



Episode 162 (Ch. 158 9th) – Plants, Mushrooms and Herbals

Episode Overview:

1. For each of the following, describe the expected toxicity
 - a. Jequirity pea, Rosary
 - b. Umbrella tree, Dieffenbachia, Dumb cane
 - c. Capsicum annum
 - d. Water Hemlock
 - e. Jimson Weed, Deadly Nightshade
 - f. Eucalyptus oil
 - g. Poinsettia
 - h. Oleander, Foxglove
 - i. Tobacco
 - j. Pokeweed
 - k. Rhododendron
 - l. Yew
 - m. Castor Beans
2. List 5 mushrooms with early onset toxicity and 3 with late onset – and describe the toxicity expected.
3. List 4 mechanism of toxicity resulting from the use of herbal medicine
4. List 4 plants containing cardiac glycosides
5. What is Buckthorn?

KEY CONCEPTS

- Most botanical exposures result in minimal toxicity and management is largely symptom-based, supportive care.
- Most serious toxicity results from exposure to plants with anticholinergic, antimitotic, cardiovascular, or convulsive properties
- Most cases in which gastrointestinal (GI) symptoms begin within the first 2 hours after an unknown mushroom ingestion will prove to involve a non-life-threatening substance
- GI symptoms that onset in more than 6 to 8 hours suggest a potentially life-threatening ingestion, such as the cyclopeptide and gyromitrin groups
- Use local poison control centers, mycologists, and botanists to help identify serious plants and mushrooms that have been ingested. We recommend digital photography with expert consultation
- Herbal medications are unregulated and may have inherent toxicity, herb-drug interactions, or contaminants. Clinicians should advise against the routine use of herbal medications.

Rosen's in Perspective

- Since ancient times plants have been used for nutritional, therapeutic, psychoactive, and toxic properties
- Ancient Greeks recognized the lethal effects plants for eg sentencing Socrates to death by ingestion of a hemlock-based liquid
- 65% plant exposures involve children younger than 6 years old
- Majority of plant exposures result in minimal toxicity and death is exceedingly rare
- The most common severe and occasionally fatal poisonings= anticholinergic, antimetabolic, cardiotoxic, or convulsive properties

[1] For each of the following, describe the expected toxicity.

Jequirity pea / Rosary, Castor Beans

- Toxalbumins
- Contain the toxins abrin and ricin
- Inhibit ribosomal protein synthesis, leading to cell death.
- Seeds or beans swallowed whole with the hard outer shell intact typically prevent absorption of significant toxin
- Chewed or crushed=may release the toxin and cause local toxicity in the GI tract
- Symptoms may progress to severe neurologic toxicity (seizure, coma, cerebral edema, demyelinating encephalitis), multi-organ failure, and death
- Purified ricin derived from the castor bean is highly toxic and lethal in small doses



jequirity pea



Castor Beans

Umbrella tree (*Schefflera arboricola*), Dumb cane (*Dieffenbachia*)

- These plants are commonly found in homes / offices - hard to kill 'em and look good
- Toxicity with these plants comes down to the presence of Raphides
- Raphides= needle-shaped, calcium oxalate crystals \
- Ingestions can result in vomiting, mucosal irritation, ulceration, and edema
- Look for airway compromise in severe ingestions
- Dermal exposures may lead to contact dermatitis
- Treatment = supportive, including maintenance of a patent airway.
- Corticosteroids and antihistamines = adjunctive therapies
 - diphenhydramine (25 to 50 mg intravenous push [IVP]) and dexamethasone (4 to 8 mg IVP)



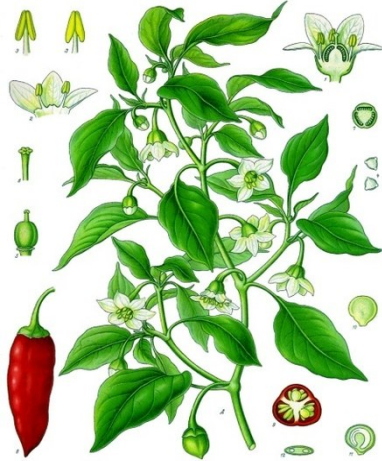
Umbrella Tree (*Schefflera arboricola*)



Dumb cane (*Dieffenbachia*)

Capsicum annuum aka all those peppers you love (jalapeno, bell, cayenne)

- Basically comes down to capsaicin
- Vanilloid 1 receptor (TRPV1) agonist
- These receptors activate nociceptive nerve fibers
- Potent burning sensation
- Causes GI / Mucosal / Dermal irritation



Water Hemlock

- Cicutoxin
- Neurotoxicity / seizures (GABA antagonist)
- Supportive / Benzos



Jimson Weed, Deadly Nightshade

- Anticholinergic Toxicity
- Commonly mistaken for blueberries
- Supportive care, consider physostigmine



Eucalyptus oil

- High doses eucalyptol = ingestion, skin contact, or inhalation
- Usually cause GI or dermal irritation
- However, large doses of essential oil preparations have been reported for causes of status epilepticus



Eucalyptus Tree

Poinsettia

- Mild GI toxicity when plants ingested (N/V/D)
- Can cause temporary blindness when exposed to eyes



Oleander, Foxglove, Lily of the valley, Milkweed

- Cardiac glycoside
- Digitalis tox / digoxin toxicity
- Bind to cell transmembrane Na⁺-K⁺-ATPases
- Leads to a rise in intracellular Ca²⁺ concentrations
- Depresses the AV/SA nodes, increased contractility and myocardial irritability
- Low & slow toxidrome



Oleander



Foxglove



Lily of the Valley



Milkweed

Tobacco

- Nicotinic
- SLUDGE / BBB + Neuromuscular Weakness → Looks more sympathomimetic initially than does a regular cholinergic toxidrome
- Supportive care, atropine, benzos



Pokeweed

- Can be lethal in Children and to adults in large amounts
- Highest concentrations= rootstock > leaves > stems > ripe fruit
- Berries can be very toxic, even when immature



Pokeweed (*Phytolacca americana*)

Rhododendron

- Rhododendron species contain grayanotoxin
- AKA “Mad Honey”
- Present in honey that is produced from their nectar
- Presents w/ GI symptoms, hypersalivation, diaphoresis, and cardiac effects.
- Grayanotoxin = sodium channel “openers” - hold Na channels in their open state and keep cells in a depolarized state
- Watch for Low & Slow
 - Bradycardias (including sinus bradycardia, AV blocks, and atrial fibrillation with slow ventricular response)
 - Hypotension
 - Seizures
- Tx w/ fluids, atropine & pacing



Rhododendron

Yew

- Taxus* species = coniferous trees and shrubs
- taxine pseudoalkaloids = sodium and calcium channel blockade
- hypotension, dysrhythmias, and cardiac arrest.
- Management = supportive. Consider ECMO



European yew / common yew (*Taxus baccata*)

[2] List 5 mushrooms with early onset toxicity and 3 with late onset – and describe the toxicity expected

- Classified as
 - Early = 0-4hrs
 - Late onset = > 6hrs
 - Think most lethal = late
- Early = C-GIMPS
 - Coprine
 - GI Toxin
 - Ibotenic Acid / muscimol
 - Psilocybin
- Late = GOAA
 - Gyromitrin
 - Orellanine
 - Allenic norleucine
 - Amanita (cyclopeptides)



- CNS / Hallucinogenic
 - Amanita Muscaria (Ibotenic Acid / muscimol)
 - Psilocybe cubensis (Psilocybin)
- Cholinergic
 - Clitocybe (muscarine)
- Hepatotoxicity
 - Amanita phalloides (cyclopeptides/amatoxin) “Death cap/angel”
 - Amnita Verosa
 - Lepiota
- Disulfiram-like reaction w/ ETOH
 - Coprinus (Coprine)
- Seizures
 - Gyrometria (GABA)
- Renal
 - Cortinarius (orellanine)

MNEMONIC: **GO A PIC EM** (relevant mushroom toxins)

G: Gyrometrin **O:** Orellanine **A:** Amatoxin **P:** Psilocybin **I:** Ibotenic Acid **C:** Coprine **E:** Emetogenic (early GI group) **M:** Muscamol

[3] List 4 mechanisms of toxicity resulting from the use of herbal medicine

- Ephedra
 - sympathomimetic
- Ma huang
 - sympathomimetic
- Jimsonweed
 - anticholinergic
- St John's Wart
 - MAOI
 - SS, decreases INR

[4] List 4 plants containing cardiac glycosides

FOLM

- Foxglove
- Oleander
- Lilly of the Valley
- Milkweed

[5] What is Buckthorn?

Poisonous fruit from the karwinskia humbold tianna commonly seen in SW USA and Mexico.

- Toxicity
 - Exposure: Ingestion
 - Toxic agent: T-544 (Tullidinol)
 - May uncouple oxidative phosphorylation
- Epidemiology
 - Ingestion of buckthorn fruit: [Karwinskia humboldtiana](#)
 - Distribution: Southwestern U.S. & Mexico
 - Children, cattle & goats most commonly affected
 - Animal disease called "Limberleg": Incoordination & Ataxia



- Severity of toxicity proportionate to amount of fruit ingested
- External links: [Medicinal Plants](#); [NatureServe](#)
- Neuropathy
 - Onset
 - Latent period: 5 to 20 days after ingestion
 - Rapidly progressive
 - General features: Fever; Cramps; Diarrhea; Headache
 - Weakness
 - Early: Legs > Arms
 - Progression: Severe quadriparesis; Bulbar & respiratory involvement
 - Cranial nerves: Normal
 - Sensory loss: Mild; Distal
 - CSF: Normal
 - Course
 - May improve spontaneously if supported through paralysis
 - Over 3 to 12 months
 - Pathology
 - Segmental demyelination ± Axonal swelling & loss
 - Experimental: Axonal loss (Motor) more prominent with systemic administration
 - Diagnosis: History of ingestion of fruit; Exclusion of other causes
- Systemic features
 - Liver necrosis
 - Occasional degeneration of skeletal & cardiac muscle fibers
 - Micturition difficulty
 - Muscle: Cramps; Cardiac change