

**FINAL REPORT OF THE BEA WORKING GROUP TO DEVELOP A LEVEL 1  
CURRICULUM FOR PSYCHOPHARMACOLOGY EDUCATION AND TRAINING<sup>1</sup>**

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FINAL REPORT OF THE BEA WORKING GROUP ON  
PSYCHOPHARMACOLOGY: CURRICULUM FOR LEVEL 1 TRAINING  
IN PSYCHOPHARMACOLOGY

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## Preface

The Board of Educational Affairs (BEA) Working Group to Develop Levels 1 and 2 Curricula for Psychopharmacology Education and Training has worked within the framework for Level 1 basic psychopharmacology education as set forth in the 1992 Report of the APA Ad Hoc Task Force on Psychopharmacology:

"Basic Psychopharmacology Education implies a knowledge of the biological bases of psychopharmacology, including the locus of action for psychoactive substances and the mechanisms by which these substances affect brain function. Training at this level also involves mastery of the psychopharmacology of classes of drugs commonly used to treat mental disorders, as well as those commonly abused which may or may not have therapeutic uses." (cf. Ad Hoc Task Force Report, p. 103)

In presenting this Curriculum for Level 1 Training in Psychopharmacology, the BEA Working Group would like to emphasize the following three related points. First, this is a curriculum for a **basic** course in psychopharmacology education with clinical populations. It builds upon courses outlined in current APA guidelines for accreditation including, but not limited to, the biological bases of behavior. The Working Group has developed the curriculum in a modular format so that it is adaptable readily to a variety of learning settings in which psychologists in training or professional psychologists may find themselves, which include doctoral programs, predoctoral internships, postdoctoral residencies, or integrated series of Continuing Education (CE) workshops. The nine modules are as follows:

1. Biological Bases of Psychopharmacological Treatment - 1 module
- 2-3. Principles of Psychopharmacological Treatment - 2 modules
4. General Introduction to Clinical Psychopharmacology - 1 module
5. Introduction to Psychopharmacological Treatment of Psychoactive Substance Use Disorders - 1 module
6. Introduction to Psychopharmacological Treatment of Psychotic Disorders - 1 module
7. Introduction to Psychopharmacological Treatment of Mood Disorders - 1 module
8. Introduction to Psychopharmacological Treatment of Anxiety Disorders - 1 module
9. Introduction to Psychopharmacological Treatment of Developmental Disorders - 1 module

The BEA Working Group has eschewed establishing rigid parameters for the exact number of contact hours for each of the nine modules. The number of contact hours will vary depending on the prerequisite knowledge of students, the particular emphasis of faculty, and the specific pedagogical applications incorporated in the doctoral course or CE series. For example, modules 1 and 2-3 on the Biological Bases and Principles of Psychopharmacological Treatment may be included in the biological bases of behavior course mandated in all APA accredited doctoral programs and/or lend themselves to graphic presentations and computer-assisted learning adaptations. Both factors may affect the number of faculty-student contact hours related to these two important modules.

Accordingly, two pedagogical imperatives should attend the implementation of this Level 1 curriculum. On the one hand, all providers in psychology need to have basic knowledge in the area of clinical psychopharmacology represented by the entire knowledge base delineated in all the modules of the Level 1

curriculum. On the other hand, programs based on this Level 1 curriculum need to take account of individual differences in prospective learners by creating flexible learning opportunities which recognize prior mastery of one or more of the particular modules comprising the curriculum.

While insisting on flexibility in the implementation of the Level 1 curriculum in doctoral level programs, predoctoral internships, postdoctoral residencies, and CE workshop series, the BEA Working Group has established the following broad guidelines. This curriculum is envisioned as applicable for a 3-4 credit one-semester course in APA-accredited doctoral programs in clinical, counseling, and school psychology. In more advanced learning settings, each module is considered to be the equivalent of approximately 7 credit hours of continuing education with the exception of the General Introduction to Clinical Psychopharmacology, which is considerably shorter, perhaps 3-4 CE credit hours (1 CE credit = 1 contact hour).

Second, because this is a curriculum for **basic** psychopharmacology education, the BEA Working Group chose to develop a curriculum emphasizing central principles. The central principles of psychopharmacology arise from two lines of work: (1) preclinical, utilizing paradigms that range from recombinant DNA techniques to animal models of disorders, and (2) clinical, utilizing paradigms that range from those that enroll healthy young volunteers to those that enroll patients with a specific disease. One consequence of this methodology has been that the principles derived do not necessarily speak to the nuances of application to the full range of individuals who may receive drugs.

The Working Group wants to emphasize in this preface that **any doctoral course or CE series based on the Level 1 curriculum should create a mindset that gives the student/participant an exquisite awareness of the interactive effects of various individual differences including, but not limited to, gender, age, ethnicity, disability, and environment.** Education programs based on the Level 1 curriculum should emphasize that risks for interactive effects and adverse outcomes of medications vary in subgroups of the population and that such individual differences need to be considered if medications are to be used effectively within specific subgroups of people. For example, clear differences exist in pharmacokinetics and pharmacodynamics at different ages, developmental stages, between men and women, and among various ethnic groups. In a manner consistent with its **introductory nature and purpose**, the Level 1 model curriculum notes these important differences in various individual modules' learning objectives, specific references, and in some sample questions. Also, a module has been included on psychopharmacological treatment of developmental disorders.

This brings us to the third and final point. The BEA Working Group believes that a Level 2 curriculum is the appropriate place to include both a more indepth knowledge base and the essential supervised professional experience necessary to work with populations that represent such individual differences as gender, age, ethnicity, disability, and environment. Accordingly, as the Working Group moves to a consideration of a Level 2 curriculum, a number of psychologists have been added who have expertise in working with special populations not already represented on the BEA Working Group. Following the recommendations of the 1992 Report of the Ad Hoc Task Force on Psychopharmacology, the Level 2 curriculum will focus on a collaborative practice training for psychologists and will reflect the knowledge and skill base necessary to participate actively in managing medications prescribed for mental disorders and integrating these medications with psychosocial treatments. The BEA Working Group has begun its work in developing this Level 2 curriculum and anticipates that it will be available in early 1997.

The members of the BEA Working Group and the modules on which each focused follow:

Ronald Brown, PhD, *Module 9*  
Charles France, PhD, *Modules 2 and 3*  
M. Marlyne Kilbey, PhD, *Modules 2 and 3, Module 5*  
Neil M. Kirschner, PhD, *Module 4, Module 6*  
Joan Martin, PhD, *Module 8*  
Carolyn Mazure, PhD, *Module 7*  
Morgan T. Sammons, PhD, *Module 1, Module 6*  
Tony L. Strickland, PhD, *Module 1, Modules 2 and 3*  
Travis Thompson, PhD, *Module 9*  
Rudy E. Vuchinich, PhD, *Module 5*

## Introduction

A working group on a psychopharmacology curriculum for psychologists developed from the American Psychological Association (APA) and the Center for Mental Health Services (CMHS) converging and complementary interests and activities of APA and CMHS that emerged in the early 1990s. APA, recognizing scientific advances in the study of neurobiologic bases of behavior and psychopharmacologic treatments of disordered behavior, became interested in expanding and improving the training psychologists receive on the mechanisms of action of psychoactive medications, the way in which pharmaco- and psychotherapeutic strategies interact, and issues in the management of persons who are receiving such combined treatment. At the same time, CMHS recognized that both mental health professional and consumer constituencies had identified the need for improving implementation and utilization of combined psychopharmacological and psychosocial treatment as among the most pressing issues faced by persons needing treatment for mental disorders, and their families.

As an initial step in addressing the issue of psychology's role in pharmacologic treatment, APA's Board of Directors formed an ad hoc task force on psychopharmacology, chaired by Michael A. Smyer, PhD, charged with exploring the desirability and feasibility of psychopharmacology prescription privileges for psychologists. The ad hoc task force issued a final report in July 1992. Its recommendations have been widely distributed, and a summary has been published (Smyer, Balster, Egli, et al. 1993).

Briefly, the task force identified three levels of preparation in psychopharmacology for psychologists providing mental health services. The three levels were differentiated based on such factors as depth and breadth of training, inclusion of a supervised practical component, and ultimate use to which the psychologist would put the training. Level 1 consists of basic psychopharmacology education. Level 2 psychopharmacology education is for a consultation-liaison model of collaborative practice between psychologists and professionals currently holding prescription privileges for psychotherapeutic medications. Level 3 is education for prescription privileges for doctoral level psychologists. Issues of the didactic and practical training necessary at each of these levels were discussed in some detail. The report suggests that Levels 1 and 2 education and training could be obtained either as part of a doctoral program of study or through continuing education programs at the postdoctoral level. Level 3 would provide additional extensive hands-on supervised training to develop the needed expertise, which would precede the granting of prescription privileges. It would require more extensive and intensive training in the doctoral program and in a postdoctoral setting.

During this same period, 1989-1993, CMHS appointed a task force, initially chaired by Mark Goldman, PhD, that met annually in conjunction with the annual APA convention to discuss the status of current psychopharmacological training for psychologists at the graduate and postgraduate levels and ways in which it might be expanded and improved. This group also studied the steps nursing and social work associations were taking to enhance and improve training in psychopharmacology for their practitioners.

In March 1994, the APA Board of Educational Affairs (BEA) approved the formation of a Working Group to develop Levels 1 and 2 curricula for psychopharmacology education and training. The BEA Psychopharmacology Working Group members included Charles France, PhD; M. Marlyne Kilbey, PhD (Chair); Neil M. Kirschner, PhD; Joan Martin, PhD; Carolyn Mazure, PhD; Morgan T. Sammons, PhD; Edward P. Sheridan, PhD (Ex-Officio, BEA Chair); Tony L. Strickland, PhD; and Rudy E. Vuchinich, PhD. These Working Group members are experts in psychopharmacology. Most are affiliated with

academic research departments and/or medical schools providing psychopharmacology training to mental health professionals, including those who prescribe medications. One member (Sammons) is a prescribing psychologist trained at the Uniformed Services Medical School under the Department of Defense demonstration program.

In June 1994, the APA Board of Directors allocated \$10,000 from its 1994 contingency funds to establish and begin the work of the BEA Working Group. On September 10, 1994, the CMHS issued contract number 94MF11645001D to the APA to support the effort to develop and implement a Level 1 psychopharmacology curriculum tailored to the needs of psychologists who deliver mental health services.

After its first meeting in November 1994, the Working Group shared information with psychologists regarding the work in progress on a curriculum for Level 1 training and queried individuals in more depth regarding their opinions about the proposed nature of Level 2 training. For example, the BEA Psychopharmacology Working Group determined that it would target mid-winter meetings of various psychology organizations for Working Group members to attend. The Working Group also distributed to the BEA and all other Boards and Committees of APA an outline of the components of the Level 1 modules during the March 1995 consolidated meetings. Information gained at both the mid-winter and consolidated meetings informed the Working Group's activities at its second meeting in April 1995 and resulted in modification of the draft curriculum modules.

In May 1995, the Working Group mailed a draft of the Level 1 curriculum to a group of experts who were invited to review and critique it. This group includes representatives of subsections of APA having an interest in psychopharmacology training issues, professional groups (trainers, providers), and consumer groups. The members of this group also were invited to comment on the proposed modules during a 2-hour meeting held on August 14 in conjunction with the annual APA convention.

For additional review and feedback, the Level 1 training modules were circulated in June 1995 to the APA Board of Directors, the APA Council of Representatives, the APA Board of Educational Affairs, APA Division Presidents, State Psychological Associations, the Council of Graduate Departments of Psychology, the National Council of Schools and Programs in Professional Psychology, the Association of Psychology Postdoctoral and Internship Centers, and the Chairs of Training Councils. These groups were also invited to comment on the modules during a 1-hour session on August 14, 1995 at the APA convention.

To report further on their activities and to solicit additional feedback from the field, the BEA Working Group participated in a symposium, sponsored by APA Divisions 29 and 43 at the 1995 APA convention, which included representatives from a variety of groups considering education in psychopharmacology. Edward F. Bourg, PhD, Senior Consultant to the APA Education Directorate, chaired the symposium. He had assisted the Working Group in the preparation of the Level 1 curriculum. Marlyne Kilbey, chair of the BEA Working Group, provided an update on the Level 1 curriculum and discussed plans for development of a Level 2 curriculum.

Written comments were received from individuals, groups, and scores of psychologists from these efforts to circulate widely drafts of the Level 1 curriculum. The Working Group carefully considered the written and verbal comments obtained through these efforts, and made a number of substantive changes in an

October 1995 draft of the Level 1 curriculum.

A recurring issue, raised in response to early drafts, was the need for including more material relating to developmental disorders. In the October 1995 draft, the BEA Working Group dealt with this important input by making some substantive changes within various modules and by adding a preface that stresses the need for faculty using the Level 1 curriculum to emphasize the critical importance of creating a mindset for the learner regarding the important interactive effects of various individual differences including, but not limited to, gender, age, ethnicity, disability, and environment.

The BEA Working Group held a third meeting in November 1995 to finalize the Level 1 curriculum, discuss plans for the dissemination and teaching of the curriculum, and begin deliberations on the development of the Level 2 curriculum. Additional members of the BEA Working Group, selected by Marlyne Kilbey, PhD, and Lynn Rehm, PhD (BEA Chair), from a large number of people who had been nominated, attended this meeting. The following people joined those already serving on the Working Group: Ronald Brown, PhD; Robert Coursey, PhD; Carl Eisdorfer, MD, PhD; Dale Johnson, PhD; Jerry Morris, PsyD; and Travis Thompson, PhD. These Working Group members were selected because of their expertise in education and training in psychopharmacology, especially as applied to such special populations as children, adolescents, older adults, seriously/chronically mental ill people, or people in rural settings.

The expanded Working Group first considered the recurring comments on the need for more substantive material on developmental disorders. Two of the new members of the Working Group with expertise in this area developed a draft module which, after review by the entire Working Group, was added to the curriculum. After review and discussion, the BEA unanimously approved the Level 1 curriculum, with the directive that the expanded BEA Working Group should further consider dissemination and implementation issues.

At its meetings, the Working Group has considered a wide range of possibilities for offering the training delineated in the Level 1 curriculum across the various levels of education and training of professional psychologists including through doctoral programs, predoctoral internships, postdoctoral residencies, and in-depth CE workshop series. The curriculum was developed in a modular format to accommodate the specific idiosyncracies of these various learning settings. Moreover, the Working Group gave consideration to a wide variety of pedagogical methods including the use of advanced technology such as teleconferencing, multimedia products, and computer-assisted learning.

Two complementary pedagogical imperatives follow from these considerations. On the one hand, all health service providers in psychology need to have basic knowledge in the area of clinical psychopharmacology represented by the entire knowledge base defined in all the modules of the Level 1 curriculum. On the other hand, programs offered at whatever level in the "learning career" of professional psychologists need to take account of individual differences in prospective learners by creating flexible learning opportunities which recognize prior mastery of one or more of the particular modules comprising the curriculum, as well as the specific pedagogical techniques and resources utilized.

At its November 1995 meeting, the BEA Working Group recommended to the APA Education Directorate and/or the APA Board of Educational Affairs several implementation steps. These steps include, for example, that BEA request the Association of State and Provincial Psychology Boards to

include examination questions from the Level 1 curriculum in the written National Licensing Examination for psychologists and that BEA work with its liaison members to promote education and training based on the Level 1 curriculum to educational programs at all levels: doctoral programs, predoctoral internships, postdoctoral residencies, and CE programs. In the context of the dissemination efforts, the BEA will seek on-going feedback from the field regarding the use of the Level 1 curriculum.

The expanded BEA Working Group began work on a Level 2 curriculum at its November 1995 meeting. As noted above, Level 2 will focus on the emphasis set forth in the 1992 Report of the APA Ad Hoc Task Force on Psychopharmacology, namely, the specific training needed for psychologists to enter into a more active partnership with physicians in decision making regarding medication use. Such collaborative practice will depend on the setting and circumstances of psychological practice. The Working Group will also consider much more in-depth learning related to such special factors as working with children, rural and inner-city populations, the seriously mentally ill, and the elderly. Following review and approval by the BEA, final reports of both Level 1 and Level 2 curricula will be distributed broadly to the profession and the public.

## **Module 1:**

### **BIOLOGICAL BASES OF PSYCHOPHARMACOLOGICAL TREATMENT**

#### **PURPOSE**

The purpose of this module is to enable the learner to obtain basic practical and theoretical knowledge of neuroanatomy, neurochemistry, and neurophysiology relevant to research and clinical work in psychopharmacology. A primary objective is to provide the learner with the necessary foundation with which to understand the biochemical and physiological bases for mental disorders, as well as their response to psychotropic compounds. This module should serve as a starting point for empowering the learner to initiate future self-study as needed and/or prepare for more intensive training in this area.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Identify gross anatomical structures: CNS and surrounding structures, including vascular supply, anatomy, and functional divisions of the autonomic nervous system and cranial nerves.
2. Identify structure and function of cortical areas, subcortical structures, and tracts implicated in the etiology of mental disorders.
3. Identify neurotransmitters associated with mental disorders, pathways of synthesis and degradation, associations with brain structures and tracts, and roles of neurotransmitters in mental disease.
4. Understand components of individual CNS neurons, including cell membranes, cellular content, the action potential and mechanisms of electrical and chemical cellular transmission.
5. Understand major cell receptor types, composition, and function.
6. Appreciate radiologic and laboratory investigatory techniques in neuroanatomy and neurophysiology and pertinent clinical applications.
7. Understand brain areas with associated neurohormonal or neuroendocrine roles and production and activities of neurohormones and their role in mental disease.

## MAJOR CONTENT AREAS OF THE SYLLABUS

### I. NEUROANATOMY

Successful completion of this section will familiarize the learner with basic neuroanatomical distinctions in the cerebrum, midbrain, pons, medulla, cerebellum, cranial nerves, spinal cord, and peripheral nervous system. Surface topography of the brain should be learned for superior, inferior, and medial sagittal views. The learner should become familiar with major tracts (e.g. corpus callosum, cortico-spinal tracts, nigrostriatal tract, etc.). The learner should become capable of distinguishing (1) between primary cortical and subcortical structures, (2) upper and lower motor neurons, and (3) distributions of the anterior, middle, and posterior cerebral arteries. The learner should also become able to identify the various cerebral lobes, ventricles, and thalamic and other subcortical nuclei on CT and MRI scan. There should be an understanding of the gestalt of the dermatome layout in the peripheral nervous system that corresponds to levels of the spinal cord.

#### Gross anatomy of the CNS

1. Surface topography and meninges
  - Meningeal coverings of the brain and cord
  - Meningeal layers: Dura mater, leptomeninges, and subarachnoid spaces
  - Surface topography and functional mapping of the brain and spinal cord
2. Major lateral anatomical structures
  - Lateral surface: Cerebral gyri, sulci, and lobes
  - Frontal lobe: Anatomy and functional considerations (Primary motor area, premotor area, Broca's area, insula)
  - Parietal lobe: Anatomy and functional considerations, primary sensory area, inferior parietal lobule
  - Temporal lobe: Anatomy and functional considerations
  - Primary auditory cortex, medial temporal lobe, parahippocampal gyrus
  - Occipital lobe: Anatomy and functional considerations; primary visual cortex
  - Cerebellum: Anatomy and functional considerations
3. Major medial anatomical structures
  - Medial surface
  - Corpus callosum
  - Limbic lobe: Anatomy and functional considerations of the hippocampus, cingulate gyrus, and associated structures
  - Ventricular anatomy
4. Deep brain structures:
  - Subcortical white matter tracts: Projection and association fibers
  - Basal ganglia: Anatomy and functional considerations (movement disorders, frontal/midbrain association tracts)
5. Brainstem:

- Diencephalon: Hypothalamus, thalamus, and subthalamic regions
  - Mesencephalon: Substantia nigra
  - Metencephalon: Pontine nuclei
  - Myelencephalon: Pyramidal decussation and cranial nerves
  - Overview of cranial nerve distribution and function
6. The blood brain barrier (BBB):
    - Structure and composition
    - The chemoreceptor trigger zone
    - Selectivity and function of the BBB
  7. Cerebral ventricles and CSF:
    - Ventricular anatomy
    - Manufacture and circulation of CSF
    - Space occupying lesions and hydrocephalus
    - Normal pressure hydrocephalus
    - Lumbar puncture and CSF analysis
  8. Vascular supply of the brain:
    - Anterior, middle, and posterior cerebral arteries and their distribution
    - Vascular abnormalities in mental illness
    - Atherosclerotic vessel disease
    - Congenital abnormalities and cerebrovascular events
    - Stroke
    - Brain imaging in cerebrovascular disease

## II. NEUROPHYSIOLOGY

Upon completion of this section, the learner should have become familiar with basic physiology of the above-named structures. This includes distinction of primary sensory and motor areas (idiotypic cortex), modality-specific (unimodal) and high-order (heteromodal) association areas, paralimbic, and limbic areas. Functions of the prominent nuclei of the brainstem should be included (e.g., nuclei of the substantia nigra, basal ganglia, thalamus, cranial nerves). Learners should be capable of distinguishing between upper and lower motor neuron functions and dysfunctions, between predominantly left and right hemispheric functions, and between predominantly anterior and posterior cerebral functions, extrapyramidal motor disease, and functions and dysfunctions associated with cerebrovasculature and cerebrospinal fluid (i.e., circulatory patterns, consequences of blockage or leakage). An introduction to investigational methods of brain functioning is presented.

### Basic physiology of the CNS

1. Cortex: Functional mapping of the primary sensory and motor areas
2. Subcortical areas:
  - Association tracts

- Hypothalamic functions
  - The *grande lobe limbique*
  - Basal ganglia: Functional considerations (movement disorders, frontal/midbrain association tracts)
  - Medullary and pontine nuclei, associated transmitters, and function
3. The spinal cord
    - Upper and lower motor neurons: Functional considerations
    - Anterior and posterior horns, laminae of the central gray
    - Spinal nerves and special senses: pain, heat, touch, vibration, and kinesthesia
    - Voluntary movement, involuntary movement, and autonomic regulation
  4. The autonomic nervous system
    - Gross anatomy
    - Sympathetic and parasympathetic divisions
    - Chemical anatomy and neurotransmitters
    - Functional considerations
  5. Experimental/investigatory methods of brain/behavior relationships
    - Preclinical and clinical psychopharmacological studies
    - Pharmacological studies in animals
    - Stereotactic lesioning and stimulation
    - Chemical lesioning and stimulation
    - Single neuron studies
    - Radionuclide labelling and radiographic studies
    - Postmortem studies
    - Clinical applications (stereotactic surgery; radiodiagnostics)

### III. CELLULAR AND MOLECULAR BIOLOGY

The learner should acquire knowledge of the basic structure of the neuron and supporting cells. The parts and functions of the neuron are essential for understanding brain function at the cellular level. Learners should be capable of describing the activities of dendrites, soma, axon, and synaptic cleft, as well as be familiar with the various types of neurons (e.g., interneurons, bipolar, sensory, and motor neurons) and supporting cells (e.g., Schwann cells, microglia, astrocytes). The function and dysfunction of myelin is of special concern because of its role in some degenerative diseases. There should be attention to retrograde and anterograde axoplasmic transport; exocytosis, pinocytosis, and membrane physiology as it pertains to action potentials (AP), excitatory post-synaptic potentials (EPSP), inhibitory post-synaptic potentials (IPSP), and refractory period. Sensory neurons and their basic mechanisms for sensing pain, touch, heat, vibration, kinesthesia, light, sound, and odor should be understood.

Structure and function of neurons and supporting cells

1. The neuron
  - Structure of the idealized neuron
  - The soma and its contents
  - Dendrites and intracellular transmission
  - The axon, anterograde, and retrograde axonal transmission
  - The synaptic bouton and its contents
  - Oligodendrocytes, astrocytes, and microglia
  - Conductivity in myelinated and unmyelinated axons
  
2. Cellular communication
  - The action potential
  - Resting membrane potentials
  - Influx and efflux of ions in the neuron
  - Passive ion exchange
  - Active processes: The sodium-potassium-ATP pump and other ion pumps
  - Generation
  - Propagation
  - Summation
  - Action potentials in the synaptic bouton: Calcium ions and neurotransmitter release
  - Synaptic transmission
  - Chemical transmission
  - Electrical transmission
  
3. Receptors: Introduction to composition and function\*
  - Transmembrane protein receptors
  - Ligand gated channels
  - Intracellular receptors
  - Second messenger systems
  - (\* Receptors will be covered in depth in Modules 2 and 3)

#### IV. NEUROCHEMISTRY AND NEUROENDOCRINOLOGY

The learner should acquire knowledge of neurotransmitters and neuropeptides; transmitted amino acids, second messengers, and reception; and secretion of hormones by neurons. Production and metabolism of acetylcholine, norepinephrine, dopamine, serotonin, inhibitory neuropeptides (e.g. GABA, glycine), and excitatory neuropeptides (glutamate, aspartate) along with localization and functional considerations will be presented. There should be an appreciation for primary neuroendocrine glands (e.g., pituitary and pineal as well as hypothalamic function).

Neurochemical and neuroendocrine processes

1. Acetylcholine:
  - Biosynthesis and degradation
  - Localization and function of cholinergic neurons in the CNS
  - Cholinergic interneurons and motor control

- Clinical considerations: Anticholinergic side effects of TCAs; adjunctive use of anticholinergics with antipsychotic agents
2. Dopamine:
    - Synthesis and degradation
    - Localization and function of dopaminergic tracts and nuclei
    - Dopamine receptor subtypes
    - Role in psychotic illnesses
    - Antagonism by antipsychotic agents
  3. Norepinephrine:
    - Biosynthesis and degradation
    - Localization and function of noradrenergic tracts and nuclei in the CNS
    - Locus coeruleus
  4. Serotonin:
    - Biosynthesis and degradation
    - Location and function of major serotonergic nuclei and tracts
    - Role of serotonin in mental illness
    - Serotonin as a neuroregulator
  5. GABA and other inhibitory neurotransmitters:
    - GABA synthesis and degradation
    - GABA receptor complex
    - GABAergic neurons: Principal locations and function
    - Glycine and other putative inhibitory transmitters
    - Inhibitory processes and interneurons
  6. Excitatory transmitters (glutamate, aspartate):
    - NMDA receptor complex
    - Receptor subtypes
    - Agonists and antagonists
    - Calcium, nitric oxide, and neurotoxicity
  7. The hypothalamus and pituitary gland:
    - Anatomy and function (anterior and posterior divisions, hormonal synthesis, and secretions)
    - Hypothalamic neurosecretion: Pituitary regulation, reproductive hormones
    - Hypothalamic/pituitary/adrenal axis
    - Pituitary/thyroid functions
  8. The Pineal Gland: Neurohormonal role and serotonin

## SAMPLE TEST QUESTIONS

1. The primary motor strip is \_\_\_\_\_ to the angular gyrus.
  - a. anterior
  - b. posterior
  - c. inferior
  - d. superior
  
2. The area most responsible for regulation of feeding and sexual drives is the \_\_\_\_\_.
  - a. thalamus
  - b. reticular activation system
  - c. hypothalamus
  - d. basal ganglia
  
3. What property or properties are responsible for the homeostasis of sodium and potassium in and around the neuron?
  - a. concentration gradient
  - b. electrical and concentration gradients
  - c. nonpermeable membranes
  - d. electrical gradient and nonpermeable membranes
  
4. Exocytosis occurs \_\_\_\_\_.
  - a. when neurons need to expel waste
  - b. when taking up synaptic neurotransmitters
  - c. when the soma reaches the threshold necessary for an action potential
  - d. when the intracellular vesicles merge with the neuronal membrane
  
5. Complete occlusion of the right middle cerebral artery is likely to cause all but which of the following?
  - a. hemiparesis
  - b. hemiballismus
  - c. impaired speech
  - d. left-sided neglect
  
6. The omega-1 binding site on the GABA receptor complex is the putative site of action of benzodiazepines. The GABA receptor complex is located on neurons in which principal brain area?
  - a. spinal cord
  - b. hypothalamus

- c. hippocampus
  - d. amygdala
  - e. all of the above
7. Which of the following dopaminergic pathways is primarily implicated in the antipsychotic action of neuroleptic agents?
- a. mesolimbic mesocortical
  - b. nigrostriatal
  - c. incertohypothalamic
  - d. tuberoinfundibular
  - e. medullary-periventricular
8. The rate controlling enzyme in the biosynthesis of serotonin is:
- a. tyramine hydroxylase
  - b. tryptophan hydroxylase
  - c. amino acid decarboxylase
  - d. HVA
  - e. 5-HIAA
9. The highest concentration of noradrenergic neurons in the CNS is found in the:
- a. putamen
  - b. amygdala
  - c. locus coeruleus
  - d. hippocampus
  - e. pineal body
10. Which of the following structures is not part of the basal ganglia?
- a. caudate nucleus
  - b. globus pallidus
  - c. putamen
  - d. amygdala
  - e. substantia nigra
11. Which of the following is not an example of a second messenger protein?
- a. cAMP
  - b. DAG
  - c. inositol
  - d. NMDA

- e. arachidonic acid
12. Potassium is:
- a. the primary extracellular ion
  - b. equally distributed on both sides of the cell membrane
  - c. the primary intracellular ion
  - d. nonpermeable through nongated ion channels
  - e. diffusible across cell membranes only via active (ATP dependent) mechanisms
13. Speed of propagation of the action potential is increased in cells which have:
- a. smaller axonal diameters
  - b. unmyelinated axons
  - c. myelinated axons
  - d. larger axoplasmic resistance
  - e. myelin plaques
14. The loss of nigrostriatal dopaminergic neurons, as would be observed in Parkinson's and other disease states, might have which of the following effects:
- a. reducing inhibition of cholinergic neurons
  - b. increasing the number of GABAergic neurons
  - c. decreasing prolactin secretion
  - d. increased HVA in CSF
  - e. none of the above
15. In the autonomic nervous system, norepinephrine is:
- a. the postsynaptic neurotransmitter in the SNS
  - b. the presynaptic neurotransmitter in the PSNS
  - c. the pre- and postsynaptic neurotransmitter in the PSNS
  - d. the neurotransmitter at the neuromuscular junction in the SNS
  - e. equally distributed throughout the ANS

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## **Module 2 and 3:**

### **PRINCIPLES OF PSYCHOPHARMACOLOGICAL TREATMENT**

#### **PURPOSE**

The purpose of these modules is to provide a fundamental understanding of how drugs are delivered to and removed from their site(s) of action; to impart basic knowledge on the pharmacological features of different classes of drugs and the way in which these drugs produce their biological effects; to give examples of clinically relevant drug interactions that illustrate pharmacodynamic and pharmacokinetic principles of drug effects; and to describe the methods by which drugs are classified, regulated, and controlled by governmental agencies. These modules will provide learners with basic mechanisms and principles of drug action that will enable more focused study on psychopharmacologic treatments.

#### **LEARNING OBJECTIVES**

These modules are designed to help the learner:

1. Know the major chemical features of drugs that influence their effects on biological systems. Identify the major influences of drug absorption, distribution, and elimination, including a fundamental understanding of: 1) body compartments throughout which drugs distribute; 2) relationships between different routes of administration and bioavailability; 3) role of the kidney, liver and other organs in the elimination of drug and drug metabolites; 4) the meaning and relevance of clearance rate, half-life, and first-pass effect.
2. Know the different types of receptors through which drugs exert effects and the various mechanisms by which drugs produce effects through receptors. Understand the principles that govern the actions of drugs at receptors and know the definitions and biological relevance of affinity, efficacy, and spare receptors. Recognize the pharmacological and physiological parameters that determine selectivity, specificity, and potency of a drug.
3. Be able to describe and give examples of the various mechanisms by which drugs from the same and different pharmacological classes can interact. Know the therapeutic implications (positive and negative) of drug combinations and drug interactions.
4. Understand the dynamic interactions that occur between drugs and behavior and appreciate the importance of environment in determining drug action.
5. Appreciate the sources of individual differences in drug action that occur in association with gender, ethnicity, age, and specific physical conditions.
6. Know the various ways by which drugs are classified, including categories assigned by therapeutic uses. Identify how drugs are scheduled and the characteristics that lead to classification in Schedules I through V.

## MAJOR CONTENT AREAS OF THE SYLLABUS

### I. PHARMACOKINETICS

#### A. Absorption

1. Passage through cell membranes
  - a. Passive diffusion
  - b. Carrier-mediated transport
    - (1) Facilitated diffusion
    - (2) Active transport
  - c. Pinocytosis
2. Factors affecting absorption
  - a. Drug solubility
  - b. Route of administration
  - c. Concentration at site of absorption
  - d. Blood flow at site of absorption
  - e. Weak acids and bases, pH, and ionization
  - f. Age, gender, and ethnic considerations
3. Sites of drug absorption  
Oral, gastrointestinal, parenteral, others

#### B. Distribution

1. Blood flow
2. Plasma protein binding
3. Barriers (blood-brain, placenta)
4. Redistribution (e.g., thiopental)
5. Age, gender and ethnic considerations

#### C. Elimination

1. Biotransformation (metabolism)
  - a. Deactivation, activation (e.g., prodrug)
  - b. Sites of transformation
    - (1) Liver
    - (2) Lung

- (3) Gastrointestinal
    - (4) Kidney
    - (5) Blood
  - c. Filtration and bulk flow
  - d. First-pass effect
  - e. Factors affecting metabolism
    - (1) Age
    - (2) Gender
    - (3) Ethnic
    - (4) Others (e.g., diet)
  - f. Enzyme inhibition
  - g. Enzyme induction
- 2. Excretion: Renal, biliary, pulmonary, sweat, saliva, tears, milk, hair, skin
- 3. Plasma half life and biological half life
- 4. Physiologic modulation of drug elimination (e.g., pH)

#### D. Clinical pharmacokinetics

- 1. Bioavailability
- 2. Volume of distribution ( $V_d$ )
- 3. Single and multiple compartment models
- 4. Single and multiple administrations and constant infusion
- 5. Steady state
- 6. Zero- and first-order kinetics

## II. PHARMACODYNAMICS

### A. Receptor-mediated drug action

- 1. Families of receptors
  - a. Cell surface (transmembrane)
    - (1) Ligand-gated (channel)
    - (2) Second-messenger linked (e.g., cAMP)
  - b. Intracellular (e.g., steroid)

2. Receptor regulation
3. Receptor desensitization
4. Receptor theory
  - a. Importance of free drug concentration at receptor
  - b. Affinity ( $K_d$ )
  - c. Efficacy
    - (1) Full, partial, and inverse agonists
    - (2) Spare receptors
    - (3) Structure-activity relationships
  - d. Antagonism
    - (1) Simple competitive
    - (2) Noncompetitive
    - (3) Irreversible
    - (4) Pharmacologic versus physiologic
  - e. Specificity and selectivity of drug action
    - (1) Relative affinities
    - (2) Availability of specific receptor types and subtypes
  - f. Dose-response relationships
    - (1) Threshold dose
    - (2) Potency
    - (3) Quantal and graded effects
    - (4)  $ED_{50}$
    - (5)  $LD_{50}$
    - (6) Therapeutic index

#### B. Receptor-independent drug action

1. Alter normal metabolism (antiparkinson, antihypertensives)
2. Alter chemical actions (anticoagulants)
3. Alter physical structure (general anesthetics)
4. Alter enzymatic activity (antibiotics)

### III. DRUG INTERACTIONS (PHARMACOKINETIC AND PHARMACODYNAMIC)

#### A. Types of interactions

1. Addition
2. Synergism

3. Potentiation
  4. Antagonism
  5. Novel action
- B. Consequences of interactions
1. Adverse effects
    - a. Tolerance
    - b. Dependence
    - c. Allergic reaction
  2. Altered (increased or decreased) therapeutic action

#### IV. BEHAVIORAL MECHANISMS OF DRUG ACTION

- A. Environmental considerations
1. Pharmacological history
  2. Behavioral history
- B. Pharmacological and behavioral history and drug action
- C. Tolerance and cross tolerance
1. Pharmacokinetic
  2. Pharmacodynamic
  3. Behavioral (associative versus nonassociative)
- D. Physical dependence and withdrawal
1. Acute
  2. Chronic
- E. Animal models of central nervous system dysfunction
1. General experimental designs
    - (a) Depression
    - (b) Anxiety

- (c) Aggression
  - (d) Schizophrenia
  - (e) Movement disorders
  - (f) Cognitive disorders
  - (g) Drug abuse
2. Validation of procedures
    - (a) Face validity
    - (b) Pharmacological validity
  3. Predictive value
  4. Problems and confounds

## V. NOMENCLATURE, REGULATION, SCHEDULES

### A. Ways in which drugs are classified:

1. Origin
2. Action
3. Mechanism of action
4. Site of drug action
5. Therapeutic use
6. Chemical structure
7. Proprietary/trade names
8. Street names

### B. Common classification system for psychoactive drugs:

One commonly accepted classification system of psychoactive drugs organizes them into seven classes by therapeutic use:

1. Sedative-hypnotic compounds (CNS depressants)
2. Stimulants and anticonvulsants
3. Analgesic agents
4. Antianxiety agents

5. Mood Stabilizing agents
  6. Antidepressant agents
  7. Antipsychotic agents
- C. Drug regulation and scheduling
1. Controlled Substance Act, 1991
  2. Comprehensive Drug Abuse Prevention and Control Act of 1970
  3. Scheduling of drugs
    - a. Role of Health and Human Services
    - b. Role of Food and Drug Administration
  4. Enforcement of drug laws
    - a. Role of Department of Justice
    - b. Role of Drug Enforcement Administration
      - Controlled Substances Inventory
  5. Factors considered in scheduling of drugs
    - a. Abuse potential
    - b. Scientific evidence of pharmacological effects
    - c. Scientific evidence on pharmacologic properties
    - d. Current and historical patterns of abuse
    - e. Scope, duration, and significance of abuse
    - f. Risk to public health
    - g. Evidence on psychological and/or physiological dependence
    - h. Relationship to an already controlled substance
- D. List of Schedules, defining characteristics, and examples of drugs
1. Schedule I
  2. Schedule II
  3. Schedule III
  4. Schedule IV
  5. Schedule V
- E. Teratogenic potential categories, defining characteristics, and examples of drugs

1. Category A
2. Category B
3. Category C
4. Category D
5. Category X

### **SAMPLE TEST QUESTIONS**

1. What route of administration typically delivers a drug fastest to the brain?
  - a. intravenous
  - b. oral
  - c. transmuscular
  - d. inhalation
2. Applying a re-uptake inhibiting drug leads to what action at the post-synaptic membrane?
  - a. potentiation of the action of the synaptic neurotransmitter
  - b. antagonistic properties
  - c. upregulation
  - d. termination of the action of the synaptic neurotransmitter
3. The half-life of a drug is \_\_\_\_\_.
  - a. a fixed property
  - b. usually a function of urinary output
  - c. affected by individual and group differences
  - d. dependent on the disorder being treated
4. LD<sub>50</sub> is a measure of a drug's \_\_\_\_\_.
  - a. lowest dose that is effective for 50% of patients
  - b. blood plasma level
  - c. elimination rate for 50% of the drug
  - d. lethality
5. Serotonergic function is most related to which of the following?
  - a. abuse of benzodiazepines
  - b. depression

- c. mania
  - d. schizophrenia
6. Affinity and efficacy are properties of which types of drugs that act as receptors?
- a. agonists
  - b. antagonists
  - c. both agonists and antagonists
  - d. neither agonists nor antagonists
7. Hepatic first-pass effect will not affect a drug that is administered by the \_\_\_\_\_ route.
- a. intramuscular
  - b. sublingual
  - c. transdermal
  - d. all of the above
8. The apparent volume of distribution ( $V_d$ ) of a drug increases with \_\_\_\_\_.
- a. increased molecular weight
  - b. increased first-pass effects
  - c. increased lipophilicity
  - d. increased polarity
9. Increases in the number of functional receptors will \_\_\_\_\_.
- a. increase the half-life of a reversible antagonist
  - b. decrease the potency of a low-efficacy agonist
  - c. have little or no effect on a high-efficacy agonist
  - d. increase the potency of agonists and antagonists
10. A decrease in gastrointestinal motility will have what effect on a drug that is absorbed slowly and incompletely from the small intestine?
- a. increase elimination
  - b. decrease absorption
  - c. increase absorption
  - d. no effect
11. Darvon is classified under which Schedule?
- a. Schedule I
  - b. Schedule II
  - c. Schedule III
  - d. Schedule IV

e. Schedule V

12. The Comprehensive Drug Abuse Prevention and Control Act specifically excludes:

- a. distilled spirits and look-alike drugs
- b. cigarettes and antidiarrheal drugs
- c. wine and malt beverages
- d. immediate precursors of controlled substances
- e. herbal medications and look-alike drugs

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Experimental and Clinical Psychopharmacology, American Psychological Association, Washington DC.

The Journal of Pharmacology and Experimental Therapeutics, Williams and Wilkins, Baltimore, MD.

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Trends in Pharmacological Sciences, Elsevier Trends Journals, Cambridge, UK.

## **Module 4:**

### **GENERAL INTRODUCTION TO CLINICAL PSYCHOPHARMACOLOGY**

#### **PURPOSE**

Psychologists in clinical practice routinely interact with patients who are on psychotropic medication and/or could benefit from the addition of psychotropic medication to their treatment regimen. The purpose of this module is to provide an introduction to the historical, philosophical, biopsychosocial, and legal/ethical factors involved in the use of medication in clinical practice within the context of the psychologist/physician treatment collaboration situation.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Acquire an understanding of the history of the use of medications to treat mental disorders, including the involvement of psychologists in the development and use of these substances.
2. Acquire an understanding of the perspective and practices of the biologically oriented practitioner and the relationship of this biological approach to the functional model of mental illness.
3. Acquire an understanding of the interaction among biological, psychological, and interpersonal factors within the medication process.
4. Acquire a general awareness and understanding of the interactive effects of various classes of individual differences (e.g. gender, age, ethnicity, disability) on the medication process.
5. Acquire an understanding of the advantages and disadvantages (including potential conflicts) associated with the physician/psychologist collaboration model of treatment, as well as issues related to the development and successful maintenance of a collaborative relationship.
6. Acquire a general understanding of the empirical data that support the efficacy of psychotherapy and medication treatment combinations.
7. Acquire an understanding of the ethical/legal issues related to the use of medication in clinical practice.

#### **MAJOR CONTENT AREAS OF THE SYLLABUS**

##### **INTRODUCTION OF CLINICAL PSYCHOPHARMACOLOGY**

###### **A. History of Use of Medications to Treat Mental Disorders**

1. General overview of medication use history--from ancient times to present

2. Psychologists' involvement with medication development (research) and use
  3. The prescription privilege movement in psychology
- B. The rationale for psychologists to have knowledge of basic clinical psychopharmacology
1. Increased recognition that mental disorders are a biopsychosocial entity
  2. Increased research evidence in support of the efficacy of medication in the treatment of symptom clusters associated with specific mental disorders
  3. Increased awareness by the general public of medication as an effective treatment component for specific mental disorders
  4. Increased role of psychologists as independent health care practitioners and treatment decisionmakers
  5. Ethical/legal factors
- C. Theoretical perspective and practices of the biologically oriented practitioner
1. Biological model versus functional models of mental illness
  2. Biological conditions that mimic functional disorders
  3. Overview of the physical exam: Medical history, review of systems, routine laboratory tests
- D. Psychosocial dynamics of medication use--Medication treatment as a biopsychosocial event
1. Placebo effect
    - a. Concept defined
    - b. Research evidence in support of the placebo effect
    - c. Effects on both patient and therapist
    - d. Need to control placebo effects in psychotherapy and psychopharmacological clinical research
  2. Compliance
    - a. Concept defined
    - b. Factors related to patient medication compliance/noncompliance
  3. Psychosocial determinants of diagnosis, medication effects, and treatment outcome  
Overview of age, gender, and ethnicity influences
  4. Psychoeducational influences on response to medication

5. Patient issues and their effect on treatment
    - a. Patient's interpretation of the medication
    - b. Patient's interpretation of the motivation for being referred to a medication consultant
  6. Therapist issues and their effect on treatment
    - a. Therapist's motivation to refer the patient to a medication consultant
    - b. Therapist's response to patient's request to have a medication consultation
- E. Psychologist/physician combined treatment model
1. Model defined
  2. Estimate of prevalence
  3. Advantages
  4. Disadvantages--Potential areas of conflict
  5. When to consider referral to a medication consultant
  6. Division of labor
  7. Role of psychologist in combined treatment
    - a. Psychologist as therapist
    - b. Psychologist as medication monitor
  8. How to choose a physician medication consultant
- F. Efficacy of psychotherapy and psychopharmacology combinations
1. Research issues in assessing combined effectiveness
    - a. Sample size and composition
    - b. Control variables
    - c. Design models and related inferences
    - d. Outcome measures
  2. Overview of research evidence in support of combined effectiveness
- G. Ethical/legal issues related to the use of medication
1. Legal/regulatory basis of prescribing medication--What determines who can prescribe?
  2. Informed consent obligations

3. Patient's right to refuse medication treatment
4. Malpractice issues
5. Ethical obligations for psychologists

### SAMPLE TEST QUESTIONS

1. Indicate which of the following are true concerning the privilege to prescribe medication.
  - a. The authority to prescribe medication is primarily under Federal as opposed to State control.
  - b. "Licensed scope of practice" and "certification" are two models used for prescription privilege legislation.
  - c. Podiatrists, optometrists, and pharmacists have some degree of independent prescribing authority throughout the country.
  - d. Only a. and b. are true.
  - e. All the above are true.
2. All of the following are requirements for a successful malpractice action **except**:
  - a. there exists a patient-therapist relationship creating some duty of care
  - b. the therapist's conduct was at a level below the professionally reasonable level of care
  - c. the patient has been harmed
  - d. there is a close temporal relationship between the therapist's action and the harm to the patient
  - e. there are no exceptions, all the above alternatives are true
3. The "modern age of pharmacotherapy" is best associated with:
  - a. Hippocrates and Galen's theoretical statements relating mental illness to organic conditions
  - b. publication of Kraepelin's textbook on psychiatry, which listed a number of psychopharmaceutical agents
  - c. the serendipitous use of lithium, chlorpromazine, and iproniazid in clinical situations
  - d. the use of barbiturates and amphetamines to treat mania and depression
4. The following are generally consistent with the views of a physician medication consultant **except**:
  - a. the patient's symptoms are caused by a biological abnormality that needs to be corrected
  - b. there is an amoral view regarding the responsibility of the patient for his or her symptoms
  - c. the clinician tends to be directive and suggestive rather than collaborative regarding treatment
  - d. there are no exceptions, all the above are true
5. As a means of determining an individual's ability to physically tolerate medications, creatinine level is often measured since it reflects the functioning of the:
  - a. liver

- b. cardiovascular system
  - c. kidney
  - d. spleen
6. Research data has associated degree of medication compliance with:
- a. socioeconomic level
  - b. number of medications prescribed
  - c. psychoeducation of patient and family
  - d. only b. and c. above
  - e. all of the above
7. Which of the following statements is true?
- a. The term placebo comes from the latin meaning "I am inert."
  - b. Research supports significant placebo effects in the treatment of depression.
  - c. There is no research support for placebo effects in the treatment of schizophrenia.
  - d. All of the above are true.
8. Which of the following would be suggestive of the need to refer to a physician consultant:
- a. nonresponsivity to psychotherapy after a suitable trial
  - b. delirium or acute confusion
  - c. a family history of mania or schizophrenia
  - d. only b. and c. above
  - e. all of the above
9. Reviewing with patients the positive and negative aspects of alternatives to the recommended treatment:
- a. is a desirable but not ethically/legally necessary procedure
  - b. is a procedure supported by malpractice case law
  - c. is a practice consistent with the APA Ethical Code
  - d. both b. and c. above are true
  - e. all of the above
10. The efficacy of combined treatments with medication and psychotherapy has been found with:
- a. mood disorders
  - b. anxiety disorders
  - c. schizophrenic disorders
  - d. only a. and b. above
  - e. all the above

## RESOURCES FOR TEACHING

### BOOKS AND ARTICLES

#### General History of Psychopharmacology

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## **Module 5:**

### **INTRODUCTION TO THE PSYCHOPHARMACOLOGICAL TREATMENT OF PSYCHOACTIVE SUBSTANCE USE DISORDERS (NICOTINE, ALCOHOL, OPIOIDS)**

#### **PURPOSE**

This module will introduce the participant to issues in the treatment of substance use disorders. Major topics include: definitions of substance abuse and dependence disorders associated with alcohol, nicotine, and opioids as representative substances; physical and psychological assessment issues and instruments; prevalence; developmental progression and natural history; risk factors; and physical and psychological comorbidities of substance use disorders. Also covered are the scientific bases of pharmacological and psychosocial treatment.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Understand the historical conceptualization of the use of legal and illegal drugs as:
  - a. behavior;
  - b. habit;
  - c. psychoactive substance disorder.
2. Acquire knowledge of the impact of legal status of a drug on its use, abuse, and dependence.
3. Know the current psychiatric diagnostic criteria.
4. Understand the epidemiology of nicotine, alcohol, and opiate substance use disorders including the co-occurrence of other psychiatric and/or physical disorders.
5. Acquire knowledge of the behavioral pharmacology of nicotine, alcohol, and opiates; their reward characteristics; and abuse liability.
6. Understand the preclinical and clinical scientific literatures relevant to nicotine, alcohol, and opiates, including research strategies, tactics, and relevant findings.
7. Understand the known or hypothesized mechanism of action, pharmacokinetics, side effects, drug interactions, indications, and contraindications of nicotine replacement agents used in the treatment of smoking and nicotine dependence.
8. Understand the known or hypothesized mechanism of action, pharmacokinetics, side effects, drug interactions, indications, and contraindications of the pharmacological agents used in the treatment of various aspects of alcohol abuse disorders, including intoxication, withdrawal, excessive consumption, relapse, and co-occurring behavioral disorders.

9. Understand the known or hypothesized mechanism of action, pharmacokinetics, side effects, drug interactions, indications, and contraindications of the pharmacological agents used in the treatment of various aspects of opiate abuse/dependence disorders, including withdrawal and opiate replacement.
10. Become familiar with combinations of psychosocial and pharmacological therapies of substance use disorders.
11. Understand the utility of pharmacotherapies (with and without psychosocial treatment) in the phases of recovery from substance use disorders, including the acute, maintenance, and continuation phases.
12. Appreciate the contributions of age, gender, ethnicity, and physical conditions to the topics listed above.

## **MAJOR CONTENT AREAS OF THE SYLLABUS**

### **I. SUBSTANCE USE DISORDERS: DEFINED**

#### **A. Psychiatric diagnostic criteria**

1. Nicotine dependence
2. Alcohol abuse
3. Alcohol dependence
4. Opioid abuse
5. Opioid dependence

#### **B. Assessment issues**

1. Nosological issues:
  - a. Concept of unitary substance use disorder
  - b. Pathology versus problem behavior
  - c. Rate and motive in smoking
  - d. Quantity and frequency in drinking
  - e. Functional analysis
  - f. Role of criminalization
2. Assessing negative physical consequences
  - a. Tolerance and physical dependence
  - b. Medical diseases
3. Assessing negative psychosocial consequences

4. Assessing cost of negative physical and psychosocial consequences of disorder

C. Assessment instruments

1. DSM-IV, substance specific modules

2. CIDI

3. Fagerstrom

4. MAST

5. Addiction Severity Index

6. Physiological measures: Drug level, metabolites, etc.

D. Preclinical and clinical research strategies in substance use disorders

1. Genetic vulnerability

2. Family history variables

3. Individual risk factors

4. Environmental determinants

## II. OVERVIEW OF SUBSTANCE USE DISORDERS

A. Epidemiology

1. Incidence and prevalence

- a. Smoking, nicotine dependence

- b. Social drinking, alcohol abuse, alcohol dependence

- c. Opioid abuse, opioid dependence

2. Comorbidities

- a. Other psychiatric disorders

- b. Physical disorders

B. Developmental progression and natural history

1. Age of first use

2. Gateway drug

3. Drug of choice
4. Help seeking
5. Relapse
6. Treatment-assisted and unassisted recovery

C. Risk factors

1. Age
2. Sex
3. Ethnicity
4. Education
5. Family factors
6. Personality factors
7. Environmental factors

III. CLINICAL PSYCHOPHARMACOLOGY ISSUES

A. Biological basis of smoking and nicotine dependence

1. Nicotine as the addicting agent in tobacco
  - a. Role of delivery
  - b. Role of reinforcement
  - c. Role of tolerance and withdrawal

2. DA and Ach Systems

B. Biological basis of excessive alcohol consumption

1. Serotonergic system
2. Opioid system
3. Dopaminergic system
4. GABAergic system

C. Biological basis of opioid abuse and dependence

1. Endogenous opioid peptides  
Opioid receptors
  2. Natural, semisynthetic, and synthetic opiates
    - a. Role of delivery
    - b. Role of reinforcement
    - c. Role of tolerance and withdrawal
- D. Psychosocial basis of substance use, abuse, dependence
1. Role of experience
  2. Role of environmental and individual differences
  3. Role of conditioning factors
  4. Role of expectancies
  5. Role of illegal status of opioids
- E. Addressing physical aspects of dependence in treatment of nicotine dependence
1. Brand switching
  2. Nicotine replacement agents
  3. Nicotine Polacrilex
    - a. Pharmacokinetics
    - b. Effects on withdrawal symptoms
    - c. Side effects
    - d. Treatment outcome results
  4. Transdermal nicotine systems
    - a. Pharmacokinetics
    - b. Effects on withdrawal symptoms
    - c. Side effects
    - d. Treatment outcome results
  5. Determinants of use of nicotine replacement
  6. Transdermal nicotine system versus nicotine gum
  7. Cessation of nicotine replacement
- F. Addressing physical aspects of dependence in treatment of alcohol abuse and dependence

1. Pharmacological agents
    - a. Benzodiazepines
    - b. Thiamin, folate, and multivitamins
    - c. Disulfiram
    - d. Naltrexone
    - e. Lithium
    - f. SSRIs
  2. Hypothesized mechanism of action
  3. Pharmacokinetics
  4. Side effects
  5. Dosing parameters
  6. Indications and contraindications
- G. Addressing physical aspects of dependence in treatment of opioid abuse and dependence
1. Pharmacological agents
    - a. Methadone
    - b. LAAM
    - c. Buprenorphine
    - d. Clonidine
    - e. Naltrexone
    - f. Naloxone
  2. Detoxification
  3. Stabilization
  4. Drug replacement
    - a. Short-term
    - b. Long-term
  5. Abstinence
- H. Addressing psychosocial aspects of dependence in treatment
1. Models of quitting drug use
    - a. Self-help
    - b. Health professional stepped care (in medical settings)
    - c. Minimal contact (inpatient/outpatient)
    - d. Hypnosis, acupuncture, other modalities
    - e. Social and coping skills training

2. Models of maintaining abstinence  
Relapse prevention/recovery

I. Treatment strategies

1. Acute
  - a. Intoxication
  - b. Withdrawal
  - c. Psychosocial crisis management
2. Maintenance
  - a. Reducing or eliminating alcohol consumption
  - b. Skill training
  - c. Relapse prevention

IV. ISSUES OF SPECIAL POPULATIONS AND COMORBIDITY

A. Special populations

1. Adolescent
2. Pregnant
3. Elderly
4. Ethnic

B. Comorbidity

1. Co-occurring psychiatric disorders
2. Co-occurring medical disorders

## SAMPLE TEST QUESTIONS

1. From 1965 to 1991, rates of current smoking in the U.S. declined:
  - a. from 52.7% to 25.9%
  - b. from 41.7% to 25.9%
  - c. from 50.7% to 30.4%
  - d. from 41.7% to 27.0%
  - e. none of the above is correct
  
2. Nicotine's reinforcing effects are related to all of the following except:
  - a. prior use
  - b. learned effects
  - c. speed at which it reaches the brain
  - d. method of delivery
  - e. its solubility in water
  
3. The levels of blood nicotine attained with 2 mg nicotine gum is ?% of that attained from cigarettes:
  - a. 25% to 33.3%
  - b. 15% to 30%
  - c. 50% to 60%
  - d. 70% to 80%
  - e. 90% to 100%
  
4. Meta analytic studies of nicotine replacement therapy indicate that it is best given:
  - a. with behavioral treatment
  - b. for short periods only
  - c. to smokers with a history of failure using other methods
  - d. to people with life-threatening illnesses
  - e. to women as compared to men
  
5. What percent of the U.S. population reports a lifetime prevalence of an alcohol abuse/dependence disorder?
  - a. 30-35%
  - b. 5-10%
  - c. 50-55%
  - d. 15-20%
  - e. 10-15%
  
6. What percent of alcohol abuse/dependence cases enter formal treatment?
  - a. 10-20%

- b. 40-50%
  - c. 70-80%
  - d. 90-100%
7. Which of the following is typically used to treat alcohol withdrawal?
- a. naltrexone
  - b. thiamin
  - c. benzodiazepines
  - d. lithium
8. The half-life of LAAM is:
- a. 96 hours
  - b. 24 hours
  - c. 48 hours
  - d. 72 hours
9. Which medication is not used for opioid detoxification?
- a. methadone
  - b. LAAM
  - c. buprenorphine
  - d. naltrexone
10. Which of the following is considered a medium maintenance dose of methadone?
- a. 20 mg
  - b. 10 mg
  - c. 50 mg
  - d. 80 mg
11. Three to five years following discharge from a drug free treatment program, what percent of former opioid abusers are abstinent?
- a. 80-90%
  - b. 10-20%
  - c. 30-40%
  - d. 50-60%

## RESOURCES FOR TEACHING

### BOOKS AND ARTICLES

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Addictive Behaviors

Addictions

Clinical Pharmacology Therapy

Drug and Alcohol dependence

Experimental and Clinical Psychopharmacology

Journal of Studies on Alcohol

Journal of Substance Abuse

Pharmacology, Biochemistry & Behavior

Psychopharmacology

**ELECTRONIC AIDS**

National Institute on Drug Abuse, Adolescent Treatment Approaches, VHS40; Assessment, VHS38; Drug Abuse and the Brain, VHS57; Dual Diagnosis, VHS58; Methadone, VHS59; Relapse Prevention, VHS39; Treatment Issues for Women, VHS39, Videotape Series

## **Module 6:**

### **INTRODUCTION TO PSYCHOPHARMACOLOGICAL TREATMENT OF PSYCHOTIC DISORDERS**

#### **PURPOSE**

This module is designed to introduce the learner to the pharmacological treatment of psychotic disorders. Types of psychotic disorders, notably the various presentations of schizophrenia, will be briefly presented along with epidemiology and phenomenology of these disorders. Antipsychotic agents from all classes will be discussed, with a focus on putative mechanisms of action, side effects, and interactions with other agents.

As this module is designed to familiarize the learner with clinical applications of antipsychotic agents used to treat psychotic disorders, some knowledge is required of presumed biological mechanisms of psychosis. The role of neurotransmitters, notably dopamine, and abnormal brain morphology and neurochemistry in the etiology of psychotic disorders is covered. Essential issues relating to the use of antipsychotic agents are covered, with a focus on exposure to long-term side effects and other medicolegal problems.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Acquire knowledge of the phenomenology and presumed etiology of schizophrenia and other psychotic disorders and techniques for assessing such disorders.
2. Acquire knowledge of neuroanatomical structures and neurochemical pathways implicated in psychotic disorders.
3. Acquire knowledge of major dopaminergic pathways in the CNS and their role in psychosis and movement disorders.
4. Acquire knowledge of functional anatomy of the basal ganglia and putative etiology of movement disorders.
5. Acquire knowledge of the history of biological treatment of psychosis.
6. Acquire knowledge of the dopamine hypothesis and other explanations of psychosis.
7. Acquire knowledge of dopaminergic and serotonergic receptor subtypes and their role in the disorder.
8. Acquire knowledge of all classes of antipsychotic agents, indications for use, side effects, and dosing parameters.
9. Acquire knowledge of all classes of adjunctive agents used with antipsychotic agents, their indications for use, side effects, and dosing parameters.

## MAJOR CONTENT AREAS OF THE SYLLABUS

### I. PSYCHOTIC DISORDERS: DEFINED

#### A. Definitions and phenomenology of

1. Psychotic syndromes
  - a. Schizophrenia and subtypes
  - b. Schizophreniform disorder
  - c. Schizoaffective disorder
  - d. Brief psychotic episode
  - e. Shared psychotic disorder
  - f. Delusional disorder
2. Other syndromes with psychotic features
  - a. Psychotic disorder due to a general medical condition
    - (1) Alzheimer's dementia, Pick's dementia, and other dementing disorders
    - (2) Space occupying cranial lesions, multiple sclerosis, Systemic lupus erythematosus
    - (3) Substance abuse induced psychotic disorder: PCP, amphetamines, etc.
    - (4) Other physiologic or toxic states with psychotic presentations
3. Mood disorders with psychotic presentations
  - a. Major depression with psychotic features
  - b. Bipolar disorder

#### B. Nosology

##### Preclinical and clinical research strategies

- a. Animal models of psychosis
- b. Deliriant/hallucinogenic/stimulant drugs and the biochemical induction of psychosis
- c. Brain imaging (PET, SPECT, MRI, CT, rCBF)

#### C. Assessment

1. Evidence for biological correlates of schizophrenia/psychotic disorders
  - a. Studies of abnormal brain structure and function
    - (1) Gross abnormalities in CNS structure
    - (2) Brain asymmetry and psychosis
    - (3) Frontal lobe and executive function deficits
    - (4) Left hemispheric functional abnormalities in psychosis
    - (5) Ocular and auditory abnormalities in psychosis
2. Psychological diagnostic instruments
  - a. Neuropsychological assessment

- (1) Frontal lobe dysfunction
  - (2) Hemispheric dysfunction
  - (3) Visual processing deficits
  - (4) The search for a definitive battery
  - b. Self-report measures and projective testing
3. Physiological and laboratory exams in the assessment of psychotic disorders
    - a. Metabolic perturbations resulting in psychosis
    - b. Role of brain imaging and EEG in clinical practice

## II. OVERVIEW OF PSYCHOTIC DISORDERS

### A. Incidence and prevalence of schizophrenia

1. Familial incidence of schizophrenia
2. Proband and adoptive studies
3. Cross-cultural prevalence of schizophrenia

### B. Risk factors related to schizophrenia

1. Demographic correlates
2. Genetic vulnerability
3. Psychosocial vulnerability
4. Biopsychosocial vulnerability: The stress/diathesis model

### C. Relapse and recurrence of schizophrenia and other psychoses

1. Time course of acute psychotic episodes (treated and untreated)
2. Relapse rates in schizophrenia, bipolar disorder (psychotic manic states), and psychotic major depressions
3. Prodromal and residual phases
4. Schizophrenia as a chronic condition: New evidence for a nonunified theory

### D. Costs of untreated or undertreated disorders

1. Economic issues: Long-term hospitalization, unemployment, homelessness
2. Suicide and comorbid disorders (substance abuse) in schizophrenia

### III. CLINICAL PSYCHOPHARMACOLOGY ISSUES

#### A. Biological hypothesis of schizophrenia/psychotic symptoms

1. Dopamine Hypothesis
  - a. Definition and clinical/research supportive evidence
  - b. Dopaminergic neuronal tracts-anatomy and function
  - c. Pharmacology of dopaminergic receptor subtypes
  - d. Receptor occupancy theory and D2 receptors
2. Serotonin hypothesis
  - a. Subtypes of serotonin receptors
  - b. Serotonergic tracts: Anatomy and function
  - c. Pharmacology of serotonergic receptors
3. Movement disorders, extrapyramidal syndromes, and tardive dyskinesia
  - a. Basal ganglia: Neuroanatomy and chemical anatomy
  - b. Post synaptic receptor supersensitivity
  - c. GABA and other hypotheses of tardive dyskinesia

#### B. Treatment strategies

1. Acute psychoses
  - a. Medication strategies (including IM and elixir forms) and side-effect management
  - b. Time course of acute phases of schizophrenia
  - c. Treatment of negative and positive symptoms
  - d. Placebo responding in psychotic disorders
2. Maintenance treatment
  - a. Dosing strategies and side-effect management
  - b. Relapse rates and medication discontinuation
3. Continuation treatment
  - a. Dosing strategies
  - b. Compliance issues and decanoate preparations
  - c. Exposure to tardive dyskinesia: risk factors
  - d. Tardive dyskinesia: Detection (Abnormal Involuntary Movement Scale {AIMS} test), management, and long-term outcome
4. Medication-free strategies
  - a. Cognitive retraining
  - b. Social skills retraining
  - c. Family and environmental interventions
  - d. Individual therapeutic approaches

C. Psychopharmacological agents to treat schizophrenia/psychosis

1. Chemistry and pharmacokinetics
2. Mechanisms of action
3. Side effects
4. Clinically significant drug interactions (licit and illicit substances)
5. Dosing parameters
6. Efficacy data in schizophrenia and other psychoses
7. Classification by high and low potency medications

D. Discussion of all factors in C for each of the following classes:

1. Antipsychotic agents
  - a. Phenothiazines
    - (1) Aliphatics
    - (2) Piperidines
    - (3) Piperazines
  - b. Thioxanthenes
  - c. Butyrophenones
  - d. Dibenzoxazepine
  - e. Dihydroindolones
  - f. Dibenzodiazepine
  - g. Benzisoxazole

2. Adjunctive medication agents to treat side effects, including *their* side effects, both physical and psychological
  - a. Anticholinergics
  - b. Antihistaminergics
  - c. Dopaminergic agents
  - d. Beta blockers
  - e. Vitamin E

E. Other uses of antipsychotic agents

1. Tourette's syndrome
2. Severe obsessional states
3. Neurological disorders
4. Post-cardiotomy delirium
5. ICU psychosis

F. Combined psychological/pharmacological treatment

1. Individual, family, and environmental interventions
2. Comparative outcome studies

G. Specific legal/malpractice concerns with the use of antipsychotic agents

1. Tardive dyskinesia
2. Neuroleptic malignant syndrome
3. Agranulocytosis

IV. ETHNIC, GENDER, AND AGE RELATED CONSIDERATIONS

- A. Use of antipsychotics in disorders of childhood and adolescence
- B. Use of antipsychotics in pregnancy
- C. Use of antipsychotics in geriatric populations

## SAMPLE TEST QUESTIONS

1. Haloperidol is a(n)
  - a. aliphatic phenothiazine
  - b. piperazine phenothiazine
  - c. dihydroindolone
  - d. butyrophenone
  - e. aquatic phenylephrine
  
2. With which of the following antipsychotic agents would you be MOST concerned about cardiac side effects?
  - a. pimozide
  - b. chlorpromazine
  - c. trifluoperazine
  - d. thioridazine
  - e. haloperidol
  
3. The site of action for most antipsychotic drugs is presumed to be the:
  - a. presynaptic D1 receptor
  - b. postsynaptic D1 receptor
  - c. nigrostriatal dopamine receptors
  - d. presynaptic D2 receptor
  - e. postsynaptic D2 receptor
  
4. Agranulocytosis, or reduction of polymorphonuclear leukocyte blood cells to less than 500 per  $\text{mm}^3$ , is most commonly associated with the use of which antipsychotic agent?
  - a. risperidone
  - b. molindone
  - c. trifluoperazine
  - d. clozapine
  - e. remoxapride
  
5. The AIMS test is a measure of:
  - a. liver functioning
  - b. prolactin levels
  - c. abnormal motor movements
  - d. likelihood of response to antipsychotic agents
  - e. attention/concentration difficulties
  
6. Side effects typically associated with high potency antipsychotic medications include:

- a. anticholinergic symptoms
  - b. sedation
  - c. extrapyramidal symptoms
  - d. orthostatic hypotension
  - e. all of the above
7. Pimozide is most commonly used in the treatment of:
- a. Tourette's syndrome
  - b. agitated dementia
  - c. agitation in manic patients
  - d. negative symptoms of schizophrenia
  - e. PCP/LSD induced psychoses
8. Decanoate antipsychotic medications:
- a. are available for all currently approved antipsychotic agents
  - b. are particularly useful for patients with a heavy history of noncompliance
  - c. have a rapid onset of therapeutic effects
  - d. can be given in capsule, injectable or oral form
  - e. all of the above are true
9. High fever and muscular rigidity are associated with:
- a. pseudoparkinson side effects
  - b. tardive dyskinesia
  - c. anticholinergic symptoms
  - d. neuroleptic malignant syndrome
  - e. none of the above
10. Akathisia refers to:
- a. severe muscular rigidity
  - b. motor restlessness
  - c. early symptoms of tardive dyskinesia
  - d. evidence of no motor adverse side effects
  - e. none of the above

11. The one antipsychotic agent for which there is an absolute maximum daily dose is:
- mesoridazine
  - trifluoperazine
  - haloperidol
  - thioridazine
  - chlorpromazine
12. A drug which has been specifically marketed as targeting the negative symptoms of schizophrenia is:
- droperidol
  - risperidone
  - perphenazine
  - loxapine
  - pimozide
13. Tardive dyskinesia is:
- more common after short-term, rather than long-term treatment with antipsychotics
  - a major contraindication to the use of clozapine
  - best controlled by increasing the dose of antipsychotic medication
  - often reversed with administration of vitamin E
  - probably related to presynaptic dopamine receptor supersensitivity
14. Regarding overdoses with antipsychotic agents:
- lethality is similar to that in tricyclic antidepressant overdose
  - most deaths following overdose are due to neuroleptic malignant syndrome
  - thioridazine and mesoridazine carry the highest risk of mortality
  - clozapine is by far the most lethal of the antipsychotics in overdose
  - the cardiac side effects of haloperidol make among the most dangerous antipsychotics taken in overdose
15. Which of the following is NOT an expected or reported interaction between an antipsychotic and another agent:
- decrease in blood levels of antipsychotics with concurrent use of barbiturates
  - increase in blood levels of antipsychotics with concurrent use of tricyclics
  - paradoxical CNS excitation with narcotic compounds
  - anticholinergic symptoms with concurrent use of tricyclics
  - decreased levels of phenothiazines with antacids

## RESOURCES FOR TEACHING

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## **JOURNALS**

Journal of Clinical Psychopharmacology

Schizophrenia Bulletin

Psychopharmacology Bulletin

Experimental and Clinical Psychopharmacology

Annual Review of Pharmacology and Toxicology

## **ELECTRONIC AIDS**

Physician's Desk Reference (On-line)

DrugDex (Martindale's Pharmacopoeia)

## **Module 7:**

### **INTRODUCTION TO PSYCHOPHARMACOLOGICAL TREATMENT OF MOOD DISORDERS**

#### **PURPOSE**

The purpose of this module is to introduce the learner to the pharmacological treatment of mood disorders with a focus on the clinical application of mood regulating drugs. The scope and characteristics of mood disorders are reviewed first in order to understand the diversity and severity of these disorders. Biological hypotheses for the mood disorders will then be presented. Antidepressant and antimanic agents will be discussed, with a focus on the hypothesized mechanisms of action, therapeutic effects, and adverse effects of these compounds.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Acquire knowledge of the diversity and prevalence of mood disorders.
2. Acquire knowledge of the major biological hypotheses for mood dysregulation.
3. Acquire familiarity with the process of neuroregulation in the treatment of mood disorders.
4. Acquire knowledge of all classes of drugs used in the treatment of depression and mania, including indications for use and dosing parameters.
5. Acquire knowledge of therapeutic and adverse effects of mood regulating compounds.
6. Acquire an introduction to the use of electroconvulsive therapy.
7. Acquire an introduction to special treatment considerations.
8. Acquire an introduction to how age, ethnic/minority status, gender, and disability relate to psychopharmacologic treatment of mood disorders.

## MAJOR CONTENT AREAS OF THE SYLLABUS

### I. INTRODUCTION TO THE MOOD DISORDERS

#### A. Nosology/DSM-IV criteria

1. The major mood disorders
  - (a) Definition and differential diagnoses
  - (b) Syndrome descriptions
2. Mood disorder subtypes: Definition and implications for drug treatment
  - (a) Depression
    - (1) Dysthymia
    - (2) Double depression
    - (3) Psychotic depression
    - (4) Seasonal affective disorder
    - (5) Atypical depression
  - (b) Mania
    - (1) Rapid cycling bipolar disorder
    - (2) Mixed mania

#### B. Incidence and prevalence of mood disorders

1. Population data on the frequency of mood disorders
2. Familial incidence of mood disorders
3. Genetic evidence for heritability of mood disorders

#### C. Risk factors

1. Demographic correlates
2. Psychosocial vulnerability
3. Biopsychosocial vulnerability: The stress/diathesis model

#### D. Relapse, recurrence, and course: Definition and recent data

1. Relapse rates
2. Recurrence rates
3. Time course

#### E. Costs of untreated and/or unsuccessful treatment

1. Mortality and morbidity
2. Economic costs (e.g., impairment in work functioning; increased use of medical services)

#### F. Assessment

1. Psychological evaluation/mental status examination/identification of target symptoms
2. Physical examination: Importance of recognizing medical illness that may be causing or exacerbating psychological symptoms
3. Psychological measures for evaluating severity of mood symptoms
  - (a) Self-report measures
  - (b) Clinician-administered assessments
4. Physiological and laboratory tests in the assessment of mood disorders
  - (a) Assessment of pathophysiological changes (including the Dexamethasone Suppression Test)
  - (b) Assessment of cerebral hemisphere dysfunction
  - (c) Role of brain imaging and EEG in clinical practice

## II. OVERVIEW OF PHARMACOLOGICAL TREATMENTS

### A. Preclinical and clinical pharmacological development

1. Overview of animal studies in the development of antidepressant drugs
2. Original use and further development of mood regulating drugs in humans
  - (a) Depression  
Example: Imipramine and iproniazid for the treatment of depression
  - (b) Mania  
Example: Lithium for the treatment of mania

### B. Biological hypotheses

1. The biogenic amine hypothesis
  - (a) Catecholamine hypothesis
  - (b) Indolamine hypothesis
2. Interaction theories

### III. CLINICAL PSYCHOPHARMACOLOGY OF MOOD DISORDERS

#### A. Psychopharmacologic treatment strategies

1. Acute phase
  - (a) Basis for choice of medication
    - Type/subtype of disorder
    - History of prior response
    - Drug side-effect profiles
    - Concurrent medical illnesses
    - Concurrently prescribed medications
  - (b) Dosing strategies and side-effect management
  - (c) Length of an acute trial
2. Continuation phase
  - (a) Dosing strategies and side-effect management
  - (b) Adequate drug continuation
3. Maintenance phase
  - (a) Dosing strategies and side-effect management
  - (b) Length of drug maintenance

#### B. Pharmacological agents for the treatment of mood disorders

1. Chemistry and pharmacokinetics of mood regulating drugs
2. Clinically significant drug interactions
  - (a) For agents used to treat depression
  - (b) For agents used to treat mania
3. The mechanisms of action of mood regulating drugs
4. Pharmacological mechanisms of action underlying adverse effects from antidepressants
  - (a) Effects due to inhibition of alpha adrenergic receptors
  - (b) Effects due to inhibition of histaminic receptors
  - (c) Effects due to inhibition of cholinergic receptors
  - (d) Effects due to serotonergic excess
  - (e) Effects due to catecholamine excess

#### C. Classes of pharmacological agents

1. Depression
  - (a) Tricyclic antidepressants
    - (1) Examples/common doses
    - (2) Examples/therapeutic blood levels
    - (3) Most common side-effects
    - (4) Efficacy data
    - (5) Toxicity in overdose
  - (b) Selective serotonin reuptake inhibitors
    - (1) Examples/common doses
    - (2) Most common side-effects
    - (3) Efficacy data
  - (c) Monoamine oxidase inhibitors
    - (1) Examples/common doses
    - (2) Most common side-effects
    - (3) Efficacy data
  - (d) Heterocyclics and newer agents
    - (1) Examples/common doses
    - (2) Efficacy data
2. Mania
  - (a) Lithium
    - (1) Common doses
    - (2) Most common side-effects
    - (3) Efficacy data
  - (b) "Anticonvulsant Agents"
    - (1) Examples/common doses
    - (2) Most common side-effects
    - (3) Efficacy data
  - (c) Benzodiazepines
    - (1) Examples/common doses
    - (2) Most common side-effects
    - (3) Efficacy data
  - (d) Calcium channel blockers
    - (1) Examples/common doses
    - (2) Most common side-effects
    - (3) Efficacy data

- D. Combined psychological/pharmacological treatment (comparative outcome studies)
- E. Other forms of somatic treatment for mood disorders
  - 1. Electroconvulsive therapy (ECT)
  - 2. Phototherapy

#### IV. SPECIAL CONSIDERATIONS FOR TREATMENT

- A. Mood regulating agents and ECT during pregnancy
- B. Strategies for treatment of refractory mood disorders
  - 1. Depression
    - (a) Lithium augmentation
    - (b) Thyroid augmentation
    - (c) Combined antidepressant drug treatment (e.g., TCA plus SSRI)
    - (d) Use of stimulants
    - (e) ECT
  - 2. Mania
    - ECT
- C. Comorbidity of mood disorders with other syndromes
  - 1. Comorbidity with other psychological disorders
  - 2. Comorbidity with medical illness
- D. Other uses for traditional antidepressant agents
  - 1. Anxiety disorders
  - 2. Eating disorders
  - 3. Hyperactivity/ADHD
  - 4. Substance abuse

## SAMPLE TEST QUESTIONS

1. According to the lifetime prevalence data from the Epidemiological Catchment Area study, the most commonly occurring mood disorder is:
  - a. bipolar disorder
  - b. major depression
  - c. cyclothymia
  - d. unipolar mania
  - e. seasonal affective disorder
  
2. Risk factors for major depression include:
  - a. prior episodes of depression
  - b. being female
  - c. medical comorbidity
  - d. history of depression in first degree relative(s)
  - e. all of the above
  
3. Atypical depression is characterized by:
  - a. mood reactivity
  - b. "reverse" neurovegetative symptoms
  - c. seasonal changes in mood
  - d. a and b
  - e. all of the above
  
4. The catecholamine hypothesis:
  - a. postulated that depression was associated with decreased activity of catecholamines
  - b. has largely been replaced by theories implicating multiple neurotransmitter systems
  - c. was based on the finding that drugs like imipramine relieved depressive symptoms
  - d. a and b
  - e. all of the above
  
5. Medication(s) commonly used to treat severe mania include:
  - a. lithium
  - b. carbamazepine
  - c. valproate
  - d. neuroleptics
  - e. all of the above

6. Which class of drugs used to treat depression requires dietary restrictions?
  - a. tricyclic agents
  - b. selective serotonin reuptake inhibitors
  - c. monoamine oxidase inhibitors
  - d. benzodiazepines
  - e. heterocyclics
  
7. Adverse effects due to inhibition of cholinergic receptors can include:
  - a. dry mouth
  - b. blurred vision
  - c. urinary retention
  - d. a and b
  - e. all of the above
  
8. Mood regulating agents for which there are known therapeutic drug blood levels include:
  - a. nortriptyline
  - b. paroxetine
  - c. lithium
  - d. a and c
  - e. all of the above
  
9. The drugs that are potentially most lethal in overdose are:
  - a. monoamine oxidase inhibitors
  - b. selective serotonin reuptake inhibitors
  - c. carbamazepine and valproate
  - d. tricyclic antidepressants
  - e. trazadone and nefazadone
  
10. Common strategies for the treatment of refractory depression include:
  - a. lithium augmentation
  - b. use of thyroid hormone
  - c. use of stimulant drugs
  - d. a and b
  - e. all of the above

## RESOURCES FOR TEACHING

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## **JOURNALS**

Depression

Experimental and Clinical Psychopharmacology

Journal of Affective Disorders

Journal of Clinical Psychopharmacology

## **Module 8:**

# **INTRODUCTION TO PSYCHOPHARMACOLOGICAL TREATMENT OF ANXIETY DISORDERS**

### **PURPOSE**

The purpose of this module is to provide the learner with a basic understanding of the symptoms or disordered behaviors subsumed under the rubric "anxiety," as defined in DSM-IV, and the pharmacological and combined pharmaco- and psychological therapies used in treatment. The Axis I diagnoses discussed are generalized anxiety disorder (GAD), panic disorder, simple and social phobias, obsessive compulsive disorder (OCD), and posttraumatic stress disorder (PTSD).

### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Identify the target symptoms for the specific disorders.
2. Become familiar with differential diagnoses: (a) general medical conditions, (b) other DSM disorders.
3. Know pharmacologic agents used in treatment for the specific disorders and biologic hypotheses.
4. Understand efficacy of treatment: Acute, short- and long-term maintenance.
5. Understand combined pharmaco- and psychological treatment.

### **MAJOR CONTENT AREAS OF THE SYLLABUS**

- I. Anxiety disorders defined
  - A. Nosology/DSM-IV criteria
    1. Major anxiety disorders. Panic disorder and agoraphobia, social phobia, simple phobia,

obsessive compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder

2. Anxiety symptoms as part of primary mental disorder
3. Anxiety symptoms as part of a medical illness

B. Brief overview of cellular, animal, and human studies defining the disorders. Animal models of anxiety

### C. Assessment

1. Target symptoms for specific disorders
2. Medical conditions as causal or associative factors: Adrenal tumors, alcoholism, CNS degenerative diseases, Cushing's disease, coronary insufficiency, delirium, hypoglycemia, hyperthyroidism, early stages of Meniere's disease, parathyroid disease, PMS, and mitral valve prolapse, clinical and epidemiological factors

D. Evaluation for treatment for specific disorders: Differential diagnoses. Examples: Panic disorders versus mitral valve prolapse; agoraphobia versus situational phobias

## II. OVERVIEW OF ANXIETY DISORDERS

- A. Prevalence of anxiety disorders: Demography and epidemiology, evaluation for treatment of specific disorders
- B. Risk factors: Specific populations at risk for anxiety (e.g., individuals undergoing multiple stressors, adults who were abused as children), lifestyle issues
- C. Relapse and recurrence: Comparisons with pharmacotherapy alone and psychotherapy alone, and the two combined by anxiety subtype
- D. Economic, social, and personal costs of untreated or unsuccessfully treated anxiety, including physical and mental impairment and decreased ability to work effectively

## III. CLINICAL PSYCHOPHARMACOLOGY ISSUES

- A. Biological hypotheses
  1. Role of GABA, dopamine, norepinephrine, and serotonin neurotransmitters
  2. Specific receptor site and clinical potency
  3. Mechanisms of action

- B. Anxiety disorders and comorbidity with other DSM Axis I diagnoses
- C. Ethnic-, gender-, and age-related differences in drug metabolism, dosage, and maintenance
- D. Drug treatments by subtype
  - 1. Drugs and drug types
    - (a) Benzodiazepines
    - (b) Buspirone (Buspar)
    - (c) Serotonin Reuptake Inhibitors (SSRIs) (fluoxetine, sertraline, paroxetine)
    - (d) Monoamine-oxidase inhibitors (MAOIs)
    - (e) Other uses for these drugs, e.g., as sleep inducers
  - 2. Adverse effects
    - (a) Tolerance and dependence
    - (b) Impaired motor performance and ataxia
    - (c) Nausea, dizziness, and weakness
  - 3. Dosing parameters
  - 4. Short- and long-term efficacy
  - 5. Drug interactions
- E. Treatment strategies by class of agent
  - 1. Acute treatment
  - 2. Maintenance strategies
  - 3. Long-term maintenance strategies
- F. Treatment efficacy by disorder

1. Acute treatment efficacy
  2. Maintenance treatment
  3. Long-term efficacy by disorder
- G. Choices of agents by disorder
1. Drug abuse potential
  2. Adverse effects
  3. Medical illness complications
  4. Interaction of psychotropics with drugs of abuse
- H. Combined psychological-pharmacological treatments: A discussion of disorders in which a combination of drugs and therapy work better than either alone (e.g., panic disorder) and where there are few or no controlled studies (e.g., social phobias and generalized anxiety disorder)

#### IV. COMORBIDITY WITH OTHER AFFECTIVE DISORDERS

##### **SAMPLE TEST QUESTIONS**

1. In which anxiety disorders is psychotherapy the clear choice over drug treatment?
  - a. generalized anxiety disorder
  - b. panic disorder
  - c. simple phobia
  - d. posttraumatic stress disorder
  - e. all of the above

2. What are the advantages of SSRIs over TCAs in the treatment of anxiety disorders?
  - a. no addictive potential
  - b. faster acting
  - c. little or no suicide potential
  - d. fewer side effects
  - e. all of the above
  - f. none of the above
  
3. Which of the following is true of panic disorder?
  - a. no known genetic component
  - b. first onset rarely occurs after age 35
  - c. spontaneous remissions may last for years
  - d. the incidence is approximately equal in men and women
  - e. b and c above
  
4. Which of the following medical conditions cause or mimic anxiety disorders?
  - a. adrenal tumors
  - b. epilepsy
  - c. mitral valve prolapse
  - d. a and c
  - e. all of the above

## RESOURCES FOR TEACHING

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## **JOURNALS**

Archives of General Psychiatry

Biological Psychiatry

Clinical Geriatrics Psychopharmacology

Journal of Anxiety Disorders

Journal of Clinical Psychiatry

## **Module 9:**

### **INTRODUCTION TO PSYCHOPHARMACOLOGICAL TREATMENT OF DEVELOPMENTAL DISORDERS**

#### **PURPOSE**

The purpose of this module is to introduce the learner to the pharmacological treatment of disorders of development from a life-span perspective. The focus is on the clinical application on those pharmacotherapies employed for childhood emotional and behavioral disorders, developmental disabilities believed to have a neuropathological etiology, acquired brain injuries including trauma to the central nervous system (CNS), seizure and tic disorders, as well as organic syndromes arising in mid-life or thereafter (e.g., Huntington's and Parkinson's disease), and diseases associated with dementia (e.g., Alzheimer's and Pick's disease).

The scope and characteristics of the specific disorders for which pharmacotherapy is likely to prove efficacious and beneficial in the long term also is reviewed. Psychotropic agents commonly employed to treat the aforementioned disorders are discussed, with a focus on the known or presumed mechanisms of action, special considerations in pharmacokinetics, therapeutic effects, adverse effects, and the impact of these psychotropic agents on cognition and learning. Finally, special ethical and moral considerations are raised.

#### **LEARNING OBJECTIVES**

This module is designed to help the learner:

1. Acquire knowledge of the various childhood disorders for which psychopharmacologic treatment is frequently employed.
2. Acquire knowledge of the various developmental disorders for which psychotropic medication is appropriate and is frequently employed.
3. Acquire knowledge of the drug classes used in treating children, adolescents and adults with developmental disabilities, acquired brain injuries, cognitive syndromes, seizure disorders, and finally with diseases associated with dementia.
4. Acquire knowledge of assessment of efficacy and adverse effects of pharmacotherapy in children, adolescents, and adults with cognitive disorders.
5. Acquire knowledge of the role of social and other environmental intervention in drug therapy.
6. Acquire knowledge of moral and ethical considerations in using pharmacotherapy with minors or individuals impacted by cognitive impairments, developmental disabilities, acquired brain injuries, or various dementias.

#### **MAJOR CONTENT AREAS OF THE SYLLABUS**

## I. CLASSIFICATION OF CHILDHOOD AND ADOLESCENT PSYCHIATRIC AND DEVELOPMENTAL DISORDERS

### Disruptive behavior disorders

1. Attention deficit hyperactivity disorder
  - a. Inattention
  - b. Impulsivity
  - c. Overactivity
  - d. Duration and severity of symptoms
2. Oppositional defiant disorder  
Aggression and drug response
3. Conduct disorder  
Aggression and drug response
4. Mood Disorders
  - a. Dysthymia
  - b. Major depressive disorder
  - c. Emerging recognition of bipolar disorders in pediatrics
5. Anxiety related disorders
  - a. Generalized anxiety disorder
  - b. Separation anxiety disorder (School Phobia)
  - c. Panic disorder
  - d. Acute stress disorder
  - e. Posttraumatic stress disorder
  - f. Obsessive-compulsive disorder
  - g. Social phobia
6. Psychotic disorders
  - a. Childhood and adult schizophrenia
  - b. Organic psychosis
  - c. Other psychotic disorders
7. Regulation disorders
  - a. Sleep terror disorder and other sleep problems
  - b. Enuresis
    - (1) Nocturnal
    - (2) Diurnal

## II. TIC AND SEIZURE DISORDERS

- A. Tourette's disorder
- B. Landau-Kleffner's syndrome
- C. Seizure disorders
  - 1. Temporal lobe epilepsy
  - 2. Partial seizures
  - 3. Complex seizures

### III. CLASSIFICATION OF DISORDERS OF DEVELOPMENT

- A. Mental retardation
  - 1. Levels of mental retardation
    - a. Mild mental retardation
    - b. Moderate mental retardation
    - c. Severe mental retardation
    - d. Profound mental retardation
  - 2. Behavior problems commonly associated with mental retardation (relation to cognitive and language ability)
    - a. Aggression
    - b. Stereotypy
    - c. Self-Injury
    - d. Property destruction
  - 3. Comorbidity and diagnostic overshadowing
    - a. Problems with psychiatric diagnosis in nonverbal individuals with mental retardation, autism, and related disabilities
    - b. Strategies for differential diagnosis
- B. Learning disabilities
  - 1. Dyslexia
  - 2. Acalculia
- C. Motor skills disorder
  - Developmental coordination disorder
- D. Communication disorders
  - 1. Expressive language disorder
  - 2. Mixed receptive-expressive language disorder
  - 3. Phonological disorder

- 4. Stuttering
- E. Pervasive developmental disorders (autism spectrum disorders)
  - 1. Autistic disorder
  - 2. Childhood disintegrative disorder (Heller's syndrome)
  - 3. Asperger's syndrome
  - 4. Pervasive developmental disorders NOS
  - 5. Other developmental disorders associated with autistic spectrum features

IV. ACQUIRED BRAIN INJURIES AND COGNITIVE DISORDERS ARISING IN MIDLIFE AND LATER YEARS

- A. Closed head injuries
  - 1. Impulse control
  - 2. Rage
- B. Spinal cord injuries
  - 1. Impulse control
  - 2. Rage
- C. Multiple sclerosis
  - 1. Rigidity and tremor
  - 2. Sleep disorder
  - 3. Depression
- D. Huntington's disease

- E. Parkinson's disease
  - 1. Rigidity and tremor
  - 2. Depression
  - 3. Confusion
- F. Dementias and other late adult onset cognitive disorders
  - Alzheimer's and Pick's disease
    - 1. Disorientation, agitation, and wandering
    - 2. Memory disturbance
    - 3. Sleep disorder
    - 4. Depression
    - 5. Delusions and hallucinations

V. RELATION OF SOCIAL AND OTHER ENVIRONMENTAL INTERVENTIONS TO PHARMACOTHERAPY

- A. Assessment of environmental context of behavior disorder
- B. Environmental intervention alone or in combination with pharmacotherapy
- C. Efficacy of social, educational, and other habilitative interventions versus pharmacotherapy in children, adults with neurological insults, or people with mental retardation or related developmental disabilities

VI. MULTIMODAL THERAPIES

Adjunctive psychotherapies with pharmacotherapy

VII. CLASSIFICATION OF PSYCHOTROPIC DRUGS FOR SPECIAL POPULATIONS (CHILDREN, ADOLESCENTS, AND ADULTS WITH ACQUIRED BRAIN INJURIES AND ADULTS WITH DEVELOPMENTAL DISABILITIES AND DISORDERS)

- A. Stimulants
  - 1. Type
    - a. Methylphenidate
    - b. Dextroamphetamine
    - c. Pemoline
    - d. Adderall

2. Clinical indications
    - a. Attention deficit hyperactivity disorder
    - b. Conduct disorders
    - c. Mental retardation
    - d. Acquired neurological conditions
    - e. Tourette's syndrome
    - f. Depression
  3. Lifespan developmental issues
    - a. Preschool
    - b. School-aged children
    - c. Adolescence
    - d. Adulthood
    - e. Late life
  4. Clinical outcome
    - a. Long-term
    - b. Short-term
    - c. Adulthood
    - d. Late life
- B. Antidepressants
1. Clinical indications
  2. Tricyclic antidepressants
  3. Selective serotonin reuptake inhibitors
  4. Atypical antidepressants
    - a. Bupropion
    - b. Monamine oxidase inhibitors
- C. Mood stabilizers
- Lithium
- D. Anxiolytics, sedatives, hypnotics
1. Benzodiazepines
  2. Antihistamines
  3. Muscle relaxants

- E. Neuroleptics
  - 1. Clinical indications
    - a. Mental retardation and autism
    - b. Closed head injuries
    - c. Mid-life neurodegenerative disorders and dementias
  - 2. Typical neuroleptics
  - 3. Atypical neuroleptics
  - 4. Efficacy and adverse effects
- F. Antihypertensives
  - 1. Beta blockers
    - Inderal
  - 2. Alpha adrenergic agonists
    - Clonidine
- G. Anticonvulsants
  - 1. Clinical indications
    - a. Seizure disorders
    - b. Behavior disorders
    - c. Rapidly cycling bipolar disorder
  - 2. Drugs commonly used for their psychotropic effects
    - a. Carbamazepine
    - b. Valproate
    - c. Clonazepam
- H. Other nontraditional pharmacotherapies employed as psychotropics
  - 1. Cognex
  - 2. L-DOPA and Mazindol
  - 3. Naltrexone
  - 4. Steroids (e.g. in CNS neurodegenerative conditions)
  - 5. Others

VIII. SPECIAL CONSIDERATIONS IN THE ASSESSMENT OF PHARMACOTHERAPY RESPONSE AND ADVERSE EFFECTS

- A. Predicting drug response
  - 1. Target symptoms
  - 2. Psychological testing
  - 3. Assessment of potential compliance
- B. Cognitive toxicity of psychotropic medication in children
  - 1. Impairments in learning and cognitive performance
  - 2. Risk-benefit ratio
- C. Untoward physical effects
- D. Iatrogenic effects of psychotropic
  - 1. Tardive dyskinesia
  - 2. Self-efficacy and attributional messages
  - 3. Risk-benefit analysis
- E. Monitoring psychotropic drug response
  - 1. Assessment of functioning during peak drug response time
  - 2. Use of placebo controls and double-blind drug trials
  - 3. Use of multiple assessment measures
    - a. Behavioral recording based on observations in natural settings
    - b. Laboratory assessment
    - c. Teacher ratings of behavior
    - d. Parent ratings of behavior
  - 4. Systematic evaluation of adverse effects
  - 5. Qualitative differences in the assessment of drug response of children, adolescents, adults, and elderly people  
Reliance on assessment by caretakers, teachers, and staff in residential and other treatment settings
  - 6. Social acceptability of psychotropic medication and consumer satisfaction

IX. SPECIAL ISSUES PERTAINING TO PHARMACOKINETICS IN CHILDREN, ADOLESCENTS, AND ADULTS

- A. Qualitative differences in pharmacokinetics in children, typical adults, and elderly people
  - 1. Dose
  - 2. Rate of absorption
  - 3. Distribution
  - 4. Differences in tissue binding and body compartments
  - 5. Sites of action
  - 6. Metabolism and active metabolites
  - 7. Excretion
- B. Developmental maturity of various neurological substrates through which desired drug effects are achieved
  - Age of the Individual
    - 1. Positive response
    - 2. Adverse effects
- C. Drug interactions in elderly patients
  - 1. Frequent prescription of multiple medications to elderly patients
  - 2. Common drug interactions and toxicity problems
  - 3. Memory impairment and accidental multiple dosing

X. MORAL AND ETHICAL ISSUES IN THE PHARMACOTHERAPY OF CHILDREN, ADOLESCENTS, AND OTHER SPECIAL POPULATIONS

- A. Differential treatment decisions and regulation of use of psychotropic medications for children
- B. Organic versus environmental causes of psychiatric/behavior disorders
- C. Effects of use of psychotropic medications on self-efficacy and sense of locus of control

- D. Tendency to over prescribe medications rather than invest in staff training and programmatic changes necessary to improve educational, residential, or nursing home settings
- E. Problems posed by the limited ability of children and adults with developmental disabilities to provide self-reports regarding, mood, and other symptoms
- F. Problems posed by benefits to caregivers, teachers, or family members when prescribing psychotropic drugs to children and other special populations
- G. Dilemma of prescribing psychotropic drugs to children and adolescents while prohibiting use of recreational drugs

### **SAMPLE TEST QUESTIONS**

1. A 72-year-old patient with Alzheimer's disease lives alone with her husband and has recently been prescribed 8 mg per day of haloperidol for delusional thinking and confusion. Her thought disorder was markedly improved for the first 2 weeks on haloperidol, but she has lost her balance several times over the past few days; she looks "glassy eyed," and said she felt "dizzy" at times when she is standing or walking. The most likely reason this patient has developed toxic symptoms is:
  - a. She may be taking multiple doses and not remember that she had already taken her medication.
  - b. Her metabolic rate may be below normal.
  - c. Her rate of excretion may be impaired.
  - d. She may be taking another medication which is interacting with the haloperidol and didn't mention it to her doctor.
  - e. All of the above.
2. Which medication in this group is most effective in reducing obsessive compulsive symptoms in autism?
  - a. glutethimide
  - b. desipramine
  - c. fluvoxamine
  - d. Baclofen
  - e. L-tryptophan

3. A 15 year old girl who was labeled ADHD as a young child has problems with impulsiveness and rage outbursts, for which she was previously treated with carbamazepine in another city. She does not have a diagnosed seizure disorder. She discloses that she uses cocaine intermittently and recently engaged in unprotected sexual intercourse. In evaluating whether carbamazepine would be an appropriate choice for continued treatment, which of the following factors would be weighed?
  - a. Carbamazepine has very few adverse effects.
  - b. Carbamazepine can cause birth defects.
  - c. Carbamazepine selectively reduces sex drive.
  - d. Carbamazepine has a large therapeutic index.
  - e. She is more likely to be noncompliant with other drugs.
  
4. A 32-year-old woman with an IQ of 62 lives in a group home in the community and works in a supported employment setting at a fast food restaurant. She is brought to see her doctor because the staff says she is acting "odd" and that over the past several months her physical appearance has declined. She has become uncooperative and obstinate at times, refusing to get up in the morning and often not answering questions. Her affect is indifferent. The staff says this is a change from the past when she carried on cogent conversations. You would suspect the woman has \_\_\_\_\_ and would be a candidate for \_\_\_\_\_ (what kind of medication?).
  - a. depression/ an SSRI
  - b. anxiety disorder/ clomipramine
  - c. schizophrenia/ a neuroleptic
  - d. bipolar disorder/ lithium
  - e. neurodegenerative disease/ a neuroleptic
  
5. A 9-year-old child with childhood disintegrative disorder has severe tantrums and extended bouts of self-injury. He has been treated with haloperidol and fluoxetine, and neither produced improvement. Records kept by his teacher and parents indicate he bites his hands and bangs his head against hard surfaces more or less randomly throughout the day, though it is worse when he is frustrated. The most likely medication you would expect to be effective in reducing the boy's self-injury is:
  - a. naltrexone
  - b. inderal
  - c. lithium
  - d. klonopin
  - e. cogentin

6. A teenager who has major allergy problems has developed severe adverse effects when treated with sertraline for anxiety attacks (e.g. dizziness, nausea, irritability, fatigue, muscle pain, and headache). A year before he had been treated with sertraline at the same dose and developed no adverse effects. In trying to determine the reason for the different adverse effect reaction, one of the first questions you would be likely to ask is:
  - a. whether he began receiving an antihistamine for his allergies during the past year
  - b. whether allergies run in his family
  - c. which came first, the anxiety attacks or the allergies
  - d. whether his anxiety attacks are preceded by an "aura"
  - e. whether his father has migraine headaches
  
7. The class of drugs referred to as the stimulants is most appropriate for which classification of disorder:
  - a. attention deficit hyperactivity disorder
  - b. mood disorders
  - c. anxiety related disorders
  - d. pervasive developmental disorder and/or autism
  - e. psychotic disorders
  
8. For pediatric populations, which is not an adverse effect potentially encountered with the neuroleptic drugs?
  - a. Parkinsonian symptoms
  - b. neuroleptic malignant syndrome
  - c. cardiac conduction disturbances
  - d. acute dystonic reactions
  - e. none of the above
  
9. Children and adolescents are most apt to respond to tricyclic antidepressants when:
  - a. they score abnormally high on dexamethazone suppression tests
  - b. they evidence target symptoms of depression including appetite loss, sleep disturbances, and anhedonia
  - c. they have conduct disorder
  - d. they exhibit dysthymic disorder
  - e. all of the above

10. The anxiolytics are believed to facilitate transmission of which neurotransmitter:
- serotonin
  - dopamine
  - GABA
  - norepinephrine
  - all of the above
11. In pediatric populations, with most psychotropic medication, the likelihood of adverse effects and toxicity increases:
- with increasing age of the child
  - with decreasing age of the child
  - idiosyncratically
  - linearly with dose
  - none of the above
12. For which of the following disorders/symptoms are stimulants not likely to prove efficacious:
- problems associated with attention concentration
  - specific learning disabilities (i.e., dyslexia)
  - symptoms associated with depression, including lack of energy and problems with concentration
  - attention deficit hyperactivity disorder that is co-morbid with mild mental retardation
  - all of the above

## RESOURCES FOR TEACHING

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Journal of the American Academy of Child and Adolescent Psychiatry

Journal of Child Psychology and Psychiatry and Allied Disciplines

Journal of Child and Adolescent Psychopharmacology

Archives of General Psychiatry

Pediatrics

Journal of Pediatrics

American Journal of Psychiatry

Psychopharmacology Bulletin

Journal of Autism and Developmental Disorders

American Journal of Mental Deficiency