Toxidromes: An approach to the poisoned patient

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HARVARD MEDICAL SCHOOL

Disclosures

- Nothing to disclose

Toxidrome?

- We don’t know what they took, or when they took it.
- What findings point to a potential ingestion?
- What are the symptoms that best correlate with a poisoning?

Objectives

Recognize a constellation of symptoms that correspond with a specific toxidrome(s) or poisoning

History

When was the ingestion?

What did they take?

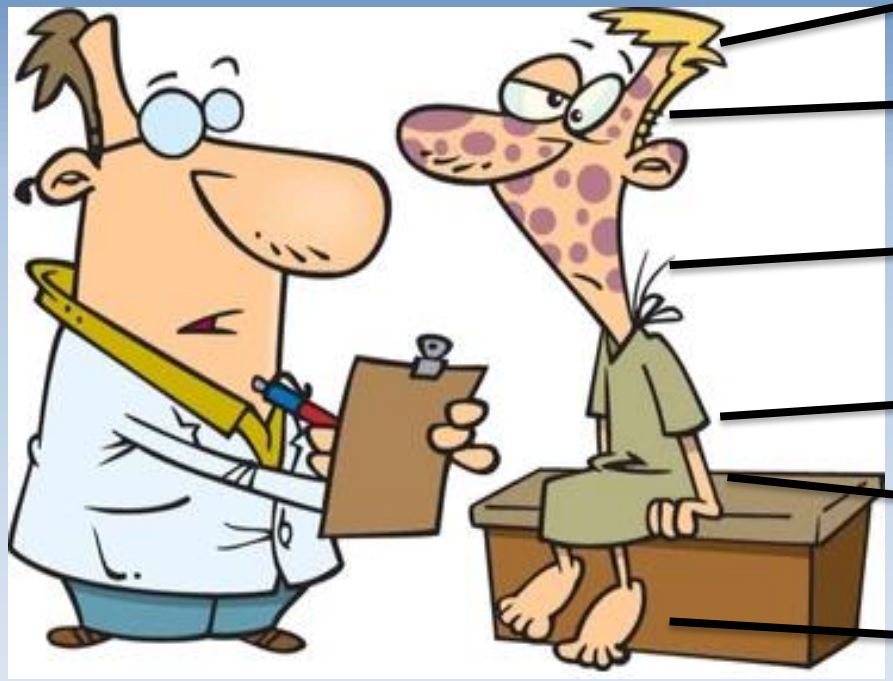
Co-ingestant(s)?

Medications they have access to?

How did they get to the hospital?

History of prior attempts?

Exam



Mental Status

Pupils

Mucous Membranes

Bowel Sounds

Bladder

Clonus, reflexes

Diagnostics

- CBC
- Chemistry
- Liver function
- Salicylates
- Acetaminophen
- Ethanol
- UCG

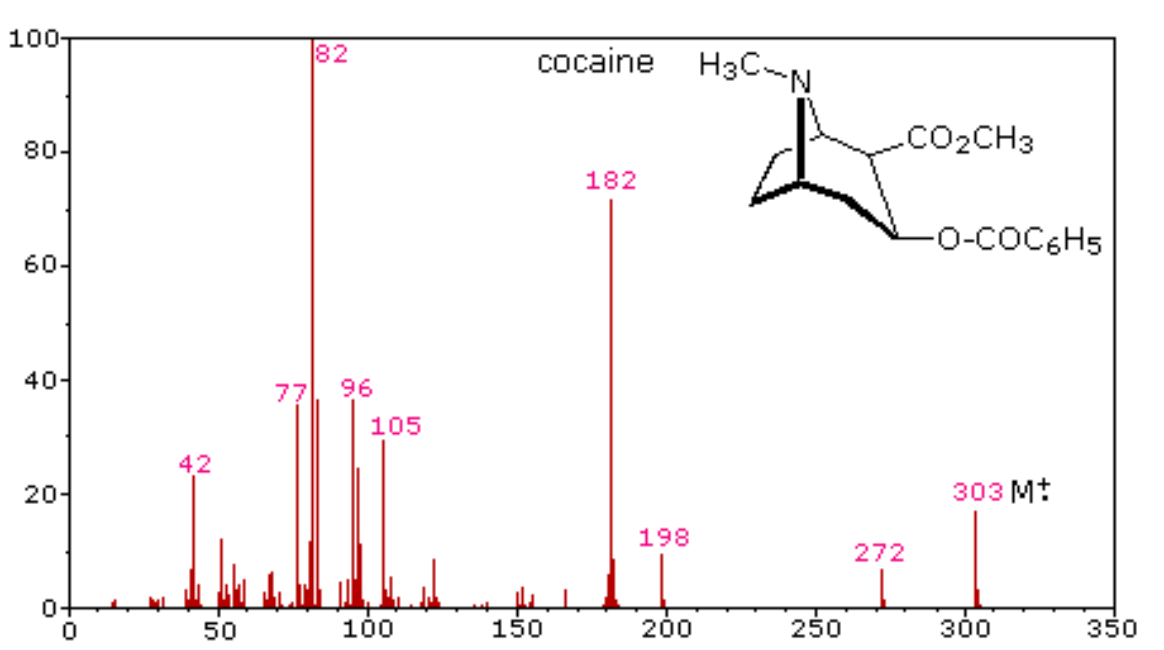
- Fingerstick glucose
- EKG (rate, intervals)
- POC US

… A word about drugs of abuse screening

- ***Know the matrix*** you are testing (Urine? Hair? Blood? Stool? Nails?) and its associated limitations.
- Understand your testing technique
- **DO NOT** get drug testing for medico-legal purposes

How about specific drug testing?

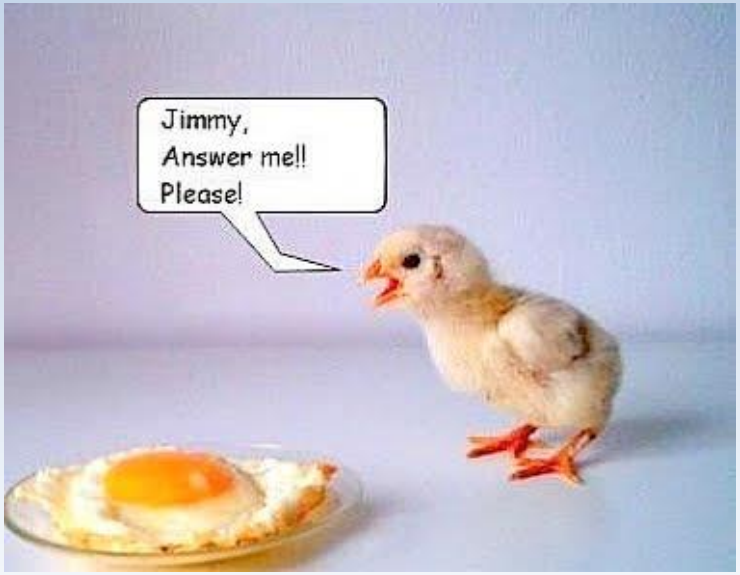
Initial Test Analyte	Federal Cutoff Concentrations (ng/mL)
Marijuana metabolites	50
Cocaine metabolites	150
Opiate metabolites (codeine/morphine[1])	2,000
6-Acetylmorphine (6-AM)	10
Amphetamines[2] (Amphetamine /methamphetamine)	500
Phencyclidine (PCP)	25
Methylenedioxymethamphetamine (MDMA)	500



US Department of Health and Human Services. Technical Assistance Publication Series: Clinical Drug Testing in Primary Care. 2012

Case 1

- 20yo male brought to ER by friends
- Unresponsive
- VS: 98.6, 80, 110/75, 10, 93% 4L NC
- Pinpoint pupils, skin cool.



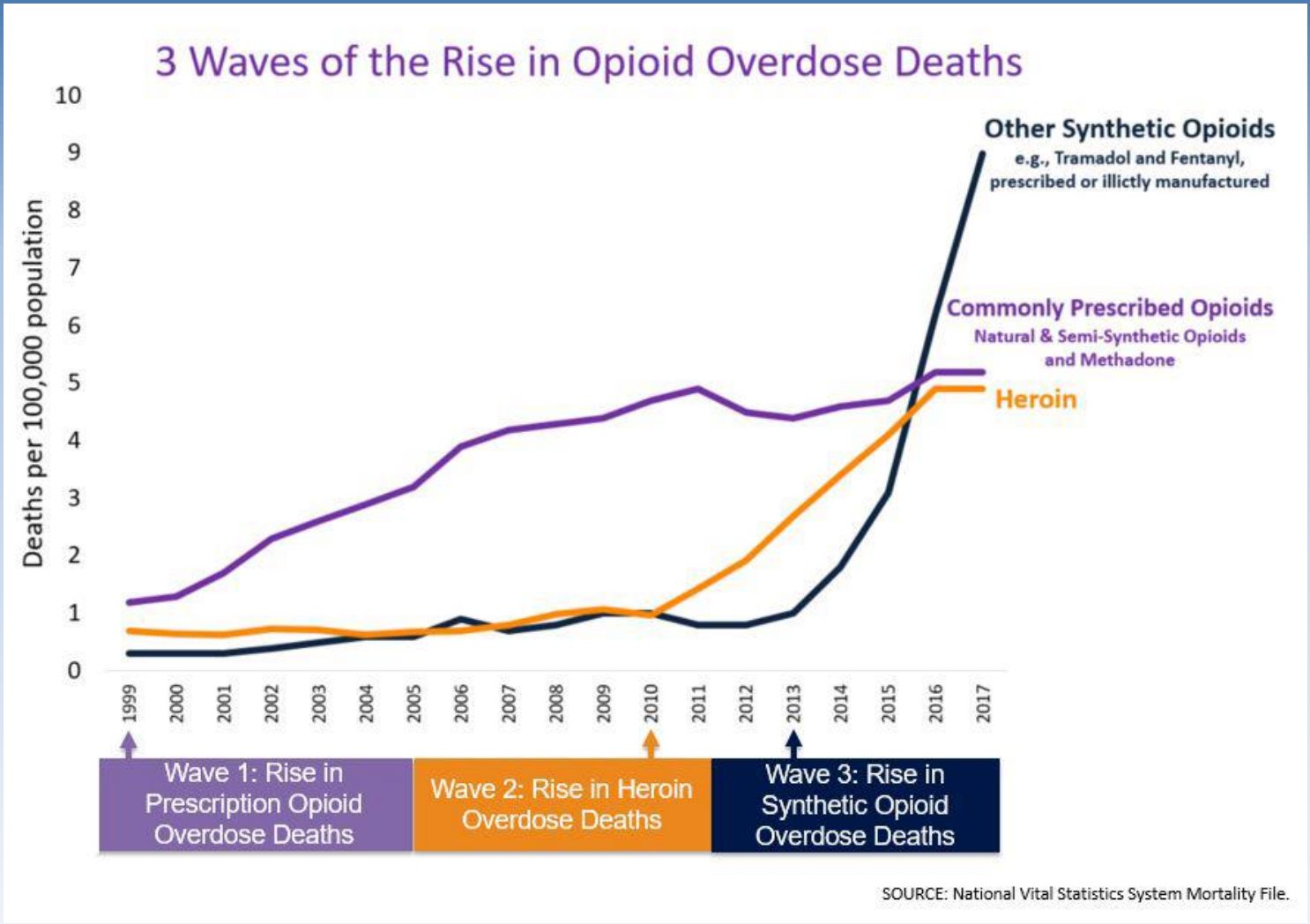
Opioid Intoxication

Coma, Respiratory depression, PINPOINT PUPILS, apnea

Percocet
Vicodin
Morphine
Heroin
Dilaudid
Oxycodone
Zohydro

Tramadol
Buprenorphine
Fentanyl
Methadone
Codeine

Fentanyl & “Fentalogues”

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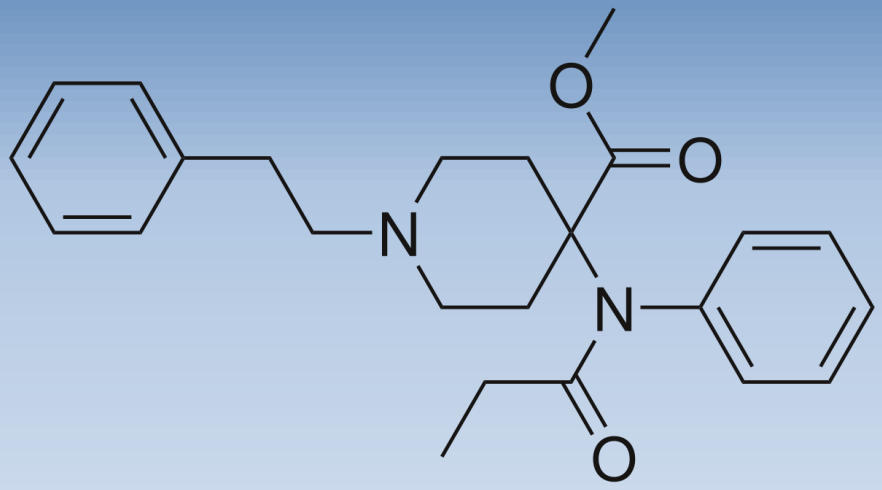
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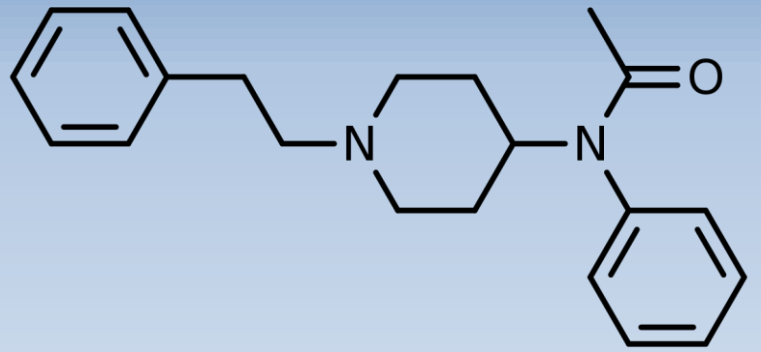
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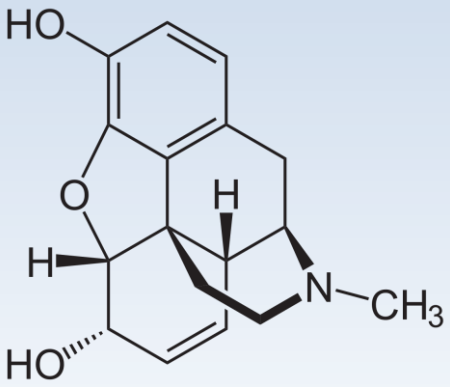
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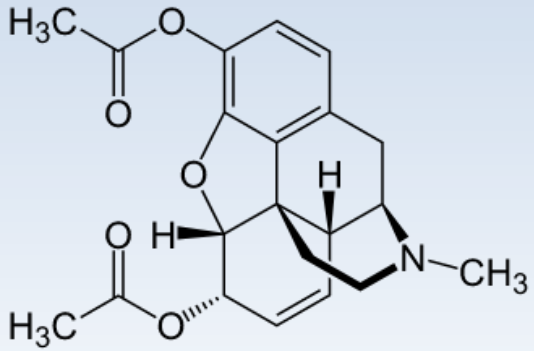
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Case 2

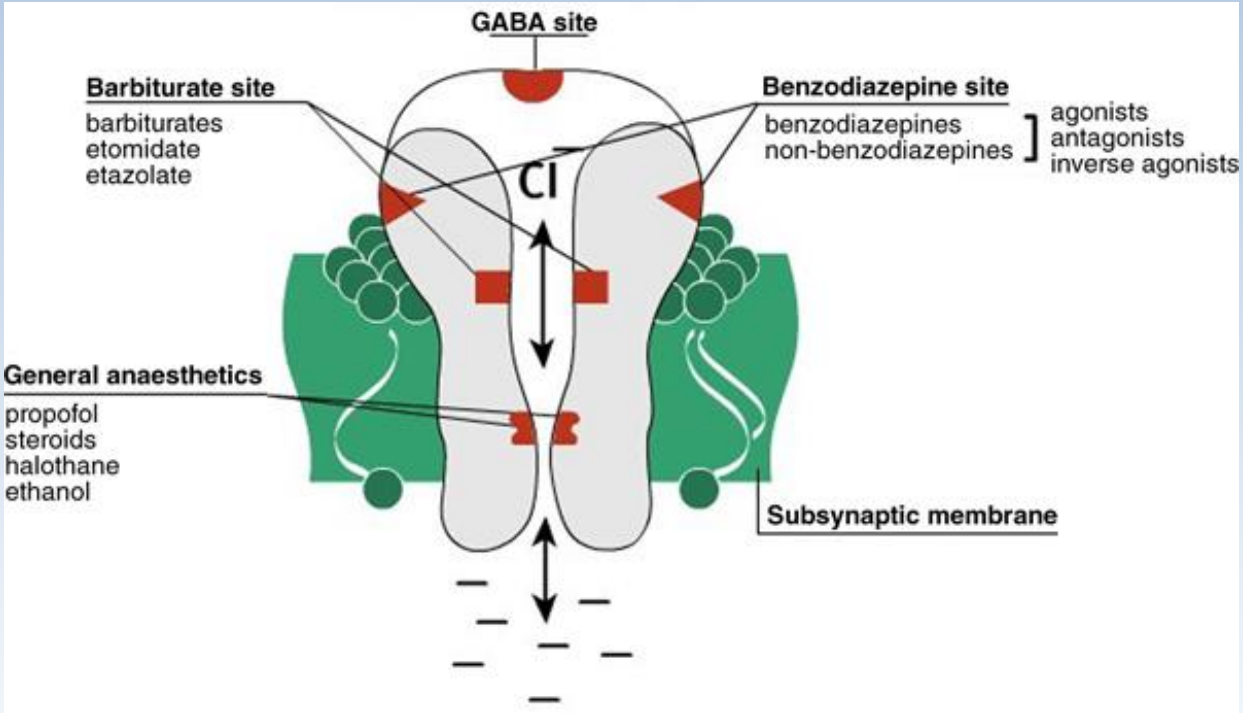
- 20yo male brought to ER by friends
- Somnolent, minimally arousable to noxious stimuli
- VS: 98.6, 80, 110/75, 10, 93% 4L NC
- Pupils 4mm reactive, skin cool.

Sedative/hypnotics

Coma, Respiratory depression, NORMAL PUPILS, apnea

NO RESPONSE TO NALOXONE

Benzodiazepines
Neurontin
Melatonin
Barbiturates
Gammahydroxybutyrate
Zolpidem
Ethanol



Case 3

- 20yo male brought to ER by police
- Diaphoretic, screaming, in handcuffs, biting
- VS: 101, 160, 180/95, 25, 97% on RA
- Pupils 7mm, no tremor or clonus

Sympathomimetic

Surge of sympathetic system: hyperthermia, hypertension, tachycardia

AGITATED DELIRIUM, DIAPHORESIS, NO TREMOR

Cocaine
Ecstasy (MDMA)
Amphetamines
Cathinones (bath salts)
Ephedra Sinica
Amphetamine aspartate monohydrate
Methylphenidate

Case 4

- 20yo male found by police wandering the streets
- Confused, mumbling
- VS: 101.1, 140, 110/75, 18, 98% 2L NC
- Pupils 5mm, dry skin, dry mm, no clonus, distended bladder

Anticholinergic

Muttering delirium, dry skin, mydriasis, dry mucous membranes, decreased bowel sounds

Quetiapine
Diphenhydramine
Atropine
Benztropine
Antipsychotics
Tricyclic Antidepressants

Case 5

- 20yo male brought in by EMS
- h/o Depression, left suicide note, found with empty pill bottle
- VS: 100.9, 140, 110/75, 18, 98% 2L NC
- Mumbling, clonus, hyper-reflexia, flushed skin

Serotonin Syndrome

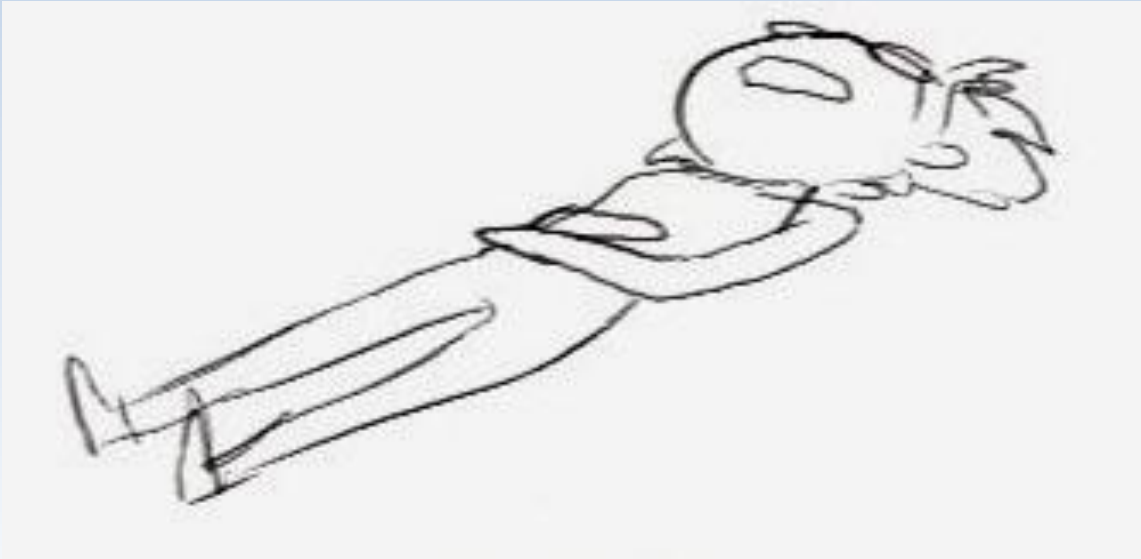
Tremor, flushed skin, rigidity, febrile, diaphoretic

INDUCIBLE OR SPONTANEOUS CLONUS, WITH AGITATION

SSRIs, SNRIs
Atypical antipsychotics
Trazodone, buspirone
MAO-Is
Linezolid, Isoniazid, ritonavir
Meperedine, fentanyl, tramadol
Triptans
Dextromethorphan

Case 6

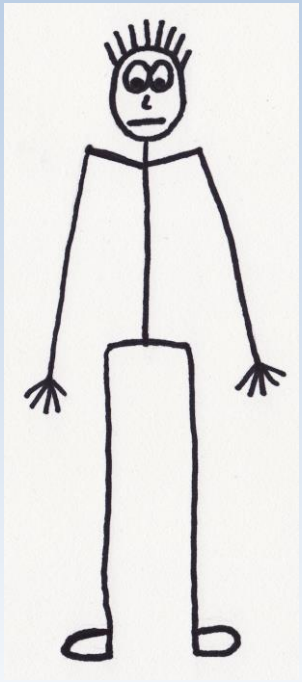
- 20yo male brought in by EMS found in bed
- Schizophrenic, increased meds recently
- VS: 102, 120, 180/90, 20, 90% 4LNC
- Rigid, tremors, hyperthermic



Neuroleptic Malignant Syndrome

Hyperthermia, rigidity, tachycardia, dopamine receptor blockade

LEAD PIPE RIGIDITY, ESCALATING DOSE OF ANTIPSYCHOTIC OR WITHDRAWAL OF DOPAMINERGIC AGENT



Atypical antipsychotics
Haloperidol
Quetiapine
Parkinson's medications
Reserpine

Case 7

- 20yo male found wandering, covered in feces
- H/o schizophrenia
- VS: 98.6, 40, 110/75, 18, 85% 2L NC
- Diaphoretic, SOB, foaming at mouth, diarrhea

Cholinergic

The Killer B's: bronchorrhea, broncospasm, bradycardia
Sludge drainage from every orifice

Organophosphates
Carbamates
Sarin gas
V agents

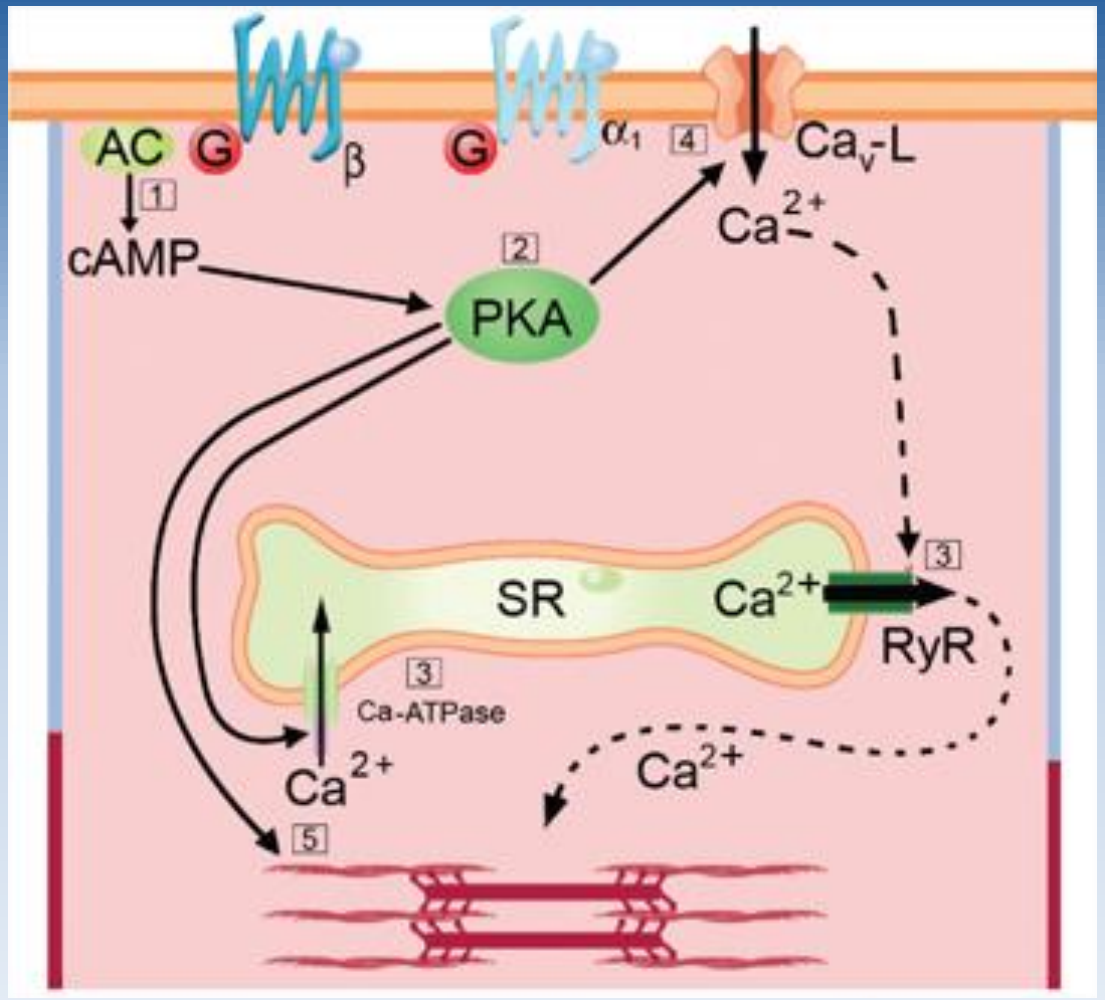
Case 8

- 25yo male presents after suicide attempt
- Took mother's medication she is on for a fib.
- VS: 98.6, 30, 60/40, 20, 100% RA
- Awake, oriented, strong peripheral pulses, no complaints

Case 8

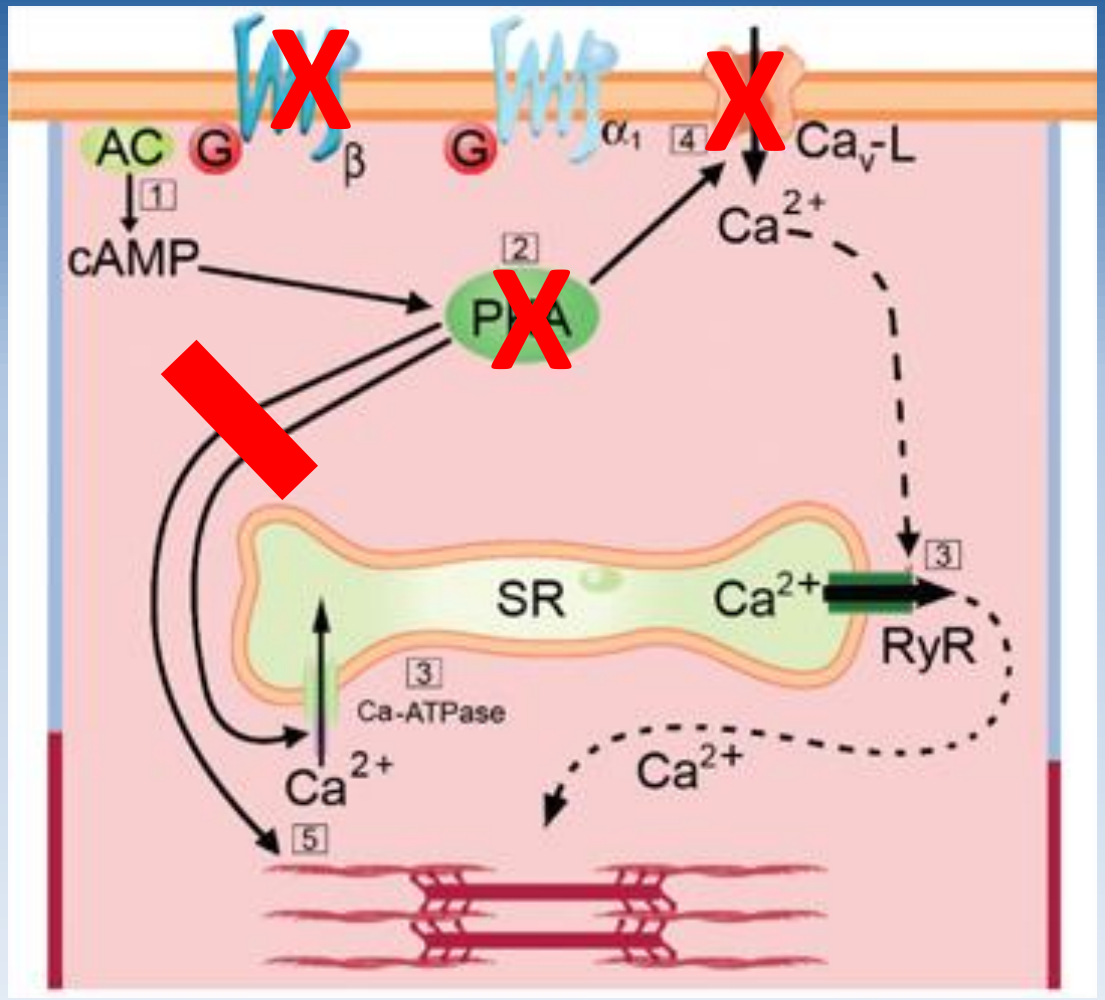
Calcium Channel Blocker Toxicity

- Bradycardia, hypotension and hyperglycemia + physical exam findings create a “CV poison toxidrome”
- Differentiate between CCB vs BB on exam
- Key “unique presentations” that aren’t textbook



- Blunt inotropy
- Decrease contractility
- Slow SA node discharge
- Blocks free fatty acid mobilization from fat cells

Goldfranks Toxicologic Emergencies 10th ed. Beta Adrenergic Antagonists.



BRADYcardia

HYPOtension

Reliant on sympathetic tone to maintain above

HYPOglycemia

Goldfranks Toxicologic Emergencies 10th ed. Beta Adrenergic Antagonists.

	Heart Rate	Blood Pressure	Mental Status	Blood Glucose
Calcium Channel	Decreased	Decreased	Normal	Hyperglycemia
Beta Blocker	Decreased	Decreased	Depressed, altered	Hypoglycemia

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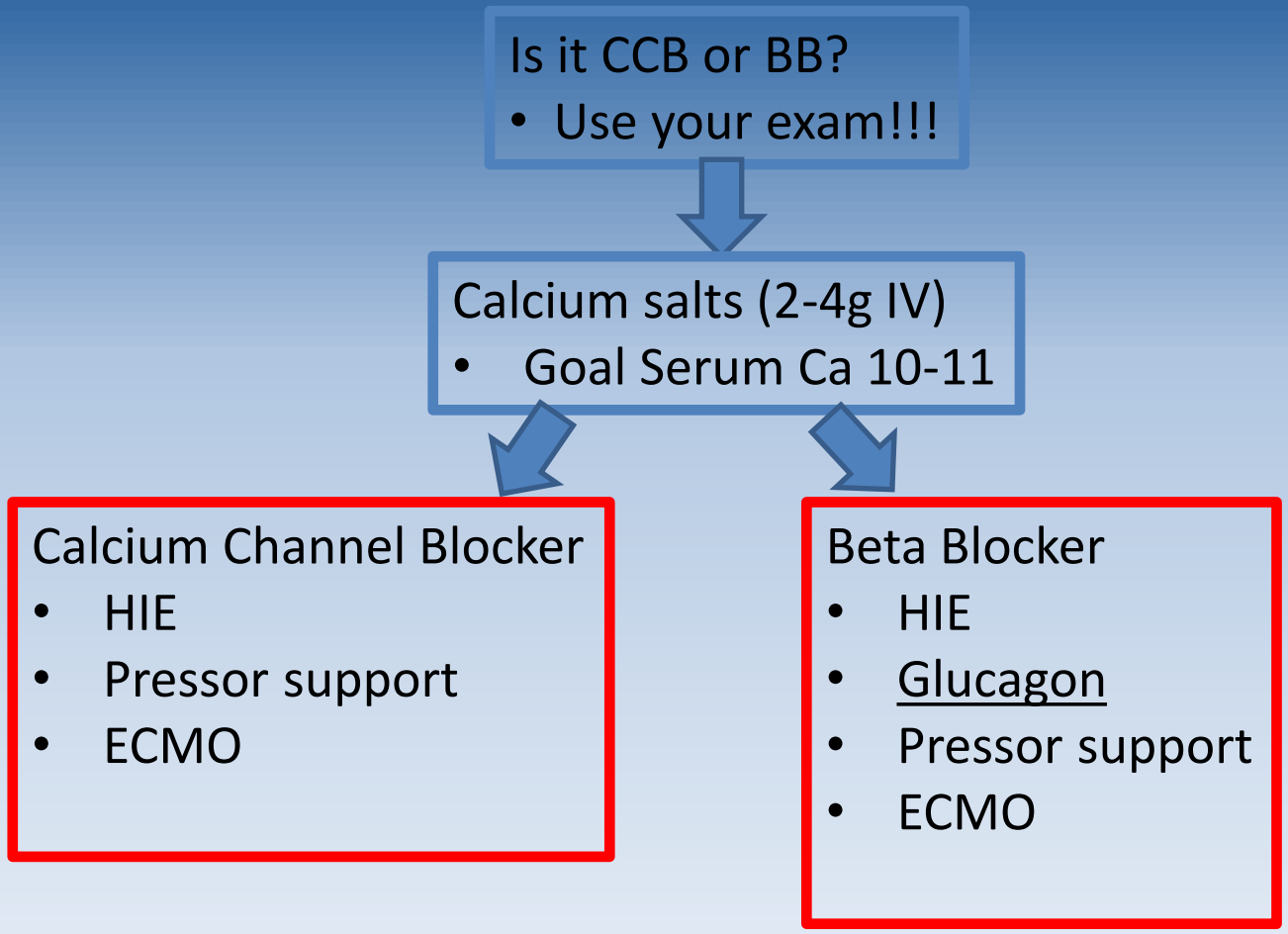
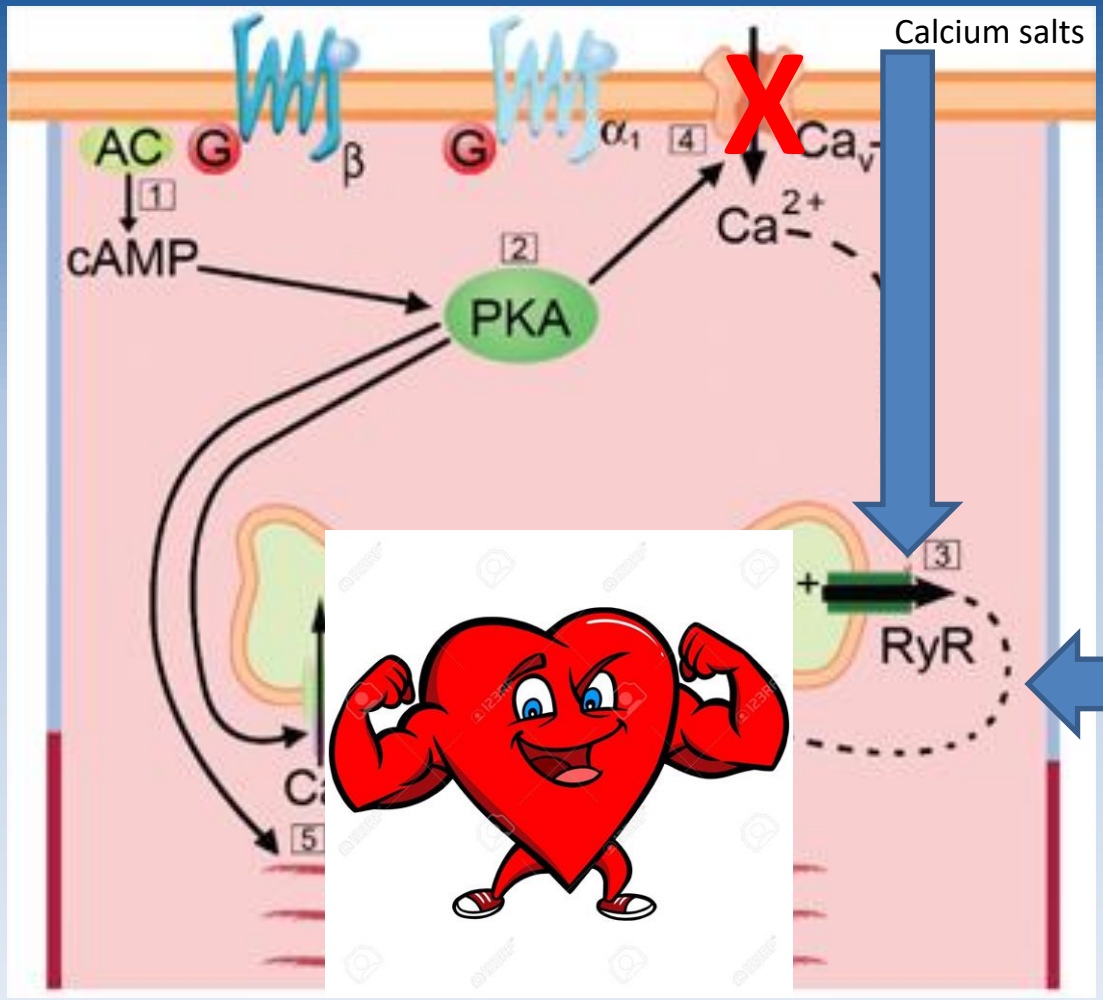

Is it CCB or BB?
• Use your exam!!!
Calcium salts (2-4g IV)
• Goal Serum Ca 10-11
Calcium Channel Blocker
• HIE
• Pressor support
• ECMO
Beta Blocker
• HIE
• Glucagon
• Pressor support
• ECMO



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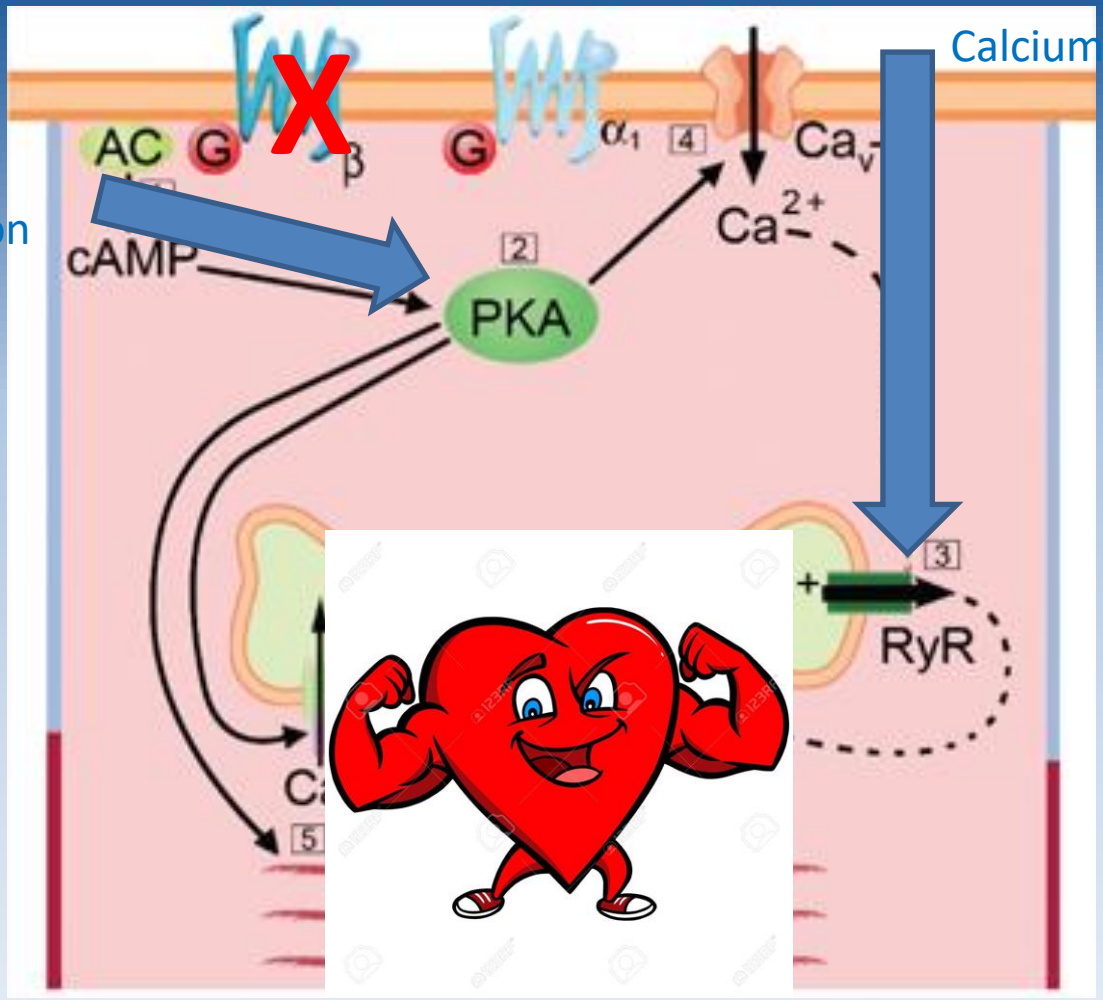
Glucagon



Goldfranks Toxicologic Emergencies 10th ed. Beta Adrenergic Antagonists.

Toxidromes Review

	Heart rate	Resp rate	Blood pressure	Mental status	Skin	Reflexes
Opioid	Nml	Low	Nml	Dec	Nml	Nml
Sedative/hypnotic	Nml	Low	Low/nml	Dec	Nml	Nml
Sympathomimetic	High	High	High	Agitated	Diaphoresis	+
Anticholinergic	High	Nml	Nml	Altered	Dry	+
Serotonin Syndrome	High	Nml	Nml	Altered	Diaphoresis	+ (clonus)
NMS	High	High	Nml	Altered	Nml	Rigidity
Cholinergic	Low	Nml	Nml	Seizures	diaphoresis	Nml
Ion Channel (BB)	Low	Nml	Low	Sedated	Nml	Nml
Ion Channel (CCB)	Low	Nml	Low	Alert	Nml	Nml

Test your knowledge!

1) A patient is admitted to the ICU on a naloxone drip after a suspected opioid overdose. He presented with hypopnea and pinpoint pupils. His urine drugs of abuse screen returns negative for opiates. Describe the most likely reason:

a) The patient did not overdose on opioids, the presentation is more consistent with benzodiazepine overdose.

c) Naloxone neutralizes opioids on the urine drug of abuse screen.

b) The patient overdosed on opioids that do not react with the opiate immunoassay.

d) Another drug is the primary cause of the overdose.

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d) Another drug is the primary cause of the overdose.

Rationale: Opioid immunoassays test for metabolites of natural opiates (morphine derivatives). Remember to treat the presenting toxidrome given limitations of the laboratory test.

Test your knowledge!

2) A patient presents with bradycardia and hypotension after an intentional overdose. She is oriented, remorseful. On exam, she has strong radial pulses and a fingerstick of 250. EKG demonstrates junctional bradycardia. What is the causative agent and antidotal therapy?

a) Digoxin, DIGIFab

b) Beta blocker, glucagon

c) Calcium Channel blocker, hyperinsulinemia euglycemia therapy

d) Cocaine, benzodiazepines

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Rationale: This is clearly poisoning from a cardiovascular toxin. Remember the differentiation between calcium channel and beta blocker toxicity based on physical exam: strong pulses, preserved mental status and hyperglycemia in the setting of bradycardia and hypotension suggest calcium channel blockers.

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Thanks!

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