

Pesticide Poisoning

Goal

This publication provides information on the symptoms of pesticide exposure and emergency first-aid treatment. It is not a substitute for medical intervention.

Objectives

The objectives of this program are to provide workers exposed to pesticides with basic information on routes of intoxication, symptoms of poisoning by three classes of pesticides, basic decontamination procedures, and basic first-aid procedures.

General

Pesticides are a diverse group of substances with a potential for varied toxic effects. For example, parathion is lethal to humans in doses of 0.004 ounce, or about five drops, but it takes about half an ounce of piperonyl butoxide to cause acute symptoms of poisoning when ingested. With many pesticides, the possibility of skin exposure with subsequent absorption may present almost as great a danger to the worker as inhalation. Remember that skin exposure and inhalation can occur concurrently.

Inhalation

The inhalation of pesticide dusts, vapors, mists, and gases may represent a significant occupational hazard. Dust hazards may involve the loading, mixing, and application of insecticides in powder or granular form. The finer the dust, the greater the potential problem. Medical research has shown that about 25 percent of inhaled material is exhaled, about 50 percent is deposited in the upper respiratory passages and subsequently swallowed, and 25 percent is deposited in the lower respiratory passages of the lungs.

Dermal Exposure

Dermal exposure presents almost as great a potential for absorption as inhalation. The absorption rate through the skin is determined by the nature of the pesticide, condition of the exposed skin, and external factors such as temperature, duration of exposure, and the area exposed (see Figure 1). Rapid absorption occurs in pesticides that are soluble both in water and in oils. The rate of absorption can be significantly high if the skin is irritated or dry or chapped from excessive washing with solvents. Other factors that may increase absorption are sweating and increased blood circulation.

Ingestion (Swallowing) Exposure

Accidental ingestion of chemicals can occur in several ways. Ingestion may occur through accidental splashing of chemicals in the face and mouth, eating contaminated food, using contaminated smoking materials, or by rubbing the face with contaminated hands or gloves. Personal hygiene is important when working with pesticides. The degree of hazard from ingesting pesticides is related to the toxicity of the materials, their solubility, and the specific portion of the gastrointestinal tract involved.

Ocular (Eye) Exposure

Ocular exposure is usually the result of accidental splashing or spilling a pesticide while not wearing eye protection. Acute local effects may be produced in associated eye structures such as burns to the eyelid and conjunctiva. It should be noted that sufficient material may be absorbed through the eyes to produce acute blood system effects.

Pesticide Families and Symptoms

Organo Phosphates

These pesticides are cholinesterase inhibitors (nerve poisons) and range in toxicity from mild to acutely toxic. For the most part, these pesticides break down rapidly in the environment. This family of pesticides includes: Chlorpyrifos (Dursban), diazinon, dichlorvos (DDVP), dimethoate (Cygon), fenthion (Baytex, Entox), rabon (Gardona), malathion, methyl parathion, naled (Dibrom), ronnel (Korian), and triehlonfon (Dipterex).

Symptoms may include

mild exposure - headaches, dizziness, weakness, anxiety, nervousness, impaired vision

moderate exposure - nausea, salivation (slobbering), watering eyes, abdominal cramps, vomiting, sweating, slow pulse, muscular tremors

severe exposure - diarrhea, constricted and nonreactive pupils, vision or respiratory difficulties, cyanosis (bluish color to face and hands), loss of bowel and bladder control, convulsions, coma and death.

Carbamates

These pesticides also are cholinesterase inhibitors (nerve poisons) and range in toxicity from low to mild toxicity. This pesticide family includes carbaryl (Sevin), dimetilan, landrin,

carbofuran, propoxur (Baygon), and methiocarb (Bay 37344).

Symptoms may include

mild exposure - constricted pupils, salivation (slobbering), profuse sweating

moderate exposure - fatigue, uncoordinated muscles, nausea, vomiting

severe exposure - diarrhea, stomach pain, tightness in the chest.

Chlorinated Hydrocarbons

Many of these pesticides are now banned for use in the United States. However, some of these insecticides are still used in other countries and are illegally brought into the United States. In general, these insecticides affect the central nervous system and, depending on the compound, can depress or stimulate the central nervous system. This pesticide family includes Aldrin, BHC, Chlordane, DDT, Dieldrin, Heptachlor, Lindane, Mirex, and Toxaphene.

Symptoms may include

mild exposure - nausea, vomiting

moderate exposure - restlessness, tremors (shakes), apprehension (fear), convulsions

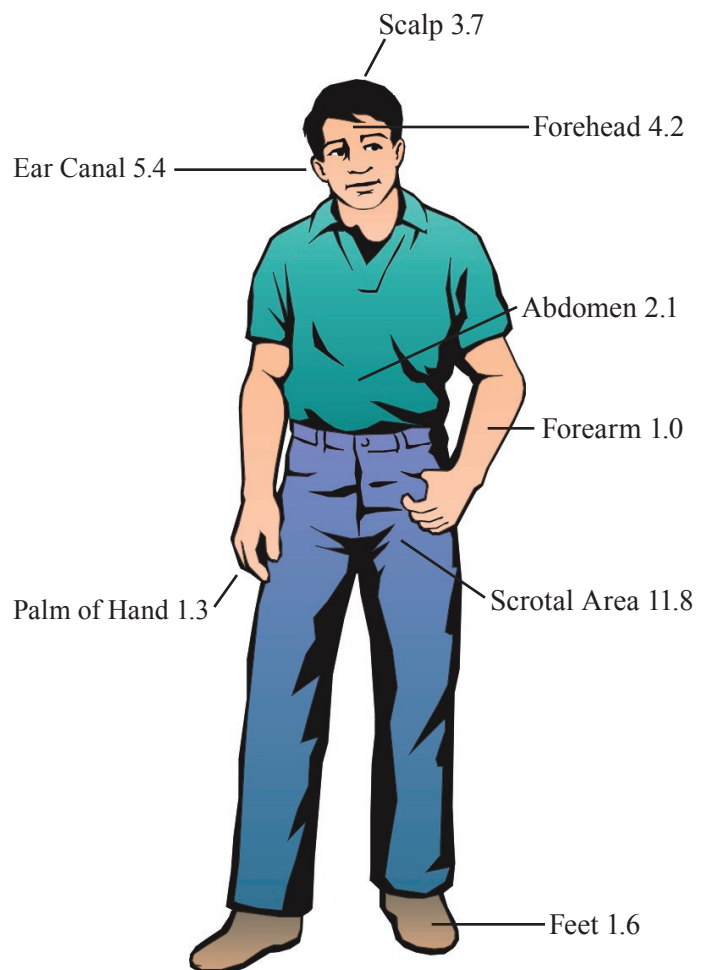
severe exposure - coma, respiratory failure, death.

General First Aid for Pesticide Poisoning

- Keep airway clear; provide artificial respiration if necessary; use oxygen if available to support breathing. Death from pesticide poisoning is usually due to respiratory failure.
- Decontaminate the victim as indicated by the material safety data sheet (MSDS) or label. Remove all contaminated clothing, wash skin, hair, hands, and face with soap and water. If eyes are involved, flush eyes with clean water for a minimum of 15 minutes or until medical help arrives.
- It is generally recommended that if poison was ingested, and the person is not vomiting and is fully conscious, give the person water with 5 percent sodium bicarbonate (baking soda).
- Consult the insecticide label or MSDS for active ingredients and specific first-aid treatment.
- If a mixture of organo phosphates and chlorinated hydrocarbons are involved (DDVP and Mirex), first give specific treatment for organo phosphates. Then give the indicated support therapy and decontamination procedures, as indicated by the label or material safety data sheet.
- Protect medical personnel from contamination. Call 911 or the local emergency medical service as soon as possible.

- Transport the victim to a medical facility as soon as possible.
- If a person has been exposed to a pesticide, begin first-aid treatment and decontamination procedures, then transport the victim to a medical facility.

Fig. 1.



Absorption rates for various parts of the body, compared to forearm which is 1.0 based on (Mg/CM²).

Review Questions

1. Approximately how many pesticide compounds are registered with the EPA?
2. What factors affect the rate of absorption of a pesticide through the skin?
3. Why is personal hygiene important when working with pesticides?
4. Can poisoning occur from a pesticide splashed in the eyes?

5. Death from pesticide poisoning is due to failure of what system of the body?

Answers

1. 1,500
 2. Nature of the pesticide, condition of the exposed skin, and external factors such as temperature, duration of exposure, and the area exposed.
 3. Ingestion may occur through accidental splashing of chemicals in the face and mouth, eating contaminated food, using contaminated smoking materials, or by rubbing the face with contaminated hands or gloves.
 4. Yes
 5. Death from pesticide poisoning is usually due to respira-
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