



## Thug Drugs

Mark Garofoli, PharmD, MBA, BCGP, CPE

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## Faculty

Mark Garofoli, PharmD, MBA, BCGP, CPE

- Experiential Learning Director & Clinical Assistant Professor, WVU School of Pharmacy
- Clinical Pain Management Pharmacist, WVU Medicine Integrative Pain Center
- Coordinator, WV Pain Management Expert Panel (SEMP Guidelines)
- WV PDMP Advisory Panel Member
- CDC Grant Reviewer



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## Disclosures

- Advisory Board: DSI

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



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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.




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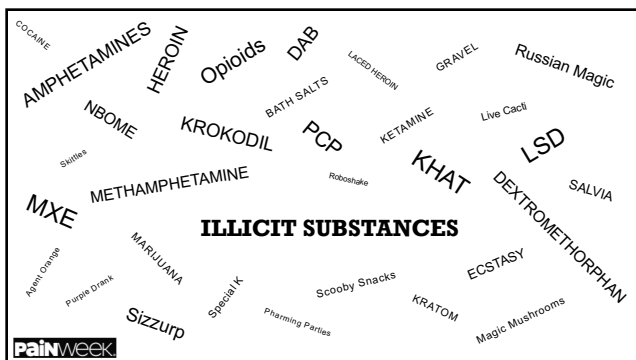
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**What are *illicit* substances?**

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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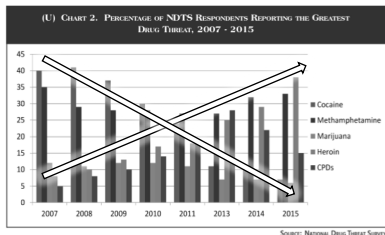
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### Most Abused Illicit Substances (2015)




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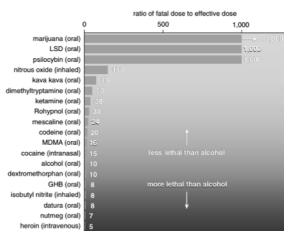
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### Illicit Therapeutic Index



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

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### 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

58	oxycodone ER tablet	Not Bad
59	Generic Opave ER, 10mg pill	\$ \$ \$ \$ \$
55	oxycodone, 10mg pill	Reasonable
59		\$ \$ \$ \$ \$
114	Adderall, 30mg pill	Not Bad
114		\$ \$ \$ \$ \$
112	Adderall, 30mg pill	Reasonable
112		\$ \$ \$ \$ \$



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



Home About Blog External Resources Disclaimer Contact

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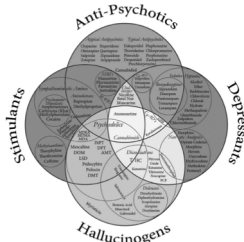
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### Illicits de Venn



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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

PainWeek

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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=C5N2)C4</chem> Morphine (Painkiller)



PainWeek

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

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# HALLUCINOGENS

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### Hallucinogens

<b>NBOMe</b>	1 <sup>st</sup> 5-HT <sub>2A</sub> Receptor Agonist	
<b>LSD</b>	Affects D/5HT/NE Receptors	
<b>Ketamine</b>	NMDA Antagonist, <u>D</u> / <u>mu</u> / <u>k</u> agonist, <u>S</u> / <u>N</u> / <u>D</u> -RI, <u>Na</u> / <u>Ca</u> Channel Blockers, <u>NO</u> Synthase Inhibitor	
<b>MXE</b>	NMDA Antagonist & SSRI (5HT)	

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



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### Hallucinogens

<b>PCP</b>	NMDA Antagonist, Anti-Cholinergic, & Dopamine	
<b>Psychedelic Mushrooms</b>	5-HT <sub>1A</sub> and 5-HT <sub>2A</sub> and 5-HT <sub>2C</sub> Agonist	
<b>Peyote Cacti</b>	5HT-2A Receptors & Dopamine	
<b>Ecstasy (MDMA)</b>	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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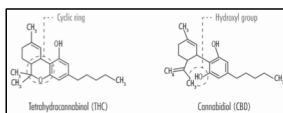
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## Let's Dive into the WEEDs...



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

Painweek

[www.marijuana.com/industry/health-benefits-of-marijuana-2014/](http://www.marijuana.com/industry/health-benefits-of-marijuana-2014/)

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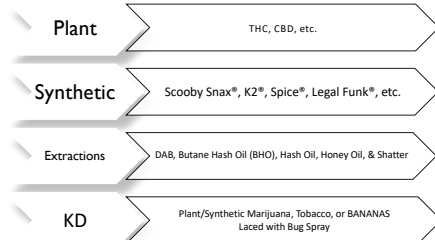
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## Marijuana



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[www.marijuana.com/industry/health-benefits-of-marijuana-2014/](http://www.marijuana.com/industry/health-benefits-of-marijuana-2014/)

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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 Edibles in Colorado. 2016. <http://dph.colorado.gov/files/2016/02/2016-09-15>.  
 Johnson, R. et al. Adverse Health Effects of Marijuana Use. *MMWR*. 2016; 235: 239-243.

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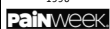
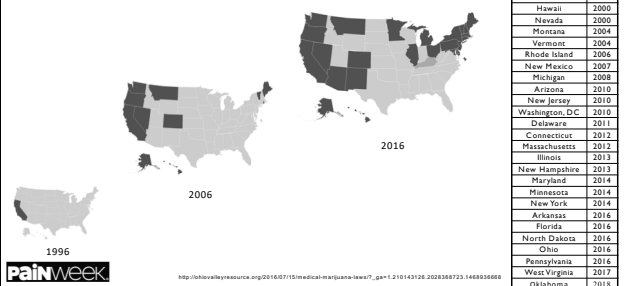
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## “Medical” Marijuana States Timeline



[http://ihhvalleyresource.org/2016/07/15/medical-marijuana-law47\\_jan+1210143126-2020358723-146893668](http://ihhvalleyresource.org/2016/07/15/medical-marijuana-law47_jan+1210143126-2020358723-146893668)

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## Opiates/Opioids




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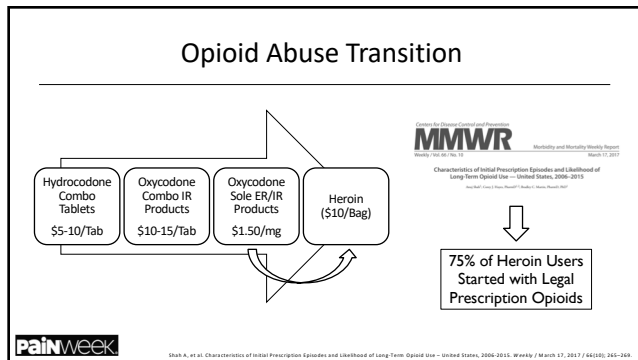
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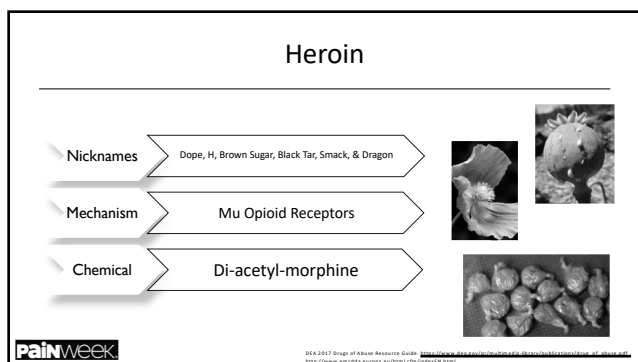
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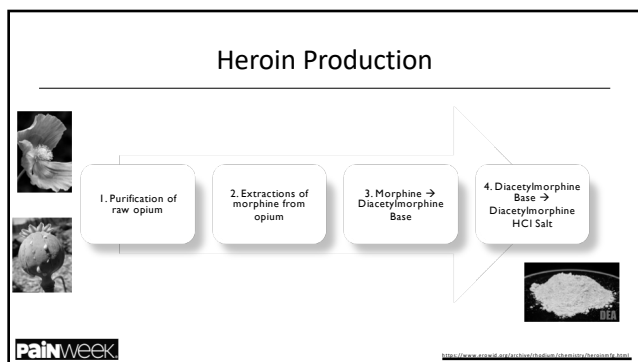
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
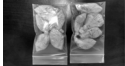
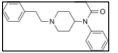

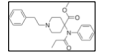

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### Laced Heroin

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

PainWeek

USA 2017 Drugs of Abuse Research Guide <http://www.usa.gov/2017-drugs-of-abuse-research-guide>

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### 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	

PainWeek

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

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### 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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USA 2017 Drugs of Abuse Research Guide <http://www.usa.gov/2017-drugs-of-abuse-research-guide>

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## Salvia



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**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/2017/09/25/salvia-divinorum/>  
<http://www.drugofabuse.com/2017/09/25/salvia-divinorum/>  
 News & Info: <http://www.drugofabuse.com/2017/09/25/salvia-divinorum/> 2017-10-18 14:17

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## Dextromethorphan (DXM)


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**Nicknames** Sizzurp, Purple Drink, Purple Tonic, Robitussin DM\* → Roboshake, Delusim\* → Agency 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/2017/09/25/dextromethorphan-dxm/>  
<http://www.drugofabuse.com/2017/09/25/dextromethorphan-dxm/>  
 Clinical Pharmacology Online © Roboshake, 2017

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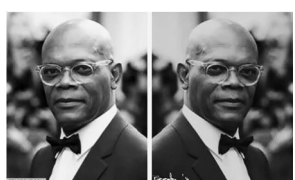
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## Chirality

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Samuel-L-Jackson    Samuel-D-Jackson

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
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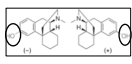
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### Opioid "Cousins"

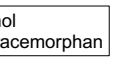
**Dextromethorphan (DXM)**  


⇨

CYP-2D6  
O-demethylation

**Dextrorphan (DXO)**  
 "D(+)-enantiomer" of racemorphan  


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**Levorphanol**  
 "L(-)-enantiomer" of racemorphan  


**PainWeek** Clinical Pharmacology Online Database, 2011

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### loperamide

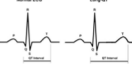

**Nicknames** → Poor Man's Methadone & Imodium®

**Mechanism** → Peripheral Mu-Opioid Agonist

**Info** → 1988 Moved from C-V to OTC



Normal ECG      Long QT

**PainWeek** 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.

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### Illicit Substances Overview

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

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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 NBQMe 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



DiPiro, J. et al. Pharmacotherapy: A Pathophysiologic Approach, 10<sup>th</sup> Edition, McGraw-Hill Education, 2017.  
 DEA 2017 Drugs of Abuse Resource Guide: <https://www.dea.gov/sites/default/files/2017-08/2017-2018%20DOA%20Resource%20Guide.pdf>

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## Pharming & Punchbowl Parties



DEA 2017 Drugs of Abuse Resource Guide: <https://www.dea.gov/sites/default/files/2017-08/2017-2018%20DOA%20Resource%20Guide.pdf>

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## Resources Concentrating on Illicit Substances




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### Support Groups

**Alcoholics Anonymous (AA)**

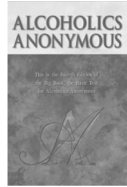
- ❖ <http://www.aa.org/>
- ❖ 212-870-3400

**Narcotics Anonymous (NA)**

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

**Nar Anon (Family & Friends)**

- ❖ [www.nar-anon.org](http://www.nar-anon.org)
- ❖ 1-800-477-6291



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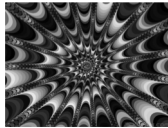
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### Audience Question #1

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 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



**Pain**week

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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



**Pain**week

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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**



Mark Garofoli, PharmD, MBA, BCGP, CPE  
LinkedIn: Mark Garofoli



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