

MEDICAL TREATMENT OF PESTICIDE POISONING

A. MEDICAL STAFF, AND TRAINED NURSING STAFF:

Subjects A and B: Should know the importance of history, the symptoms and signs, and the treatment of cases of poisoning from all the chemical groups used by applicators or available to the public in their area.

B. PRIMARY HEALTH CARE WORKERS:

Subject A: Should know the importance of history, and the symptoms and signs of poisoning from all the chemical groups in the area. (See note below.)

Subject B: Should know the general principles of the management of cases of poisoning. May need to know specific treatment for cases of poisoning by some chemical groups.

NOTE TO TRAINER:

Depending on the level of training of primary health care workers, it may be more appropriate for the trainer to use the modules in Section VI.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 1 History

Main points:

Pesticide poisoning may mimic several other conditions. Organophosphorous poisoning particularly may at first sight simulate syndromes which are common in tropical countries.

**THE DIAGNOSIS OF PESTICIDE POISONING IS NOT EASY.
A HISTORY OF EXPOSURE IS ESSENTIAL.**

IMPORTANT POINTS TO BE ESTABLISHED ARE AS FOLLOWS:

1. HAS THE PATIENT BEEN EXPOSED TO A PESTICIDE?
2. IF SO, TO WHICH PESTICIDE, AND TO WHICH CHEMICAL GROUP DOES IT BELONG?
If a package or name of the pesticide has arrived with the patient, this information will be available through a poisons centre. The label may also include a brief indication of the line of treatment.
3. BY WHAT ROUTE HAS THE PATIENT ABSORBED THE PESTICIDE?
4. FOR HOW LONG WAS THE PATIENT EXPOSED, AND WHEN DID EXPOSURE CEASE?
Has exposure in fact ceased? Is the patient still wearing contaminated clothing, or is the stomach full?
5. WHAT WAS THE TIME BETWEEN EXPOSURE AND THE ONSET OF SYMPTOMS?

Subsidiary point:

It is important that once it has been established that a pesticide is the probable cause, time should not be lost in obtaining a detailed history. If an insecticide was being used, the chances are that the symptoms will be due to either an organophosphorous or a carbamate compound, and treatment with an initial dose of atropine should be started. This may be lifesaving, and even if the initial diagnosis turns out to be incorrect, no harm will be done to the patient by this dose. However, all the details mentioned above should be recorded on the case history sheet as soon as possible.

Suggested visual aid: Text, using words in capitals above.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 2 Organophosphorous poisoning

Main points:

As a chemical group, organophosphorous insecticides cause more serious accidental poisonings than any other group of pesticides. The signs and symptoms are related to acetylcholinesterase inhibition. The compounds may be retained in the alimentary tract or in body fat, and slowly absorbed or released. The onset of signs may be delayed, or may be recurrent during treatment.

ONSET: ½ - 24 HOURS AFTER EXPOSURE.

AT FIRST: NAUSEA, HEADACHE, FATIGUE

**THEN: HYPERSALIVATION, AND EXCESSIVE SWEATING,
VOMITING, AND ABDOMINAL
CRAMPS, DIARRHOEA,
MYOSIS AND BLURRED VISION,
MUSCULAR FASCICULATIONS,
TREMOR,
BRONCHIAL HYPERSECRETION,
CONVULSIONS AND COMA.**

PROGNOSIS: DEATH OR RECOVERY WITHIN A MONTH.

**USUALLY NO RESIDUAL DISABILITY, EXCEPT RELATED
TO ANOXIA.**

Subsidiary points:

1. The confirmatory test is erythrocyte cholinesterase activity which usually shows a 60-70% fall below the patient's pre-exposure level. **TREATMENT SHOULD NEVER BE DELAYED TO AWAIT THE RESULT OF THE TEST.** The level recovers at a rate of approximately 1% per day depending on the type of pesticide and therefore may take six weeks or more to return to normal. The patient should not be employed in contact with any cholinesterase inhibitor until the enzyme activity rises to over 70%.
2. Plasma cholinesterase activity only indicates exposure, and even a marked fall or virtual absence of activity does not itself confirm poisoning.

Other information:

For treatment, see module VII B 2. For interpretation of cholinesterase levels, see module VII B 2.

Suggested visual aid: Text, using words in capitals above.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 3 Carbamate poisoning

Main points:

Carbamate insecticides (not to be confused with thio- or dithiocarbamate pesticides) are inhibitors of cholinesterase like the organophosphorous compounds, but they are very rapid inhibitors, and the enzyme is only temporarily inactivated. Although in presentation, there are no differences (except in timing and degree) from organophosphorous poisoning, it is important that the distinction should be made as this affects treatment. The history and course of the case should provide the clue.

ONSET: SOMETIMES AT WORK - 3 HOURS.

AT FIRST: NAUSEA AND VOMITING,
HEADACHE AND DIZZINESS,
FATIGUE AND TIGHTNESS IN CHEST.

THEN: HYPERSALIVATION AND EXCESSIVE SWEATING,
BLURRED VISION,
MUSCULAR FASCICULATIONS,
TREMOR,
TACHYCARDIA OR BRADYCARDIA,
RARELY, CONVULSIONS AND COMA.

PROGNOSIS: COMPLETE RECOVERY IN 24 HOURS,
UNLESS DOSAGE HAS BEEN MASSIVE.
NO SEQUELAE OR RESIDUAL DISABILITY.

Subsidiary points:

1. If cessation of work ends exposure, recovery usually starts immediately, and no signs may be found on medical examination.
2. It is unlikely that erythrocyte cholinesterase test will show significant reduction in the enzyme activity, even if the blood is taken while symptoms are severe, unless the activity is measured instantly with an appropriate technique. Spontaneous reactivation of the enzyme activity continues even while the blood is being processed.

Other information:

For treatment, see module VII B 3.

Suggested visual aid: Text, using words in capitals above.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 4 Organochlorine poisoning

Main points:

Poisoning by organochlorine pesticides is uncommon. It may be due to massive contamination, occupationally, or to accidental or deliberate ingestion. The signs and symptoms are all related to the excitation of the central nervous system by these compounds.

ONSET: WITHIN HOURS OF EXPOSURE.

**AT FIRST: HEADACHE,
APPREHENSION,
EXCITEMENT,
DIZZINESS.**

**THEN: DISORIENTATION,
VOMITING,
MUSCLE WEAKNESS,
TREMORS,
EPILEPTIFORM CONVULSIONS.**

**PROGNOSIS: DEATH OR RECOVERY IN 1-3 DAYS.
NO SEQUELAE OR PERSISTENT DISABILITY
EXPECTED.**

Subsidiary points:

1. Laboratory tests can be carried out to confirm the diagnosis, consisting of detection of the compound at an adequate level in blood or urine. These tests take time, and cannot be carried out except in well equipped and experienced laboratories. There is no specific antidote. **TREATMENT SHOULD NEVER BE DELAYED TO AWAIT THE RESULTS OF TESTS.**
2. Detection of small amounts of organochlorine compounds in biological material is very common. It only indicates exposure at some time in life.

Other information:

For treatment, see module VII B 4.

Suggested visual aid: Text, using words in capitals above.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms.
Number: 5 Pyrethroid insecticides

Main points:

Pyrethroids have been very widely used in agriculture, public health, and household insecticidal formulations since the late 1970's. They can be absorbed by all routes, and have high toxicity if injected. However, when absorbed these compounds are very rapidly metabolized. As a result, systemic toxicity in humans has only been reported when few precautions have been taken during a spraying programme, and exposure of the whole body has been considerable and prolonged through the wearing of soaked clothing. Systemic signs in animals are non-specific, but include tremor or choreoathetosis, according to the type of the compound under test.

PYRETHROID COMPOUNDS CAN PRODUCE PARAESTHESIA ON AREAS OF EXPOSED SKIN, ESPECIALLY ON THE FOREARMS, FACE AND NECK.

This is a local effect, due to prolongation of the refractory period in nerves in the affected skin.

**THE COMPOUNDS CAUSING THIS VARY,
WITH DELTAMETHRIN BEING THE MOST LIKELY.**

**ONSET: WITHIN HOURS OF FIRST EXPOSURE.
INDIVIDUALS VARY IN THEIR SUSCEPTIBILITY,
AND NO RELATIONSHIP WITH DOSE HAS BEEN IDENTIFIED.
THERE IS NO SIGN ON THE AFFECTED SKIN.**

**PROGNOSIS: THE SYMPTOM DISAPPEARS WITHIN 24 HOURS
AFTER EXPOSURE CEASES.
NO SEQUELAE HAVE BEEN REPORTED OR ARE TO BE EXPECTED.**

Subsidiary point:

The only laboratory test is for blood or urine levels of the compound and/or its metabolite. This is a very sophisticated test and is not recommended, especially as few tests have been able to be carried out in time to give any significant results.

Other information:

For treatment, if needed, see module VII B 5.

Suggested visual aid: Text, using words in capitals above.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 6 Rodenticides

Main points:

Poisoning by rodenticides is often accidental in children and deliberate in adults. The oral route is usual, and gastric lavage is needed if the ingestion was within hours.

1. **ANTICOAGULANT RODENTICIDES:** THE SYMPTOMS AND SIGNS ARE THOSE OF OVERDOSAGE BY WARFARIN. THE PROTHROMBIN TIME IS PROLONGED.
2. **CALCIFEROL DERIVATIVES:** THESE NEW COMPOUNDS ACT BY INDUCING THE SIGNS AND SYMPTOMS OF VITAMIN D OVERDOSAGE. AS THEY HAVE BEEN INTRODUCED RELATIVELY RECENTLY, FEW HUMAN CASES HAVE BEEN STUDIED. SYMPTOMS INCLUDE ANOREXIA, NAUSEA AND VOMITING, AND ABDOMINAL PAIN. HEADACHE HAS AN UNUSUAL DISTRIBUTION, BEING OCCIPITAL AND ASSOCIATED WITH SENSITIVITY OF THE WHOLE SCALP. MENTAL CONFUSION AND LOSS OF MEMORY FOLLOW. AS MIGHT BE EXPECTED, FOCAL CALCIFICATION HAS BEEN FOUND IN ANIMALS, AND OTHER SIGNS, INCLUDING RENAL FAILURE ARE ASSOCIATED WITH THIS. DIAGNOSIS IS CONFIRMED BY BLOOD CALCIUM AND PHOSPHOROUS LEVELS.
3. **OTHER RODENTICIDES:**
ZINC PHOSPHIDE IS ASTRINGENT AND CORROSIVE. IN THE STOMACH IT REACTS WITH ACID TO FORM PHOSPHINE, RESULTING IN NAUSEA, THIRST, CHEST TIGHTNESS, FAINTNESS, AND PULMONARY OEDEMA.
FLUOROACETIC ACID AND DERIVATIVES GIVE RISE TO NONSPECIFIC BUT SEVERE SYMPTOMS. SEVERE EPILEPTIFORM CONVULSIONS ALTERNATE WITH COMA AND DEPRESSION. CARDIAC IRREGULARITIES ARE ALSO SEEN WITH VENTRICULAR FIBRILLATION AND ARREST. THERE ARE NO CONFIRMATORY TESTS AND CASES MAY GO UNDIAGNOSED.
CHLORALOSE IS OF MODERATE TOXICITY, AND LARGE DOSES ARE NEEDED FOR MAN TO BE AFFECTED. IT SLOWS THE METABOLISM AND LOWERS BODY TEMPERATURE. THERE IS NO DIAGNOSTIC TEST.

Other information: For treatment, see module VI B 6.

Suggested visual aid: Local names of compounds concerned.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs, and symptoms
Number: 7 Paraquat and diquat poisoning

Main points:

Paraquat is an unusual compound in that it is an excellent herbicide which does not have any adverse environmental effects since it is inactivated with contact with soil. Many thousands of litres have been applied without adverse effects on humans, unless exposure is repeated and careless. There is then a corrosive action on the fingernails and on the nasal mucosa causing epistaxis. Paraquat is not absorbed readily through intact skin unless contact is prolonged. However, if swallowed, the effects are catastrophic with a very high mortality. Such cases are due to accidental or deliberate ingestion.

1. **PARAQUAT:** ONSET IS IMMEDIATE WITH CORROSIVE EFFECTS ON THE MOUTH AND PHARYNX, LEADING TO ULCERATION. SEVERE CASES DIE RAPIDLY FROM PULMONARY OEDEMA AND ACUTE OLIGURIC RENAL FAILURE. LESS SEVERE CASES SHOW SIGNS OF RENAL IMPAIRMENT AND LIVER DAMAGE. ANXIETY, ATAXIA AND CONVULSIONS MAY OCCUR. EVEN IF THE PATIENT IS SHOWING SIGNS OF IMPROVEMENT AT THE END OF THE FIRST WEEK, THE SIGNS OF PULMONARY FIBROSIS MAY APPEAR, WITH GRADUALLY INCREASING DYSPNOEA AND HYPOXEMIC PULMONARY FAILURE.
2. **DIQUAT:** Diquat poisoning is less common. The remarks above concerning the use and misuse of paraquat also apply to diquat.
ONSET IS IMMEDIATE. DIQUAT ALSO HAS CORROSIVE EFFECTS ON THE MOUTH AND PHARYNX. IN SEVERE CASES, VOMITING AND DIARRHOEA FOLLOW WITHIN HOURS. LIVER FUNCTION IS DISORDERED AND PROTEINURIA IS FOUND. METABOLIC ACIDOSIS DEVELOPS WITH THROMBOCYTOPENIA AND ANURIA. DISORIENTATION AND CONVULSIONS FOLLOW, AND IN SEVERE CASES DEATH OCCURS FROM RENAL OR CARDIAC FAILURE WITHIN THE FIRST WEEK. RECOVERY IS USUALLY COMPLETE. THE DELAYED PULMONARY EFFECTS SEEN WITH PARAQUAT DO NOT OCCUR AFTER INGESTION OF DIQUAT.

Other information:

For treatment, see module VII B 7.

Suggested visual aid: List of symptoms.

Section: VII Medical treatment of pesticide poisoning
Subject: A History, signs and symptoms; treatment
Number: 8 Pentachlorophenol (PCP) and related compounds

Main points:

These compounds are irritant to the skin, mucous membranes and the respiratory tract. Chloracne sometimes occurs. Systemic poisoning may occur occupationally on prolonged and excessive exposure, or if there is a sudden massive exposure. The general public has little significant contact with these compounds, which are mainly used in timber treatment, but there have been many cases of accidental or deliberate ingestion.

**MOST SIGNS AND SYMPTOMS ARE RELATED TO THE INCREASE
IN THE METABOLIC RATE.**

**DEATH IS USUALLY DUE TO HYPERPYREXIA AND CARDIAC ARREST
WITH EARLY ONSET OF RIGOR MORTIS.**

**COMMON SYMPTOMS AND SIGNS INCLUDE: FATIGUE AND ANOREXIA,
ATAXIA, DIZZINESS, VERTIGO (PCP) AND DISORIENTATION,
HYPERPYREXIA, WITH NAUSEA AND VOMITING, DYSPNOEA, AND
TACHYCARDIA.**

**PULMONARY OEDEMA MAY OCCUR AFTER ORAL OR RESPIRATORY EXPOSURE.
FITS MAY OCCUR AT A LATE STAGE (NOT PCP).**

**THERE MAY BE SOME KIDNEY AND LIVER DAMAGE AND
SLIGHT FALLS IN T-CELLS.**

APLASTIC ANAEMIA HAS BEEN REPORTED.

TREATMENT: THERE IS NO SPECIFIC ANTIDOTE.

**TREATMENT IS SYMPTOMATIC WITH EMPHASIS ON REDUCING BODY
TEMPERATURE.**

Suggested visual aid: None indicated.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 1 General principles

Main points:

**TREATMENT OF ANY PESTICIDE POISONING DEPENDS
ON HISTORY OF EXPOSURE,
AND THE CHEMICAL CONCERNED.**

**TREATMENT MUST NEVER BE DELAYED PENDING THE RESULT OF A
LABORATORY TEST.**

**SUPPORTIVE THERAPY IS THE SAME AS FOR ANY CHEMICAL POISONING.
SPECIFIC ANTIDOTES SHOULD BE USED AS SOON AS POSSIBLE.**

THE FOLLOWING IS A SUGGESTED SEQUENCE OF TREATMENT:

- 1. CHECK VITAL SIGNS AND APPLY RESUSCITATIVE MEASURES IF REQUIRED.**
- 2. CHECK NEED TO STOP FURTHER ABSORPTION, BY REMOVAL OF WET CLOTHING, DECONTAMINATION OF SKIN, OR EMPTYING STOMACH (EXCEPT IN PARAQUAT POISONING).**
- 3. GIVE ANTIDOTE(S) IF REQUIRED.**
- 4. MONITOR PROGRESS OF PATIENT FREQUENTLY OVER FIRST HOURS, AND REGULARLY FOR DAYS, AS REQUIRED.**
- 5. KEEP FULL NOTES ON CASE PROGRESS.**

Subsidiary points:

- 1. In areas of high pesticide usage, stocks of antidotes should be readily available.**
- 2. The possibility of pesticide poisoning should be borne in mind in treating attempted suicides. In some countries, pesticides are frequently used for this purpose because of the ready availability of highly toxic formulations.**

Suggested visual aid: Text, if needed, using words in capital letters.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 2 Poisoning by organophosphorous compounds

Main points:

**THERE ARE TWO ANTIDOTES FOR ORGANOPHOSPHOROUS POISONING, AND
THEY ARE USED TOGETHER.**

**ATROPINE COUNTERACTS THE EFFECTS OF ACCUMULATED ACETYLCHOLINE,
AND SOME OXIME COMPOUNDS ARE ABLE TO REACTIVATE CHOLINESTERASE
IF IT HAS NOT BEEN IRREVERSIBLY ALTERED.**

Even before removal of nonabsorbed material, atropine should be injected intramuscularly in large doses, 2 - 4 mg for most adults, 4 - 6 mg in severe cases, and repeated in 2 mg doses at 5 - 10 minute intervals, depending on response. Aim to keep pulse over 90 and below 140, which indicates mild atropinisation. The tongue should also be monitored for dryness. Quarter or half dosage for children, depending on age.

Atropine should be slowly reduced over one or more days after symptoms disappear. If symptoms reappear, the dosage will probably need to be increased again.

**CONCURRENTLY, GIVE PRALIDOXIME INTRAMUSCULARLY OR
VERY SLOWLY INTRAVENOUSLY OR IN DRIP,
1 - 2 G FOR ADULTS OR 50 MG/KG BODY WEIGHT FOR CHILDREN,
(OR 250 MG OBIDOXIME CHLORIDE FOR ADULTS) 6-HOURLY.**

**MORPHINE AND OTHER RESPIRATORY DEPRESSANTS ARE CONTRAINDICATED.
DIAZEPAM, 5 - 10 MG INTRAVENOUSLY FOR ADULTS, IS USEFUL IN REDUCING
THE SEVERITY AND FREQUENCY OF MUSCLE FASCICULATIONS.
IN MILD CASES ORAL DIAZEPAM RELIEVES ANXIETY.**

Subsidiary points:

1. Atropine is life-saving, and hundreds of milligrams have been given to severe cases in the first 24 hours.
2. High dosage with obidoxime has been associated with liver damage.
3. Pulmonary oedema is treated in the usual way.

Suggested visual aid: Text, indicating dosage, if needed.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 3 Poisoning by carbamate compounds

Main points:

**THERE IS ONLY ONE ANTIDOTE FOR CARBAMATE POISONING
- ATROPINE.**

**REACTIVATION OF CHOLINESTERASE IS SPONTANEOUS AND RAPID.
OXIMES MUST NOT BE USED.**

**IF NEEDED, ATROPINE IS ADMINISTERED AS IN MILD CASES
OF ORGANOPHOSPHOROUS POISONING.**

THE PATIENT MUST BE MONITORED TO PREVENT OVER-ATROPINISATION.

Suggested visual aid: Text, if needed.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 4 Poisoning by organochlorine compounds

Main points:

**THERE IS NO SPECIFIC ANTIDOTE FOR ORGANOCHLORINE POISONING.
THE AIM OF TREATMENT IS TO MAINTAIN VENTILATION,
AND CONTROL HYPERACTIVITY AND CONVULSIONS.**

**IF THE COMPOUND HAS BEEN INGESTED,
GASTRIC LAVAGE IS INDICATED,
AND A SALINE NON-OILY PURGATIVE SHOULD BE GIVEN.**

**IF THE COMPOUND HAS BEEN ABSORBED THROUGH THE SKIN,
SOAP AND WATER DECONTAMINATION OF THE SKIN SHOULD BE THOROUGH.**

**TO CONTROL OR PREVENT CONVULSIONS,
BARBITURATES, PARALDEHYDE OR DIAZEPAM SHOULD BE USED.
THE DOSAGE OF DIAZEPAM IS 5 - 10 MG INTRAVENOUSLY FOR ADULTS,
0.1 MG/KG BODY WEIGHT FOR CHILDREN,
REPEATED AT 2 - 4 HOUR INTERVALS AS NECESSARY.**

IN SEVERE CASES, CURARIZATION AND INTUBATION MAY BE NEEDED.

**CONTRAINDICATED ARE OILY PURGATIVES WHICH INCREASE ALIMENTARY
ABSORPTION,
AND EPINEPHRINE WHICH MAY CAUSE VENTRICULAR FIBRILLATION
DUE TO SENSITIZATION OF THE HEART MUSCLE.**

MONITORING MUST BE CONTINUED FOR SEVERAL DAYS.

Suggested visual aid: Text, indicating dosage and contraindications.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 5 Pyrethroid insecticides

Main points:

THERE IS NO SPECIFIC ANTIDOTE.

**LOCAL PARAESTHESIA REQUIRES NO TREATMENT
OTHER THAN WASHING OF THE SKIN IN THE AREA AFFECTED
TO REMOVE ANY SKIN CONTAMINATION.**

**THE PATIENT CAN BE REASSURED
THAT THE SYMPTOM WILL HAVE DISAPPEARED BY NEXT DAY,
AND IS OF NO LONG TERM IMPORTANCE.**

Subsidiary points:

In the unlikely event that systemic symptoms may be suspected after massive exposure, treatment is only supportive while awaiting the metabolism of the absorbed compound. Anxiety and muscle weakness should pass off rapidly.

Suggested visual aid : Text, if needed.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 6 Poisoning by rodenticides

Main points:

1. ANTICOAGULANT RODENTICIDES:

VITAMIN K₁ (PHYTOMENADIONE) IS A SPECIFIC ANTIDOTE. A DOSE OF 5 - 10 MG IN 5% DEXTROSE SHOULD BE GIVEN INTRAVENOUSLY THREE TIMES ON THE FIRST DAY, IRRESPECTIVE OF SYMPTOMS. IN SEVERE CASES, FRESH BLOOD SHOULD ALSO BE GIVEN, EVEN IN A DOSE OF 50 ML. TREATMENT WITH VITAMIN K₁ MUST BE CONTINUED UNTIL THE PROTHROMBIN TIME BECOMES NORMAL. COUMARIN DERIVATIVES ARE SUSCEPTIBLE TO INTERACTION WITH OTHER DRUGS.

2. CALCIFEROL DERIVATIVES:

CALCITONIN HAS BEEN USED WITH GOOD RESULTS. STEROIDS HAVE ALSO BEEN FOUND TO BE EFFECTIVE BUT SLOWER IN ACTION. CHELATING AGENTS ARE INEFFECTIVE.

3. OTHER RODENTICIDES: THERE ARE NO SPECIFIC ANTIDOTES FOR ZINC PHOSPHIDE, THE FLUOROACETIC ACID DERIVATIVES, AND CHLORALOSE. TREATMENT IS SYMPTOMATIC

Subsidiary points:

1. Normally, recovery from rodenticide poisoning will be complete. However, the corrosive action of zinc phosphide can give rise to sequelae in those who survive ingestion of this highly toxic rodenticide.
2. If coumarin derivatives (second generation warfarins) have been ingested, large doses of vitamin K₁ may be needed for an extended period.

Suggested visual aid: Text with dosages.

Section: VII Medical treatment of pesticide poisoning
Subject: B Treatment
Number: 7 Paraquat and diquat poisoning

Main points:

Similar treatment is given for both compounds.

THERE ARE NO SPECIFIC ANTIDOTES.

**TREATMENT IS AIMED AT REDUCING ABSORPTION IN THE GUT,
AND ON REMOVAL OF ADSORBED COMPOUND.**

GASTRIC LAVAGE IS CONTRAINDICATED.

**AS SOON AS POSSIBLE, GIVE 300 GRAMS OF FULLERS EARTH
OR 70 GRAMS OF BENTONITE IN 1 LITRE OF WATER.**

ACTIVATED CARBON SHOULD ALSO BE GIVEN IF AVAILABLE.

**A CATHARTIC AGENT SUCH AS MAGNESIUM SULPHATE
SHOULD ALSO BE GIVEN**

TO AVOID INTESTINAL OBSTRUCTION BY THE ADSORBENT.

TREATMENT OF ABSORBED COMPOUND IS SYMPTOMATIC.

DIALYSIS HAS BEEN TRIED BUT HAS USUALLY BEEN INEFFECTIVE.

AFTER PARAQUAT HAS BEEN INGESTED,

OXYGEN IS CONTRAINDICATED IN ACUTE POISONING

SINCE PARAQUAT IS MORE TOXIC IN THE OXYGENATED LUNG.

Subsidiary point:

The recovery rate from paraquat poisoning has been 32% to 65% in large series. Recovery is usually complete, but once the delayed pulmonary effects have been established, the prognosis is very poor.

Suggested visual aid: Text showing dosages and contraindications.