Lecture title: Carbamate Chlorinated Hydrocarbons(Organochlorine)

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Carbamate

Mechanism of action :

Binding and inhibitory actions are similar to those of organophosphorus agents. After hydrolysis of compound, acetylcholinesterase undergoes carbamoylation. Carbamates are poor substrates for acetylcholinesterase. • Spontaneous reactivation of enzyme is rapid

Diagnosis

1- clinical signs

2- Chemical analysis of insecticide in gastric contents or tissues • only indicates exposure

3- - Cholinesterase inhibition • Cholinesterase activity is measured in the following samples: whole blood (heparin or EDTA tubes) blood, blood clots, brain, eyes chilled after necropsy • inhibition of activity by at least 50% indicative of intoxication • erythrocyte cholinesterase “true cholinesterase” same as neural isoform • plasma cholinesterase “pseudocholinesterase” produced in liver •

Organophosphate	Carbamate
irreversible cholinesterase inhibitors	reversible cholinesterase inhibitors
long duration of action	short duration of action
more toxic	less toxic
use 2-PAM in treatment	not use 2-PAM in treatment

Clincal signes of carbamate poisoning are similar to that of organophosphate'

Chlorinated Hydrocarbons(Organochlorine)

Compound are:

fat-soluble

low molecular weight

stable compound

low water solubility rate of biotransformation and degradation causes thus causes residues in milk and fat.

It selective toxicity to insects. They can easily penetrate the exo-skeleton of insects but percutaneous absorption in mammals is relatively poor.

The organochlorine insecticides are divided to their chemical classes:-

Diphenyl aliphatic :- e.g. (DDT dichlorodiphenyl trichoroethan), methoxychlor .

Cyclodienes :- e.g. Aldrin, heptachlor used against termites النمل الابيض .

Miscellaneous :- e.g. lindane used on dogs and human against fleas, ticks and sarcoptic mange

Clinical Signs

• Neurologic syndromes • Agitation, frenzied behavior • Abnormal gait • Hypersalivation • Muscle fasciculation • Central nervous system depression • Prolonged seizures • Hyperthermia • Decreased reproductive efficiency (long-term exposure) .

Mechanism of Action cyclodienes

• Inhibition of -aminobutyric acid (GABA)–mediated chloride receptor

• GABA antagonist • decreased repolarization of neuronal membrane

• Inhibition of adenosine triphosphatase in neuronal and cardiac membranes

• Increased calcium concentration in presynaptic terminal

• Increased calcium-mediated neurotransmitter release

DDT

• Diminished repolarization

• inhibition of adenosine triphosphate (ATPase) in neuronal cells

• actions on potassium channels diminished potassium flux across neuronal membrane

• actions on sodium channels diminished inactivation of sodium channels increased sodium flux across neuronal membranes

• inhibition of calmodulin decreased calcium-mediated neurotransmitter release in neurons

• Decreased threshold for stimulation of nerves .

• Lindane-treated rams • decreased concentration of luteinizing hormone • decreased concentrations of estrogen and testosterone • Decreased in vitro ATPase

Diagnosis

• History of exposure

• Presence of clinical signs

• several other toxic exposures and infectious diseases cause tremors, seizures, and depression .

• Chemical analysis for organochlorine insecticide • feed sources • blood • liver • brain • fat • milk • hair • kidney • stomach content.

Treatment

1- Decontamination

• Dermal :Wash animals with mild detergent. • Prevent human exposure during washing

. • Oral :Administer activated charcoal and cathartic agent.

• Repeat dosing of activated charcoal if necessary.

• Mineral oil may be more effective than saline cathartics or sorbitol.

2- Supportive care

• Control seizures. :diazepam • phenobarbital • pentobarbital • Move to an environment that prevents trauma during seizures

Facilitate elimination. • Food animals that survive an acute episode may contain insecticide residue in edible tissues. • Increased mobilization of fat increases elimination of insecticide. • Residues may exist for days or months.