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Toxicology

General toxicology: involves studies of exposure to chemical, biological, or physical agents and their untoward consequences that affect biological systems.

- **Toxicology** is the quantitative and qualitative study of the adverse effects of toxicants on biological organisms
- **Toxicant** is a chemical or physical agent that produces adverse effects on biological organisms.

I-How toxicants enter organism

1-Inhalation (mouth or nose to lungs) then into blood
2-Ingestion (mouth to stomach) then into blood
3-Injection (cuts, punctures in skin) into blood
4-Dermal absorption (through skin) into blood

II-Effects of Toxicants

Irreversible Effects

- Carcinogen - causes cancer
- Mutagen - causes chromosome damage
- Reproductive hazard - damage to reproductive system
- Teratogen - causes birth defects

May or may not be reversible

- Dermatotoxic – affects skin
- Hemotoxic – affects blood
- Hepatotoxic – affects liver
- Nephrotoxic – affects kidneys
- Neurotoxic – affects nervous system
- Pulmonotoxic – affects lungs

III-Elimination of toxins

1-Excretion through kidneys, liver and lungs
2-Detoxification is the biotransformation of chemicals into something less harmful
3-Storage in fatty tissue

Management of poisoning

- provision of supportive care
- prevention of poison absorption
- enhancement of elimination of poison
- administration of antidotes

1-Supportive care

- Vital signs, mental status, and pupil size
- Pulse oximetry, cardiac monitoring, ECG
- Protect airway
- Intravenous access
- cervical immobilization if suspect trauma
- Rule out hypoglycaemia
- Naloxone for suspected opiate poisoning

2-Preventing absorption

Gastric lavage

- ❖ Not in unconscious patient unless intubated (risk aspiration)
- ❖ Flexible tube is inserted through the nose into the stomach
- ❖ Stomach contents are then suctioned via the tube
- ❖ A solution of saline is injected into the tube
- ❖ Recommended for up to 2 hrs in TCA and up to 4hrs in Salicylate OD

Induced Vomiting

- Ipecac - Not routinely recommended
- Risk of aspiration

3-Elimination of poisons

Renal elimination

 Medication to stimulate urination or defecation may be given to try to flush the excess drug out of the body faster.

Forced alkaline diuresis

 Infusion of large amount of NS+NAHCO3

 Used to eliminate acidic drug that mainly excreted by the kidney eg salicylates

 Serious fluid and electrolytes disturbance may occur

 Need expert monitoring

4-Antidotes

1-Opiates

 Antidote – naloxone

2-Benzodiazepines

 Antidote – flumazenil

3-Tricyclic antidepressants (TCAD)

 Consider gastric lavage if taken < 2hrs

 Activated charcoal

 Treatment of hypotension with isotonic saline

 Sodium bicarbonate for cardiovascular toxicity

 Alpha adrenergic vasopressors (norepinephrine) for hypotension refractory to aggressive fluid resuscitation and bicarbonate infusion

 Benzodiazepines for seizures

4-Aspirin (acetylsalicylic acid)

- ❖ directed toward increasing systemic pH by the administration of sodium bicarbonate
- ❖ IV fluids +/- vasopressors
- ❖ Avoid intubation if at all possible (↑ acidosis)

- Supplemental glucose (100 mL of 50 percent dextrose in adults) to patients with altered mental status regardless of serum glucose concentration to overcome neuroglycopaenia
- Hemodialysis