FORENSIC & TOXICOLOGY

SUMMARY

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Toxicology summary

Lecture 1: Introduction to toxicology

The major determinant that makes a substance poison or not is the **DOSE** of that substance.

Type of chemical interactions:

Additive	Synergistic	Potentiation	Antagonist
The effect is the sum of the activity of each substance. Most common.	The effect is more than the sum of the activity of each substance.	Occurs when nontoxic substance makes another chemical more toxic	Two chemicals interfere with each other's actions
Tranquilizer and alcohol	Ethanol and carbon tetrachloride	Carbon tetrachloride and isopropanol	

Types of antagonism:

Functional	Chemical	Dispositional	Receptor
Two chemicals counterbalance each other by producing opposite effects on the same physiologic function	Chemical reaction between two compounds that produces a less toxic product.	Methods that interfere with absorption, metabolism and excretion	Occurs when two chemicals potentially bind to the same receptor, the one which occupy the receptor will dominate the action
Epinephrine and acetylcholine	Protamine sulfate and heparin	Enzyme inhibitors and stimulators	Naloxone for Opiates Flumazenil for Benzodiazepine Physostigmine for Atropine

Lecture 2: Principles of Management of Acute Poisoning

Point 1: Patient stabilization

- ABCD
- Substance that can be administered for lethargic patient with possible overdose: Oxygen, Glucose, Thiamine, Naloxone, Atropine.

Point 2: Complete patient assessment.

- Hx, PEx, labs (LFT, KFT, CBC, Glucose, toxicological analysis …).

Point 3: Poison decontamination.

Methods of GIT decontamination:

1. **Dilution**
   - Applied **only** following **corrosives** ingestion, use milk, gelatin or egg white.
   - **Avoid using neutralizing agents!!**
   - It increases disintegration of drugs and **enhances their absorption**
2. **Emesis (induce vomiting)**

- ❖ Ipecac syrup: Oral, response rate is 90-95%, contains emetine & cephaline.
- ❖ Apomorphine: IV, fast response (3-5 min), cause hypotension + CNS, RS depression, contraindicated for children.
- ❖ Solid liquid detergents: Response and effectiveness are similar or ipecac syrup.
- ❖ Gag reflex: Low response rate, risk of pharyngeal injury.
- ❖ Hypertonic solution (concentrated NaCl): Complicated by hyperosmotic dehydration.
- ❖ **Contraindicated in case of corrosive substances due to risk of perforation & aspiration pneumonia.**

3. **Gastric lavage**

Complication:	**Contraindications:**
*Laryngeal spasm. *Aspiration pneumonia. *Esophageal/gastric lesion. *Perforation & hemorrhage. *Pneumothorax. *Ectopic beat. *Electrolytes disturbance.	*Unprotected airways *Ingestion of hydrocarbons & corrosives ***Kerosene**: Will cause **aspiration chemical pneumonitis**

4. **Adsorbents**
   - ❖ Like **activated charcoal**, traps most of organic poisons.
   - ❖ Binds to most substances, except: Metals, Methanol and ethanol, Acids/base, **Hydrocarbons**, Inorganic salts, **Corrosives**.
5. **Cathartics**

   Decrease contact time between the poison and absorption sites.

   Cautions: Absence of bowel sounds, intestinal obstruction.
   - Renal failure: Mg containing cathartics.
   - Heart failure: Na containing cathartics.

Point 4: Poison enhancement of elimination.

1. **Renal excretion**: Forced diuresis and alteration of urinary pH
   - **Alkalization** of urine by **Sodium bicarbonate** will enhance eliminating **acidic** substances (**Salicylates**, **Phenobarbital**)
   - **Acidification** of urine by **Ammonium chloride** will enhance elimination of **basic** substance (**Amphetamines**, Quinidine, Phencyclidine)
   - Cautions: Pulmonary edema, cerebral edema, Electrolyte disturbance
2. **Dialysis**

   The toxin must be able to pass across the dialysis membrane (small molecular weight <500 , water soluble, low protein binding).
3. **Plasma Exchange**
4. **Exchange Transfusion**

Point 5: Use of poison antidote.

Point 6: Continuous patient supportive care.