



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

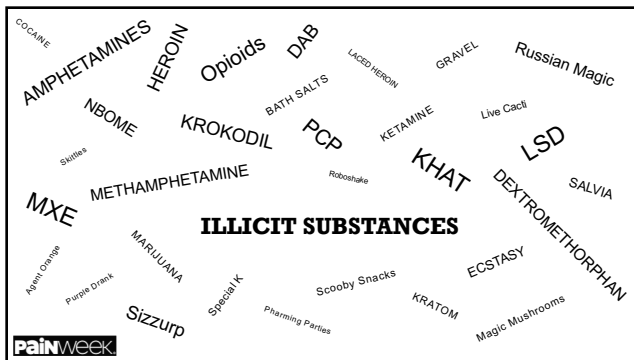
This presentation was not a part of the presenter's official duties at the WVU and does not represent the opinion of WVU



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.

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What are *illicit* substances?

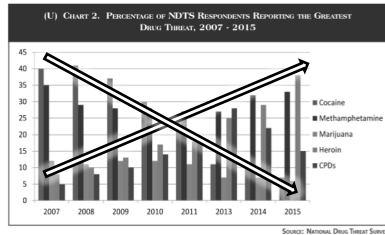
1. Schedule 1 Controlled Substances
 - Illegal to make, sell, or use
 - No accepted medical use, dangerous, & potential severe dependence
2. Any Schedule Controlled Substance utilized for unintended people/uses

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

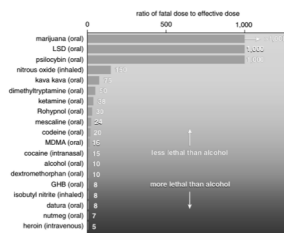
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Most Abused Illicit Substances (2015)



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Illicit Therapeutic Index



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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?

Substitutions are encouraged

Name of drug

Formulation

Price per unit

Continue

Nevada

88	oxycodone ER tablet	Not Bad
89	oxycodone ER, 10mg pill	Reasonable
90	oxycodone, 10mg pill	Reasonable
91	adderall, 30mg pill	Not Bad
92	adderall, 30mg pill	Reasonable

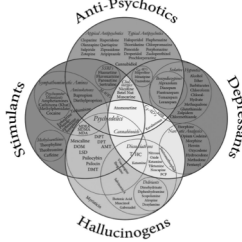


Resource for addiction treatment centers by zip code
(Link to SAMHSA)

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Illicit Substances Overview

Hallucinogens

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

Stimulants

- Cocaine
- Methamphetamine
- 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 Reflexes Tachycardia	"Reward & Pleasure" Schizophrenia Muscle Twitching Annesia Insomnia Tachycardia	"Fight or Flight" Dilated Pupils Tachycardia Dry Mouth Urinary Retention	Constricted Pupils Confusion Nausea/Vomiting Constipation Dry Mouth Urinary Retention Respiratory Depression
Structures				



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Source: 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 agonist, 5₂/N/D-RI, Na/Ca Channel Blockers, NO Synthase Inhibitor

MXE NMDA Antagonist & SSRI (5HT)



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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 Time 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



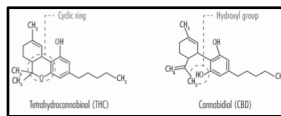
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Marijuana

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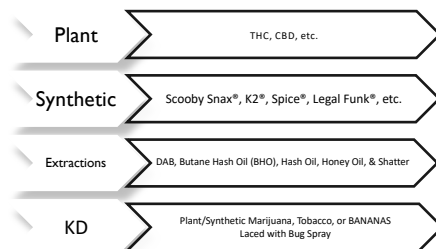
Let's Dive into the WEEDs...



THC	CBD
Pain	Pain
Nausea	Inflammation
Vomiting	Seizures
Appetite	Psychosis
Glaucoma	Depression
Insomnia	IBS
Anxiety	
Muscle Spasticity (Stiffness)	

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Marijuana

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Cannabinoids

Adverse Effects & Interactions

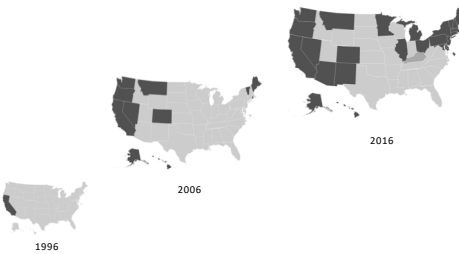
Adverse Effect	~Odds Ratio
Disorientation	5
Dizziness	5
Dry Mouth	4
Euphoria	4
Drowsiness	4
Confusion	4
Balance Issues	3
Hallucinations, Nausea, Vomiting, Diarrhea, & Fatigue	2

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 Marijuana in Colorado: 2016. Best State in Drug Abuse for 2016(2): 24-25. Johnson, R. et al. Adverse Health Effects of Marijuana Use. MMWR 2016; 125: 228-232.

"Medical" Marijuana States Timeline



1996

2006

2016

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

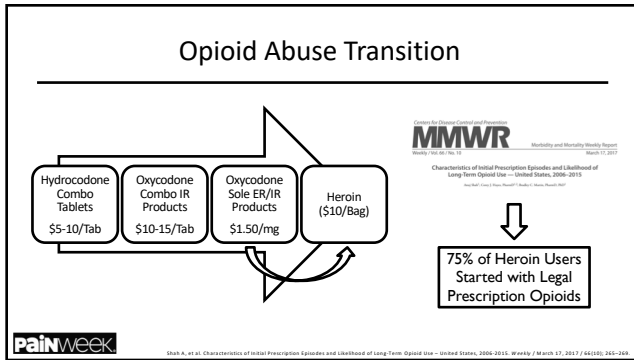


<http://ohiovalleyresource.org/2016/07/15/medical-marijuana-law/>, per 1-210143126-2020308723-146803666

Opiates/Opioids



8



Heroin

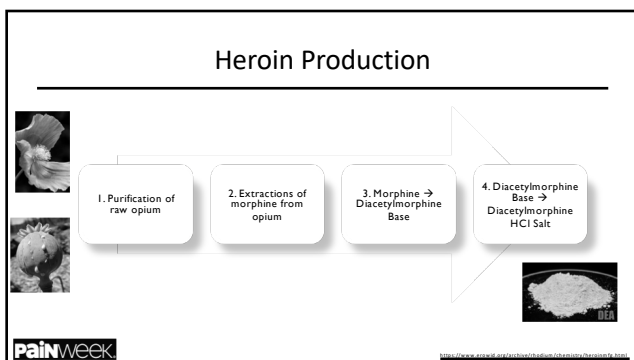
Nicknames Dope, H, Brown Sugar, Black Tar, Smack, & Dragon

Mechanism Mu Opioid Receptors

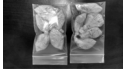
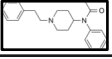
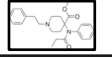
Chemical Di-acetyl-morphine

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DEA 2017 Drug of Abuse Research Guide <http://www.dea.gov/druginfo/2017-drug-of-abuse-research-guide>



Laced Heroin

Heroin	Fentanyl	Carfentanil
MME: 3	- MME: 100 - Theraflu, Bud Ice, or Income Tax	- MME: 10,000 - Wildnil - Elephant tranquilizer
 	 	 

Remifentanyl
Sufentanyl
Alfentanyl

PainWeek DEA 2017 Drug of Abuse Resource Guide <http://www.dea.gov/trafficking/traffickinginformation.pdf>

Krokodil

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

PainWeek Alavi SA, et al. The Heroin Chemistry (desomorphine) Synthesis and Mechanisms of Toxicity. Forensic Science International 280 (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	

PainWeek DEA 2017 Drug of Abuse Resource Guide <http://www.dea.gov/trafficking/traffickinginformation.pdf>

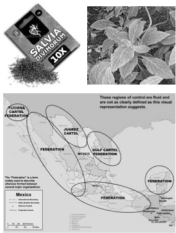
Salvia

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 DEA 2017 Drug of Abuse Research Guide: <http://www.dea.gov/enforcement/Drug-Abuse-Research-Guide-of-2017-01>
<http://www.dea.gov/enforcement/Drug-Abuse-Research-Guide-of-2017-01>
 Weiss M et al. New Engl J Med. 2015;373:1252-1261

Dextromethorphan (DXM)

Nicknames Sizzurp, Purple Drank, Purple Tonic, Robitussin DM* → RoboCoke, Delusio* → Agent Orange, Corvidin HSP → Siletics

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	Dissociative Sedation

PainWeek DEA 2017 Drug of Abuse Research Guide: <http://www.dea.gov/enforcement/Drug-Abuse-Research-Guide-of-2017-01>
<http://www.dea.gov/enforcement/Drug-Abuse-Research-Guide-of-2017-01>
 Clinical Pharmacology Online Database, 2014

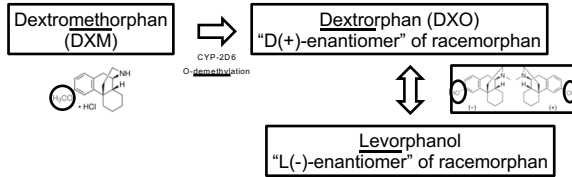
Chirality




Samuel-L-Jackson Samuel-D-Jackson

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Opioid "Cousins"

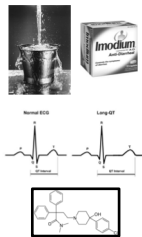


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Clinical Pharmacology Online Database, 2014

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	Stimulants	Opioid-Related Products
• NBOME • LSD • Ketamine • MXE • PCP • Psychedelic Mushrooms • Peyote Cacti • Ecstasy	• Cocaine • Meth(amphetamine) • KHAT • Bath Salts & Gravel	• Heroin • Laced Heroin • Krokodil • Kratom • Salvia • Dextromethorphan • Loperamide
	Cannabis Products • Marijuana Plant • Synthetic Marijuana • Marijuana Extracts	

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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 Anorexia 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 MKX 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 Krocodil Salvia U-47700 W-18

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Spans L et al. Pharmacotherapy: A Pathophysiologic Approach, 10th Edition, McGraw-Hill Education, 2017.
 BSA 2017 Drugs of Abuse Resource Guide: <https://www.bsacenter.org/bsa-2017-drugs-of-abuse-resource-guide/>

Pharming & Punchbowl Parties



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BSA 2017 Drugs of Abuse Resource Guide: <https://www.bsacenter.org/bsa-2017-drugs-of-abuse-resource-guide/>

Resources Concentrating on Illicit Substances

BLUELIGHT

Drugs-Forum
the international drugs community

European Monitoring Centre
for Drugs and Drug Addiction

Drugs of Abuse

EROWID
Researching The Legality, Risks and Misuse of Psychoactive Substances

**FOUNDATION FOR A
DRUG-FREE WORLD**
Find out the Truth about Drugs

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Support Groups

Alcoholics Anonymous (AA)

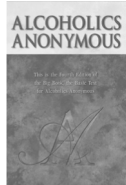
- ❖ <http://www.aa.org/>
- ❖ 212-870-3400

Narcotics Anonymous (NA)

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

Nar Anon (Family & Friends)

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



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Audience Question #1

Which of the following illicit substances is a hallucinogen?

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



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Audience Question #1 (ANSWER)

Which of the following illicit substances is a hallucinogen?

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



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Audience Question #2

While stopped at a cross-walk on Las Vegas Boulevard (i.e. "The Strip") 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 she 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 Las Vegas Boulevard (i.e. "The Strip") 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 she was to have ingested an illicit substance, which of the following would be the most likely of the listed substances.

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- 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
- d) Euphoria
- e) ALL OF THE ABOVE

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Discussion

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LinkedIn: Mark Garofoli

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