



Administration, Travel, Metabolism and Elimination of Psychoactive Drugs

Psychology 470

Introduction to Chemical Addictions

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Neuropharmacology

- Is the scientific study of drug effects on the nervous system.
- Is an all encompassing term
- Is applied to ALL drugs that influence the nervous system
- Includes
 - Sensory systems
 - Motor systems
 - Cognitive functioning
 - Others

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Some Terms and Definitions

- Psychopharmacology
 - Usually used to describe drug effects on psychological parameters such as emotion and cognition (Nestler)
- Psychotropic
 - Drugs that influence behavior
- Pharmacokinetics
 - Is the study of how drugs enter, are distributed, metabolized, and removed (excreted) from the body
- Pharmacodynamics
 - Is the study of what drugs do various structures in the body.

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Pharmacokinetics

- Four variables to examine
 - How drugs enter the system
 - How drugs are distributed throughout the system
 - How drugs are metabolized in the system
 - How drugs are eliminated from the system.

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How Drugs Enter the System

- Influences
 - How fast a drug reaches its target organ
 - Which structure(s) the drug influences
 - Risk of acquiring BBPs

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Oral

- Slow onset of action
- Advantage
 - Easy to take
 - Low risk for BBPs

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Other Routes of Administration

- Faster routes (Seconds)
 - Respiratory (Nasal/Oral) Nicotine Cocaine
 - Intravenous (Venous system) Meth. Opiates
 - Intraarteral (Arterial system) Meth. Opiates
- Problem – Risk of BBPs
- Slower routes (Minutes)
 - Intramuscular (muscle groups) Steroids
 - Subcutaneous (under the skin) Some Halluc.
 - Cutaneous (Dermal) Ach. Nerve Agents, Nicotine Patches

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Additional Medical/Scientific Routes

- Routes
 - Intraperitoneal (peritoneal-abdominal cavity)
 - Intracerebroventricular (cerebral ventricular)
 - Intracerebral (brain parenchyma)
- Takes seconds or minutes
- Can be dangerous
- Minimal risk of BBPs due to sterile techniques used.

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How Drugs are Distributed in the Body

- Circulatory system
- Heart to
- Lungs to
- Heart to
- Body structures via arteries
- Arteries to smaller blood vessels
- Small blood vessels to Heart via veins
- Repeat

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Bioavailability

- Determines how much of a drug that actually reaches a target.
- Effects can depend on
 - Gastrointestinal loading (decreases absorption)
 - Liver metabolism (First Pass)
 - Binding to plasma proteins that makes the drug unavailable to the target
 - Cannot penetrate the Blood-Brain Barrier
 - Cannot penetrate other cell membranes

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Effects on Target Binding Site

- All drugs bind on some receptor site
- Causes some effect on the target site
- Creates some behavioral effect
 - Called Main Effect
- Also has other unintended effects
 - Called Side Effect
- Called Pharmacodynamics

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Pharmacodynamics

- Generally is defined as effects of drugs on neurological systems.
- Can be associated with any system
 - Heart, Liver, Endocrine System, etc.
- Lots of issues influence pharmacodynamics
 - Amt of drug available
 - Past drug use - Tolerance
 - Drug Stability
 - How long a drug lasts in the body before it is metabolized
- Drug Consistency
 - Does it need metabolized before it can be used
 - L-Dopa vs. Dopamine

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Metabolism and Elimination of Drugs

- Can be removed many ways
- Breathing
- Sweat
- Feces
- Liver metabolism
 - Have specific enzymes that break down drugs to inactive compounds
- Can be influenced by
 - Liver disease
 - Other compounds that are present
 - Multiple drugs
 - Fluid levels
- Other health effects

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Kidneys

- Removes waste products from the blood
- Can be influenced by fluid levels and other compounds (salt)
- Also removes other drugs and products
 - BCPs and metabolites
 - Can cause problems in other organisms

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Breathing, Sweat, Feces

- Removes trace amounts of some drugs
- Alcohol
 - Is removed multiple ways
 - Reason for breathalyzer

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Conclusions

- Many variables can influence drugs in the body
- Is important for the clinician to be aware of them
 - Reason psychopharmacology is important
 - Reason medical exams are an important component for drug/alcohol treatment

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