



Thug Drugs

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Faculty

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- WV PDMP Advisory Panel Member
- CDC Grant Reviewer



Disclosures

- Consultant/Independent Contractor: Daiichi Sankyo, Clinical Pharmacists Advisory Panel, Member

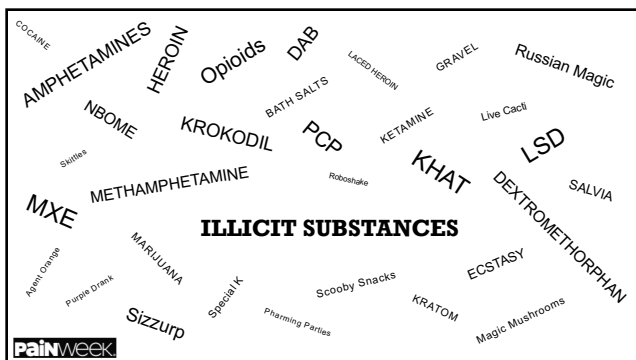
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Learning Objectives

- Recognize commonly abused substances across the globe.
- Classify commonly abused substances based on each substance's mechanism(s) of action.
- Explain how to provide guidance to the lay public on the anticipated effects of commonly abused substances.





What are *illicit* substances?

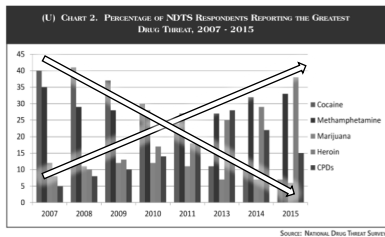
1. Schedule 1 Controlled Substances
 - Illegal to make, sell, or use
 - No accepted medical use, dangerous, & potential severe dependence
2. Any Schedule Controlled Substance utilized for unintended people/uses

Laws are not uniform among states/countries

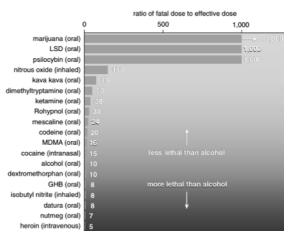
- Heroin is LEGAL in the UK, Portugal, Canada, etc.
- Marijuana is "LEGAL" in certain US states, yet Illegal on the Federal Level



Most Abused Illicit Substances (2015)



Illicit Therapeutic Index



The Toxicity of Recreational Drugs. American Scientist. 2006. Volume 94, 206-208.

Word of Mouth

www.streetrx.com

Shows daily observed prices by location

Did you get a good deal?

Substitution and emergency

Name of drug

Formulation

Price per unit

Submit

Nevada

88	oxycodone ER tablet	Not Bad
88	Generic Opave ER, 10mg pill	\$ \$ \$ \$ \$
85	oxycodone, 10mg pill	Reasonable
85		\$ \$ \$ \$ \$
114	Adderall, 30mg pill	Not Bad
114		\$ \$ \$ \$ \$
112	Adderall, 30mg pill	Reasonable
112		\$ \$ \$ \$ \$



Resource for addiction treatment centers by zip code (Links to SAMHSA)



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Illicit Substances Overview

Hallucinogens

- NBOME
- LSD
- Ketamine
- MXE
- PCP
- Psychedelic Mushrooms
- Peyote Cacti
- Ecstasy

Stimulants

- Cocaine
- Meth(amphetamine)
- KHAT
- Bath Salts & Gravel

Cannabis Products

- Marijuana Plant
- Synthetic Marijuana
- Marijuana Extracts

Opioid-Related Products

- Heroin
- Laced Heroin
- Krokodil
- Kratom
- Salvia
- Dextromethorphan
- Loperamide

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Increased Neurotransmitter Effects

	Serotonin (5HT)	Dopamine (DA)	Norepinephrine (NE)	Opioid
Effects	Hostility/Agitation Muscle Rigidity Shivering Goose Bumps Dilated Pupils Fever/Sweating Diarrhea Seizures Bradycardia Tachycardia	"Reward & Pleasure" Schizophrenia Muscle Twitching Annesia Insomnia Tachycardia	"Fight or Flight" Dilated Pupils Tachycardia Dry Mouth Urinary Retention	Constricted Pupils Constipation Nausea/Vomiting Constipation Dry Mouth Urinary Retention Respiratory Depression
Structures	<chem>Nc1ccc(O)c(O)c1</chem>	<chem>Nc1ccc(O)c(O)c1</chem>	<chem>Nc1ccc(O)c(O)c1</chem>	<chem>CN1CC[C@]23[C@@H]4OC5=C(C=CC=C5C2=CC=C1C3=O)N</chem> Morphine (Painkiller)



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Smith L et al. Pharmacotherapy: A Pathophysiologic Approach, 10th Edition, McGraw-Hill Education, 2013.

HALLUCINOGENS

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Hallucinogens

- NBOMe → 1st 5-HT_{2A} Receptor Agonist
- LSD → Affects D/5HT/NE Receptors
- Ketamine → NMDA Antagonist, D₂/mu₁/k₁ agonist, S₁/N₁/D₁-RI, Na⁺/Ca²⁺ Channel Blockers, NO Synthase Inhibitor
- MXE → NMDA Antagonist & SSRI (5HT)



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5th 2017 Drug of Abuse Resource Guide

Hallucinogens

- PCP → NMDA Antagonist, Anti-Cholinergic, & Dopamine
- Psychedelic Mushrooms → 5-HT_{1A} and 5-HT_{2A} and 5-HT_{2C} Agonist
- Peyote Cacti → 5HT_{2A} Receptors & Dopamine
- Ecstasy (MDMA) → 5HT/DA/NE








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STIMULANTS







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Cocaine

Nicknames	Coke, Speed, Snow, Blow, or Cocoa Puffs		
Mechanism	5HT/NE/D & Na-Channel Blocker		
Market	Snorted Powder "Lines" include: "Bumps" (35mg) or "Balls" (100mg) Cocaine HCL + Baking Soda -> Crack Dime Bags: \$10 for 1/10th Gram (Smoked)		

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Stimulants

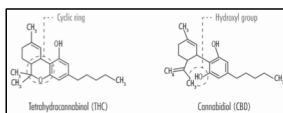
Methamphetamine	NE & Dopamine		
Khat	NE & Dopamine		
Bath Salts & Gravel	Synthetic Cathinones NE & Dopamine		

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Marijuana

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Let's Dive into the WEEDs...

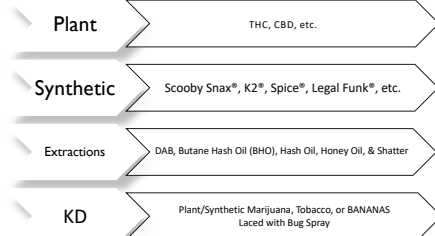


THC	CBD
<ul style="list-style-type: none"> Pain Nausea Vomiting Appetite Glaucoma Insomnia Anxiety Muscle Spasticity (Stiffness) 	<ul style="list-style-type: none"> Pain Inflammation Seizures Psychosis Depression IBS

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www.marijuana.com/industry/health-benefits-of-marijuana-2014/

Marijuana



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www.marijuana.com/industry/health-benefits-of-marijuana-2014/

Cannabinoids

Adverse Effects & Interactions

Adverse Effect	~Odds Ratio
Disorientation	5
Dizziness	5
Dry Mouth	4
Euphoria	4
Drowsiness	4
Confusion	4
Balance Issues	3
Hallucinations, Nausea, Vomiting, Diarrhea, & Fatigue	2

Cannabinoid	CYP-2C9	CYP-2C19	CYP-3A4
Δ9-THC	X		X
Δ8-THC	X		X
CBD		X	X
CBN	X		X

Colorado Department of Public Health and Environment. Monitoring Health Concerns Related to Edibles in Colorado: 2014. <http://dph.colorado.gov/sites/default/files/2015/02/151401.pdf>.
 Johnson, R. et al. Adverse Health Effects of Marijuana Use. *MMWR*. 2014; 200 (20): 200-203.

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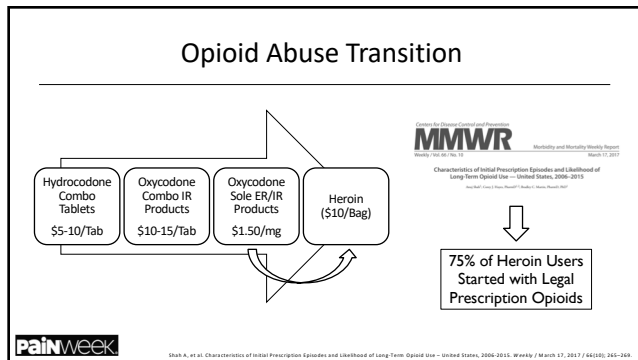
“Medical” Marijuana States Timeline

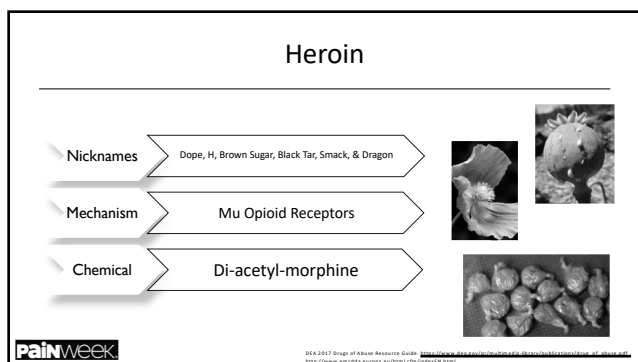
California	1996
Alaska	1998
Oregon	1998
Washington	1998
Maine	1999
Colorado	2000
Hawaii	2000
Nevada	2000
Montana	2004
Vermont	2004
Rhode Island	2006
New Mexico	2007
Michigan	2008
Arizona	2010
New Jersey	2010
Washington, DC	2010
Delaware	2011
Connecticut	2012
Massachusetts	2012
Illinois	2013
New Hampshire	2013
Maryland	2014
Minnesota	2014
New York	2014
Arkansas	2016
Florida	2016
North Dakota	2016
Ohio	2016
Pennsylvania	2016
West Virginia	2017
Oklahoma	2018

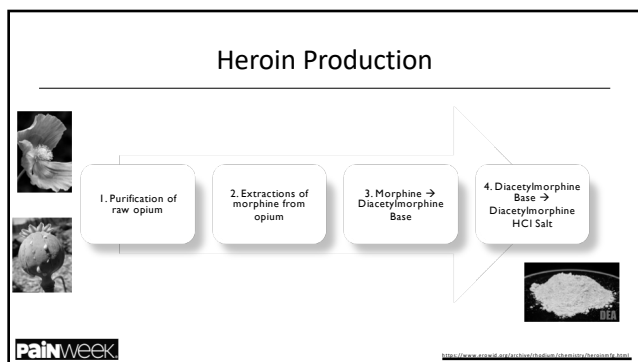
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Opiates/Opioids


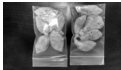
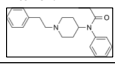

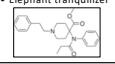
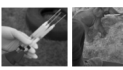
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Laced Heroin

Heroin	Fentanyl	Carfentanil	Remifentanyl Sufentanil Alfentanil
<ul style="list-style-type: none"> MME: 3  	<ul style="list-style-type: none"> MME: 100 Theraflu, Bud Ice, or Income Tax  	<ul style="list-style-type: none"> MME: 10,000 Wildnil Elephant tranquilizer  	

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MSA 2017 Drugs of Abuse Research Guide <http://www.msa.gov/~/media/MSA/2017/MSA17-0001/MSA17-0001.pdf>


Krokodil

Nicknames	Russian Magic or Poor Man's Heroin	
Mechanism	Mu Opioid Receptors	
MME Factor	Ten (10)	
Chemical	Desomorphine (di-hydro-des-oxymorphine) Patented in 1934 as Permond in Switzerland	

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Alavi SA, et al. The Heroin Chemical Behind Krokodil (Desomorphine) Synthesis and Mechanisms of Toxicity. *Toxicol. Science International* 268 (2015) 207-223.

Kratom

Nicknames	Thang, Thom, & Swim	
Mechanism	Potent K-Opioid D2 Agonist COX-2 Anti-inflammatory	
Drug Interactions	CYP450 3A4, 2D6, & 1A2 Inhibitor	
Chemical	Mitragyna Speciosa Tropical plant in coffee family Native to Southeast Asia	

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MSA 2017 Drugs of Abuse Research Guide <http://www.msa.gov/~/media/MSA/2017/MSA17-0001/MSA17-0001.pdf>



Salvia

Nicknames Salvia Divinorum, La Maria, Magic Mint, or Diviner's Sage

Mechanism Potent K-Opioid D2 Agonist Endocannabinoid Modulator

Drug Interactions CYP450 1A1, 2C18, 2D6, & 2E1

Chemical Sage plant (Mint Family) Native to Mexico

PainWeek © 2017 Drug of Abuse Research Guide: <http://www.drugofabuse.com/2017/06/01/salvia-divinorum/>
<http://www.drugofabuse.com/2017/06/01/salvia-divinorum/>
 News & Info: <http://www.drugofabuse.com/2017/06/01/salvia-divinorum/> 2017-11-18 18:18


Dextromethorphan (DXM)

Nicknames Sizzurp, Purple drank, Purple Tonic, Robitussin DM* → Roboshake, Delusim* → Agony Orange, Coricidin HBP* → Skittles

Mechanism Non-Selective Serotonin Reuptake Inhibitor, NMDA Antagonist, Opioid Sigma Agonist, & Anesthetic

Chemical D-enantiomer of levomethorphan (methyl-levorphanol)

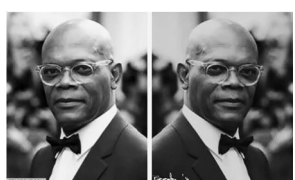

One in 10 American teenagers has abused products with DXM



Dose (mg)	Effects
100-200	Mild Stimulation
201-400	Euphoria & Hallucinations
401-600	Distorted Vision & Coordination
601-1500	Dis dissociative Sedation

PainWeek © 2017 Drug of Abuse Research Guide: <http://www.drugofabuse.com/2017/06/01/dextromethorphan-dxm/>
<http://www.drugofabuse.com/2017/06/01/dextromethorphan-dxm/>
 Clinical Pharmacology Online Database, 2017

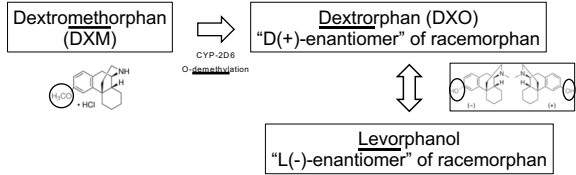
Chirality

Samuel-L-Jackson
Samuel-D-Jackson

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Opioid "Cousins"

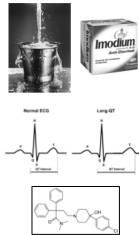


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Clinical Pharmacology Online Database, 2011

loperamide

- Nicknames: Poor Man's Methadone & Imodium®
- Mechanism: Peripheral Mu-Opioid Agonist
- Info: 1988 Moved from C-V to OTC



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Eggleston W et al. Loperamide abuse associated with cardiac dysrhythmia and death. Ann Emergency Medicine. 2016; 1-4.
 Dierksen J et al. Poor man's methadone: a case report of loperamide toxicity. Am J Forensic Med Pathology. 2015;36:268-270.

Illicit Substances Overview

- | | | |
|---|---|---|
| Hallucinogens <ul style="list-style-type: none"> • NBOME • LSD • Ketamine • MXE • PCP • Psychedelic Mushrooms • Peyote Cacti • Ecstasy | Stimulants <ul style="list-style-type: none"> • Cocaine • Meth(amphetamine) • KHAT • Bath Salts & Gravel Cannabis Products <ul style="list-style-type: none"> • Marijuana Plant • Synthetic Marijuana • Marijuana Extracts | Opioid-Related Products <ul style="list-style-type: none"> • Heroin • Laced Heroin • Krokodil • Kratom • Salvia • Dextromethorphan • Loperamide |
|---|---|---|

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Increased Neurotransmitter Effects

	Serotonin (5HT)	Dopamine (DA)	Norepinephrine (NE)	Opioid
Effects	Hostility/Agitation Muscle Rigidity Shivering Goose Bumps Dilated Pupils Fever/Sweating Diarrhea Seizures Restlessness Tachycardia	"Reward & Pleasure" Schizophrenia Muscle Twitching Amnesia Insomnia Tachycardia	"Fight or Flight" Dilated Pupils Tachycardia Dry Mouth Urinary Retention	Constricted Pupils Confusion Nausea/Vomiting Constipation Dry Mouth Urinary Retention Respiratory Depression
Substances	Peyote Cacti Cocaine DXM Ecstasy Kratom LSD Psychedelic Mushrooms MXE NBOMe PMA	Gravel Peyote Cacti Cocaine Ecstasy Ketamine Khat LSD Bath Salts PCP Salvia	Gravel Cocaine Ecstasy Khat LSD Bath Salts	DXM Heroin Ketamine Kratom Oxycodone Salvia U-47700 W-18



Diatta, L. et al. Pharmacotherapy: A Pathophysiologic Approach, 10th Edition, McGraw-Hill Education, 2017.
 © 2017 Drug of Abuse Resource Guide. www.drugofabuse.com

Pharming & Punchbowl Parties



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Resources Concentrating on Illicit Substances



Support Groups

Alcoholics Anonymous (AA)

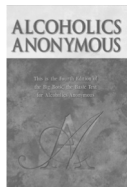
- ❖ <http://www.aa.org/>
- ❖ 212-870-3400

Narcotics Anonymous (NA)

- ❖ <http://www.na.org/>
- ❖ 1-818-773-9999

Nar Anon (Family & Friends)

- ❖ www.nar-anon.org
- ❖ 1-800-477-6291



Audience Question #1

Which of the following illicit substances is a hallucinogen?

- a) Bath Salts
- b) Khat
- c) Ketamine
- d) Carfentanyl



Audience Question #1 (ANSWER)

Which of the following illicit substances is a hallucinogen?

- a) Bath Salts
- b) Khat
- c) KETAMINE
- d) Carfentanyl



Audience Question #2

While stopped at a cross-walk on Jefferson St. in downtown Phoenix outside the Gypsy Bar at 2am, you notice a college student next to you leaning against a stop light post, shaking, with a red-toned skin color, grinding her teeth, and profusely sweating. If the student was to have ingested an illicit substance, which of the following would be the most likely of the listed substances.

- a) Kratom
- b) Scooby Snax
- c) Heroin
- d) Ecstasy



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Audience Question #2 (ANSWER)

While stopped at a cross-walk on Jefferson St. in downtown Phoenix outside the Gypsy Bar at 2am, you notice a college student next to you leaning against a stop light post, shaking, with a red-toned skin color, grinding her teeth, and profusely sweating. If the student was to have ingested an illicit substance, which of the following would be the most likely of the listed substances.

- a) Kratom
- b) Scooby Snax
- c) Heroin
- d) ECSTASY



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Audience Question #3

Which of the following are effects of various doses of dextromethorphan (i.e. DXM)?

- a) Cough Suppression
- b) Pain Suppression
- c) Hallucinations
- d) Euphoria
- e) All of the Above



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Audience Question #3 (ANSWER)

Which of the following are effects of various doses of dextromethorphan (i.e. DXM)?

- a) Cough Suppression
- b) Pain Suppression
- c) Hallucinations
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- e) ALL OF THE ABOVE



Discussion



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