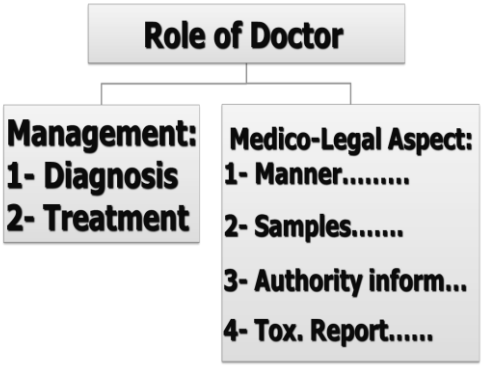
GENERAL MNAGEMENT OF THE POISONED PATIENT

The doctor's duty in a suspected poisoning case

Whatever the cause or circumstances of poisoning:

1. *Diagnosis of poisoning*.
2. *Treatment of the poisoned patient.*
3. *Determining the manner* of poisoning: **intentional** (homicide or suicide) or **unintentional** (accidental), why?:
   - In cases of suspected homicide, patients should be advised to avoid food and drinks prepared by others, and visitor contact with hospitalized patients should be monitored carefully.
   - Suicidal patients should receive a psychiatric evaluation.

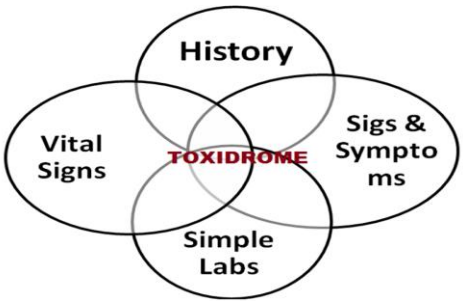


4. *Sending samples for toxicological analysis*:
   - Blood and urine are the first to be taken.
   - Samples must be collected and handled in a particular manner **"establishing continuity of evidence"** = "***chain of custody***". متسلسلة الأحداث = the doctor who takes a sample must place it into the appropriate tube and label it with the patient's name, hospital number, the date, the nature of the sample taken, the doctor's signature, then, the sample should be handed to a specific person, who will take it to the laboratory and every step in the chain from collection to laboratory must be capable of later proof in court.
5. *Police notification:*
   - If the patient is ***very ill*** and in ***danger of dying***, or when ***death*** occurs.
6. *Writing a Toxicological report:* ..... **انظر الجزء العملى**

Diagnosis of poisoning

The same in the living and the dead:

1. **History:** circumstantial evidence such as:
   - Sudden appearance of symptoms in a healthy person.
   - A group of persons taking the same food.
   - Sudden death.
2. **Physical signs:**



- **Clinical picture (in the living):** the symptoms and signs may ***suspect poisoning***.

- Sudden vomiting and diarrhea.
- Unexplained coma especially in children.
- Coma in an adult known to have a depressive illness.
- Rapid onset of a neurological or gastrointestinal illness in persons known to be exposed to chemicals.

Toxidromes:

- The term toxidrome (a ***toxic fingerprint***) refers to the collection of signs and symptoms that are observed after an exposure to a substance.
- Toxidromes are typically helpful in establishing a diagnosis when the exposure is not well known.

- **Autopsy findings (in the dead):** they are usually unhelpful but may be helpful in certain cases of poisoning.

3. Analysis of body fluids and tissues:

Qualitative and quantitative estimation of the poison are the ***most accurate and confirmatory diagnostic method*** for poisoning.

Samples required for toxicological analysis include:

- **Blood:**

- During life, any venous sample is usually satisfactory.
- At autopsy:

a) The best place is from **the femoral or iliac veins, or from the axillary veins**.

b) Blood should ***never be taken from the general body cavity*** (as postmortem contamination can occur by intestinal contents, effusion, urine, feces, etc), from the heart or great vessels in the chest (as postmortem contamination can occur by stomach content).

- **Urine:** up to 20 to 30 ml of urine should be placed in a universal container without preservative.
- **Faeces:** up to 20 to 30 g should be taken into a plastic container.
- **Vomit and gastric content:** during life, vomit produced by emesis or gastric lavage should be placed in a clean glass jar. At autopsy, vomit recovered from the scene of death, or the stomach contents may be saved into a clean glass jar.
- **Organs:** at autopsy, the most common organ to be analyzed is the liver.
- **Hair and nail clippings**: when a heavy metal poison is suspected.

Basic principles of modern toxicological management

- **القاعدة** For the *vast majority* of poisoned or overdosed patients, is that ***the clinical condition of the patient, rather than the specific ingredients*** of the ingestion, dictates the management.
- In other words, ***treat the patient, not the poison*.**

I- Management of poisoned patient with an altered mental status or coma:

A) Emergency stabilization of the ABCs.

Airway:

- ***Causes of Obstruction of the airway***:
  1. Posterior displacement of the tongue,
  2. Accumulated secretions,
  3. Mucosal swelling and foreign bodies such as vomitus or dentures.
- Thus, ***the doctor can ensure a patent airway by***:
  - **a)** Place patient in a semi-lateral decubitus position with head forward and mouth down to avoid aspiration of vomitus.
  - **b)** Pulling the tongue and supporting the jaw, to prevent the tongue from falling back against the pharynx.
  - **c)** Frequent suction of secretions.
  - **d)** Removal of any foreign body.
  - **e)** If necessary, ***cuffed*** endotracheal intubation is inserted. This has the advantage of preventing aspiration of gastric contents.
  - **f)** Tracheostomy may be indicated in acute upper airway obstruction if endotracheal intubation fails.

Breathing:

- Adequate ventilation with supplemental oxygen either by:
  1. Nasal cannula or a simple face mask or
  2. Mechanical ventilation, according to the clinical condition of the patient and the type of the poison.
- Perform arterial blood gas analysis to monitor:
  - ✓ The adequacy of ***oxygenation*** by measuring PO_2 (normal values are 75-100 mmHg or 10-13.3 KPa) and O_2 saturation (normal values are 95-100%)
  - ✓ The adequacy of ***alveolar ventilation*** by measuring PCO_2 (normal values are 35-45 mmHg or 4.8-6.1 KPa).

Circulation:

- Abnormalities of blood pressure, pulse, rectal temperature, and oxygen saturation must be corrected.
- ***The doctor can ensure effective circulation "treatment of hypotension" by***:
  1. Fluid expansion: provide intravenous access and initiate crystalloid fluid resuscitation, up to 2 L in adults or to a systolic blood pressure of 100 mmHg.
  2. If fluid resuscitation fails, vasopressors such as dopamine or dobutrex are given.
  3. Continuous ECG monitoring: antiarrhythmic agents such as lidocaine or phenytoin for cardiac dysrhythmias
  4. Cardio-pulmonary resuscitation (CPR) for cardiac arrest.
  5. Known arrhythmogenic factors such as hypoxia, acidosis, and hypokalemia should be corrected.

N.B.: Stabilize the cervical spine: when a patient's mental status is abnormal, the possibilities of head and cervical trauma must also be considered.

B) Initial therapy: Empiric antidote or drugs:

- *Should be used as **diagnostic or therapeutic** agents for the comatose patient*.
- Early (within the first 5 minutes) in the management of a patient with altered mental status
- The physician should give **DONT**:
  1. **Hypertonic dextrose**, 0.5 to 1 g/kg of 50% dextrose in water (D50W) for an adult, or D10W or D25W for a child, to diagnose and treat or to exclude hypoglycemia.
  2. **Thiamine,** 100 mg intravenous for an adult (usually unnecessary for a child) to prevent or treat Wernicke's encephalopathy in alcoholics.
  3. **Naloxone (Narcan),** 2 mg (5 ampoules, each 0.4 mg) IV for adults and children with respiratory compromise, to diagnose and treat (reversal of coma and cardio-pulmonary depression) or to exclude (no effects) opiate overdose.
  4. **100% O2 therapy,** not for long time for fear of lung fibrosis.

C) Emergent therapy: = Treatment of urgent complications of toxicity**:**

- **Seizures:**
  1. Benzodiazepines e.g. 5 to 10 mg diazepam IV are the anticonvulsant of choice.
  2. Barbiturates e.g. 130 mg Phenobarbital IV/15 minutes, if seizures resistant to diazepam or status epileptics, if barbiturates fail,
  3. Muscle relaxant or
  4. General anesthesia.
- **Sever metabolic acidosis:** IV sodium bicarbonate.

- **Cerebral edema:**
  1. Elevate the head of bed, and use
  2. Adrenocortical steroids e.g. dexamethasone,
  3. Hypertonic mannitol, and
  4. Hyperventilation.

D) Proper clinical evaluation:

Medical history:

- The following histories may provide important clues to identifying the exposure:
  1. Empty pill bottles or containers nearby.
  2. The environment where patient was found.
  3. Smells or unusual materials in the home.
  4. The occupation of the person.
  5. The presence of a suicide note.

Toxicological physical examination:

- Check the patient's clothing for substances still retained in the pockets or substances hidden on the patient's body.
- Search for other **causes of coma (such as head trauma or cervical spine injury, infections, metabolic, hypertensive encephalopathy, hypo or hyperglycemia, hypo or hyperthermia, etc)** and to identify the poison:

1. **Skin:** must be examined for cyanosis or flushing, excessive diaphoresis (sweating) or dryness, signs of injury or injection, ulcers, or bullae.
2. **Eyes:** must be examined for pupil size, reactivity, nystagmus, or excessive lacrimation.
3. **Oropharynx:** must be examined for hypersalivation or excessive dryness, corrosive burns, or any characteristic smell.
4. **Chest:** careful evaluation of the lungs to assess for bronchorrhea, or wheezing, and the heart to assess for its rhythm, rate, and regularity.
5. **Abdomen:** bowel sounds, urinary retention, and abdominal tenderness or rigidity.
6. **Neurological examination:**

- Determine the level of consciousness:
  1- **AVPU:** alert, verbal response, painful stimuli response, and unresponsiveness.
  2- **Glasgow Coma Scale (GCS)**
  3- **Reed grades.**

*The **GCS should never be used for prognosis purposes**, because complete recovery from properly managed toxic coma despite a low GCS is the rule rather than the exception.*

Eye opening (E)	score	Motor response (M)	score	Verbal response (V)	score
Spontaneous	4	Obeys	6	Oriented	5
To speech	3	Localizes	5	Confused	4
To pain	2	Withdraws	4	Inappropriate words	3
Nil	1	Abnormal flexion	3	Incomprehensible sounds	2
		Extensor response	2	Nil	1
		Nil	1		

Glasgow coma scale, Coma score = E+M+V (minimum = 3 and maximum = 15)

Grade	Clinical presentation	Management
Grade 0	**Sleep**, but arousable and ***answer questions***	Empty stomach, obtain baseline bloods
Grade 1	**Stupor**, respond to ***painful stimuli***, gag reflex and deep reflexes are present, no respiratory or circulatory depression.	Same as above, plus start IV with D5W
Grade 2	**Coma,** patients ***do not respond to painful*** stimuli, reflexes are present, no respiratory or circulatory depression.	Same as above, plus insert cuffed endotracheal tube
Grade 3	**Coma**, patients do not respond to painful stimuli, ***reflexes are absent***, no respiratory or circulatory depression	Same as group 2
Grade 4	**Deep coma**, patients do not respond to painful stimuli, absent ***reflexes, respiratory and/or circulatory depression***	Place on volume respirator, suction, treat vital signs, hemodialysis

Reed's classification of coma

7. Extremities must be evaluated for tremor or fasciculation.
8. Cranial nerves, reflexes, resting muscle tone, coordination, and cognition must be assessed.

E) DECONTAMINATION

Definition:

- The removal of the patient from the substance (poison) or
- The substance (poison) from the patient**.**

Types:

1. ***External or gross decontamination:*** for toxins outside the body (environment, clothing, skin, and eyes) to prevent further exposure:
   a) **Environment:** Removal of the patients from the polluted environment, as in CO poisoning.
   b) **Clothing:** undressing patients completely.

c) **Dermal decontamination:** washing patients thoroughly with copious amounts of soap & water.

d) **Ocular decontamination:** the eyes must be immediately washed with copious amounts (4-6 L) of saline solution or water after topical analgesia.

2- ***Internal decontamination*:** for toxins inside the body (gut, blood, tissues):

a) GIT decontamination:

- ❖ **Gastric emptying:** i.e. removal of the toxin from the stomach to prevent further absorption by **emesis or gastric lavage.**
- ❖ **Activated charcoal:** it adsorbs and binds the toxin inside the gut lumen to make it unavailable for absorption**.**
- ❖ **Cathartics and whole bowel irrigation**: they enhance elimination of toxin from the gut, thus they can reduce absorption.
- The choice of method used is determined by the toxin ingested, the time course, and the patient's clinical status.

b) Blood and tissues (systemic circulation decontamination) = enhanced elimination: by forced diuresis, urinary alkalinization, hemodialysis, or hemoperfusion.

GASTRIC EMPTYING

Emesis:

Definition: induction of vomiting

Methods:

1. **Mechanical emesis.**
2. **Syrup of ipecac:**
   - **A plant-derivative.**
   - **Mechanism of action:** induces vomiting by working ***both*** peripherally on the stomach and centrally on the chemotactic trigger zone.
   - **Child < 6 months** …….. ***Never to give ipecac*** ?????
   - **Complications of syrup of ipecac-induced emesis include:**
     1. Aspiration
     2. Intractable vomiting.

Gastric lavage:

- **Tube type and size:** a French tube is used with suitable sizes for adults and for children.
- The tube is rounded with multiple holes on the sides of its tip to avoid its obstruction by the gastric wall.
- It is about 150 cm long and marked at 50 cm distance from its tip, which is the distance between the front teeth and the inside

of the stomach of an average-sized adult.

- **Lavage procedure:**

1. The patient should be kept in the left lateral decubitus position, for good washing and to prevent aspiration.
2. Remove dentures and other foreign bodies from the mouth, and then open the mouth using a mouth gage.
3. Endotracheal tube ***(cuffed)*** should precede gastric lavage in the unconscious patient or the patient with seizures and an absent gag reflex.
4. Lubricate the end of the tube with paraffin oil or glycerin (not used in winter as it may close the tube holes), then introduce it smoothly into pharynx, esophagus, and stomach, till the mark is at the front teeth.
5. If the patient conscious, he is asked to *swallow during introducing the tube*.
6. Once the tube is introduced, confirmation of position of the tube in the stomach must be assessed by:
    - Aspiration which brings up gastric contents (by suction),
    - Absence of sudden spasmodic cough, dyspnea or cyanosis, and
    - Absence of bubbling when the upper end of the tube is immersed in water.
7. Attach a sucker to the tube and withdraw the gastric content into a clean jar labeled with the name of the patient, the date, the place and suspected poisons, and sent for analysis.
8. Disconnect the sucker and attach a funnel to the tube and held it high up, then instill room-temperature water (200 ml for adults and 50 to 100 ml for children) and lower the funnel to regurgitate the contents into a bucket.
9. *This should be continued until the lavage is clear*.
10. Before the tube is removed, ***activated charcoal*** and a ***cathartic*** should be instilled, if indicated.
11. ***The tube is firmly nipped and removed, to avoid aspiration.***

- **Contraindications to the gastric lavage include:**
    1. Non-life-threatening ingestions and nontoxic ingestions,
    2. Corrosive ingestions, to avoid gastric perforation,
    3. Pills that are known not to fit into the holes of the gastric lavage tube.
    4. Any patient whose airway integrity is not assured, or
    5. Toxic ingestions with pulmonary toxicity e.g. kerosene to avoid aspiration.
- **Complications of gastric lavage include:**
    a) Insertion of the tube into the trachea obstructing it.
    b) Aspiration pneumonitis
    c) Esophageal or gastric perforation.
    d) Decreased oxygenation during the procedure.

ACTIVATED CHARCOAL

Mechanism of action:

- Activated charcoal adsorbs **الأمتزاز** the toxin within the gut lumen,
- Making the toxin less available for absorption into the blood and tissues,
- Thus it enhances elimination (gastrointestinal dialysis).
- It can also bind the drug in the bile, interrupting the enterohepatic circulation.

I- Single-dose activated charcoal

- **Dose:**
  - 1 g/kg body weight for adults and children.
  - The dose must be freshly prepared by adding chosen quantity of activated charcoal to 4 parts water, then given by mouth or through gastric tube**.**
  - The dose is often given with a cathartic to reduce gastrointestinal transit time.
- **Indications:**
  - It is appropriate after ***nearly all*** suspected toxic ingestions.
  - Clear indications are ingestion of ***any substance known to adsorb*** to it or after unknown ingestion by patients with protected airways.
- **Contraindications to activated charcoal**
  - Isolated substance ingestions known not to adsorb to activated charcoal (such as iron, lithium, ethanol or lead), or
  - Corrosive ingestions (it is not only ineffective, but may accumulate in burned areas, interfering with endoscopy).
- **Complications:**
  - Activated charcoal **is safe** in both adults and children.
  - Rare risks include *aspiration* and *intraluminal impaction* in patients with abnormal gut motility.

II- Multiple-dose activated charcoal (Gut Dialysis) هالم

- **Procedure:**
  - It is usually given as follows: the first dose is 0.5 to 1 g/kg body weight, which is then followed by subsequent doses of 0.25 to 0.5 g/kg every 1 to 4 hours.
  - *Only the first dose should be given with a cathartic*, to prevent excessive fluid loss and electrolyte imbalance.
- **Indications: ---- L -------**
  - Ingestion of very **L**arge doses
  - **L**ife-threatening toxins,
  - Substances that have a **L**arge ***enterohepatic*** or ***enteroenteric*** circulation,
  - Substances that form large **L**umps in the gastrointestinal tract,
  - Toxins that s**L**ow gut function, or

- Toxins that are released s**L**owly into the gut lumen.

- **Contraindications:**
  - Patients with decreased gut motility, because the risks of the procedure include aspiration from gastric distension, and impaction of charcoal within the gut.

CATHARTICS

Types and dose:

- The most commonly used cathartics are ***osmotic cathartics***, such as a 70% sorbitol solution (1g/kg), or a 10% solution of ***magnesium citrate*** (in a dose of 250 mL for adults and 4 mL /kg for children).

Indications:

- Typically, cathartic is administered with activated charcoal to ***decrease the transit time*** for the passage of the activated charcoal and the adsorbed toxin through the gastrointestinal tract (i.e. to ***enhance elimination***).
- Thus indications for use of cathartics are generally those for the indication of activated charcoal.

Contraindications:

1. Ingestion of a substance that will result in diarrhea.
2. Children younger than age 5.
3. Corrosive ingestions.
4. Patients with renal failure (only magnesium-containing cathartics are contraindicated) or intestinal obstruction.

Complications:

1. Nausea and abdominal pain.
2. Severe volume depletion, electrolyte imbalances and fluid shifts.
3. Hypermagnesemia, in patients with renal compromise.

Whole Bowel Irrigation السيل الجارف للجهاز الهضمى

Definition:

- A ***rapid catharsis*** by ***mechanically*** forcing ingested substances through the bowel at a rapid rate,
- Without the risk of serious fluid and electrolyte disturbances.

Technique: the installation of large volumes (2 L/h in adults or 250 to 500 mL/h in children, either by mouth or through a gastric tube) of ***isotonic polyethylene glycol*** electrolyte lavage solution that neither causes fluid nor electrolyte shifts. The end point is clear rectal effluent.

Indications: بتاع الحاجات الصعبة

- Sustained-release preparations such as calcium channel blockers and salicylates.

- Ingestions that are known not to adsorb to activated charcoal (**iron** and **lithium**) and those form large lumps.
- In non-obstructive, non-sharp foreign bodies are present in the bowel.
- In cases of illicit drug body packing.

Contraindications:

- Patient with preceding diarrhea.
- Ingestions that will result in diarrhea (**except for heavy metals**, as they do not adsorb well to activated charcoal).
- Patients with absent bowel sounds or with obstruction.

Complications: bloating, cramping, & rectal irritation from frequent bowel movements.

Surgical Gastrointestinal Decontamination

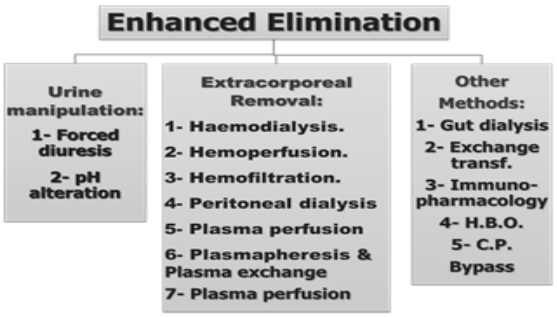
- **Indications:**
  1. Ingestion of drug-containing packets which can cause bowel obstruction or bowel ischemia.
  2. Rupture of packets containing a large amount of cocaine.
  3. Poisons that form large masses or adhere to the gastrointestinal tract wall and are not removed medically such as aspirin, bromide, or iron.

Enhanced elimination of a poison

Definition: decontamination of a patient's systemic circulation.

Methods:

1. Forced diuresis
2. Urinary alkalinization
3. Hemodialysis, hemoperfusion
4. Blood-exchange transfusion
5. Chelation.



I- Forced diuresis:

- It is achieved with fluid loading and diuretic therapy e.g. intravenous furosemide.
- The urinary flow should be 4 to 6 mL/kg/h.
- It is contraindicated in case of hypotension or shock.
- Complications include congestive heart failure and fluid overload.

II- Urinary alkalinization:

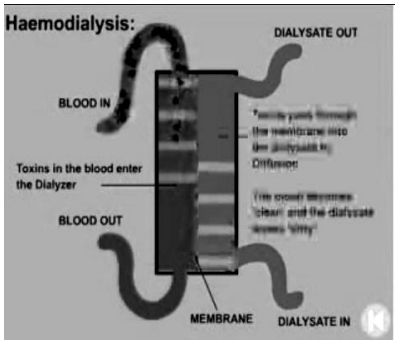
- **Indications:** toxins that are **weak acids:**

1. Weak acids are mostly uncharged (non-ionized) at physiological pH but become charged (ionized) in alkaline environments.
2. Thus, raising the urinary pH converts weak acids from non-ionized to ionized form, and are therefore held within the urinary collection system (ion trapping).

3. This ion trapping keeps the toxin within the renal tubules, thereby enhancing its urinary excretion.

- **Procedure:** intravenous sodium bicarbonate at a dose of 1 to 2 mEq/kg followed by a continuous intravenous infusion (50 to 100 mEq in 500 mL of 5% dextrose in water) to achieve a urinary pH of 7.5 to 8, serum pH of 7.5 to 7.55, and urinary output of 2 mL/kg/h.
- **Complications:** congestive heart failure, pulmonary edema, pH shifts, and profound hypokalemia.
- **Contraindications:** patients who cannot tolerate the volume or sodium load, hypokalemia, renal insufficiency, and ingestion of a toxin that does not respond to alkalinization.

III- Hemodialysis:



- Hemodialysis is reserved for ***life-threatening toxins*** that can be removed by it.
- The benefits of hemodialysis include:
  - **a.** Removal of toxins that are already absorbed from the gut lumen.
  - **b.** Removal of toxins that do not adhere to activated charcoal.
  - **c.** Removal of both the parent compound and the active toxic metabolites.
- A ***semipermeable membrane*** is used to create a concentration gradient to filter out toxin.
- Hemodialysis is less effective where:
  - **1.** the toxin ingested has a large volume of distribution,
  - **2.** has a large molecular weight, or
  - **3.** Highly protein bound.

IV- Hemoperfusion:

- Hemoperfusion involves placing a filter filled with activated charcoal into the circuit of the hemodialysis machine.
- It is commonly recommended for ***theophylline overdoses***.
- It can remove toxins that have: تتغلب على مشاكل ال Hemodialysis
  - **a)** a small volume of distribution,
  - **b)** large molecular weight,
  - **c)** highly protein bound,
  - **d)** Adsorb well to activated charcoal.

V-Blood-exchange transfusion:

- It is achieved by removal of a quantity of blood and its replacement with an identical quantity of fresh whole blood.

- It is indicated for toxins that have a small volume of distribution.
- ***Methemoglobinemia*** is one of its common indications.

VI- Chelation المخالب

Definition:

- Chelation is indicated for elimination of ***heavy metals***,
- By forming nontoxic compounds that are rapidly excreted in urine.
- Chelating agents include BAL, EDTA, DMSA, penicillamine, and desferal.

The ideal chelating agent must have the following properties:

1. High solubility in water.
2. Resistant to metabolic degradation.
3. Ability to penetrate metal store sites.
4. Active at Ph of the body fluids.
5. Having great affinity for metal ions.
6. Forming nontoxic chelating compound with heavy metal.
7. Rapid excretion of the chelating compound.

ANTIDOTAL THERAPY

Definition: chemical agents that can neutralize the effects of the absorbed poisons**.**

A. Chemical inactivators: inactivate the poison by combining with it, forming a nontoxic compound rapidly excreted in urine. Examples include:

1- ***Sodium thiosulfate*** for cyanide poisoning (forming a nontoxic thiocyanate).

2- ***Hydroxycobalamine*** for cyanide poisoning (forming a nontoxic vitamin B12).

3- ***Calcium*** for oxalic acid poisoning (forming a nontoxic calcium oxalate).

B. Antagonists:

- **Physiological antagonists:** antagonize the effects of the poison i.e. they depress where the poison stimulates and stimulates and the poison depresses.
  - **1-** Atropine for organophosphorus poisoning.
  - **2-** Anticonvulsants for strychnine poisoning.
  - **3-** Sedatives for CNS stimulant poisoning.
- **Competitive antagonists:** these antidotes include:
  - Antagonists which compete with the poison for the receptor i.e. replace the poison at the receptor such as:
    1. ***Naloxone*** for opiate poisoning,
    2. ***Vitamin K*** for dicumarol poisoning.
  - Antagonists that compete with the receptor for the poison i.e. displace the poison from the receptor such as:
    1. ***Chelating agents*** for heavy metals and
    2. ***Oximes*** for organophosphorus poisoning.

Toxidrome	Representative agent(s)	Most common findings	Additional signs and symptoms	Potential interventions
Opioid	Heroin, morphine	CNS depression miosis, respiratory depression	Hypothermia, bradycardia, Death may result from respiratory arrest.	" Ventilation or naloxone
Sympathomimetic	Cocaine, amphetamine	Psychomotor agitation, mydriasis, diaphoresis, tachycardia hypertension, hyperthermia	Seizures, rhabdomyolysis myocardial infarction death may result from seizures, cardiac arrest, hyperthermia	Cooling, sedation with benzodiazepines, hydration
Cholinergic	Organophosphate insecticides carbamate insecticides	Salivation, lacrimation, diaphoresis, nausea, vomiting urination, defecation, muscle fasciculation, weakness, bronchorrhea	Bradycardia, miosis/mydriasis. Seizures, respiratory failure Death may result from respiratory Failure	Airway protection and ventilation, atropine, pralidoxime.
Anticholinergic	Scopolamine atropine	Altered mental status, mydriasis, dry/flushed skin, urinary retention, decreased bowel sounds, hyperthermia, dry mucous membranes	Seizures, dysrhythmias, rhabdomyolysis. Death may result from hyper-themia and dysrhyhmias	Physostigmine (if appropriate) sedation with benzodiazepines, cooling, supportive management
Salicylates	Aspirin oil of wintergreen	Altered mental status, respiratory alkalosis, metabolic acidosis tinnitus, hyperpnoea tachycardia, diaphoresis nausea, vomiting	Low-grade fever, ketonuria death may result from pulmonary edema, cardio respiratory arrest	MDAC. Alkalinization of the urine with potassium repletion, hemodialysis, hydration.
Hypoglycemia	Sulfonylureas, insulin	Altered mental status, diaphoresis, tachycardia, hypertension	Paralysis, slurring of speech, bizarre behavior, seizures. Death may result from seizures, altered behavior.	Glucose containing solution intravenously, and oral feedings fable, frequent capillary blood for glucose

The common toxidromes

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