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Learning Objectives

- Compare and contrast the more commonly-used drugs in DFCs
 - Pharmacokinetics
 - Pharmacodynamics
 - Challenges
- Case Reports

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THE "Z" DRUGS

Very low-dose medications
 Available in the US as early as 1993 (zolpidem)

Binds to the GABA_A receptor to enhance GABAergic inhibition of neurotransmission

CNS depressant effects (e.g., euphoria, drowsiness, muscle relaxation, feeling of drunkenness, hallucinations, and strong sedation)

Side effects may include memory loss, anxiety, abnormal thoughts/behaviors

Complex sleep behaviors have been reported (sleepwalking, sleep-driving, engaging in other activities while not fully awake)

Declared one of the most frequently used drugs used to facilitated sexual assault in Paris and surrounding suburbs (Chêze et al. *Forensic Science International* (2005): 3-10)



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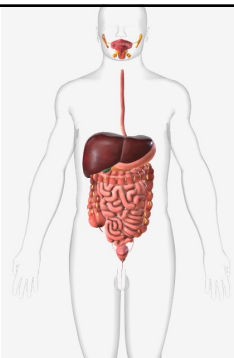
ZOLPIDEM

Hepatic metabolism occurs producing two primary, inactive urinary metabolites: zolpidem phenyl-4-carboxylic acid (metabolite I) and zolpidem 6-carboxylic acid (metabolite II).

- Metabolite I represents about 33-50% of the parent drug
- Metabolite II accounts for about 6-10%
- These metabolites may not be included in the toxicological testing

The average elimination half-life of zolpidem ranges between 2 to 3.5 hrs.

- May be extended for females and the elderly, so lower doses are recommended to avoid prolonged impairment



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ZOLPIDEM SINGLE DOSE STUDIES - URINE

Study 1:

- Three volunteers administered 10-mg oral dose of zolpidem
- Urine specimens collected every 12 hrs afterwards up to 144 hrs
- LC-MS/MS method with a reported detection limit of 0.01 ng/mL
- Able to detect the single exposure of the parent drug zolpidem for up to 60 hr in urine, with the largest concentrations (5-25 ng/mL) appearing in the first 12 hr specimen after administration
- The authors did not look for zolpidem metabolites in this study.

Study 2:

- Four Chinese subjects administered a single 10-mg oral dose of zolpidem.
- Highest urinary concentrations for zolpidem (about 250 ng/mL) occurred at 4 hrs post administration
- Highest concentration of zolpidem metabolite II was 200 ng/mL at the 4 hr collection
- Zolpidem metabolite I did not reach its maximum concentration (550 ng/mL) until 8 hrs after ingestion

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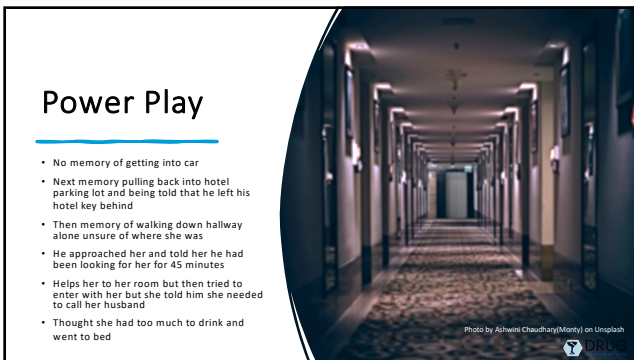
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Power Play

- Weeks later, another business trip to Chicago
- Similar scenario but memories of him being on top of her in a hotel room; her vomiting; and she discovered bruises while showering the next morning
- Talked to co-workers
- Some others had been fired after refusing to travel with him



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Photo by yourself all4gigi on Unsplash


Power Play

- Went to FBI Field Office in Houston
- Agreed to third trip
- FBI confiscated bag at airport
 - Viagra, Cialis, Ambien, and oxazepam
 - Small Jack Daniels bottles with sugar water
- Investigation found at least 4 others with similar experiences
- Photo evidence recovered from phone
- Toxicology reports and depositions provided evidence of the pharmacological effects of zolpidem and oxazepam
- Plea bargain led to 10-year federal sentence



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DARREN SHARPER

NFL player for 14 seasons

- Five-time Pro Bowler
- Two-time First-team All-Pro

Convicted serial rapist


- Accused of drugging and raping 14 women from 2011 to 2014
- Miami, New Orleans, Phoenix, Las Vegas, Los Angeles
- Instances of multiple women at one time

Zolpidem was believed to have been used

Pled guilty to charges in Arizona, California, Louisiana, and Nevada

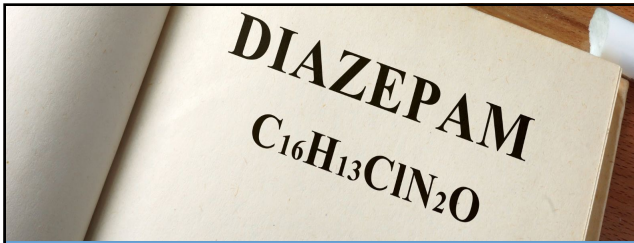
Accomplices:

- Brandon Licciardi
- Erik Nunez



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DIAZEPAM
C₁₆H₁₃ClN₂O

BENZODIAZEPINES

- Alprazolam (Xanax[®])
- Chlordiazepoxide (Librium[®])
- Clonazepam (Klonopin[®])
- Diazepam (Valium[®])
- Lorazepam (Ativan[®])
- Triazolam (Halcion[®])

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TREATMENTS

Benzodiazepines: America's 'Other Prescription Drug Problem'

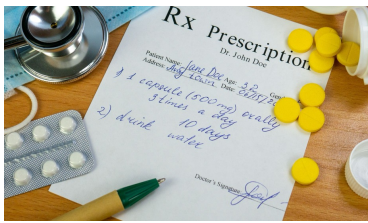
April 26, 2018 - 11:38 AM ET

JOHN HENNING SCHULMANN FROM Public Radio Tulsa



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Rx Prescription
Dr. John Doe

1) 1 capsule (1000mg) orally 3 times a day 10 days
2) drink water

POPULARITY OF BENZODIAZEPINES

- Pharmaceutical industry's top-selling family of prescription medications
- Alprazolam among the industry's best-selling pills of all time
- Now over 90 million prescriptions for various benzodiazepines in the U.S. alone
 - One for every 3 citizens

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MEDICAL USE OF BENZODIAZEPINES

- Benzodiazepines are effective for treating:
 - Sleep Disorders / Insomnia
 - Panic and Anxiety Disorders
 - Seizure Disorders
 - Alcohol Withdrawal
 - Anesthesia
 - Other Uses

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KEY SIDE EFFECTS OF BENZODIAZEPINES

- Slurred speech
- Loss of inhibitions
- Sedation and sleepiness
- Memory impairment / anterograde amnesia



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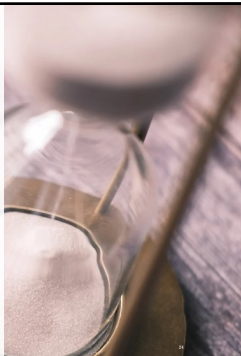
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CLASSIFICATION OF BENZODIAZEPINES

Based on duration of action

- Short-acting (~1-12h) e.g., midazolam
- Intermediate-acting (~12-24h) e.g., oxazepam
- Long-acting (>24h) e.g., clonazepam, diazepam

• Long-acting benzodiazepines tend to exhibit a longer and more severe "hangover"



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NON-CONTROLLED BENZODIAZEPINES

“Diverted” Benzodiazepines:

- Etizolam
 - Prescription med in Japan, India, and Italy
- Phenazepam
 - Approved for use in Russia
- Brotizolam
 - Approved in numerous European countries and Japan
- Flunitrazepam (Rohypnol®)
 - Approved for use in many countries

“Designer” Benzodiazepines:

- Clonazolam
- Deschloroetizolam
- Diclazepam
- Flubromazepam
- Flubromazolam
- Meclonazepam
- Nifoxipam
- Pyrazolam



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FLUNITRAZEPAM (ROHYPNOL®)

Potent and fairly short-acting
 Onset 15-30 minutes, duration 2-12 hours
 Used to treat severe insomnia and as anesthetic adjunct
 Impairs cognitive functions
 • confusion, slurred speech, anterograde amnesia, respiratory depression



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In 1990s, Rohypnol became popular drug to use in DFSA due to its strong sedative effect and ability to cause anterograde amnesia

Old tablets vs New Tablets
Blue dye in core is released when dissolved
Not incorporated into generic versions

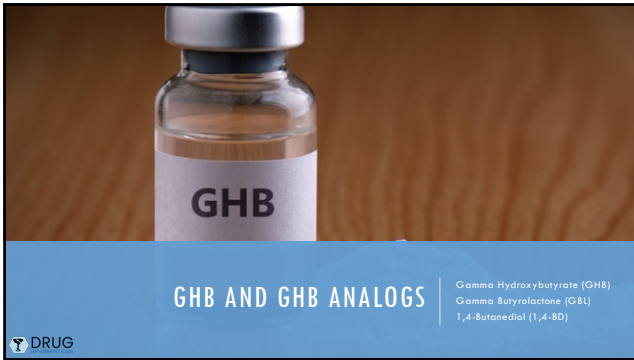
FACT: Relatively few proven cases of this drug's use in DFSA
Other benzodiazepines more likely to be used



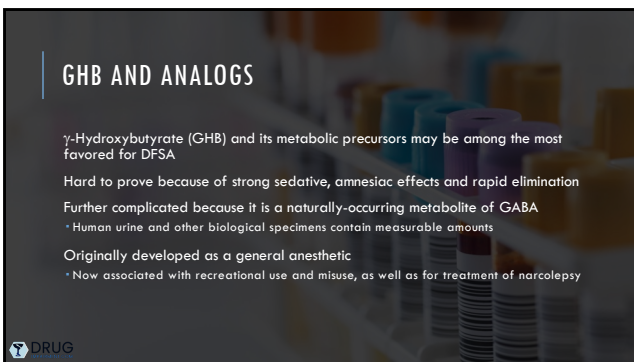
FLUNITRAZEPAM (ROHYPNOL®)



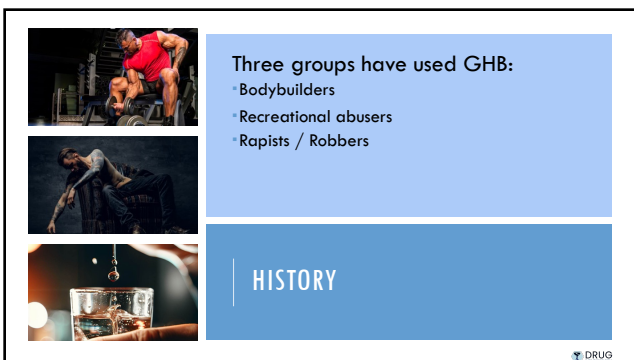
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GHB CLINICAL EFFECTS

Effects begin within the first 10 to 20 minutes after ingestion
 Peak effects may take 30 to 60 minutes

Strong CNS depressant

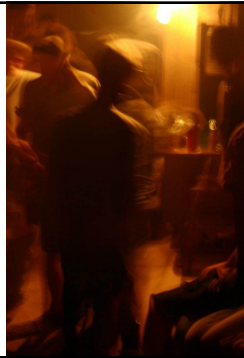
- Confusion, dizziness, vomiting, respiratory depression, apnea, bradycardia, amnesia

Alert patients may show tachycardia, combativeness, hypertension, agitation, psychotic symptoms (paranoia and hallucinations)

- May be caused by a combination of fast metabolism and GHB-induced dopamine release

GHB-assisted sleep generally only lasts about 3-4 hours

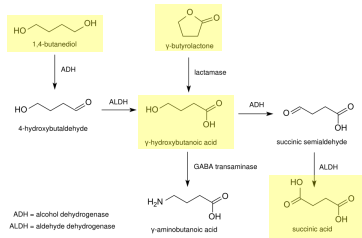
- People exposed to GHB usually wake up without a so-called "hangover" effect



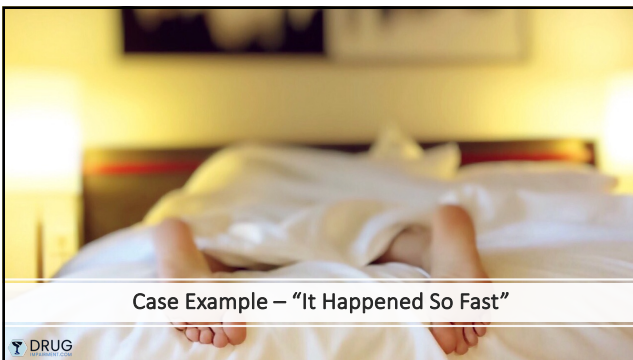
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GHB analogs are quickly absorbed after ingestion and rapidly metabolized to GHB
 If co-ingestion of 1,4-BD and alcohol, effects may be more severe and detection times may be slightly longer

GHB ANALOGS PHARMACOKINETICS



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“It Happened So Fast”

Known GBL-dealer would have parties at house and video his friends getting incapacitated

Young woman is seen on video arriving at party and consuming a small cup of liquid

8 minutes: Seen in video in a bedroom being filmed dancing with male

Told to take off top

11 minutes: Nude laying on bed with two men beginning to assault her

Clearly incapacitated (appears to have heavy arms and legs, movements are labored and slow)

Realizes what is going on and tries to kick one in the head

Rolls over on her stomach

Her body becomes completely limp

Urinate on bed

Assault appears to stop

13 minutes: Appears to be unconscious

14.5 minutes: Semi-conscious and crying out “Please Stop”

19 minutes: Unconscious again

When she woke about 4 hours later, she was nude on the bed

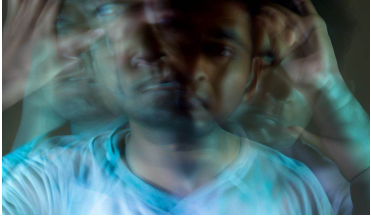
Dressed and left the party without reporting



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Dissociative anesthetic

- Instead of a “sleep-like” state, one becomes disconnected with their body

May also be used for pain management and for depression

Derived from and structurally similar to PCP

Snorted, injected, or taken orally

KETAMINE

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“Bearly” There

- Male and female animal researchers for federal agency studying black bears in New Mexico
- Forced to share a cabin in a rural part of state
- He began drugging her with ketamine and would re-dose her in glasses of water
- Hours of video
- Defense was that she was actively engaged and participating
- Forensic toxicologist explained that ketamine puts an individual into a dissociative state, not necessarily unconsciousness
- People will naturally respond to certain stimuli in a conditioned response
 - Drinking when a glass is placed to mouth
 - Grabbing something placed into hand

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CANNABINOIDS

Group of compounds that interact with the endocannabinoid system in the body

Helps regulate a variety of physiological and cognitive processes including appetite, pain-sensation, mood, and memory



Pharmacological effects are mediated by two types of receptors:

- CB1 receptors** – primarily found in the brain and central nervous system
- CB2 receptors** – primarily found in the immune system

Effects include:

- Pain relief, anti-inflammatory effects, antiemetic (anti-nausea), anti-anxiety, sedation, hallucinations, and psychosis


Second most prevalent drug in DFSA studies

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Other Lessons

- Overview of Drug-Facilitated Crimes and Associated Investigative Challenges
- The Alcohol Connection in DFCs
- “Off the Radar” Drugs to be Aware of in DFC
- Improving DFC Investigations



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Other Common Drugs Seen in Drug-Facilitated Crimes

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