Al-Mustaqbal University
College of Pharmacy
5th stage
Clinical Toxicology
Lecture: 1

Clinical Toxicology

Initial Evaluation & Management of poisoned patient

Outline

- Clinical Toxicology ?
  - Human Related effect
- Approaches and Initial Evaluation
- Management
- Definitive care with poisoning
- Supportive Care and Monitoring

Clinical Toxicology

This branch focuses on the effects of drugs and other chemicals on humans, particularly, but also on other animals.

Its work is often involved with drug overdoses and other poisonings and determining the substance involved and its amount in the body.

It typically coincides with other sciences like as biochemistry, pharmacology and pathology.

Clinical toxicology deals with the adverse effects of agents such as drugs ,chemical, etc.

Approach to the poisoned patient

All poisoned patients should be managed as if they have a potentially life-threatening intoxication(poisoning) , although they appear normal.

The initial approach to the poisoned patient should be essentially similar in every case, irrespective of the toxin ingested.
(regardless to toxin)

This approach can be termed as (Routine poison management)

Common poisoning

Poisoning can result from exposure to a variety of substances, ranging from household cleaning products to pesticides.

However, prescription and over the counter medications account for nearly one half of poisoning exposures.

Important Strategies

- ✓Treat the patient, not the poison", Promptly
- ✓Supportive therapy essential

Maintain respiration and circulation – primary

- ✓Judge progress of intoxication by: Measuring and charting vital signs and reflexes

TREATMENT OF ACUTE POISONING

1st Goal - keep concentration of poison as low as possible by preventing absorption and increasing elimination-

2nd Goal - counteract toxicological effects at effector site, if possible

Initial Evaluation & Management

Evaluation involves???

1- **Recognition** that poisoning has occurred,,.

2-**Identification** of agents involved

3-**Assessment** of severity and **prediction** of toxicity

Management

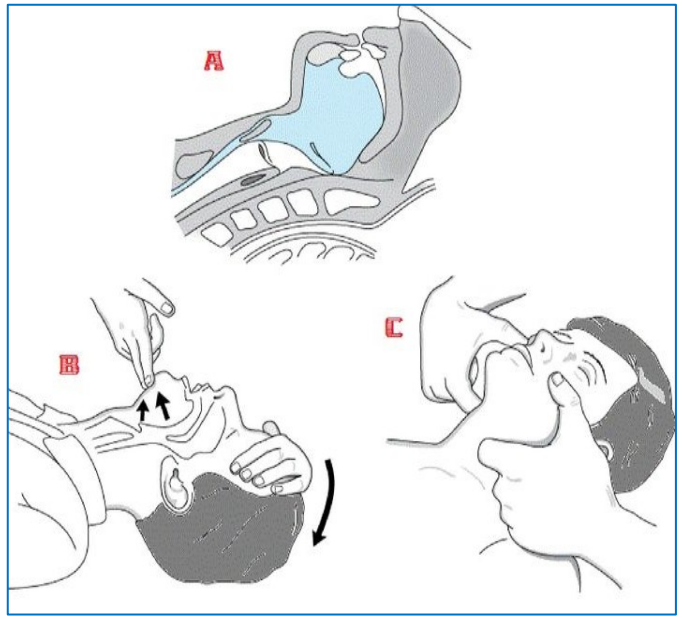
- **Management** : is directed to the **supportive** care, **prevention** of poison absorption or **enhancement** of elimination , and when appropriate the administration of **antidote**.

Initial Evaluation (ABCDEs)

Airway:

Airways should be kept **patent** and any suspicion for **obstructing material** must be removed.

The most common factor contributing to **death** from poisoning is **loss of airway-protective reflexes** with subsequent airway obstruction caused by: **Flaccid tongue** or Pulmonary **aspiration** of gastric contents.



Initial Evaluation (ABCDEs)

Breathing:

Evaluate **respiratory rate** and if available, **oxygen saturation**.

If there is **no oxygen monitor** available but the patient has an **elevated respiratory rate**, consider supplemental **oxygen**.

Initial Evaluation (ABCDEs)

Circulation:

A prompt **assessment** of vital signs and hydration status is essential.

1. Check **blood pressure** and **pulse rate** and **rhythm**.
2. Begin continuous **ECG** monitoring
3. Secure **venous access**
4. Draw blood for **routine studies**
5. Begin **intravenous infusion**

If the patient is **hypotensive**, normal saline or another isotonic solution is preferred

Initial Evaluation (ABCDEs)

Disability (Neurological):

A decreased level of **consciousness** is the most common serious **complication** of drug overdose or poisoning .

In patients that are presented with **seizures**, it is important to check the **blood sugar** level.

If the blood sugar level **is < 72 md/dL**, then administer **50ml of 50% dextrose IV**

Toxic seizures should be treated with **IV benzodiazepines** , Seizures **refractory** to benzodiazepines can be treated with **barbiturates**.

Initial Evaluation (ABCDEs)

Exposure (evaluation of temperature):

Consider the possibility of **toxic syndromes** associated with **hyperthermia.**

Toxic levels of certain drugs can lead to significantly **elevated body temperature**.

Definitive care with poisoning

1. Try to **identify** the poison.
2. Accurate and complete **history** from sources other than patient

(family, friends, pharmacist, & pill or bottles at the **scene**)(place where event occurs)).

3. Attempt to establish the **time** and **amount** of the ingestion.

Supportive Care and Monitoring

Remember that acute poisoning is a **dynamic** illness and the patient's condition may **fluctuate** over time.

Therefore **repeated** examinations and ongoing clinical **assessment** and **management** are required.

Physical examination

This may provide clues as to what the drugs ingested were.

Important aspects of the examination include:

- **Vital signs** (PR, RR, BP, temp, O2 saturation if available)
- **Neurological exam** (Pupil size, Glasgow Coma Scale (GCS), mental state, tone, reflexes, clonus, focal signs)
- **Skin** (colour, sweating absent/present)
- **Dry mouth/salivation, bowel sounds, urinary retention**
- Evidence of **trauma**

Risk Assessment

An early, accurate risk assessment is the key to managing acutely poisoned patients.

It enables us to predict the likely clinical course, potential complications, and to plan the management of the patient.

Risk Assessment

5 steps of a risk assessment:

1. Agent(s)

Assess whether the ingested agents are likely to cause significant toxicity.

2. Dose(s)

Calculate the dose taken in mg/kg body weight, use this information to predict likelihood of significant toxicity.

Risk Assessment

3. Time since ingestion

This is important for determining the likely clinical progress of the patient, and to guide management.

4. Clinical features and progress

Correlate the patient's clinical features and progress with the dose taken and time since ingestion.

5. Patient factors (weight and co-morbidities)

Consider individual patient factors that may put the patient at particular risk.

Investigations

1. **Blood sugar level**
2. **ECG – look for:**

- Rate (Bradycardia or Tachycardia)
- Rhythm

Management

The management of poisoning is directed towards

1- The prevention of further poison absorption

2- The increase of poison elimination

3- Use of an antidote (if appropriate)

Prevention of further poison absorption

1- Dermal Exposure

*Remove all clothing.

*Washing skin gently with soap and water for at least 30 minutes.

2- Eye Exposure

*Washing conjunctiva with running water or normal saline for 20 minutes.

*Solid corrosives should be removed by forceps.

Prevention of further poison absorption

3- GIT Exposure

*Induction of emesis

*Gastric lavage

*Activated Charcoal

*Cathartics

*Whole bowel irrigation

Induction of Emesis

Ipecac syrup:

The **safe** method for induction of vomiting, should be given within **30 minutes** of poison ingestion.

Syrup of ipecac should **no longer** be used routinely as a poison treatment intervention **at home.**

Induction of Emesis

Emesis Contraindications

1.Convulsions.

2.Corrosives.

3.Hydrocarbons

4.Coma

5.Less than 6 months of age (not well developed gag reflex)

Gastric Lavage

Used in **hospitals** when **emesis was failed** or there was **contraindication** for it.

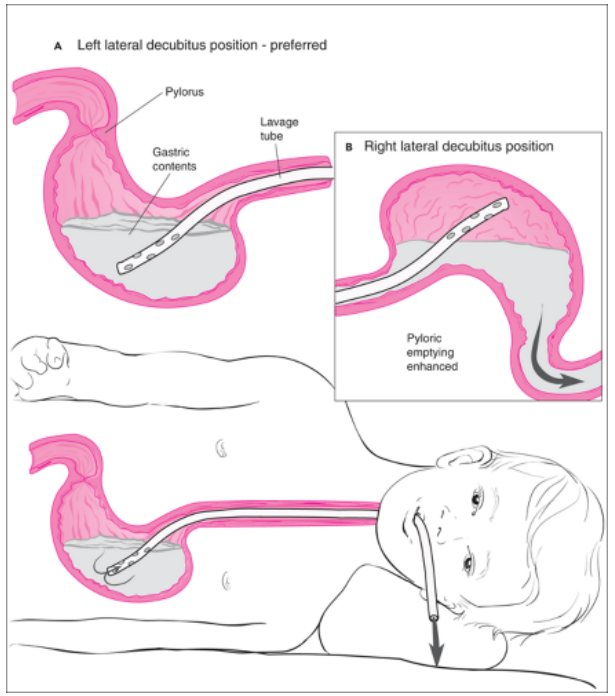
Gastric lavage is **effective** in the first **4-6 hrs** after ingestion.

Technique:

1. An assistant with **suction machine** should be available.

2. Dentures, mucous, vomitus should be **removed** from patient's mouth.

3. Proper **tube size** to be selected according to the patient **age**



Activated charcoal

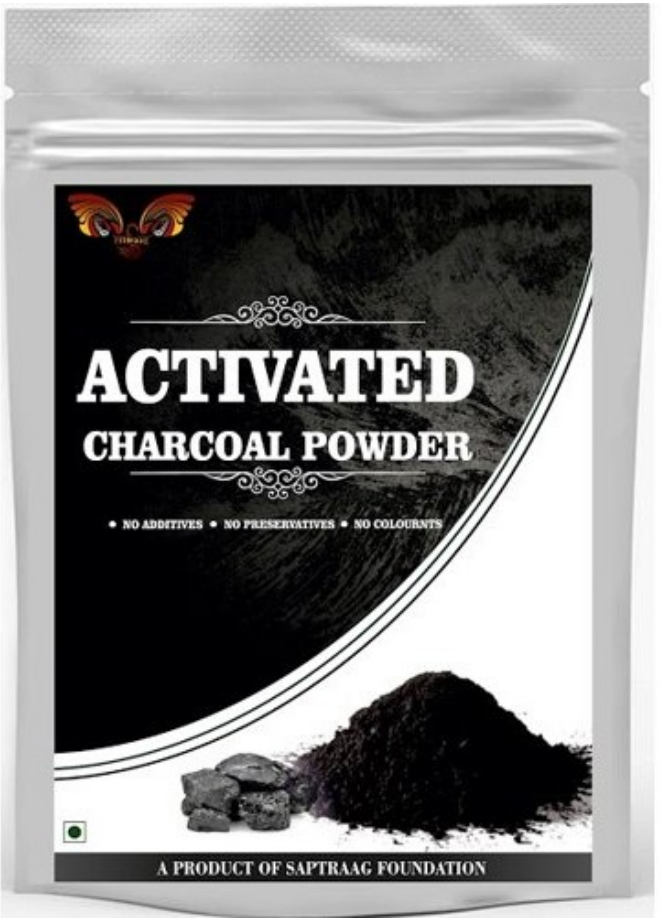
Adsorption of a wide variety of drugs and chemicals.

It is **not digested**; it stays **inside** the GI tract and **eliminates** the toxin when the person has a **bowel movement**.

Adult dose is 1 gm/kg.

Indications: (all of these must be met)

- Within **one hour** of time of ingestion
- Patient at **risk of significant toxic** effects
- Patient **NOT** at risk of **airway compromise**

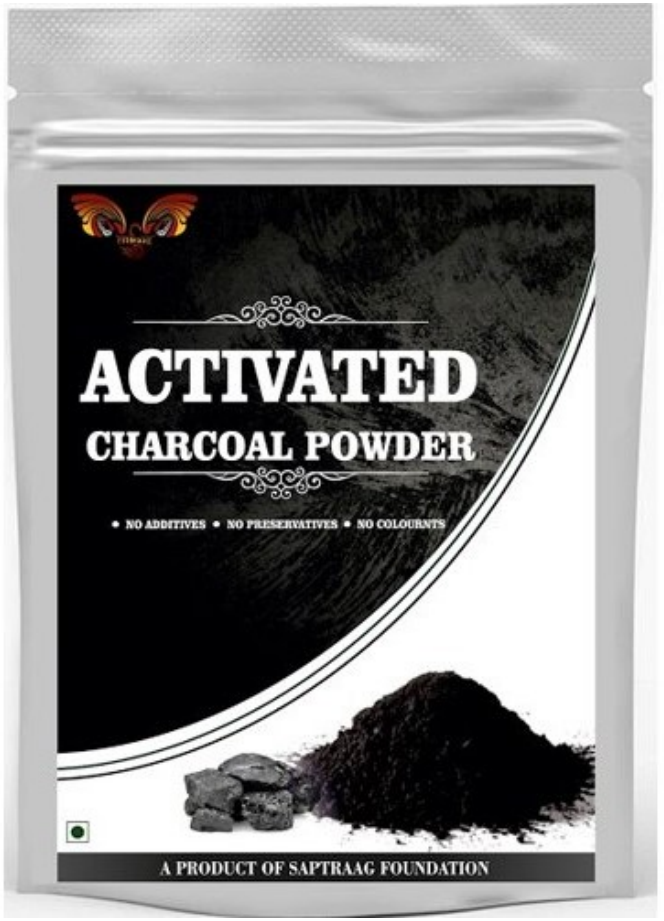


Activated charcoal

Contraindications:

- If an oral antidote is given
- Seizures, coma
- Corrosive ingestion
- Agent not bound to activated charcoal:

Hydrocarbons, alcohols and corrosives (acids, alkalis)



Cathartics (Laxatives)

These are substances that **enhance** the **passage of material through GIT** and **decrease** the **time of contact** between the poison and the absorptive surfaces of the stomach and intestine.

a)Osmotic cathartics: increase osmotic pressure in the lumen, as Magnesium sulfate.

b) Irritant cathartics: act by increasing motility, such as caster oil.

Contraindications:

GIT hemorrhage, Recent bowel surgery, Intestinal obstruction.

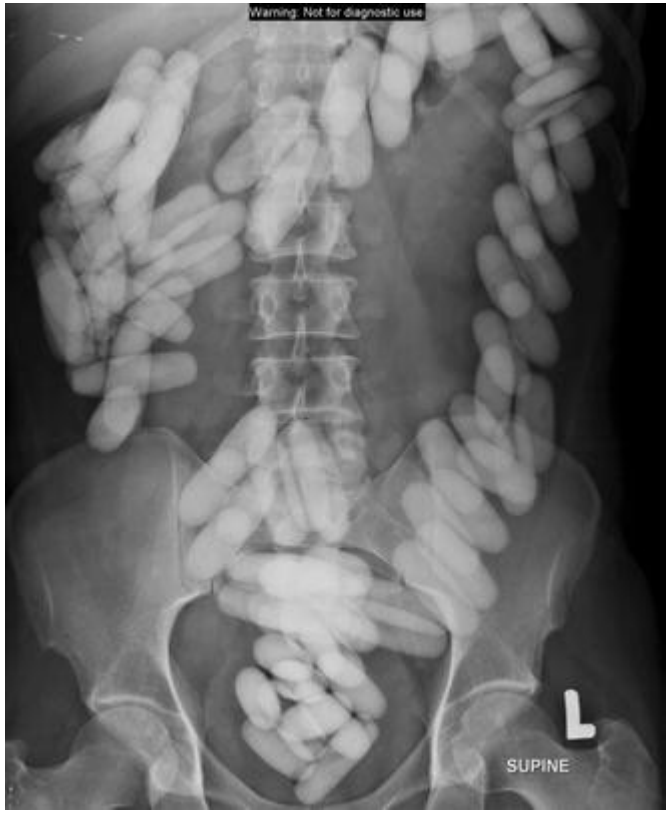
Whole Bowel Irrigation

The goal of WBI is to clean GIT from non-absorbed ingested toxins.

Polyethylene glycol electrolyte solutions are used.

Indications

- ✓ Ingestion of a toxin that is known to be poorly adsorbed by a charcoal.
- ✓ Ingestion of massive amounts of drugs
- ✓ Ingestion of sustained-release or enteric-coated preparations
- ✓ Removal of ingested packets of illegal drugs (body packers).



Antidote

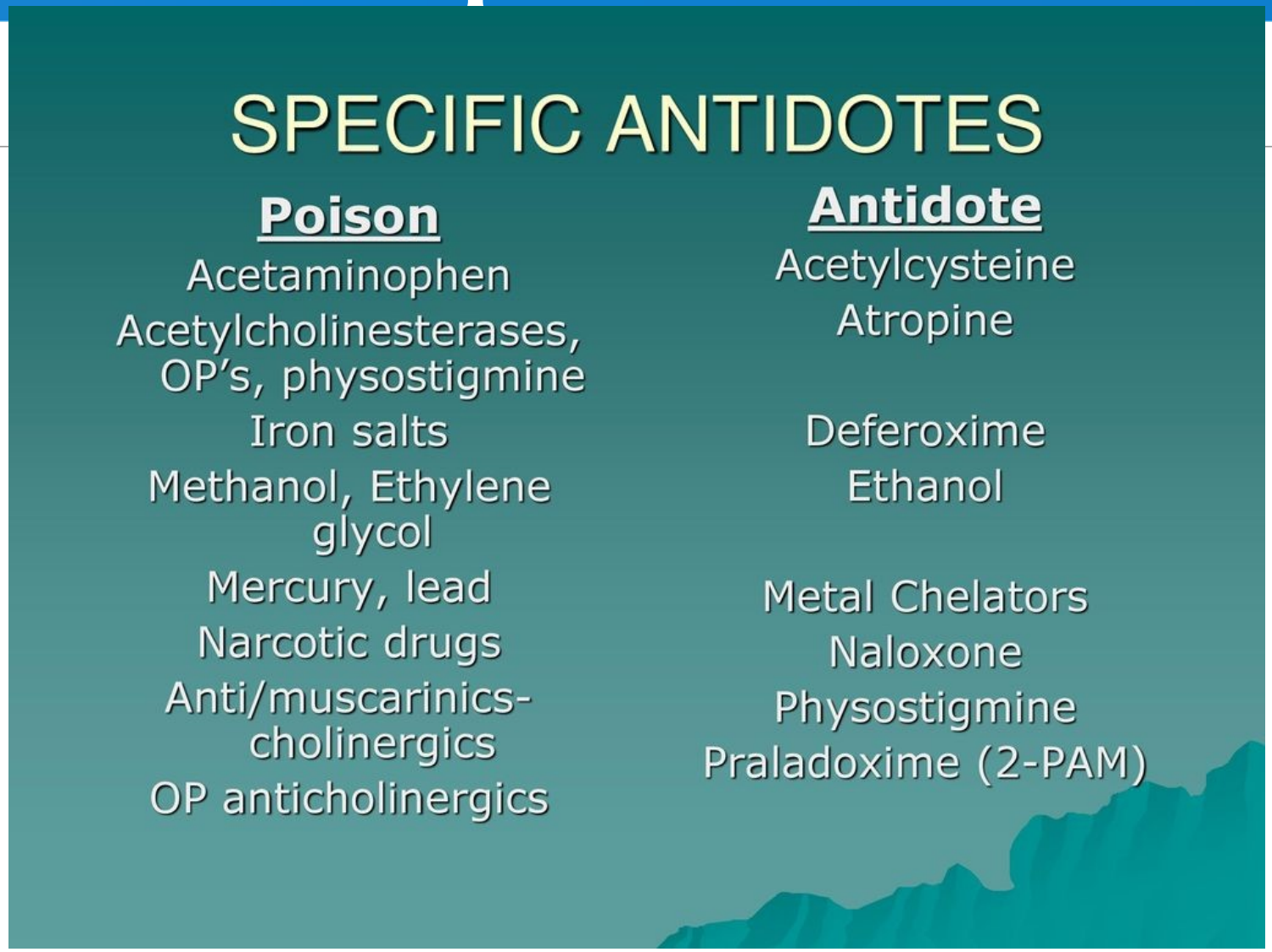
A **therapeutic** substance used to **counteract** the toxic action(s) of a specific **xenobiotic**

Antidotes are **classified** according to mechanism of action into:

1- **Interacts** with the poison to form a nontoxic complex that can be excreted e.g. **chelators**

2- **Accelerate** the detoxification of the poison: **N-acetylcysteine, thiosulfate.**

Examples of Antidote



Antidote

3- **Decrease** the rate of conversion of the poison into its toxic metabolites: **Fomepizole.**

4- **Compete** with the poison for certain receptors: **Naloxone.**

5- **Block the receptors** through which the toxic effects of the poison are mediated: **atropine.**

6- **Bypass the effect** of the poison: **O2** treatment in CO and cyanide toxicity.

7- **Antibodies** to the poison: **digiband, antivenoms**

Antidote

Antidotes also can be classified into:

1- Physical

2- Chemical

3- Physiological

Antidote

1- Physical Antidotes

Agents used to **interfere** with poisons through physical properties, not change their nature

a) **Adsorbing**: the main example is activated charcoal.

b) **Coating**: a mixture of egg & milk makes a coat over the mucosa.

c) **Dissolving**: 10% alcohol or glycerine for carbolic acid.

Antidote

2- Chemical Antidotes

a) **Oxidizing**: Amyl Nitrite is used in cyanide toxicity.

b) **Reducing**: Vitamin C used for drugs causing Met-Hb.

c) **Precipitating**: Starch, it makes blue precipitate with iodine.

Antidote

3- Physiological (Pharmacological) Antidotes

a) Antagonism

1- Competitive Antagonists.

2- Non-Competitive Antagonism

b) Chelating Agents

Unite metallic poisons to form soluble, nonionizable, less toxic, and easily excreted chelates. e.g Dimercaprol (BAL)

c) Antibodies (Immunology-based Antidotes) e.g. Digoxin Specific Antibody Fragment (FAB fragments, Digiband)

Enhancement of Poison Excretion

1- Forced Diuresis

It is a **simple** method for some poisons.

It is effect is increased with **manipulation** of urine pH. e.g. Fluid Diuresis, Osmotic Diuresis as **mannitol 10%.**

Enhancement of Poison Excretion

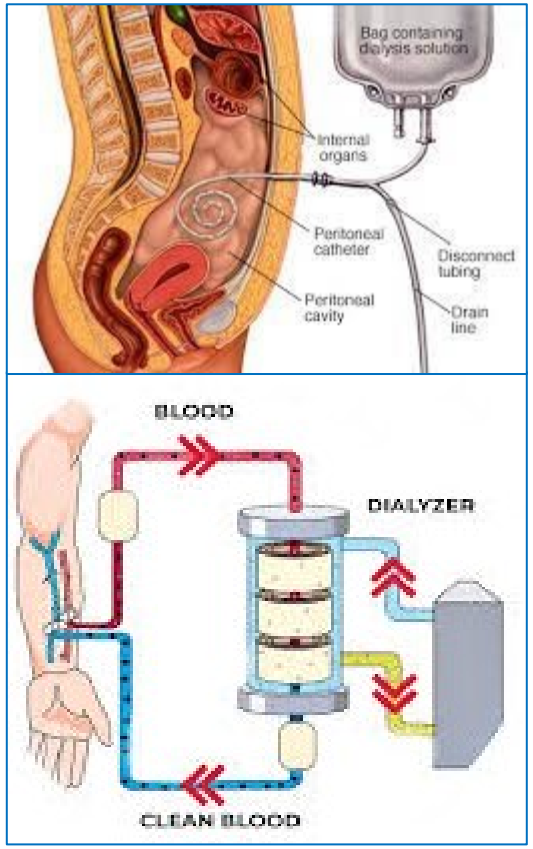
2- Dialysis

By allowing toxic substances to **pass** through **semi-permeable** membrane depending on the **concentration gradient**.

It is **beneficial** when renal function is **impaired**.

a) **Peritoneal** dialysis

b) **Hemodialysis**

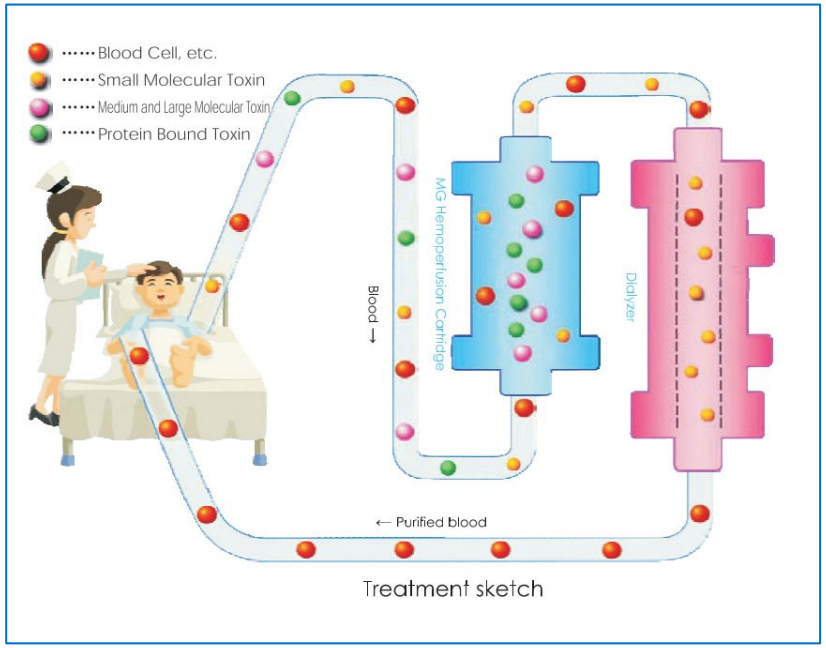


Enhancement of Poison Excretion

3- Hemoperfusion

Using **equipment** and **vascular** access similar to that for hemodialysis.

The blood is pumped directly through a **column** containing an **adsorbent** material (either charcoal or resin).



THANK YOU FOR YOUR ATTENTION