-110 of Kaplan Sadock's *Synopsis of Psychiatry* to become familiar with the brain and behavior processes such as neuronal development, migration and connections, neurophysiology and neurochemistry, and neurotransmitters.
 4. Read chapter 1 of Marangell & Martinez's *Concise Guide to Psychopharmacology* for an overview of the general principles of psychopharmacology.
 5. Read chapter 5 of the *Nursing Review and Resource Manual: PMHNP* to become familiar with the art of prescribing psychotropic medications.
 6. [Review the iTunes podcast on psychopharmacology for an overview of psychotropic medications used to treat psychiatric disorders.](#) This podcast is based on the Mental Health Concepts lecture series by Dr. David Cecil.
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Module 1: Activity 1- (Neuronal Diagram)

Using Stahl's Figure 1-8, Anatomic Zones of Neurons, page 7 and Figure 1-10, Localization of Neuronal Components, page 10 as a reference, diagram a neuron and describe the function of each neuronal component.

Neuronal Diagram File Format

Save your diagram as an MS Word file, Adobe pdf or as a scanned image file. Use the instructions below to name your file.

Diagram Paper Filename Requirements

The diagram paper file that you turn in should be named using the following naming convention: neuronaldiagram_name.doc where name is your first name followed by your middle initial and last name e.g. if you are John T. Smith, your filename should be neuronaldiagram_johntsmith.docx.

Grading Scale

Your diagram will be graded as complete or incomplete.

Turn in Your Paper

Use the neuronal diagram assignment link below to turn in your paper for instructor grading. If you need assistance with using the assignment link to turn in your assignment refer to the Assignment Student Submission Handout in the overview section of the course.