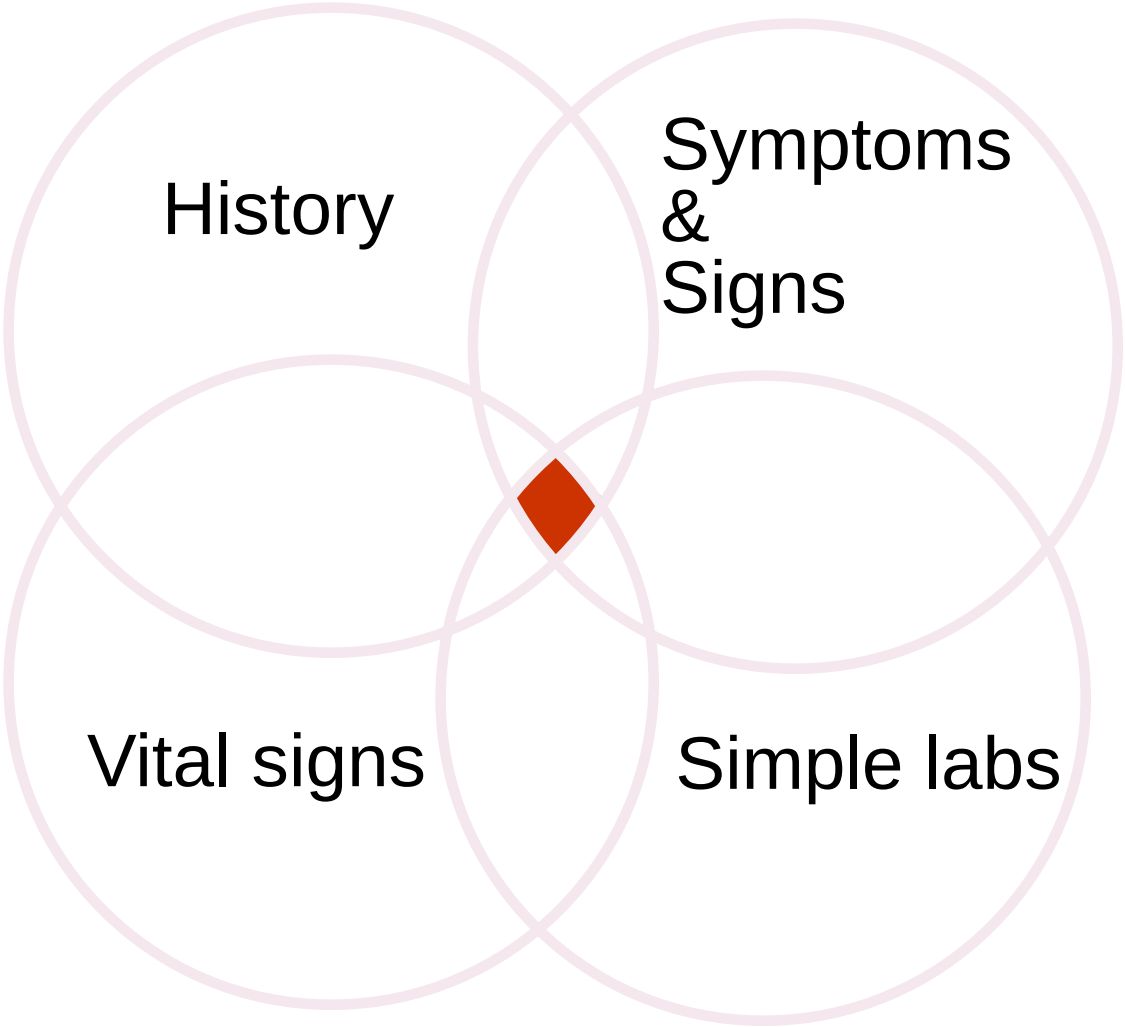
TOXIDROMES

TOXIDROMES

- ✓ THE ***IDENTIFICATION OF VARIOUS TOXIC SYNDROMES*** REQUIRES INTEGRATING OF DATA PROVIDED BY BOTH THE ***VITAL SIGNS AND PHYSICAL EXAMINATION*** TO ELICIT MANIFESTATIONS SPECIFIC TO AN INTOXICANT

- ✓ THIS COLLECTION OF MANIFESTATION (TOXICOLOGIC SYNDROMES) MAY ASSIST IN
- ✓ **1. THE DIAGNOSIS WHEN THE AGENT IS UNKNOWN** AND MAY HELP IN
- ✓ **2. ANTICIPATING MANIFESTATIONS THAT WILL DEVELOP.**

TOXIDROME



TACKLING TOXIDROMES

- Good history
- Directed physical examination
  - Vital signs, pupils, skin, bowel bladder
- Simple tests
  - Rapid glucose, ECG, ABG, UA, etc
- Simple interventions

ANTIDOTE

- ✓ **Antidotal therapy involves antagonism or chemical inactivation of an absorbed poison**

- ✓ Antidotes can significantly reduce morbidity and mortality rates but are potentially toxic if used for inappropriate reasons….their use requires correct identification of a specific poisoning or syndrome

ANTIDOTE

- ✓ The pharmacodyamics of a poison can be altered by competition **at a receptor** (naloxone therapy in the setting of heroin overdose)

- ✓ **Physiological antidote** (glucagon in the setting of propranolol overdose)

- ✓ **Anti-venoms and chelating agents** bind and directly inactivate poisons

ANTIDOTE

- The **biotransformation** of a drug can also be altered by an antidote (fomepizole will inhibit alcohol dehydrogenase and stop the formation of toxic acid metabolites from ethylene glycol and methanol)

- Many drugs used in the ***supportive care*** of a poisoned patient (anticonvulsants, vasoconstricting agents, etc.) may be considered nonspecific functional antidotes

TOXIDROMES EXAMPLES

Cholinergic receptors stimulation

TOXIDROMES: CHOLINERGIC

THREE WAYS TO ENHANCE CHOLINERGIC ACTIVITY:

1. CHOLINERGIC MEDICATIONS

PILOCARPINE = MIOSIS (glucoma)

BETHANECHOL = URINARY STIMULANT

TOXIDROMES: CHOLINERGIC

2. ACETYL CHOLINESTERASE INHIBITORS:
ORGANOPHOSPHATES & CARBAMATES

3. PLANTS: AMANITA MUSCARIA

CLITOCYBE

TOXIDROMES: CHOLINERGIC

DUMBELS (direct or indirect-AchEI)

- ✓DEFECATION
- ✓URINATION
- ✓MIOSIS
- ✓BRONCHOSPASM / BRADYCARDIA
- ✓EXCESSIVE SALIVATION
- ✓LACRIMATION
- ✓SEIZURES, SECRETIONS, SWEATING

- ANTIDOTE: atropine / pralidoxime
- Administer activated charcoal orally

TOXIDROMES: ANTICHOLINERGIC

THINK: ANTI AND ATROPINE

- ANTIHISTAMINES
- ANTIPSYCHOTICS
- ANTISPASMODICS
- ANTIEMETICS
- ANTIPARKINSON
- TCAs
- PLANTS: *Atropa belladonna*, JIMSON WEED (*Datura stramonium*), HENBANE (*Hyoscyamus niger*)

TOXIDROMES

TABLE 34–2. ANTICHOLINERGIC SUBSTANCES

Antihistamines
- Ethanolamines
  - Dimenhydrinate (Dramamine)
  - Diphenhydramine (Benadryl)
- Ethylenediamines
  - Tripelennamine (Pyribenzamine)
- Alkylamines
  - Chlorpheniramine (Teldrin, Chlortrimeton)
- Piperazines
  - Cyclizine (Marezine)
  - Meclizine (Antivert)
- Phenothiazines
  - Promethazine (Phenergan)
- Antiparkinsonian drugs
  - Benztropine mesylate (Cogentin)
  - Biperiden (Akineton)
  - Ethopropazine (Parasidol)
  - Trihexyphenidyl (Artane)
  - Procyclidine (Kemadrin)

Antipsychotics
- Phenothiazines, particularly
  - Chlorpromazine (Thorazine)
  - Thioridazine (Mellaril)
  - Perphenazine (Trilafon)
- Nonphenothiazines
  - Molindone (Moban)
  - Loxapine (Loxitane)

Antispasmodics
- Clidinium bromide (Quarzan, Librax)
  - Dicyclomine (Bentyl)
  - Methantheline bromide (Banthine)
  - Propantheline bromide (Pro-Banthine)
  - Tridihexethyl (Pathilon)

Belladonna alkaloids and synthetic relatives
- Atropine (Hyoscyamine)
- Belladonna alkaloid mixtures
- Glycopyrrolate (Robinul)
- Homatropine (Dia-Quel, Malcotran)
- Methscopolamine (Pamine)
- Scopolamine (Hyoscine)

Ophthalmic products
- Atropine and scopolamine solutions
- Cyclopentolate (Cyclogyl)
- Tropicamide (Mydriacyl)

OTC medications (including antihistamines and belladonna alkaloids)
- Analgesics: Excedrin PM, Percogesic
- Cold remedies: Actifed, Allerest, Coricidin, Dristan, Flavihist, Romex, Sine-Off
- Hypnotics: Compoz, Sleep-Eze, Sominex, Unisom
- Menstrual products: Pamprim, Premesyn PMS

Plants (see Chapter 58)

Skeletal muscle relaxants
- Orphenadrine (Norflex)

Tricyclic antidepressants
- Amitriptyline (Elavil, Amitril, Endep, Emitrip)
- Desipramine (Norpramin, Pertofrane)
- Doxepin (Sinequan, Adapin)
- Imipramine (Tofranil, Pramine, Janimine, Tipramine)
- Nortriptyline (Aventyl, Pamelor)
- Protriptyline (Vivactil)
- Trimipramine (Surmontil)

TOXIDROMES

ANTICHOLINERGIC (ATROPINE, ANTIHISTAMINES, TCA's)

- HOT AS A HARE
- RED AS A BEET
- DRY AS A BONE
- BLIND AS A BAT
- MAD AS A HATTER
- The bowel and bladder lose their tone
- ….and the heart runs alone

TOXIDROMES

ANTICHOLINERGIC

- Mydriasis
- Blurred vision
- Fever
- Dry skin
- Flushing
- Ileus
- Urinary retention
- Tachycardia
- Hypertension
- Psychosis
- Myoclonus
- Seizures

ANTIDOTE:
physostigmine /
treat symptoms

MANAGEMENT

- ✓ Maintain an open airway and assist ventilation if needed
- ✓ Treat (if they occur):
  - Hyperthermia….external rapid cooling
  - Seizures…..benzodiazepine

MANAGEMENT

- ✓ A small dose of **physostigmine** (0.5–1 mg IV in an adult), given to patients with severe toxicity
- ✓ ***Precaution:*** can cause AV block, asystole, and seizures, especially in patients with tricyclic antidepressant overdose
- ✓ **Decontamination:** administer activated charcoal orally (gastric lavage is not needed)

TOXIDROMES: SYMPATHOMIMETIC

SYMPATHOMIMETIC (COCAINE, AMPHETAMINES)

- MYDRIASIS
- TACHYCARDIA
- HYPERTENSION
- FEVER
- SWEATING
- SEIZURES

ANTIDOTE: benzodiazepines

TOXIDROMES

NARCOTIC

Papaver somniferum
“ poppy plant”

TOXIDROMES

NARCOTIC (HEROIN, METHADONE)

- MIOSIS
- CNS DEPRESSION
- BRADYCARDIA
- HYPOTENSION
- HYPOVENTILATION
- HYPOTHERMIA
- COMA
- DEATH

ANTIDOTE:
naloxone

TOXIDROMES

WITHDRAWAL

TOXIDROMES

WITHDRAWAL: (ALCOHOL, NARCOTICS, SEDATIVE - HYPNOTICS, antiHTN DRUGS

- DIARRHEA
- MYDRIASIS
- TACHYCARDIA
- HYPERTENSION
- CRAMPS
- LACRIMATION
- SEIZURES
- HALLUCINATIONS

ANTIDOTE:
benzodiazepines

Table 7. Common Toxidromes.

Cholinergic (organophosphates) (DUMBELS)
- **D**iarrhea, diaphoresis
- **U**rination
- **M**iosis
- **B**radycardia, bronchosecretions
- **E**mesis
- **L**acrimation
- **S**alivation

Anticholinergic (antihistamines, TCAs)
- Hyperthermia (HOT as a hare, RED as a beet)
- Dry skin (DRY as a bone)
- Dilated pupils (BLIND as a bat)
- Delirium, hallucinations (MAD as a hatter)
- Tachycardia
- Urgency retention

Sympathomimetic (cocaine, amphetamines)
- Diaphoresis
- Mydriasis
- Tachycardia
- Hypertension
- Hyperthermia
- Seizures

Narcotic (heroin, methadone)
- Miosis
- Hypoventilation
- Coma
- Bradycardia
- Hypotension

Withdrawal (from alcohol, opioids, benzodiazepines, barbiturates, antihypertensives)
- Diarrhea
- Mydriasis
- Goose flesh
- Tachycardia
- Lacrimation
- Hypertension
- Yawning
- Cramps
- Hallucinations
- Seizures (with ETOH and benzodiazepine withdrawal)

SPECIFIC ANTIDOTES

Table 8 *Specific Antidotes and Their Indications**

Antidote	Indication	Comments
Bicarbonate, sodium	TCA; For urine alkalinization in salicylate overdose; for severe metabolic acidosis from ASA, ethylene glycol, or methanol.	Use for TCA cardiotoxicity, not neurotoxicity. Urinary alkalinization may benefit rhabdomyolysis as well. Difficulty alkalinizing urine may be due to hypokalemia. Watch for complications from hypernatremia, volume overload, and serum pH above 7.5
Dantrolene Muscle relaxant	Malignant hyperthermia	Give in patients who do not respond to neuromuscular paralysis, may aggravate respiratory depression.[43]
Diazoxide K+ channel activator/vasodilator	Sulfonylureas	Diazoxide inhibits insulin secretion. Use when serum glucose concentrations cannot be adequately maintained by IV 5% dextrose infusion
Digibind	Digoxin/ Digitalis/ Cardiac glycosides	Use for cases involving life-threatening arrhythmias or hyperkalemia (>5 meq/L)
Flumazenil	Benzodiazepines	Half-life = 40-80 min but duration of action 90 min.[44] Do not administer in any patient at risk for seizures or withdrawal.
N-acetylcysteine	Acetaminophen	Most effective administered within 8-10 h of ingestion. Controversy as to best route (IV vs oral) and duration of therapy. 36 h likely adequate in uncomplicated cases.[45]

Nalmefene	Narcotics	Half-life=8-10 h, but duration of effect approximately 4 h. Disadvantage is cost ($6.50/0.25 mg vs $0.30/ 0.4 mg of naloxone)
Naloxone	Narcotics	Half-life=1 hour; duration of effect 45 min. Beware of exposing the dangerous effects of coingestion such as cocaine or PCP[46]
Octreotide Somatostatin analogue / inhibit insulin	Sulfonylureas	A somatostatin analog suppresses insulin and C-peptide levels, permitting the plasma glucose to rise without additional dextrose support.
Pyridoxine	Isoniazid Peripheral neuropathy due to pyridoxine depletion	Give in gram-to-gram ratio or 5 g empiric dose; consider as empiric therapy in unknown seizure overdose not responding to benzodiazepines.
Thiosulfate/nitrites	Cyanide	Do not give nitrates in the setting of smoke inhalation since the resulting methemoglobinemia may exacerbate carbon monoxide poisoning.[47-49]
Vitamin K	Coumarin and indanedione derivatives	Must use Vitamin K1, not Vitamin K3. Even after IV dose, there is a 6-8 h delay before coagulation factors begin to achieve significant levels. Use fresh frozen plasma for immediate control of hemorrhage.
*TCA = tricyclic antidepressants.		