



Dependence and Addiction

Dependence (aka physical dependence)

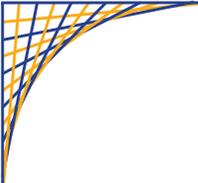
- Pharmacological adaptation to a drug or substance
 - o Drug or substance affects the body's equilibrium
 - Body "recalibrates" due to inhibition or stimulation of pathways affected by the drug or substance
 - Drug or substance required to maintain body's "new normal"
- Abruptly stopping the drug or substance produces withdrawal symptoms
 - o Drug or substance requires tapering before stopping to avoid withdrawal symptoms
 - o Withdrawal syndrome also may occur when an antagonist is administered
- Considered a normal response when using certain drugs or substances
 - o May occur even when used for appropriate medical indications at prescribed dosages
 - Examples: opioids, β blockers, antidepressants, benzodiazepines and stimulants

Tolerance

- Reduced response to a drug or substance after repeated administration
 - o Higher dose required to produce same effect previously achieved with a lower dose
- Does not develop at an equal rate for all potential effects of a drug
 - o Opioid example
 - Rapid development of tolerance to euphoria after use
 - Increasing doses taken to achieve "high"
 - Slower development of tolerance to gastrointestinal effects, respiratory depression
 - Increasing doses may result in fatal overdoses due to respiratory depression
- May occur even when used for appropriate medical indications at prescribed dosages

Addiction (aka psychological dependence)

- Administration of a drug or substance that directly and intensely activates circuits in the brain, causing strong feelings of euphoria and reward
- Defined as "a primary, chronic disease of brain reward, motivation, memory and related circuitry"
- Maladaptive state characterized by inability to consistently abstain from the drug or substance; impaired control of behavior; cravings; inability to recognize problems with behavior and interpersonal relationships; and dysfunctional emotional response
- Compulsive repetition of the behavior that focuses on immediate pleasure, regardless of long-term consequences or social responsibilities
- Chronic, relapsing disorder, leading to loss of control over taking the drug or substance



Drug Reinforcement

- The capacity of a drug to produce effects that make the user wish to take them again
- Stronger reinforcement = greater potential for abuse
- Strongly reinforcing drugs increase neuronal activity in the brain
- Some increase dopamine in various brain areas
 - o Examples: cocaine, amphetamine, ethanol, opiates, cannabinoids and nicotine
- Direct causal association between dopamine and euphoria has not been established
 - o May also involve other compounds such as serotonin, glutamate, norepinephrine and gamma-aminobutyric acid (GABA)

References:

O'Brien, Charles P. "Drug Addiction." Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 12e Eds. Laurence L. Brunton, et al. New York, NY: McGraw-Hill, <http://accesspharmacy.mhmedical.com.www2.lib.ku.edu/content.aspx?bookid=1613§ionid=102159667>. Accessed 4 August 2017.

Schumacher, Mark A., et al. "Opioid Agonists & Antagonists." Basic & Clinical Pharmacology, 13e Eds. Bertram G. Katzung, and Anthony J. Trevor. New York, NY: McGraw-Hill, 2015, <http://accesspharmacy.mhmedical.com.www2.lib.ku.edu/content.aspx?bookid=1193§ionid=69108439>. Accessed 4 August 2017.

Lüscher, Christian. "Drugs of Abuse." Basic & Clinical Pharmacology, 13e Eds. Bertram G. Katzung, and Anthony J. Trevor. New York, NY: McGraw-Hill, 2015, <http://accesspharmacy.mhmedical.com.www2.lib.ku.edu/content.aspx?bookid=1193§ionid=69108683>. Accessed 4 August 2017.