

TOXICANTS OF PUBLIC HEALTH HAZARD

A-Pesticides : are chemicals (any substance or mixture of substances) are used to preventing , destroying and kill pests.

pests can be insects, weeds, fungi, rodents or other unwanted organisms.



Pesticide can be divided into several groups, such as

- 1- **Insecticides:** target harmful or destructive insects like: **DDT, BHC.**
- 2- **Herbicides :** target weeds like : **Borax, Nitrofen.**
- 3- **Fungicides :** target fungi like: **Bordeaux mixture**
- 4- **Rodenticides :** target rodents like: **Warfarin, Zinc phosphide.**
- 5- **Nematocide:** target nematodes like: **DBCP, Phorate:**
- 6- **Molluscicides:** target molluscan like: **Sodium pentachloridephenate.**

*Basic classes of **insecticides :**

- 1- **Organochlorines (chlorinated hydrocarbons)**
- 2- **Organophosphates (organophosphorus compounds)**
- 3- **Carbametes esters** 4- **Pyrethroids**



*Botanical insecticides

The basic mechanism of action for most pesticides can be summarized as :

#An alteration of signal along nerve fiber / from one nerve to another

#Across the synapse / from a nerve to muscle fiber

- 1- **Organochlorines insecticides** : are organic compounds with chlorine (Cl) atoms attached to the ring structures.

There are three major classes of **organochlorines** :

- a)- **dichlorodiphenylethanes** : as DDT , methoxychlor
- b)-cycloclines : as aldrin , dieldrin , chlordane , endosulfan
- c)-chlorinated benzenes **cyclohexanes** or **hexachloreyclohexanes**) as lindane

2-**Organophosphates** (organophosphorus compounds **OPC**)

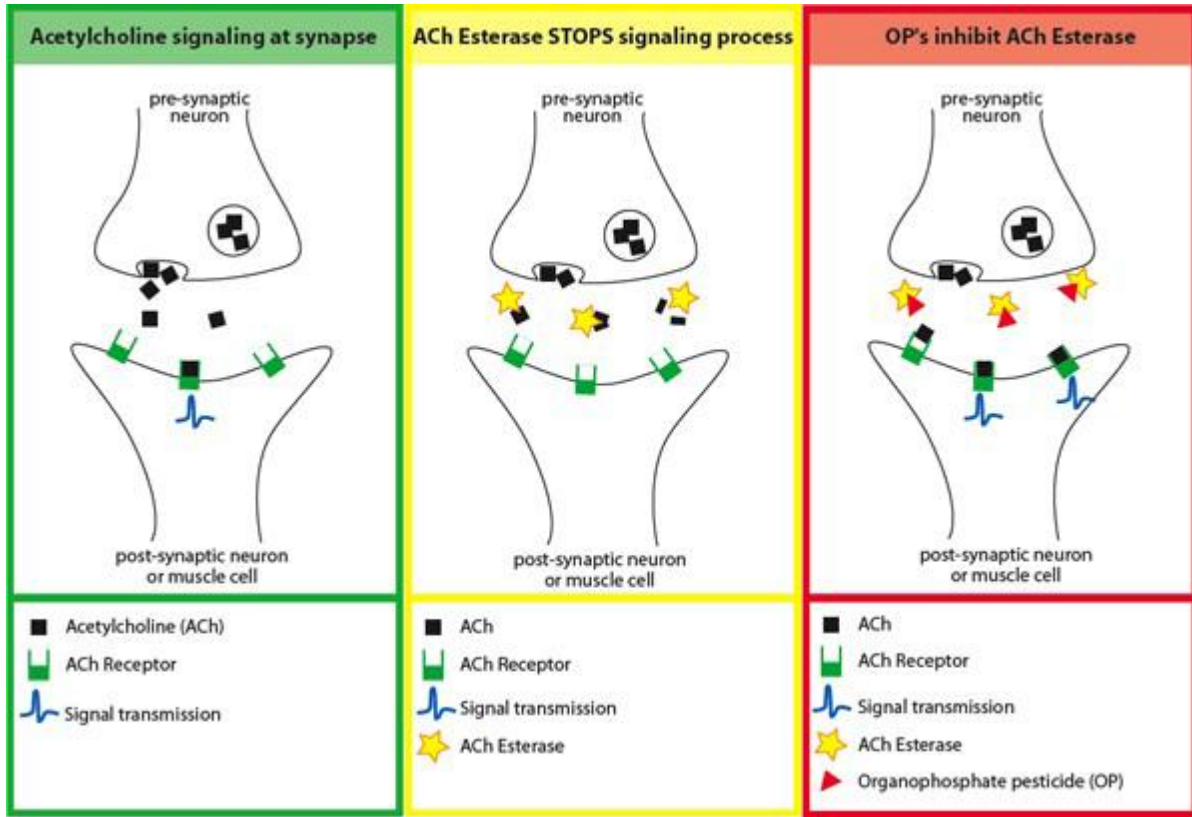
Mechanism of action: Inhibit acetylcholinesterase (ACHE) irreversibly *in nerve cells*.

OPC: are insecticides that have the active part which phosphate group sharing a double bond with either an oxygen or a sulfur group.

OPC can be categorized in two broad groups on the basis of their activity :

- a)- **direct acting organophosphate** : they act by directly inhibiting the cholinesterase enzyme. ex: dichlorvos , diazinon , dimethoate , sarin.
- b)-**indirectly action organophosphate** : they inactive but are biotransformed in the body to toxic metabolites which inhibit cholinesterase enzyme. e.g: malathion active metabolites malaoxon , parathion active metabolites paraoxon.

Effect of OP on the AChE



Signs and symptoms of organophosphate poisoning can be divided into 3 broad categories, including (1) muscarinic effects, (2) nicotinic effects, and (3) CNS effect

*** signs & symptoms of organophosphate toxicity**

Nervous tissue and receptor affected	Organ affected	manifestations
Parasympathetic postganglionic nerve fibers(muscarinic receptors)	1- Exocrine gland 2- Eye 3- GIT 4- Respiratory tract	-Increase salivation & lacrimation -miosis , blurring vision , conjunctive congestion , bloody tears - nausea , vomiting , diarrhea

		, fecal incontinence
Somatic motor nerve fibers(nicotinic receptors)	Skeletal muscle	-muscle fasciculation -diminished tendon reflexes -generalized muscle Weakness in peripheral and respiratory muscle -paralysis , ataxia
Brain (ACHreceptors)(muscarinic receptors)	Central nervous system	Drowsines fatigue lethargy tremers -coma with absence of reflexes -convulsions -depressions of respiratory centers , cyanosis.

Treatment of organophosphates toxicity :

Aim of treatment : treatment of organophosphates poisoning in an domestic & wild animals should be aimed at :

- 1)- abolish the muscarinic effects due to excess of acetylcholine.
- 2)-to regenerate the inactivated enzyme.

***Lines of treatment :**

1) the first line of treatment consist of the administration of atropine sulphate at the dose rate of 0.2-0.5mg/Kg B.W (one fourth of the dose is given IV and three fourth IM or SC as 0.15% in normal saline.

2) second line of treatment consist of the using of cholinesterase reactivator (oxime reactivator) such as (2-PAM , pralidoxime) at the dose rate of 30 mg/Kg B.W I.V or I.M as 6% solution in normal saline.

