

Methamphetamine:

It's not good for you,
and it's not good for your heart.

Objectives

- Learn about meth, it's epidemiology, and it's consequences of abuse
- Specifically learn about meth's effects on cardiopulmonary system
- Review treatment options, with overarching goal to help patients achieve abstinence and prevent readmissions for CHF

Meth mouth



These photographs demonstrate the extensive tooth decay ("meth-mouth") common in chronic methamphetamine abuse due to bruxism, decreased saliva production, and poor dental hygiene.

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Epidemiology

- Very widely used in the WORLD- second only to marijuana
- 5% of US population has used, focused in western US
- Labs have changed from multiple smaller rural labs to “superlabs”, primarily in California and Mexico

How to use meth

- Can be smoked, snorted, injected, or ingested
- 2-3 day binges are typical, 2 week binges not unheard of
- Ends when drugs or money runs out, or paranoia/disorganized thinking sets in

Why to use meth

- Euphoria
- Aphrodisia
- Weight loss
- Job performance (was popular with truck drivers)
- Mood modulation (depression, anxiety, etc.)

Meth vs cocaine

- Stimulant effect similar to cocaine, but slower onset and longer duration of action
- Cocaine = rapidly absorbed and metabolized
- Methamphetamine remains in the central nervous system longer, and a larger percentage of the drug remains unchanged in the body, producing prolonged stimulant effects.

How it works

- INdirect neurotransmitter
 - acts by displacing epinephrine, norepinephrine, dopamine, and serotonin so they are released
 - Also inhibits reuptake of these

How it works (2)

- Results in surge of adrenergic activity:
 - Stimulated alpha- and beta-adrenergic receptors produce hypertension, tachycardia, hyperthermia, and vasospasm
 - Serotonergic activation contributes to alterations in mood as well as deranged responses to hunger and thirst
 - Dopamine receptor stimulation affects drug-craving and drug-seeking behavior, and psychiatric symptoms.

Acute effects

- Psychosis/hallucinations
- Violent/erratic behavior
- Insomnia
- Loss of appetite, vomiting
- Euphoria
- Elevated BP and HR
- Rhabdomyolysis?

Treating acute effects

- Minimize sensory stimulation
- Haldol for agitation
- Benzos to control seizures
 - Caution as can induce NMS
- Cooling for hyperthermia
- Vasodilators, CCB, non-selective beta blocker if needed for increased BP and HR

Acute treatment pitfalls

- **Failure to respect agitation** – Uncontrolled agitation results in hyperthermia, acidosis, rhabdomyolysis, and sudden cardiovascular collapse. Control of agitation and chemical sedation is a clinical priority.
- **Failure to respect hyperthermia** – Hyperthermia is strongly associated with mortality and morbidity if not rapidly corrected.
- **Failure to recognize rhabdomyolysis** – A frequent complication of methamphetamine intoxication, rhabdomyolysis contributes to renal failure and hyperkalemia.

Acute treatment pitfalls (2)

- **Failure to consider associated illness** –traumatic injury, intracranial hemorrhage, myocardial infarction, aortic dissection, pulmonary edema or hemorrhage, endocarditis, injection site abscess, and placental abruption.
- **Failure to note risk of contamination** –labs often contaminated with toxic chemicals. May need decontamination to prevent poisoning patients and staff.
- **Failure to appreciate the risk of violence** – use of physical and chemical restraints, personnel, and police is often

Acute cardiopulmonary effects

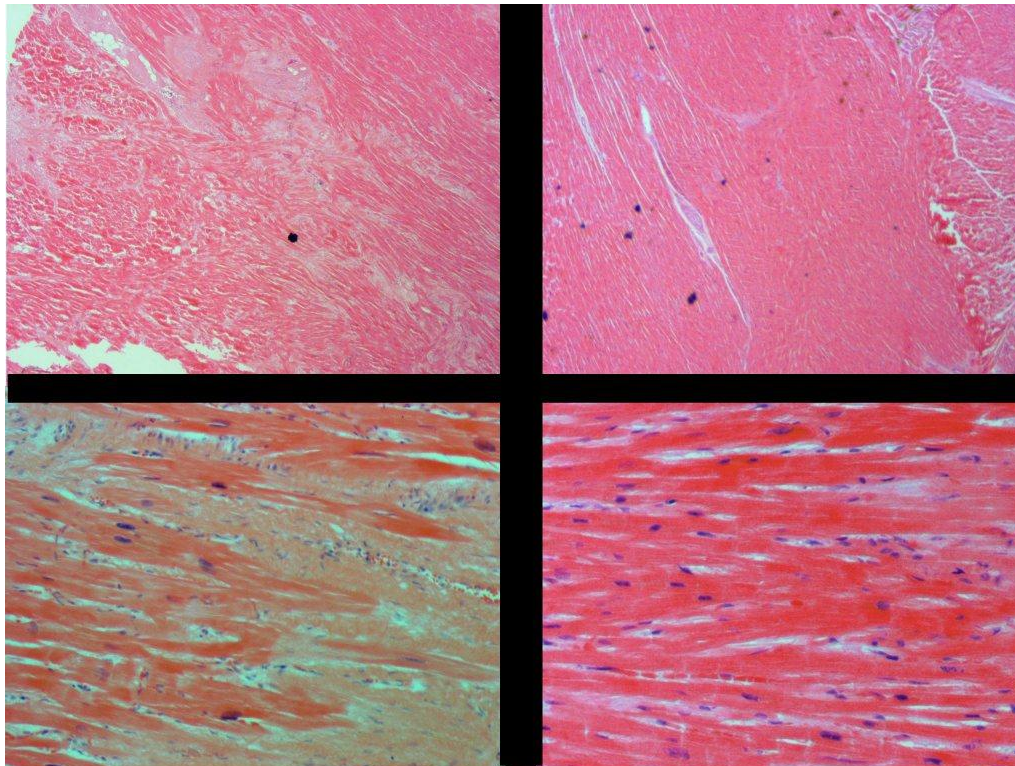
- Ischemia, MI
- Sudden cardiovascular collapse, especially in agitated, restrained patients
 - postulated to arise from a combination of neurotransmitter depletion, metabolic acidosis, and dehydration
- Increased RR and tidal volume
- Pulmonary edema

Chronic cardiopulmonary effects

- Cardiomyopathy (hypertensive? Toxic? Ischemic?)
- Valve dysfunction- possibly related to serotonergic effects
- Aortic dissection
- Pulmonary hypertension

Meth induced cardiomyopathy

Meth induces release of catecholamines in excess doses, which is linked to myocardial necrosis via transient microspasm



LEFT: middle aged man who died of acute and chronic meth use; RIGHT = healthy heart

Meth and pulmonary HTN

- Not completely understood, but proposed mechanisms include
 - toxic endothelial injury
 - hypoxic insult
 - direct spasm
 - Vasculitis
 - dysregulation of mediators of vascular tone

Chronic meth use implications

- Here: meth-induced CHF readmissions
- Difficult to treat- can use sildenafil for pulmonary hypertension, but...
- PILLAR OF TREATMENT is meth abstinence

Pharmalogical treatment for meth abstinence

- Dopamine agonists
 - Antidepressants
 - Opioid partial agonists and antagonists
 - Carbamazapine, phenytoin, lithium
- But none have been shown effective

Non-pharma treatment

- Cognitive behavioral therapy
- 12-steps (Crystal Meth Anonymous, NA)
- Residential treatment (rare)
- Contingency management (reinforcement of positive behavior, i.e. rewarding clean urines)
- All shown to be effective, if utilized
- But, major pitfalls for all of these (lack of resources, require high level of motivation)

So what CAN we do (especially as busy residents?)

- BRIEF intervention (5 or so minutes) shown to be effective
 - Ways I've done it:
 - In ED on admission
 - Afternoons
 - Just prior to discharge
 - Can be repeated, can come back to it

Brief Interventions- basic components

- Initial feedback: express concern
 - “I’m worried because...”
- Emphasize personal responsibility
 - “It’s up to you to decide...”
- Advise: make explicit recommendation
 - Abstinence vs cutting down
- Support self-efficacy
 - “I believe you can do it...”
- Assess readiness to change

Brief Intervention- how to do it

- Determine patient's perspective
 - “Do you think your meth use is a problem?”
- Assess readiness to change
 - “How important is it for you to quit?”
 - “Why did you say 3 and not a 0?”
 - “What would it take to get from 3 to 6?”

Precontemplation

- Goal: raise doubt, increase insight
 - Express concern
 - State problem non-judgementally
 - Agree to disagree
 - Advise trial of abstinence or cutting down

Contemplation

- Goal is to tip the balance
 - Elicit positive/negative aspects of using meth
 - Elicit positive/negative aspects of NOT using
 - Demonstrate discrepancies
 - Advise a trial of abstinence or cutting down

Determination

- Goal is to help patient determine best course of action
 - Working on motivation not helpful at this point
 - Support self-efficacy
 - Help to decide achievable goals
 - Assure that relapse won't disrupt relationship

(Action)

- Goal is to help patient take steps to change
 - Support and encouragement
 - Acknowledge discomfort (losses, withdrawal)
 - Reinforce importance of recovery

(Maintenance)

- Goal is to help prevent relapse
 - Anticipate triggers
 - Recognize ongoing struggle
 - Reiterate that relapse won't disrupt relationship

Relapse

- Goal is to renew process of contemplation
 - Explore what can be learned
 - Express concern
 - Support self-efficacy

References

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- DEA website drug information handout
- “Stimulant Addiction”, presented at Addiction Medicine Review Course, Thomas Kosten (2012)
- “Brief counseling interventions for alcohol and other drug use”, presented at CRIT 2012, Jeffrey Samet, MD