



London Health Sciences Centre

Southwest Ontario Regional Base Hospital Program

# EMS Grand Rounds

Heather Hames

Brianna Reilly

Adam Dukelow

October 16, 2009



# Case

- Dispatched code 4 for a male with police who was seen by bystanders stumbling around on Dundas St.
- Mid October, 8 °C
- On arrival pt. found sitting on ground crossed legged. Pt alert. Police state pt. is “well known” to them and is an IV drug user.
- Eyes open, disoriented, confused, obeys command
- The police tell us that if we “check him over” and he seems ok...he is going to cells....

- Police tell me again this pt is an illicit IV drug user, is well known to them and he is always presenting like this.
- When asked if he has any communicable diseases ...the officer replies “just assume he has everything”
- What next?

- I assessed the pt. for any obvious trauma. Pt had an old laceration that had obviously not been treated but had healed over above his eye. No new trauma. No c-spine tenderness or instability.
- We asked the pt. if he could stand up and get on our stretcher which is now on sidewalk next to him. Pt reaches out to stretcher and is unable to get to his feet so myself and my partner lift him and place him on stretcher.
- O2 via NRB
- ECG, Blood pressure pulse, RR, HR, Temp
- As Follows.....

# Vitals...

- Blood Pressure 102/70
- HR 130 Regular  
Strong
- RR 22 Regular and  
full
- Temp. 36.1
- ECG>>>>
- Sats 98%
- Pupils 5 +
- Blood glucose- unable to  
obtain



Transport or police custody?

- Unable to gain IV access.
- Pt now becoming more agitated and slightly combative
- Second set of Vitals...
- HR 130
- BP 104/96
- GCS 14
- RR 20
- What CTAS are you taking this patient in....
- What do you think is going on?.....



# Differential Diagnosis

- Infectious/Inflammatory

- Meningitis
- Encephalitis
- Sepsis

- CNS

- Trauma
- Stroke
- Mass
- Abscess
- Bleed
- Encephalopathy
- Seizure/postictal

- Metabolic/Endocrine

- Hypotension
- Hypoxia
- Hypoglycemia
- Acidosis
- Thyrotoxicosis/myxedema coma
- Uremia
- Hyperammonemia

- Toxicologic

- Sympathomimetics
- Anticholinergics
- Serotonin Syndrome/NMS
- Withdrawal
- ETOH

# Patient Presentations and Complications of Illicit Drug Use

## Objectives

- Enhance paramedic assessment of the IV drug using patient
- Recognize toxidromes specific to IV and street drug use
- Recognize medical complications specific to IV and street drug use
- Identify critical prehospital management for various toxicologic presentations



# Toxidrome

- “toxic syndrome”

*Constellation of signs and symptoms characterizing the shared acute effects of a group of toxins*

- Why is toxicology complicated?
  - Many toxins do not fit into a category
  - Mixed overdoses/Unknown substitutions, additives
  - Competing processes
  - Patients not forthcoming

# Toxidromes

- **Sympathomimetic**

- Fight or Flight

- **Anticholinergic**

- *Hot as a Hare*
- *Red as a Beet*
- *Dry as a Bone*
- *Mad as a Hatter*
- *Blind as a Bat*

- **Sedative/Hypnotic/  
Opioid**

- Depressive effects

- **Cholinergic**

- “SLUDGE”
  - Salivation, lacrimation, urination, defecation, gastric emesis
- Killer B’s
  - Bronchorrea, bradycardia, bronchospasm

	BP	H R	RR	Temp	Pupils	Skin	Mental Status
Sympathomimetic	↑	↑	↑	↑	Big	Sweaty	Agitated
Sedative/ Hypnotic/Opioid	↓	↓	↓	No change	Small	Normal	Depressed
Anticholinergic	N/ ↑	↑	V	↑	Big	Dry, Flushed	Delirious
Cholinergic	V	V	N/ ↑	No Change	Small	Sweaty Normal	Normal to Depressed



# Fever vs. Hyperthermia

- Fever

- Alteration in body's thermal "set point"
- Does not in itself cause damage
- Treatment: Tylenol, ASA, Ibuprofen....

- Hyperthermia

- Exogenous or endogenous elevation of temperature above the "set point"
- Heat illness, Drug use: sympathomimetics, salicylates, Neuroleptic malignant syndrome, Serotonin Syndrome, Malignant hyperthermia
- Tx: Cooling

# What toxidrome?

- 24 year old male friends called EMS from a house party.  
Agitated and combative
- Vitals: HR 150 BP 220/120 RR 24 Sats 100% Temp 40

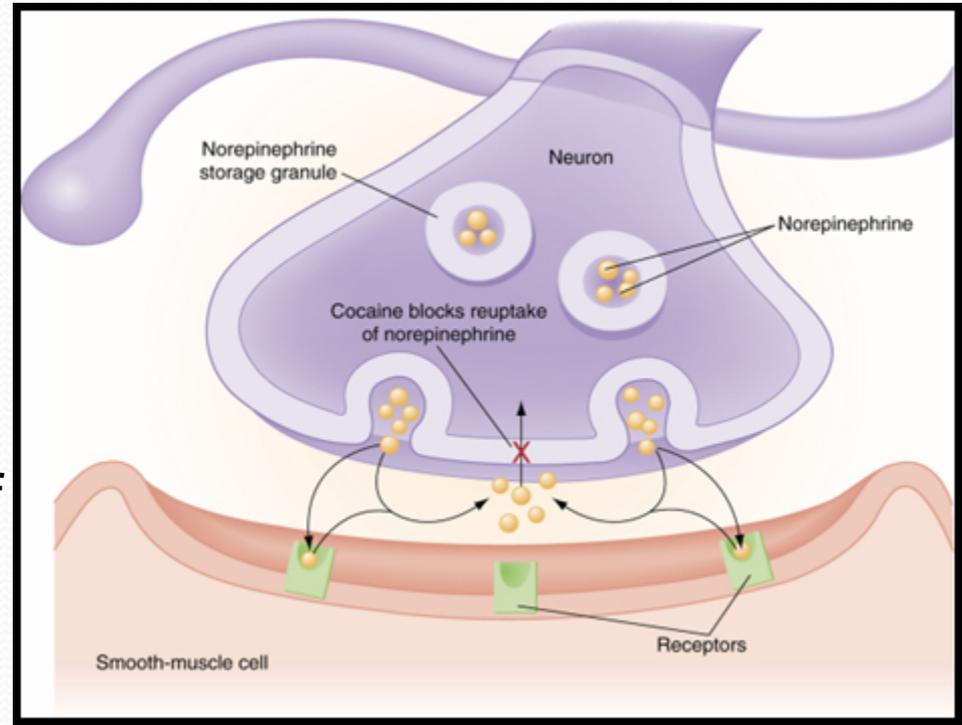
# Sympathomimetics

*Ex. Cocaine*

*Amphetamines*

*PCP*

- Increase the availability of biogenic amines
  - Serotonin
  - Epinephrine
  - Norepinephrine
  - Dopamine

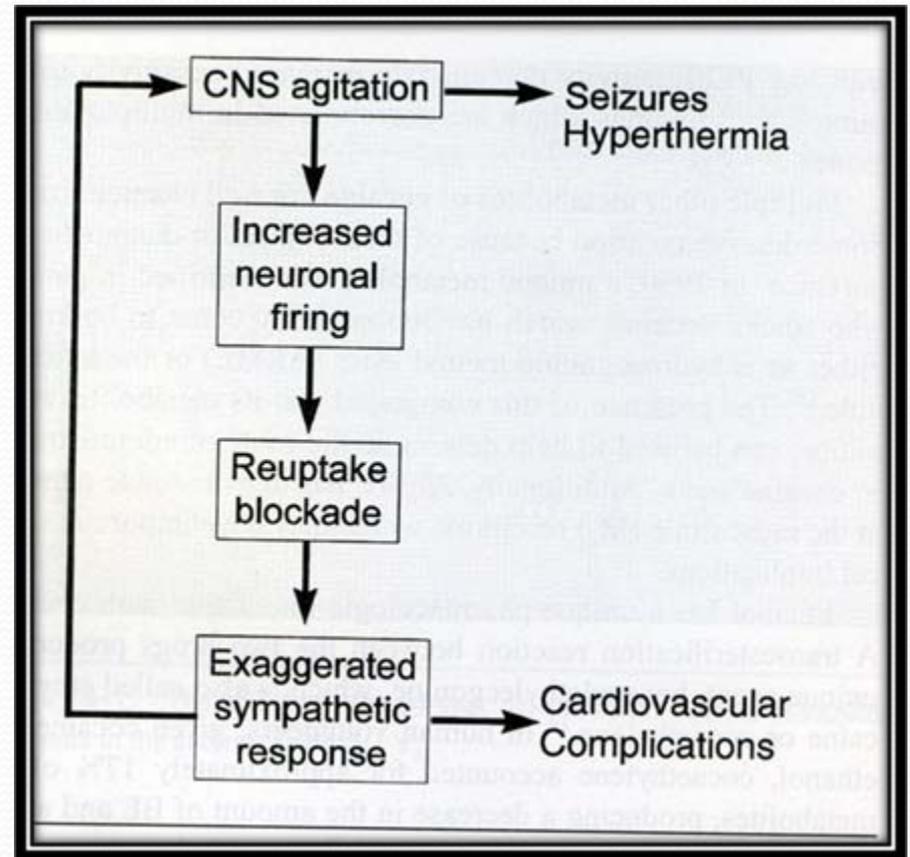




# Sympathomimetics

- Norepinephrine
  - $\alpha$  adrenergic effects- vasoconstriction
- Epinephrine
  - $\uparrow$  HR  $\uparrow$  contractility
- Serotonin
  - Mood, addiction, reward
- Dopamine
  - Psychosis, movement effects, washed out syndrome

- Increase excitatory amino acids in CNS
  - Glutamate
  - Aspartate



# Cocaine

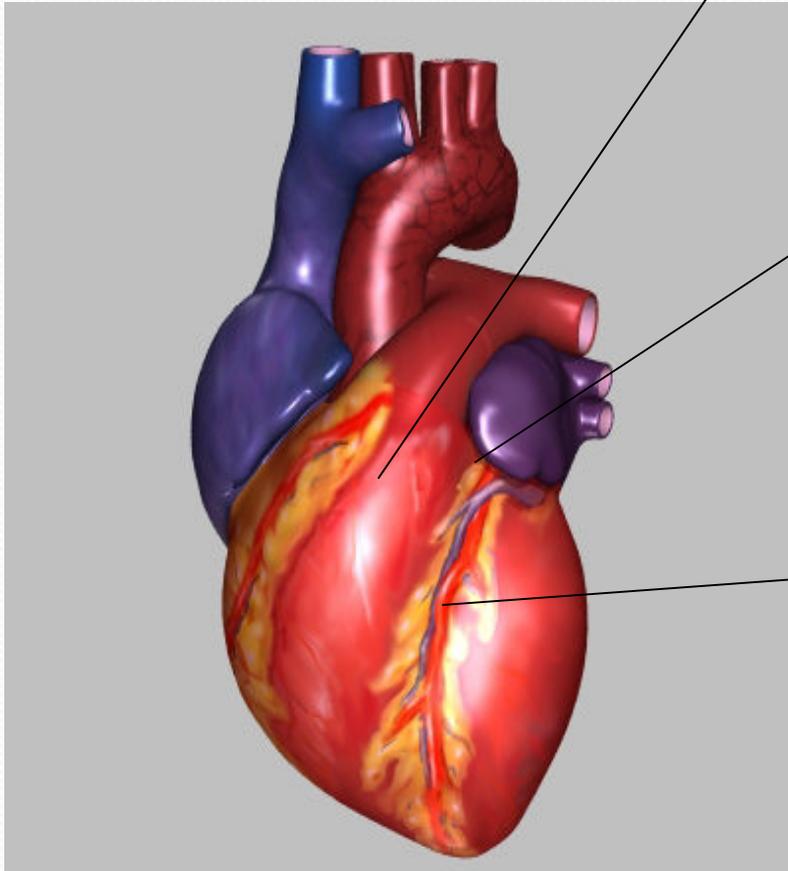
- Erythroxylum coca plant



Route	Formula	Onset	Peak	Duration
Inhalation	Crack	Seconds	2-5min	30-60min
Intranasal	Cocaine HCL	2-5min	20-30min	60-120min
IV	Cocaine HCL	Seconds	3-5min	30-60
Oral	Cocaine HCL	30-60min	60-90min	?

# Cocaine

## Myocardial Ischemia



- Increase myocardial oxygen demand
  - sympathomimetic
  - ↑ increase HR/BP/Contractility
- Decrease oxygen supply
  - vasoconstriction
  - LVH, ↓ LV function
  - premature atherosclerosis
- Create prothrombotic state
  - increase thrombus formation
  - enhance platelet aggregation, activation

## CNS

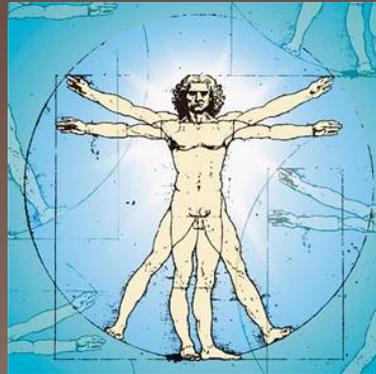
- Seizures
- Hemorrhage
- Ischemic Infarct
- Anterior Spinal Artery Syndrome

## Pulmonary

- “crack lung”
- PE
- Pneumothorax/  
pneumomediastinum

## ENT

- Oropharyngeal burns
- Ruptured nasal septum



## Obstetrical

- Placental Abruption
- Fetal Developmental Delay

## MSK

- Rhabdomyolysis

## Abdominal

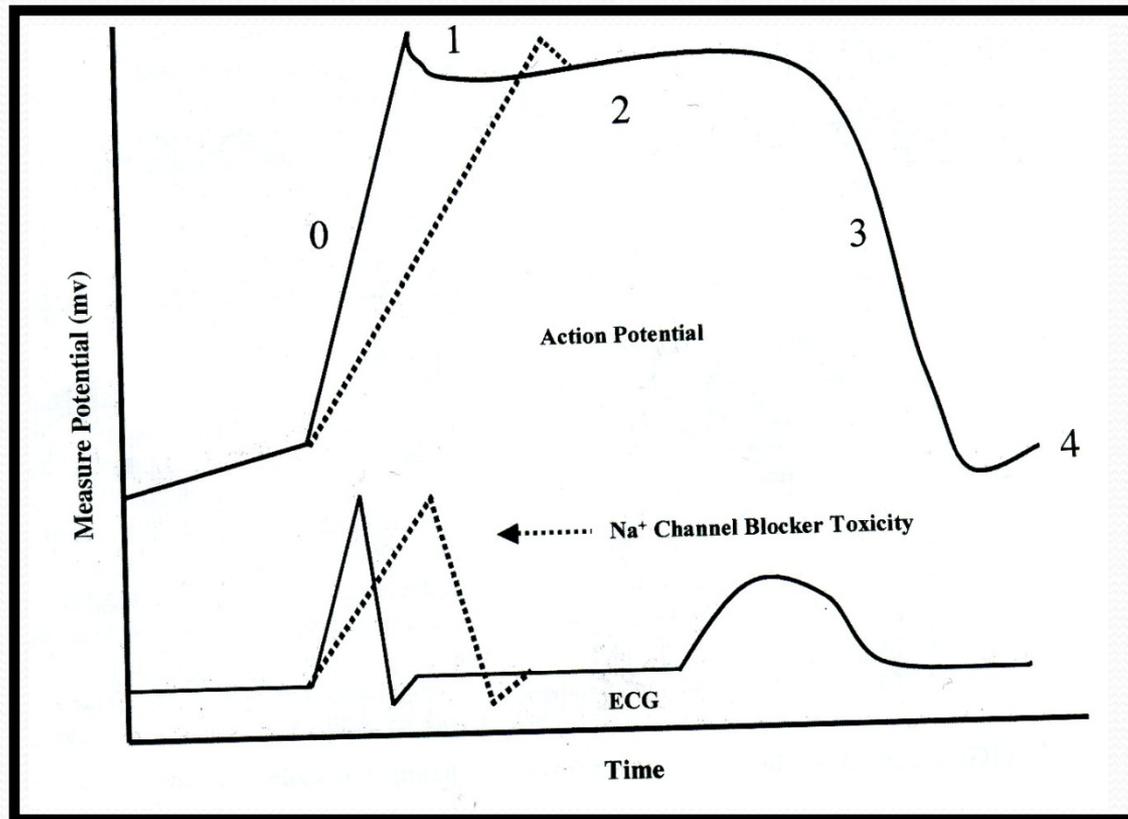
- Perforated ulcer
- Ischemic colitis

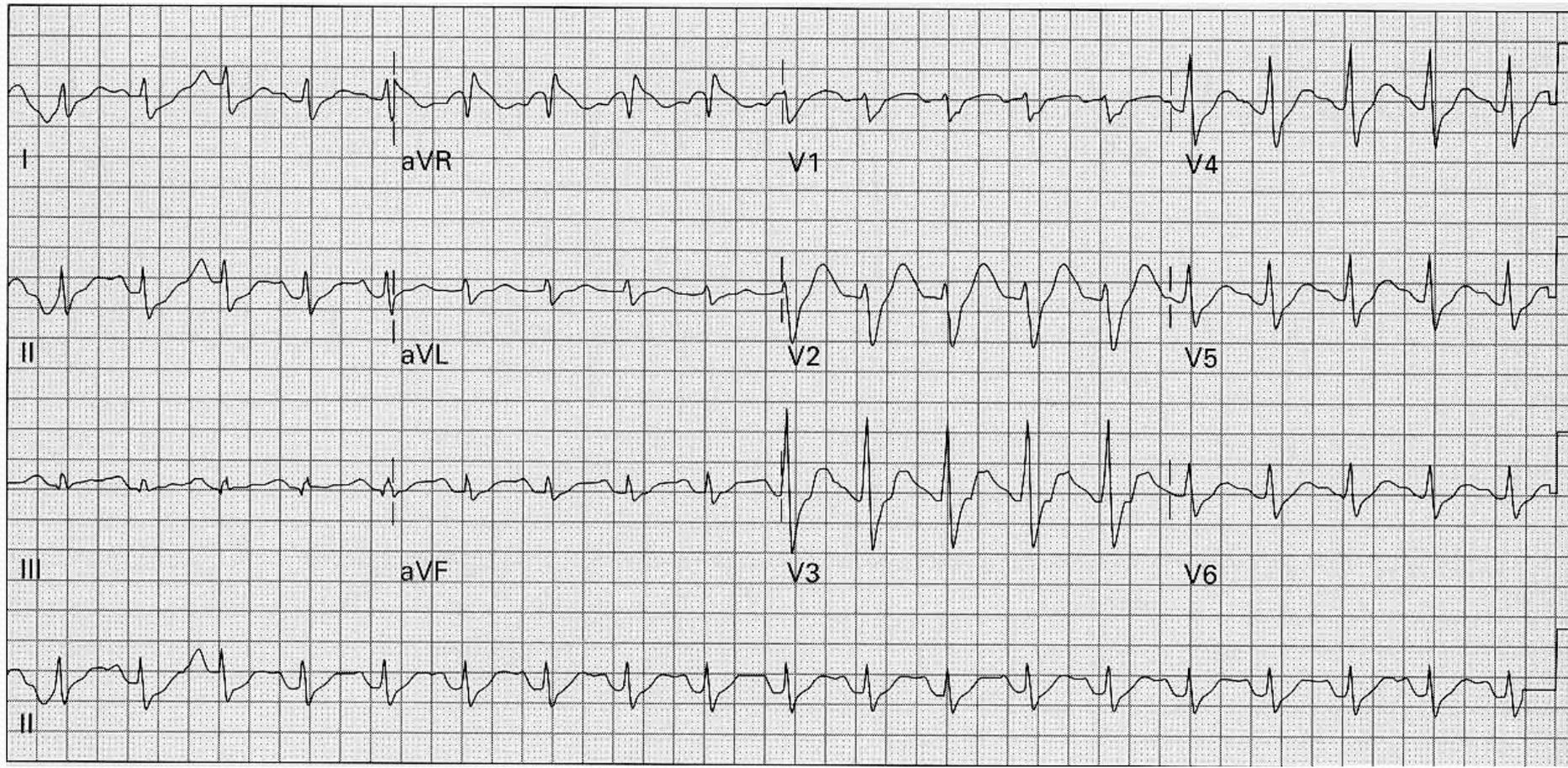
## Cardiovascular

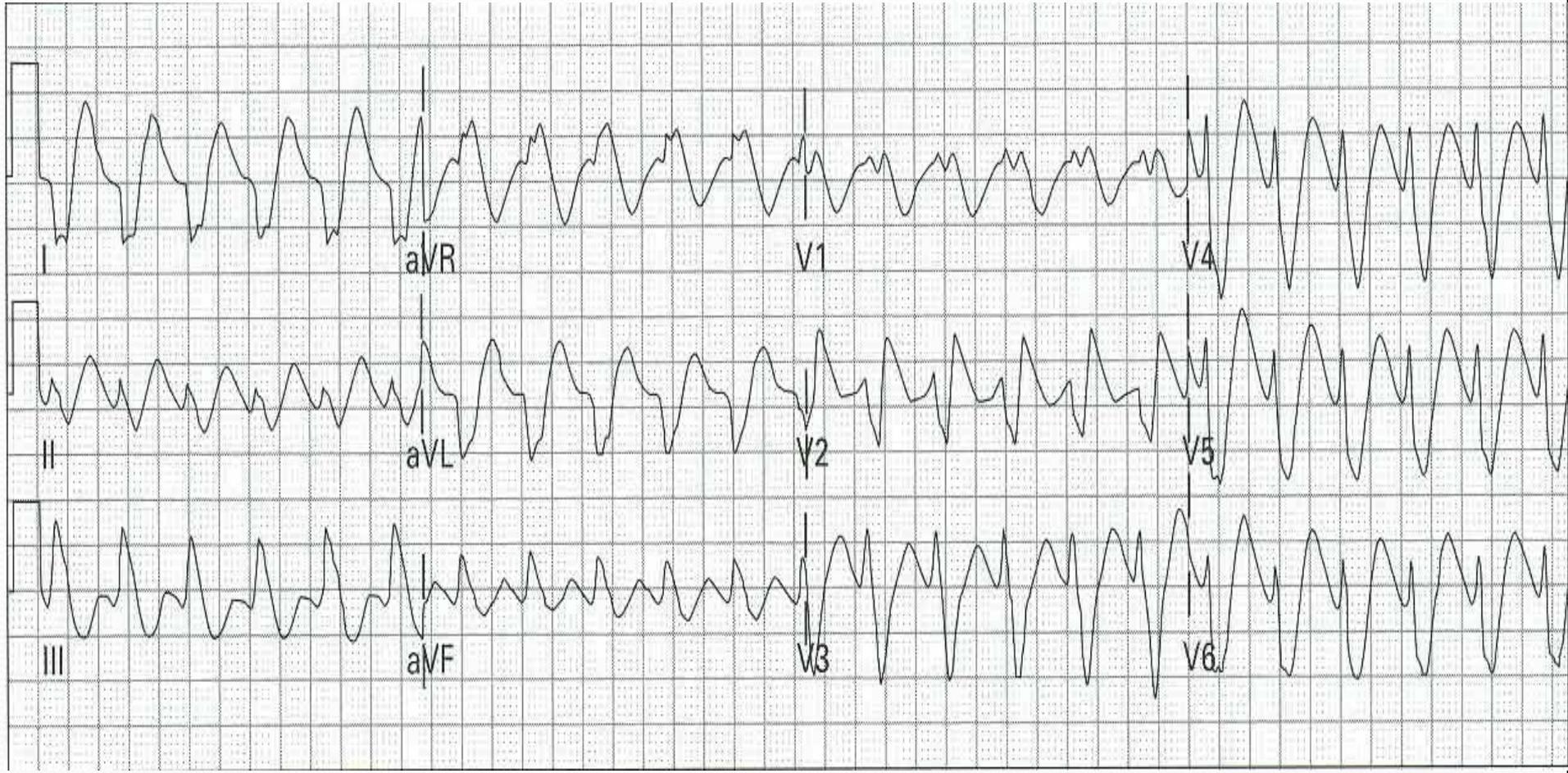
- MI
- Arrhythmia
- Aortic Dissection
- Hypertensive Emergency

# Cocaine

## Local anesthetic effects





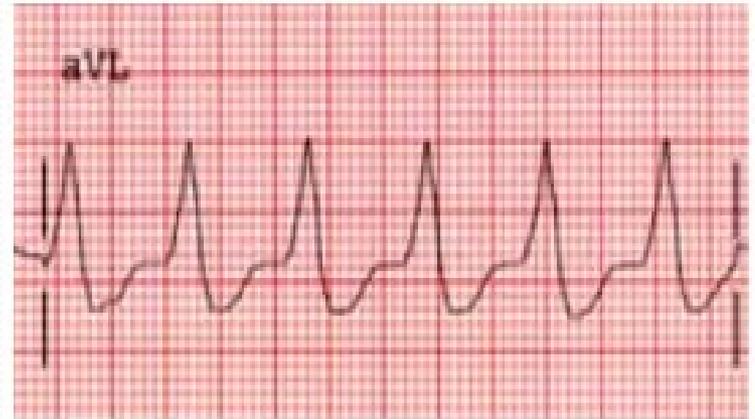


# Mechanisms for dysrhythmia

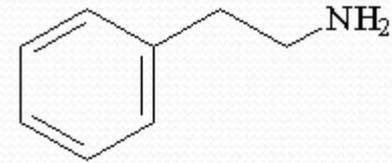
- Catecholamine surge
  - Sinus tachycardia, SVT, A Fib, PVC's
- Wide complex dysrhythmia
  - Na channel blockade/K channel blockade
  - Hyperkalemia from rhabdomyolysis
  - Myocardial ischemia

# Management

- Benzodiazepines
- Na Bicarb
- Lidocaine
- Cardioversion
  
- Contraindicated
  - Beta blockers
  
- Unknown
  - Amiodarone



# Amphetamines



- Group of compounds of the family *phenylethylamines*
- *Methamphetamine*
  - Crack/Speed/Ice/Crystal
- *3,4-Methylenedioxymethamphetamine (MDMA)*
  - Ecstasy/E/Adam/XTC
  - MDA (“love drug”)
- *Ephedrine/Ma Huang*
  - Cough/cold preparations, diet pills

# Amphetamines

- Compared to cocaine
  - longer duration of action(24hours)
  - MI/arrythmia/seizure less likely
  - Psychosis more likely
- Ecstasy
  - less sympathomimetic effect in low doses
  - Hyponatremia-seizure

*Death- hyperthermia, dysrhythmia, ICH*



# Hyperthermia

Increased motor tone, vasoconstriction, dehydration

Sustained temps  $>41^{\circ}\text{C}$  lead to fatal multisystem organ failure, DIC

Fluid rehydration

Sedation

Benzos +/- neuromuscular blockade

Aggressive cooling

Wet sheets, fans, ice packs

Goal: temp  $<38^{\circ}$  within 20 minutes

Continuous core temp monitoring

# Sympathomimetics-Management

- Prehospital

- ABC's, check glucose, temp!
- Cardiac monitor
- Transport!

- Agitation

- Benzodiazepines

- Seizures

- Benzos

- Hypertension

- Benzos
- Alpha blockers, vasodilators

- Dysrhythmia

- Benzos +- Bicarb/Lido/Cardioversion

## PCP

- Dissociative Agent
- Usually mild sympathomimetic findings
- Bizarre behaviour, blank stare, nystagmus, agitation, violence (10-40%)

## Hallucinogens-LSD

- Heightened sensation, confusion of senses
- Life threatening complications-rare



# GHB

- Sleep aid, weight loss adjunct, “natural” bodybuilding
- Banned in 1990
- Rapid onset-15min, Peak effect-90min
- Complex effects
  - Bradycardia, hypotension, hypothermia, small pupils, apnea

*“Classic” - resp depression/apnea interrupted by periods of agitation and violence*

# Inhalants

- Sniffing, Huffing, Bagging
- Usually hydrocarbons
  - Gasoline, spray paint, lighter fluid, glue
- Quick onset, symptoms resolve by 2 hours
  - Euphoria, hallucinations N/V, abdominal pain, dyspnea palpitations, headache
- CNS depression
  - confusion, slurred speech
  - Seizures, coma
- Lung toxicity
- “Sudden Sniffers Death”



# What toxidrome?

- 56 y/o male found sleeping on Richmond St.
- Vitals: HR 65 BP 100/65 RR 4 Temp 36<sup>5</sup> Sat 92%
- Skin – dry
- Pupils- pinpoint

	BP	H R	RR	Temp	Pupils	Skin	Mental Status
Sympathomimetic	↑	↑	↑	↑	Big	Sweaty	Agitated
Sedative/ Hypnotic/Opioid	↓	↓	↓	No change	Small	Normal	Depressed
Anticholinergic	N/ ↑	↑	V	↑	Very Big	Dry, Flushed	Delirious
Cholinergic	V	V	N/ ↑	No Change	Small	Dry	Normal to Depressed

# Opioids

- opioid receptors
  - Brain
  - Medulla (resp center)
  - Spinal cord
  - Peripherally
- *Heroin*
- *Morphine, fentanyl...*
- *Percocet/T#3*  
(*Acetaminophen!*)
- *Lomotil*

Cardiovascular	Peripheral vasodilation Bradycardia
Dermatologic	Flushing (histamine) Pruritus
Gastrointestinal	Reduced motility Reduced gastric acid secretion
Neurologic	Sedation/coma Analgesia Euphoria Seizures (meperidine, propoxyphene) Antitussive
Ophthalmic	Miosis
Pulmonary	Respiratory depression, Bronchospasm (histamine) Acute lung injury



# Patch Point- Narcan

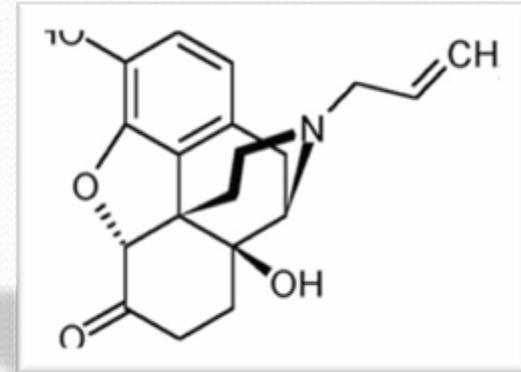
- Protocol is for a non-traumatic patient with a suspected opioid overdose
- Hypoglycemia must be excluded
- ABC's- Oxygenation and Ventilation more important!

- 0.4mg given
- Patient is now alert
- RR 24
- Sats 93%
- Tachycardic
- Physical exam
  - Vomiting
  - Lungs: Bilateral coarse crackles

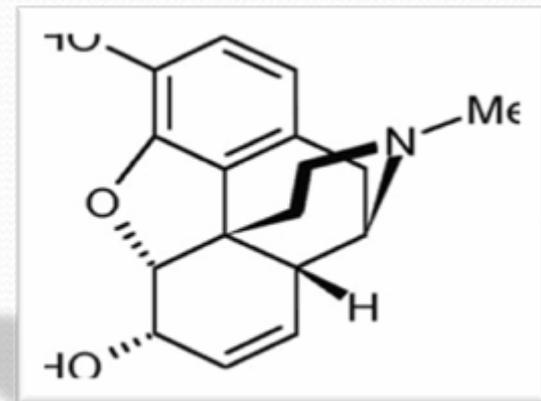


# Naloxone

- Competitive antagonist at opioid receptors
  - resp depression
- No effect at non opioid receptors
- Poor absorption orally
  - IV, SQ, IM, IN, nebulized



Narcan



Morphine

# Narcan-time to effect

- Endotracheal
- IV
- Intranasal
- Nebulized
- SubQ
- IM
- 1 min
- 1-2 min
- 3 min
- 5 min
- 6min
- unknown

*Duration of action ~20-90min and depends on dose of opioid, route and dose of narcan*



# Narcan- adverse reactions

- Withdrawal

- Re-sedation

  - transport

Acute Lung injury:

?massive sympathetic discharge

?Hypoxic alveolar damage

?negative pressure barotrauma

- “Overshoot phenomenon”



# Narcan in the ED

- LOC, resp status, Sats, cap gases
- Severe decreased LOC, hypoxia, hypercarbia

*Narcan 0.04-0.4mg increments*

*Infusion: 2/3 dose to wake them up per hour*

- Observe at least 2h after last dosing



# IVDU Complications-Chronic

- Malnutrition
- Tuberculosis, Sexually transmitted diseases
- Poor medical follow up
- Psychiatric illness
- HIV, Hep B, Hep C co-infection
- Difficult IV access

# IVDU Complications-Acute

## Injection Complications

- Cotton fever
  - Inflammatory reaction from drug impurities
  - Fever, tachycardia, tachypnea within 20min
- MRSA/local abscess/skin infection



# IVDU Complications-Acute

## Infections

- Endocarditis
  - 98% fever
  - 65% no murmur on presentation
  - Septic pulmonary emboli
  - Neurologic symptoms



# IVDU Complications-Acute

## Infections

- Septic Arthritis
- Osteomyelitis
- Epidural Abscess



# Case Conclusion

- Arrival in ED
- 80/50 130, wide complex RBBB pattern
- Haldol 5mg IV for agitation
- Bicarb given- no QRS narrowing
- Blood work:
  - Hb 102, WBC 21.4 CK 4,713 Troponin 1.09, Lactate 8.6
  - Acetaminophen/aspirin: not present
- Utox:
  - -cocaine, amphetamines, opioids, barbiturates, benzos
  - + cannabis
- CT head- small right parietal infarct
- Given Antibiotics. sepsis ? endocarditis

# Case Conclusion

- ICU consulted
- Intubated for airway protection
- Cardiac arrest with intubation
  - ROSC after brief CPR
- Echocardiogram- vegetations and large abscess on aortic valve
- Cardiac surgery consulted
- Blood cultures- Staph Aureus (MRSA)
- Patient continued to decompensate
- Bradycardia requiring pacing
- Family withdrew supportive measures and patient died admission day 2

# Back to the beginning...

## Objectives

- Enhance paramedic assessment of the IV drug using patient
- Recognize toxidromes specific to IV and street drug use
- Recognize medical complications specific to IV and street drug use
- Identify critical prehospital management for various toxicologic presentations

# Summary

## Prehospital assesment

ABC's, glucose

Evaluate quickly and monitor for cardiac, resp, and CNS manifestations of acute illicit drug toxicity

## Toxidromes

May give important clues as to causative drug and possible complications en route to ED

## Prehospital management

Recognize potentially life threatening signs requiring rapid transport, hyperthermia, dysrhythmias

## Medical complications

Differential diagnosis list is long!