1. Classification of poisonous substances

There are 4 classifications of poisonous substances and they are;

1. Chemical examples include Lead, Mercury, Hydrofluoric acid and chlorine gas
2. Biological
3. Physical
4. And Radiation
5. Most compounds considered to be foreign to the human body are rather hydrophobic and chemically inert. Because of their hydrophobicity, xenobiotics enter the body easily by diffusion through biological membranes, are difficult to excrete in unchanged form in the urine and bile and accumulate in hydrophobic compartments of the cell, including the phospholipids bilayer of membranes, where they can disturb normal cellular functions. In order to transform xenobiotics into products which are more readily excretable, enzymes of detoxication first activate these substances (primarily via the cytochrome P-450 monooxygenase system) to intermediates which are often highly electrophilic and reactive, such as epoxides, free radicals and carbonium ions. These intermediates are then partially inactivated and their solubility in water simultaneously increased through the addition of water (by epoxide hydrolases) or conjugation with glutathione (by glutathione transferases). Finally, an additional increase in water solubility can be achieved by conjugation with, for example, sulfate (via sulfotransferases) and/or glucuronic acid (via UDP-glucuronyltransferases). Unfortunately, reactive intermediates of xenobiotic metabolism which are not inactivated sufficiently rapidly can bind covalently to many nucleophilic groups in the cell, including those on DNA, RNA and protein. Most often, because of various cellular defense mechanisms, such binding causes no serious damage. However, in some cases toxic and/or genotoxic effects may be produced. As an alternative to experimentation with animals, we have examined xenobiotic metabolism in circulating mononuclear leukocytes from human beings. Certain enzymes of detoxication--including membrane-bound and cytosolic epoxide hydrolases and cytosolic glutathione transferases--can be easily measured and characterized in preparations from these cells. Autosomal dominant hereditary differences of at least several hundred-fold in the activity of glutathione transferase mu in circulating human lymphocytes were observed, differences which may be of value in predicting an individual's risk for toxic/genotoxic damage after exposure to certain xenobiotics.

2. (b) Hydrophilic substances

A hydrophilic [molecule](https://biologydictionary.net/molecule/) or substance is attracted to water. Water is a [polar molecule](https://biologydictionary.net/polar-molecule/) that acts as a [solvent](https://biologydictionary.net/solvent/), dissolving other polar and hydrophilic substances. In biology, many substances are hydrophilic, which allows them to be dispersed throughout a [cell](https://biologydictionary.net/cell/) or [organism](https://biologydictionary.net/organism/). All cells use water as a solvent that creates the [solution](https://biologydictionary.net/solution/) known as [cytosol](https://biologydictionary.net/cytosol/" \o "cytosol). Cytosol contains many substances, most of which are hydrophilic on at least part of the molecule. This ensures that that can be transported about the cell easily. Substances that are [hydrophobic](https://biologydictionary.net/hydrophobic/), or repel water, are often transported through and between cells with hydrophilic proteins or structures attached to aid in their dispersal.

Hydrophilic substances diffusein water, which is to say they move from areas of high concentration to areas of low concentration. This is caused by the attraction of water molecules to the hydrophilic molecules. In areas of high concentration of the molecules, water moves in and pulls the molecules apart. The molecules are then distributed to areas of low concentration, where more water molecules can interact. [Diffusion](https://biologydictionary.net/diffusion/) is a very important property of most hydrophilic substances to living organisms. Diffusion allows them to distribute substances with little to no energy on their part.

3(a)

|  | **ANTIDOTES** | **POISONS OR TOXINS** |
| --- | --- | --- |
|  | [Calcium chloride](https://en.wikipedia.org/wiki/Calcium_chloride) | [Calcium channel blocker toxicity](https://en.wikipedia.org/wiki/Calcium_channel_blocker_toxicity), [black widow spider](https://en.wikipedia.org/wiki/Latrodectus) bites |
|  | [Calcium gluconate](https://en.wikipedia.org/wiki/Calcium_gluconate) | [Calcium channel blocker toxicity](https://en.wikipedia.org/wiki/Calcium_channel_blocker_toxicity), [hydrofluoric acid](https://en.wikipedia.org/wiki/Hydrofluoric_acid) burns |
|  | [Chelators](https://en.wikipedia.org/wiki/Chelator) such as [EDTA](https://en.wikipedia.org/wiki/EDTA), [dimercaprol](https://en.wikipedia.org/wiki/Dimercaprol" \o "Dimercaprol) (BAL), [penicillamine](https://en.wikipedia.org/wiki/Penicillamine" \o "Penicillamine), and 2,3-[dimercaptosuccinic acid](https://en.wikipedia.org/wiki/Dimercaptosuccinic_acid) (DMSA, succimer) | [Heavy metal poisoning](https://en.wikipedia.org/wiki/Toxic_heavy_metal) |
|  | [Cyanide](https://en.wikipedia.org/wiki/Cyanide) antidotes ([hydroxocobalamin](https://en.wikipedia.org/wiki/Hydroxocobalamin" \o "Hydroxocobalamin), [amyl nitrite](https://en.wikipedia.org/wiki/Amyl_nitrite), [sodium nitrite](https://en.wikipedia.org/wiki/Sodium_nitrite), or [thiosulfate](https://en.wikipedia.org/wiki/Thiosulfate" \o "Thiosulfate)) | [Cyanide poisoning](https://en.wikipedia.org/wiki/Cyanide_poisoning) |
|  | [Cyproheptadine](https://en.wikipedia.org/wiki/Cyproheptadine) | [Serotonin syndrome](https://en.wikipedia.org/wiki/Serotonin_syndrome) |
|  | [Deferoxamine](https://en.wikipedia.org/wiki/Deferoxamine) mesylate | [Iron poisoning](https://en.wikipedia.org/wiki/Iron_poisoning) |
|  | [Digoxin Immune Fab](https://en.wikipedia.org/wiki/Digoxin_Immune_Fab) antibody (Digibind and Digifab) | [Digoxin poisoning](https://en.wikipedia.org/wiki/Digoxin_toxicity), [Oleander](https://en.wikipedia.org/wiki/Oleander) ingestion |
|  | [Diphenhydramine hydrochloride](https://en.wikipedia.org/wiki/Diphenhydramine_hydrochloride) and [benztropine mesylate](https://en.wikipedia.org/wiki/Benztropine_mesylate" \o "Benztropine mesylate) | [Extrapyramidal](https://en.wikipedia.org/wiki/Extrapyramidal_symptoms) reactions associated with [antipsychotics](https://en.wikipedia.org/wiki/Antipsychotic) |
|  | 100% [Ethanol](https://en.wikipedia.org/wiki/Ethanol) or [fomepizole](https://en.wikipedia.org/wiki/Fomepizole" \o "Fomepizole) | [Ethylene glycol poisoning](https://en.wikipedia.org/wiki/Ethylene_glycol_poisoning) and [methanol poisoning](https://en.wikipedia.org/wiki/Methanol_toxicity) |
|  | [Flumazenil](https://en.wikipedia.org/wiki/Flumazenil) | [Benzodiazepine overdose](https://en.wikipedia.org/wiki/Benzodiazepine_overdose) |
|  | 100% [oxygen](https://en.wikipedia.org/wiki/Oxygen) or [hyperbaric oxygen therapy](https://en.wikipedia.org/wiki/Hyperbaric_oxygen_therapy) (HBOT) | [Carbon monoxide poisoning](https://en.wikipedia.org/wiki/Carbon_monoxide_poisoning) and [cyanide poisoning](https://en.wikipedia.org/wiki/Cyanide_poisoning) |
|  | [Idarucizumab](https://en.wikipedia.org/wiki/Idarucizumab) | Reversal of [dabigatran etexilate](https://en.wikipedia.org/wiki/Dabigatran_etexilate" \o "Dabigatran etexilate), an [anticoagulant](https://en.wikipedia.org/wiki/Anticoagulant) |
|  | [Insulin](https://en.wikipedia.org/wiki/Insulin) + [Glucagon](https://en.wikipedia.org/wiki/Glucagon) | [Beta blocker](https://en.wikipedia.org/wiki/Beta_blocker) poisoning and calcium channel blocker poisoning |
|  | [Leucovorin](https://en.wikipedia.org/wiki/Leucovorin) | [Methotrexate](https://en.wikipedia.org/wiki/Methotrexate), [trimethoprim](https://en.wikipedia.org/wiki/Trimethoprim" \o "Trimethoprim) and [pyrimethamine](https://en.wikipedia.org/wiki/Pyrimethamine" \o "Pyrimethamine) overdose |
|  | [Intralipid](https://en.wikipedia.org/wiki/Intralipid) | [Local Anesthetic](https://en.wikipedia.org/wiki/Local_anesthetic#Treatment_of_overdose:_%22Lipid_rescue%22) toxicity |
|  | [Methylene blue](https://en.wikipedia.org/wiki/Methylene_blue) | Treatment of conditions that cause [methemoglobinemia](https://en.wikipedia.org/wiki/Methemoglobinemia" \o "Methemoglobinemia) |
|  | [Naloxone hydrochloride](https://en.wikipedia.org/wiki/Naloxone_hydrochloride) | [Opioid overdose](https://en.wikipedia.org/wiki/Opioid_overdose) |
|  | [N-acetylcysteine](https://en.wikipedia.org/wiki/N-acetylcysteine) | [Paracetamol](https://en.wikipedia.org/wiki/Paracetamol_toxicity) (acetaminophen) poisoning |
|  | [Octreotide](https://en.wikipedia.org/wiki/Octreotide) | Oral [hypoglycemic](https://en.wikipedia.org/wiki/Hypoglycemic) agents |
|  | [Pralidoxime chloride](https://en.wikipedia.org/wiki/Pralidoxime_chloride) (2-PAM) | When given with Atropine: [Organophosphate](https://en.wikipedia.org/wiki/Organophosphate) insecticides, [nerve agents](https://en.wikipedia.org/wiki/Nerve_agent), some [poison mushrooms](https://en.wikipedia.org/wiki/Mushroom_poisoning) |

3(b) Symptoms of poisoning

The effects of poisoning depend on the substance, amount, and type of contact. Your age, weight, and state of health also affect your symptoms.

Possible symptoms of poisoning include:

* Nausea and/or vomiting
* Diarrhea
* Rash
* Redness or sores around the mouth
* Dry mouth
* Drooling or foaming at the mouth
* Trouble breathing
* Dilated pupils (bigger than normal) or constricted pupils (smaller than normal)
* Confusion
* Fainting
* Shaking or seizures

**Tests and investigations**

Investigations may include blood tests and an electrocardiogram (ECG).

A blood test can be used to check the levels of chemicals and glucose in the blood. They may be used to perform a toxicology screen (tests to find out how many drugs or how much medication a person has taken), and a liver function test, which indicates how damaged the liver is.

An ECG is an electrical recording of the heart to check that it's functioning properly.

**Liver functions tests (LFTs or LFs), also referred to as a hepatic panel, are** groups of **blood tests** that provide information about the state of a patient's **liver**. These **tests** include prothrombin time (PT/INR), activated Partial Thromboplastin Time (aPTT), albumin, bilirubin (direct and indirect), and others.