

Learning Objectives

1. Apply neurobiological concepts to treat patients who suffer from substance use disorders.
2. Identify intoxication and withdrawal syndromes of alcohol, opioids, and stimulants.
3. List three psychosocial and three pharmacological interventions in the treatment of addiction.

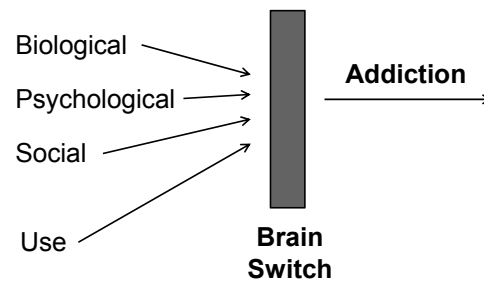
Outline

1. Neurobiology of Addiction
2. Major Classes of Drugs
3. Assessment and Diagnosis
4. Psychosocial Treatments
5. Public Health
6. Summary

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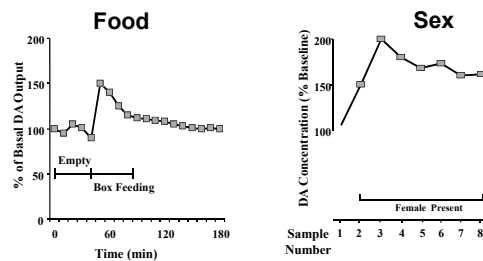
Neurobiology of Addiction

The Fundamental Model



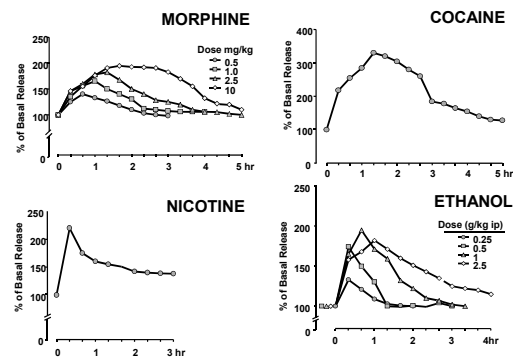
Levounis, *Journal of Medical Toxicology*, 2016.

Natural Rewards and Dopamine Levels



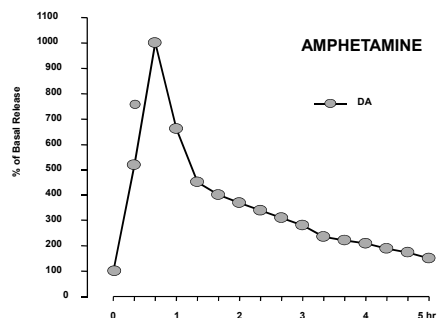
Adapted from: Di Chiara, *Neuroscience*, 1999; Fiorino and Phillips, *J Neuroscience*, 1997.

Effects of Drugs on Dopamine Levels



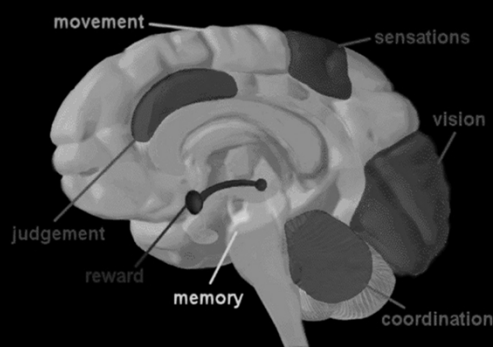
Adapted from: Di Chiara and Imperato, *Proceedings of the National Academy of Sciences USA*, 1988; courtesy of Nora D Volkow, MD.

The Special Case of the Amphetamines



Adapted from: Di Chiara and Imperato, *Proceedings of the National Academy of Sciences USA*, 1988; courtesy of Nora D Volkow, MD.

Pleasure-Reward Pathways



National Institute on Drug Abuse, DrugAbuse.gov.

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Major Classes of Drugs

Alcohol Intoxication

- | | |
|-----------------|--------------------|
| ❖ 0-100 mg/dL | Well-being |
| ❖ 100-200 mg/dL | Incoordination |
| ❖ 200-300 mg/dL | Ataxia |
| ❖ 300-400 mg/dL | Stage I Anesthesia |
| ❖ 400-600 mg/dL | Coma |
| ❖ 600-800 mg/dL | Death |

➤ Treat supportively.

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Alcohol Withdrawal

❖ Following the last drink:

- 6 to 24 hours: Autonomic Hyperactivity
- 24 to 48 hours: Seizures
- 48 to 96 hours: Delirium tremens

➤ Treat with:

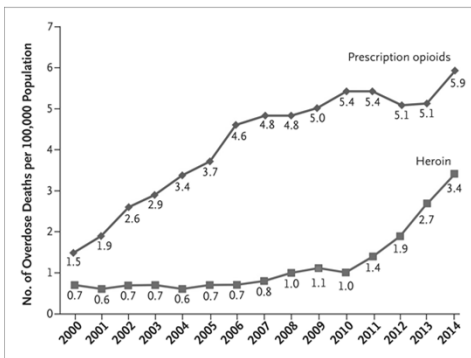
- Mild: Hydration and Rest
- Moderate: Oral Chlordiazepoxide (CIWA Protocol)
- Severe: IV Chlordiazepoxide in ICU

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Alcohol Addiction

Disulfiram
Naltrexone
Acamprosate

OPIOIDS



Compton, *New England Journal of Medicine*, 2016.

Opioid Intoxication

1. Constricted pupils
2. Constipation
3. Nausea and vomiting (often projectile)
4. Respiratory depression
5. Coma and death

➤ Treat with naloxone.

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Opioid Withdrawal

1. Dilated pupils
2. Diarrhea
3. Flu-like symptoms (rhinorrhea, lacrimation)
4. Yawning
5. Unbearable body aches
6. Sweats and piloerection ("cold turkey")

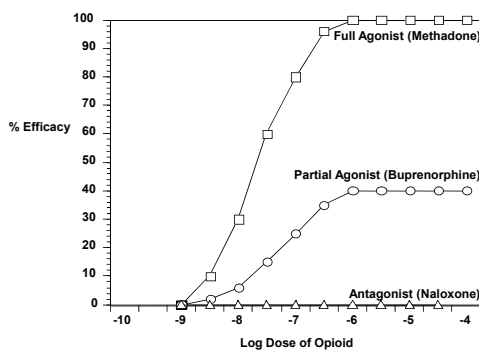
➤ Treat with methadone or buprenorphine.

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Opioid Addiction

Methadone
Naltrexone
Buprenorphine

Ceiling Effect of Buprenorphine



Renner and Levounis, *Office-Based Buprenorphine Treatment of Opioid Dependence*, APA Publishing, 2011.

Stimulant Acute States

• Intoxication:

1. Euphoria
2. Hypervigilance to frank paranoia
3. Decreased appetite
4. Seizures

• Withdrawal:

1. Dysphoria
2. Psychomotor retardation
3. Increased appetite

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Stimulant Addiction

No Medications

Cannabis Acute States

- **Intoxication:**

If drunk – you run the RED lights

If stoned – you stop at the GREEN lights

- **Withdrawal:**

Withdrawal syndrome is not:

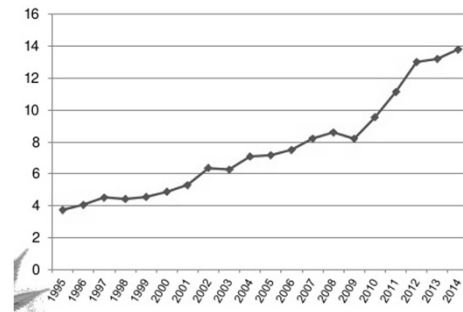
- As painful as heroin withdrawal,
- As dangerous as alcohol withdrawal, or
- As long-lasting as cocaine withdrawal

Levounis, Zerbo, and Aggarwal, *Pocket Guide to Addiction Assessment and Treatment*, APA Publishing, 2016.

Cannabis Addiction

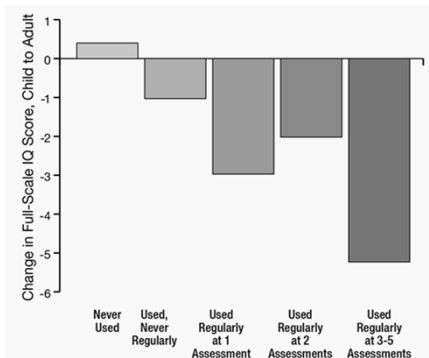
No Medications

% Delta-9 Tetra-Hydro-Cannabinol



University of Mississippi Marijuana Project; National Institute on Drug Abuse, DrugAbuse.gov.

Negative: IQ Drop



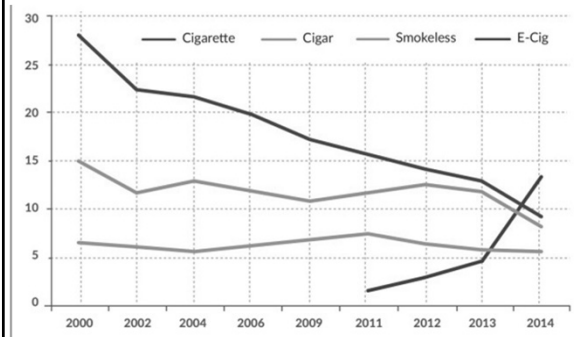
Meier, *Proceedings of the National Academy of Science*, 2012.

Positive: Therapeutic Potential

- Pain (cancer, multiple sclerosis)
- Nausea (cancer)
- Loss of appetite and wasting (HIV/AIDS)
- Increased ocular pressure (glaucoma)
- Inflammation (rheumatoid arthritis, Crohn's disease, ulcerative colitis)
- Epilepsy

Volkow, *New England Journal of Medicine*, 2014.

TOBACCO

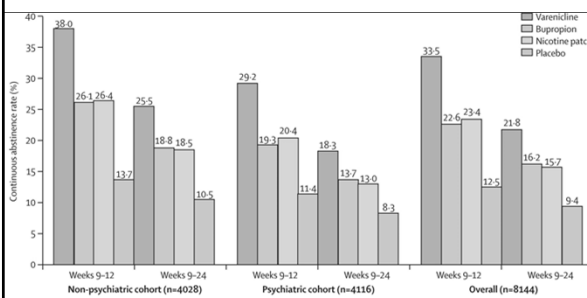


American Lung Association, *High School Tobacco Use (%) by Type*, based on CDC data, 2015.

Tobacco Addiction

Replacement (NRT)
Bupropion
Varenicline

Varenicline Prevails



Antenelli, *Lancet*, 2016.

BENZODIAZEPINES

- Antidepressants are the first-line treatments of anxiety disorders.
- Convert shorter-acting agents to clonazepam or chlordiazepoxide and taper.
- The longer the taper, the greater the chance of success (6-12 weeks minimum).

Ries et al, *Principles of Addiction Medicine, 5th Edition*, American Society of Addiction Medicine, 2014.

THE BEHAVIORAL ADDICTIONS

- Exercise
- Food
- Gambling
- Internet Gaming
- Internet Surfing
- Texting and Emailing
- Kleptomania
- Love
- Sex
- Shopping
- Tanning
- Work

Ascher and Levounis, *The Behavioral Addictions*, APA Publishing, 2015.

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Assessment and
Diagnosis

SIX TIPS FOR RECOGNIZING ADDICTION

1. Moody
2. Changes in Sleep
3. Changes in Appearance
4. Work Performance
5. Financial Difficulties
6. Abusive Behavior

Urine Toxicology Detection Limits

❖ Alcohol	7-12 hours
❖ Alcohol (Ethyl glucuronide, EtG test)	4 days
❖ Amphetamines/Methamphetamines	2 days
❖ Benzodiazepines (Short-acting)	3 days
❖ Benzodiazepines (Long-acting)	30 days
❖ Cocaine	2-4 days
❖ Heroin (Morphine)	2 days
❖ Methadone	3 days
❖ Marijuana (Single use)	3 days
❖ Marijuana (Long-term heavy use)	>30 days

Moeller, Mayo Clinic Proceedings, 2008; Anders et al, Alcohol and Alcoholism, 2009.

SCREENING

For Alcohol Use Disorders

- **MEN:**
 - 5 or more standard drinks in a sitting.
 - (15 or more per week.)
- **WOMEN:**
 - 4 or more standard drinks in a sitting.
 - (8 or more per week.)

National Institute on Alcohol Abuse and Alcoholism, NIAAA.NIH.gov.

BRIEF INTERVENTION

1. Be empathic and curious.
2. State your medical findings.
3. Educate about problematic use and addiction.
4. Advise.
5. Follow up.
6. Refer, if necessary.

National Institute on Alcohol Abuse and Alcoholism, NIAAA.NIH.gov.

The DSM-5

The	PHYSIOLOGY
Wise	Tolerance
	Withdrawal
Know:	THE CORE PROBLEM OF SUBSTANCE USE
	Knowledge of adverse consequences, yet continued use
Decline	INTERNAL PREOCCUPATION
Tender	Desire to cut down
Loving	Time —a great deal of time—spent using
Care,	Larger amounts or longer periods of use than intended
	Craving
And	EXTERNAL CONSEQUENCES
Respect	Activities given up
Silver	Role obligations neglected
Hair.	Social or interpersonal problems
	Hazardous use

Levounis, Academic Psychiatry, 2015.

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Psychosocial Treatments

1st Wave: Psychoanalysis

DISASTER

Levounis, *Journal of Medical Toxicology*, 2016.

2nd Wave: Boot Camps

DISASTER

3rd Wave: The Current Approach

1. Mutual Help Groups (12-step)
2. Psychotherapy (CBT and MI)
3. Medications
4. Family Therapy
5. Primary Care Services
6. Mental Health Services
7. Aftercare

Nunes, Selzer, Levounis, Davies, *Substance Dependence and Co-Occurring Psychiatric Disorders*, 2010.

12-Step Facilitation



Attitudes and Perceptions

MEDICAL STAFF	PATIENTS	What Medical Staff Think Patients Think
1. Housing	1. Inner peace	1. Housing
2. Gov't Services	2. God	2. Outpatient Tx
3. Medical Services	3. Medical Services	3. Medical Services
4. Outpatient Tx	4. AA	4. Job
5. Job	5. Housing	5. Trusting People
6. Community	6. Spirituality	6. AA
7. Trusting People	7. Outpatient Tx	7. Inner Peace
8. Inner peace	8. Community	8. Community
9. God	9. Gov't Services	9. Gov't Services
10. Spirituality	10. Trusting People	10. Spirituality
11. AA	11. Job	11. God

Goldfarb, *American Journal of Drug and Alcohol Abuse*, 1996.

Cognitive Behavioral Therapy



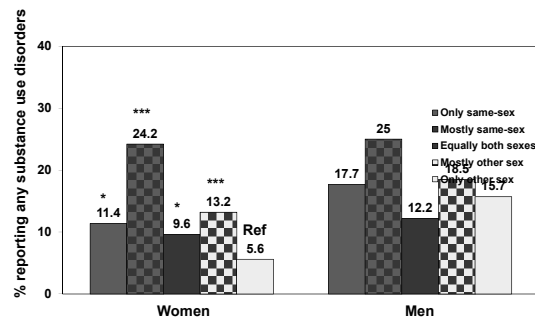
Levounis and Arnaout, *Motivation and Change: A Practical Guide for Clinicians*, APA Publishing, 2010.

Motivational Interviewing

4th Wave: Mindfulness



... and Back to Psychodynamics



* p<0.05, *** p<0.001, Ref = Reference Group
 McCabe, Addiction, 2009, Courtesy of Sean E. McCabe, PhD; Levounis, Drescher, and Barber, The LGBT Casebook, APA Publishing, 2012.

5

Public Health

The Origins of the Opioid Epidemic

ADDITION RARE IN PATIENTS TREATED WITH NARCOTICS

To the Editor: Recently, we examined our cases to determine the incidence of narcotic addiction in 100 hospitalized medical patients who were monitored intensively. Although there were 11,862 patient-days of observation, only one narcotic preparation, there were only 10 cases of addiction. This well documented addiction in patients who were hospitalized. The addiction was considered major in 10 cases. The drugs implicated were meperidine in 10 cases, Percodan in one, and hydromorphone in one. We conclude that despite widespread use of narcotic drugs in hospitals, the incidence of addiction is rare in medical patients with no history of addiction.

JANE PORTER
 MERSHEL JICK, M.D.
 Collaborative Drug
 Surveillance Program
 Waltham, MA
 Boston University Medical Center

1. Jick H, Mershel J, Shapiro S, Lewis GP, et al. Narcotic addiction: a comparison of drug surveillance. JAMA. 1970; 224:180-5.
 2. Miller KK, Jick H. Clinical effects of meperidine in hospitalized medical patients. J Clin Pharmacol. 1978; 18:180-5.

Porter and Jick, New England Journal of Medicine, January 10, 1980.

SIX TIPS FOR TREATING ADDICTION

1. Alcohol → AA
2. Opioids → Buprenorphine
3. Stimulants → CBT
4. Cannabis → MI
5. Tobacco → Varenicline
6. Benzos → Switch & Taper