Stroke Associated with Drug Abuse

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FINANCIAL DISCLOSURE:
No relevant financial relationship exists
Drug Abuse

- [http://www.youtube.com/watch?v=fdDhV45lYHU&feature=email](http://www.youtube.com/watch?v=fdDhV45lYHU&feature=email)
True or False

Is this Crack???
True or False
Bath Salts
True or False
Is this Smack???
True or False

Heroin
True or False
Is this Meth???
True or False
Methamphetamine
True or False
Is this Pot???
True or False

Spice
Drug Abuse and Stroke

- Drugs produce
  - Hypertension
  - Cerebral vasospasm
  - Vasculitis
  - Embolization (infective endocarditis)
  - Hemostatic/hematologic abnormalities
    - Increased blood viscosity, platelet aggregation
  - Intracerebral hemorrhage
More than 35 million Americans 12 years and older have tried cocaine at least once in their lives.

Over 8 million Americans have used its derivative, crack.

Over 13 million have tried methamphetamine.

56.6% Most likely use Marijuana first choice.
2010 National Institute of Drug Abuse
Monitoring the Future Survey

• Survey of 8\textsuperscript{th}, 10\textsuperscript{th}, & 12\textsuperscript{th} graders
  – Most measures unchanged use of illicit drugs
  – Increased daily marijuana use, > cigarettes
  – Decline with amphetamine use
  – Steady decline with cocaine use
Percentage of U.S. 12th Grade Students Reporting Past Month Use of Cigarettes and Marijuana, 1975 to 2010

SOURCE: University of Michigan, 2010 Monitoring the Future Study
After Marijuana, Prescription and Over-the-Counter Medications* Account for Most of the Commonly Abused Drugs
Prevalence of Past Year Drug Use Among 12th Graders

Categories not mutually exclusive

* Non-medical Use

SOURCE: University of Michigan, 2010 Monitoring the Future Study
Street Drugs & Stroke

- Cocaine, Amphetamines, Heroin, Marijuana
- Increase risks of having stroke
- No stats on how common it is for stroke to hit a 1\textsuperscript{st} or 2\textsuperscript{nd} time user
- More times use drugs the higher the chance of stroke
- Higher risk with known risk factors
University of Cincinnati Study

(De los Rios, 2011)

- Illegal drug use among stroke patients rose more than nine-fold over 13 year period
- Increase in recreational drug use
- More strokes in younger patients
- More prevalent use at younger ages
- Stable smoking and heavy alcohol use
- Street drug use rose about 4%
University of Cincinnati Study  
*(De los Rios, 2011)*

- Increased stroke occurrence in younger age group (< 45 years old)  
  - 4.5% in 1993-94  
  - 5.5% in 1999  
  - 7.3% in 2005

- Street drug use followed same trend  
  - 21% of stroke patient with drug use < 35 years old

- Three one-year periods rate of street drug use  
  - 0.5% in 1993-94  
  - 4.6% in 1999 - 2005  
  - ???? unavailable statistics
Cocaine

- CNS stimulant
- Blocks reuptake of norepinephrine and epinephrine after sympathetic stimulation
- Potentiates action of the sympathetic nervous system
- Inhibits reuptake of dopamine
  - Encourages reuse
- Local anesthetic blocks nerve impulse
Cocaine History

- 1596 Spanish - first medicinal use coca
- 1863 Wine containing cocaine – Throughout Europe (Endorsed by the Pope)
- 1886 Carbonated cocaine syrup “Coca-Cola”
- 1906 Coca-cola stopped using cocaine
- 1914 Labeled cocaine as a narcotic
- 1970s Cocaine - increasingly popular
- 1980s Crack
Cocaine

- Street Name: Crack, coke

- Toxicology Detection: 48 to 72 hours

- Psychological Effects: Varies with dose, tolerance, increase energy, alertness, euphoria, irritability, insomnia. High dose – psychosis, paranoia, aggressive
Cocaine

- Physical Effects: ↑BP, ↑HR, risk for seizure, stroke, heart attack, and death

- Withdrawal Symptoms: physical cravings, irritability, depression, paranoia, suicidal ideation, delusions, hallucinations
Cocaine

- Sniffed “snorting”
  - Cocaine hydrochloride
- Injected “mainlining”
  - Cocaine hydrochloride
  - Cocaine alkaloidal
- Smoked “smoking”
  - Cocaine alkaloidal
  - Crack

Freebasing Kit
<table>
<thead>
<tr>
<th>Cocaine &amp; Stroke</th>
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<tbody>
<tr>
<td>• 80% Hemorrhagic stroke within minutes</td>
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<tr>
<td>– 50% with aneurysm/AVM</td>
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<tr>
<td>– 20% present with seizures</td>
</tr>
<tr>
<td>• Use of Alkaloidal cocaine</td>
</tr>
<tr>
<td>– 50% ischemic, 50% hemorrhagic</td>
</tr>
<tr>
<td>• Acute hypertension</td>
</tr>
<tr>
<td>• Vasospasm</td>
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<tr>
<td>• Vasculitis</td>
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<td>• Platelet aggregation</td>
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</tbody>
</table>
Cocaine & Stroke

• SAH and Cerebral Vasospasm
  – Conway, 2001
  – Increased prevalence of vasospasm
  – No difference in clinical outcome

Conway, 2001 in Stroke;32; 2338-2343
Cocaine & Stroke

• Thrombolysis may be reasonable
  – Martin-Schild et al 2009
  – Cohort study (cocaine positive and negative)
  – No increased risk of complications

Martin-Schild 2009; Stroke; 40; 3635-3637
Cocaine & Stroke

• ICH in Cocaine Users
  – Martin-Schild et al 2010
  – Cohort study (cocaine positive and negative)
  – Subcortical location
  – Higher risk of IVH
  – Poor prognosis

Martin-Schild, 2010 in Stroke;41; 680-684
Cocaine Treatment

- Airway management, oxygen
- IV Access
- No specific antidote is known
- For arrhythmias maintain serum pH 7.50-7.55
- Consider sedation with diazepam (Valium) to treat agitation, irritability, seizures, and hyper-excitabale state
- Aggressively treat active seizures with diazepam or a short-acting barbiturate (not prophylactically)
- Hyperthermia - use ice packs, cooling blankets, and anti-pyretics (Tylenol)
Cocaine Treatment (con’t)

• Oral ingestion (stuffers/packers)
  – Charcoal

• Hypertension
  – Benzodiazepines
  – Vasodilators (nitroprusside and nitroglycerin)

• Ventricular arrhythmias
  – Sodium bicarbonate (effects of cocaine on the Na+ Channels)

• Dysrhythmias
  – May respond to lidocaine (in combo with Benzo’s)
  – Initial concerns about lidocaine with cocaine - unfounded due to differences in kinetics between the 2 compounds

• Magnesium for ventricular dysrhythmias
Medications to Avoid

• Beta-blockers
  – ↑BP, ↓Coronary blood flow, ↓CO

• Calcium Channel blockers
  – ↑ ingested cocaine from GI, and may ↑ ICP

• Nifedipine (Procardia, Adalat)
  – ↑ seizures

• Quinidine, procainamide, and disopyramide (Norpace)
  – Class 1a > QRS and QT intervals
  – Slows metabolism of cocaine
Amphetamines

- 1887 first manufactured
- 1937 available only with prescription
- WWII used to counter battle fatigue, maintain alertness, standard use in survival kits
- Prescribed for depression, fatigue, weight reduction
- 1971 Schedule II drug
- Currently used for weight reduction, narcolepsy, ADD
Amphetamines

- Street Name: bennies, black beauties, bumble bees, co-pilots, crank, cross tops, crystal meth, dexies, footballs, hearts, hot ice, ice, LA glass, meth, MDMA, pep pills, speed, uppers
- Toxicology Detection: 48 to 72 hours
- Psychological Effects:
  - Low dose: alertness, euphoria, ↑motor performance, energy, irritability, restlessness, panic
  - High dose: psychosis, aggressive, antisocial
Amphetamines

- Physical Effects: “fight or flight” state

- Withdrawal Symptoms: confusion, apathy, irritability, depression, ↑appetite, need for sleep
Amphetamines

- Sniffed
- Orally
- Injected
  - Crush tablets, dissolve into liquid, filter through cotton and injection
- Smoked “ice”
  - Crystal methamphetamine
Amphetamines & Stroke

- Chronic heavy user - ICH and/or SAH
- 1st hours after ingestion, few weeks, up to 3 months
- Hypertension vessel rupture
- Vasculitis inflammation and necrosis of small cerebral arteries
  - Steroid therapy shows little benefit
- Cardioembolic due to cardiomyopathy
Amphetamines Treatment

- Stabilize ABC’s
  - Keep Code Cart close – respiratory arrest
- Maintain IV
- Treat hypertension
- Control agitation with benzodiazepines
- Treat psychosis with Haloperidol
- No specific antidote is known
- Assess & treat hyperthermia
- Assess & treat seizures
Opiate - Heroin

- 1874 traveling salesman, mail order
- 1924 responsible for 75% of crime in NY
- 1960s – 1970s recreational drug
- Schedule I drug
- 1990 middle-class users emerged
- Prevalence in urban poor, ghettos
Opiates - Heroin

- Street Name: smack, thunder, hell dust, H or Big H, nose drops, skag, junk, other names may refer specific geographical area, such as "Mexican black tar."

- Toxicology Detection: 2 to 4 days

- Psychological Effects: pain relief, sleepiness, euphoris “on the nod”
Opiates - Heroin

- Physical Effects: ↓RR, ↓motor control, nausea

- Withdrawal Symptoms: 1 to 3 weeks, physical craving, anxiety, loss of appetite, weight loss, fatigue, nausea, diarrhea
Opiate - Heroin

• Injected
  – Allows for sudden rush of pleasant sensation, then drowsy euphoria

• Smoked

• Sniffed
Heroin & Stroke

• Frequently used in combination with other drugs (cocaine)

• Complications of IV injection
  – Septic embolization with ruptured mycotic aneurysm
  – Foreign body embolization (talc/cornstarch admixture)
Heroin Treatment

• Stabilize and Oxygenate (ABC’s)
  – Prepare to intubate (respiratory arrest is imminent)
• Consider naloxone (Narcan)
  – Effects of naloxone are short acting
  – Can cause aggressive withdrawal symptoms
• Seizures should respond to Benzodiazepine
• Activated Charcoal
• Packers may need a bowel wash out
• Assess for infection
Marijuana

• 2000 BC religious ritual
• 2737 BC Chinese medical compendium
• Andean Indians, Middle Ages, New World
• Civil War soldiers first addicts
• 1990 teenagers
Marijuana

• Street Name: hash oil, pot, refer, weed, grass

• Toxicology Detection
  – Occasional use: 1 to 3 days
  – Weekly use: persistent positive test
  – Heavy use: up to 1 month after cessation

• Psychological Effects: mild euphoria, relaxation, impaired motor control, impaired memory, panic, paranoia. Chronic use apathy, poor judgment, ↓personal hygiene
Marijuana

- Physical Effects: ↑BP, ↑HR, ↑appetite, dry mouth, dizzy, nausea, males: low sperm count, female: irregular menstrual cycles

- Withdrawal Symptoms: insomnia, loss of appetite, weight loss, irritability, rebound in REM sleep
Marijuana

- Smoked
  - Cigarette (joint, nail)
  - Blunt (cigar)
  - Pipe (bong)

- Can be made into a tea or food (brownies!)
Marijuana and Stroke

- Isolated case reports
- With traditional risk factors
- Difficult to establish causality
- Systemic hypotension and cerebral vasospasm
Diagnostic Workup

- Stroke patient < 45 years old (???elderly)
- Urine toxicology
- CT scan, MRI, MRA
- Angiography
- Transcranial Doppler
- Blood cultures
- Echocardiography
- Test for HIV, syphilis, hepatitis
Determining Use

• Look for clues
  – Paraphernalia
  – Shake a bottle of water to test for GHB (liquid ecstasy), if GHB is present foam/bubbles will form.
  – Look for empty soda cans (with holes in)
  – Does anything look like a pipe?
  – Candy, Bubbles, glow-sticks
  – Smuggling tricks: Aquafina water bottle, Pringles can, soda cans with hidden compartment for drugs and $$$

• Get the whole story
  – Talk to everyone involved
  – Friends may help if they understand the seriousness
Paraphernalia
Drug Abuse and Addiction

• Complex illness
• Begins with voluntary act of taking drugs
• Over time ability to choose is compromised
• Becomes compulsive
• Addiction is a brain disease
  – Affects reward, motivation, learning, memory, and inhibitory control over behavior
Drug Abuse/Addiction
Treatment Strategies

• Treatment is not simple
• Many components
• Goals to treatment
  – Stop using
  – Maintain drug-free lifestyle
  – Achieve productive functioning
Ask the Questions

• What drug did you think you were taking?
• How much of the drug did you take?
• Was it the usual amount?
• Was this your usual route of administration?
• Was it your usual supplier?
• Did you feel different?
Ask the Questions (con’t)

• Has your use of drugs become a problem for you with your family, friends, employer?
• How much does it cost to buy your drugs?
• Have you ever tried to quit?
• What type of withdrawal symptoms have you experienced?
• Have you been to rehabilitation?
• Are you interested in counseling?
Give Medications

• Suppressing withdrawal symptoms
  – Detoxification
  – Not treatment, only first step
  – Need further treatment
• Reestablish normal brain function, prevent relapse and diminish cravings
  – Only for heroin (methadone, buprenorphine)
  – Developing for cocaine, methamphetamine, and marijuana
Provide Behavioral Treatments

- Outpatient or Residential Programs
- Cognitive-behavioral therapy
  - Recognize, avoid, and cope with situations
- Multidimensional family therapy
  - Improve family functioning
- Motivational interviewing
  - Readiness to change behavior
- Motivational incentives
  - Positive reinforcement
Stroke Prevention

• Caution young people about association between street drugs and stroke
  – Help them make informed decisions
  – Result in life-changing medical consequences
Top Ten Things to Know for Street Drugs causing a Stroke

# 10 Cocaine, amphetamines, heroin can cause a stroke
# 9 Marijuana use is on the rise
# 8 Physical effects of various street drugs
# 7 Provide drug addiction treatment program information
# 6 Perform diagnostic workup
Top Ten Things to Know for Street Drugs causing a Stroke

# 5 Offer behavioral treatment plans
# 4 Ask the questions about drug abuse
# 3 Give withdrawal/treatment medications
# 2 Provide intensive neurocritical care management (ABCs)
# 1 Caution young people about association between street drugs and stroke