

# PATIENT CARE THEORY 2

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## UNIT 15: Part 2b Toxidromes

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# NARCOTIC OVERDOSE

# Opioid/Narcotic Overdose

- ❖ narcotics are opioid receptor agonists
- ❖ stimulation in the CNS can lead to analgesia, vomiting and profound sedation in high doses
- ❖ effects can be synergistic with sedative drugs (alcohol, benzodiazepines)

additive means  $1+1=2$   
synergistic means  $1+1=5$

# Opioid/Narcotic Overdose

## Toxicodrome

- ❖ coma
- ❖ respiratory depression (killer)
- ❖ pinpoint pupils
- ❖ hypotension
- ❖ bradycardia
- ❖ hypothermia

# Common Narcotics

- ❖ Morphine
  - hydromorphone
- ❖ codeine
- ❖ Heroin
- ❖ Methadone
- ❖ meperidine (demerol - synthetic)
- ❖ Fentanyl
  - Carfentanil (10,000 x more potent than morphine & 100 x more potent than fentanyl)
- ❖ Oxyneo
- ❖ Oxycodone (Oxycontin™) oxymorphone, tramadol
- ❖ Percocet (oxycodone & acetaminophen)

# Narcotic Overdose (cont'd...)

- ❖ The half life of most of narcotics is between 1 and 5 hours.
- ❖ The duration of naloxone is ~ 30-45 minutes
- ❖ Exceptions:
  - Methadone (about 24 hours)
- ❖ pulmonary edema occurs in many narcotic overdoses, however the pathophysiologic reason for this is unknown.

# Narcotic Overdose (cont'd...)

## Management

- ❖ Supportive in nature
  - including airway control +/- intubation
  - **Airway, Oxygenation & Ventilation!**
- ❖ naloxone is given 0.4 - 2 mg IV, IN, IM or SC
  - See Directives
- ❖ naloxone is a receptor antagonist with a half-life less than 1-2 hours
  - Repeat doses are often required since the half-life of the narcotic is longer than the  $\frac{1}{2}$  life of naloxone

If you can open airway and maintain vent, you don't have to use narcan. You want to BVM before resorting to narcan. Consider narcan before supraglottic.

# Narcotic Overdose (cont'd...)

- ❖ a failure to respond to naloxone suggests a ingestion or co-ingestion of another drug or drugs.
  - \*\*Carfentanyl may require much higher than normal doses of Narcan to be effective
- ❖ benzodiazepines and barbiturates in particular often have very similar presentations, but will not respond to naloxone

- ❖ Narcan

# **SEDATIVE HYPNOTICS**

# Benzodiazepines

- ❖ binds to benzodiazepine receptor sites on CNS cells
- ❖ promotes the interaction between gamma-aminobutyric acid (GABA) and its receptor on neurons
- ❖ neuron becomes permeable to Chloride
- ❖ influx of chloride makes the inside of the cell more negative (hyperpolarized) and thus the cell takes longer to reach threshold and depolarize
  - ❖ suppresses the spread of seizure activity by raising the seizure threshold

# Benzodiazepines



- ❖ rarely fatal when taken alone
- ❖ co-ingestion of alcohol or other drugs may result in death
- ❖ *Examples:* Barbiturates , Benzodiazepines (lorazepam oxazepam) Valium(diazepam) Chloral hydrate, Restoril, GHB, Alcohol
- ❖ *Signs and Symptoms:* Mild intoxication, similar to alcohol intoxication (poor judgement, slurred speech, staggering or unsteady gait) Nystagmus ; More severe – respiratory depression, decreased LOC progressing to coma

# Benzodiazepines

## Management

- ❖ Supportive
- ❖ SpO<sub>2</sub>, ECG
- ❖ O<sub>2</sub>
- ❖ PPV prn
- ❖ IV access
- ❖ Fluid resuscitation prn
- ❖ flumazenil (*not* indicated for prehospital)

# CARDIOVASCULAR DRUGS

# Beta Blocker O.D.

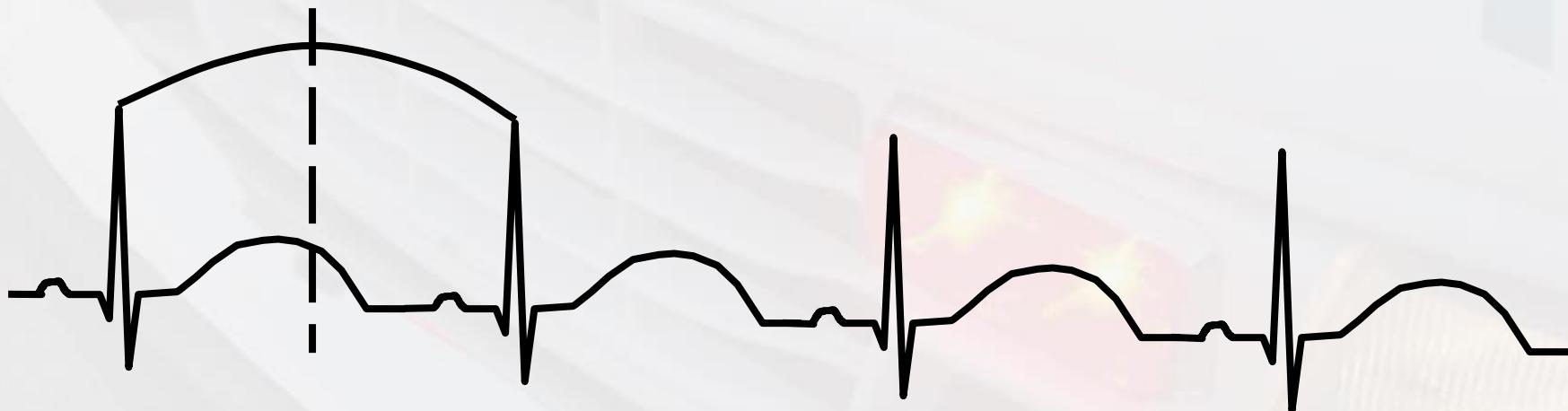
## Clinical presentation

- ❖ delirium, coma and seizures
- ❖ ECG changes including QRS and QT prolongation  
(prolonged QRS interval is predictive of seizures )
- ❖ severe hypotension and extreme bradycardia (AV blocks common)

Normal Q-T



Prolonged Q-T



# Clinical Effects (cont'd...)

- ❖ *hypoglycemia* due to inhibited glycogenolysis
- ❖ *hyperglycemia* due to impaired insulin release  
may also occur in some cases and can be  
worsened by one of the antidote therapies (any  
ideas?)
- ❖ bronchospasm may occur in patients with history  
of airway disease

# Beta Blocker OD

## Management

- ❖ Support ABCs
- ❖ SpO<sub>2</sub>, ECG
- ❖ O<sub>2</sub>
- ❖ IV access
- ❖ Fluid resuscitation
- ❖ patch to BHP for High dose IV glucagon 0.05-0.15 mg/kg (3-10mg for an average adult)

## Call for ACP

- ❖ +/- pacing (may not be effective)

# OTC DRUGS

# Salicylates



# Salicylates

- ❖ N/V - volume depletion
  - ❖ tinnitus
  - ❖ hyperpnea (+/- tachypnea)
  - ❖ gastric irritation
  - ❖ initial respiratory alkalosis, followed by a metabolic acidosis
- stimulation of chemoreceptors

# Salicylates

- ❖ stimulates respiratory system directly
- ❖ stimulates skeletal muscle metabolism - increases O<sub>2</sub> consumption and CO<sub>2</sub> production
- ❖ initial hyperventilation & respiratory alkalosis (counters metabolic acidosis)
  - initial respiratory alkalosis causes the kidneys to excrete bicarbonate and potassium which later impairs the body's ability to handle the metabolic acidosis

# Salicylates

## Management

- ❖ Support ABCs
- ❖ SpO<sub>2</sub>, ECG
- ❖ O<sub>2</sub>
- ❖ don't coach breathing
- ❖ PPV prn
- ❖ IV access TKO
- ❖ Patch to BHP for NaHCO<sub>3</sub> 1-2 mEq/kg

# Acetaminophen

- ❖ signs & symptoms classically delayed – treat all ODs seriously
- ❖ non-specific GI signs & symptoms sometime within 24 hours
- ❖ causes hepato-toxicity (necrosis as early as 12 hours)
- ❖ RUQ pain is a late sign
- ❖ most fatalities occur 3-5 days post ingestion
- ❖ toxic dose:  $\geq 7.5$  g in an adult or 150 mg/kg in a child is considered toxic
- ❖ fatal dose: 14 g (approx.)

# Acetaminophen

## Management

- ❖ Support ABCs
- ❖ SpO<sub>2</sub>, ECG
- ❖ O<sub>2</sub>
- ❖ PPV prn
- ❖ IV access TKO

## Hospital management

- ❖ activated charcoal
- ❖ N-acetylcysteine (< 8-10 hours)

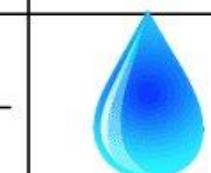
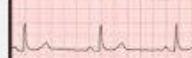
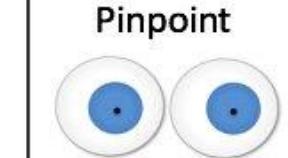
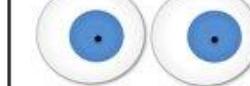
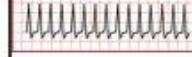
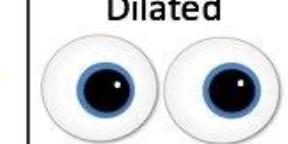
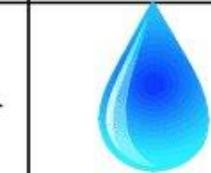
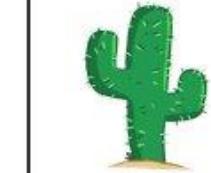
# **SUMMARY**

# Summary

- ❖ understanding the nervous system and general physiology is of crucial importance to understanding toxicology
- ❖ always consider that an OD may involve more than one substance - multi-drug overdoses are common
- ❖ specific antidotes, while necessary, do not replace the need for good supportive care!

# Summary

- ❖ gather evidence
  - What? How much? When?
- ❖ always maintain a high index of suspicion
- ❖ err on the side of caution / over-triage
- ❖ provide supportive care
- ❖ apply toxidrome specific treatment/antidote (if applicable)

	HR & BP	Resp.	Temperature	Pupils	Bowel Sounds	Diaphoresis
<b>Anticholinergic</b>  Anticholinergics –Atropine, scopolamine, glycopyrrrolate benztrapine, trihexyphenidyl Antihistamines – Chlorpheniramine, Cyproheptadine, Doxylamine, Hydroxyzine, Dimenhydrinate, Diphenhydramine, Medizine Promethazine	 	 	 	 	 	 
<b>Cholinergic</b>  Organic Phosphorous Compounds: Carbamates • Arecholine, Pilocarpine, Urecholine (Betanechol), Carbachol, Choline, Metacholine, Mushrooms				 	 	
<b>Opioid</b>  Morphine • Codeine • Tramadol • Heroin • Meperidine • Diphenoxylate • Hydromorphone • Fentanyl • Methadone • Propoxyphene • Pentazocine • DXM • Oxycodone • Hydrocodone	 	 	 	 	 	
<b>Sympathomimetic</b>  Caffeine, cocaine, amphetamines, methamphetamines, Ritalin, LSD, Theophylline, MDMA	 	 	 	 	 	
<b>Sedative-Hypnotic</b>  anti-anxiety agents, muscle relaxants, antiepileptics and preanesthetic medications –Barbituates –Benzodiazepines	 	 	 	 		

# Specific Antidotes

Narcotics	→	naloxone
Acetaminophen	→	N-acetylcysteine (Mucomyst)
Iron	→	deferoxamine
Ethylene Glycol, Methanol	→	ethanol, fomepazole
Cyanide	→	Amyl nitrate, sodium nitrate, Na thiosulfate
Organophosphates	→	Atropine, Pralidoxime (2-PAM)
Digitalis	→	Digibind
Anticholinergics	→	Physostigmine
Benzodiazepines	→	flumazenil

# Additional Reading

**The Toxikon Multimedia Project**

<http://www.uic.edu/com/er/toxikon/index.htm>

**Antidotes for common poisons**

<http://www.uic.edu/com/er/toxikon/antidot.htm>

**Slide Presentation**

<http://www.medicine.uiowa.edu/pharmacology/Lectures/Lecturenotes/130/2004/SRH-5-5-04.pdf>



# QUESTIONS?