

Pesticide Toxicity

Toxicity = the ability of a substance to cause injury to a living system.

Most important factors: Quantity of substance & frequency of exposure

Acute vs. Chronic Toxicity

- **Acute Toxicity** – how poisonous a pesticide is to a organism after a single, short-term exposure. Effects appear within 24 hours of exposure.
 - Used as basis for warning statement on label
- **Chronic Toxicity** – delayed poisonous effect after 3+ months of continuous or occasional exposure
 - Repeated exposure to pesticides in food, water & air.

RISK = TOXICITY x EXPOSURE

- Limit the possibility of poisoning by preventing and/or limiting exposure
- Exposure = amount and route of exposure

Routes of Entry

- **Dermal** – pesticide absorbed through skin – **most common route for poisonings**
 - Gets on skin during mixing/loading, or when pesticide-contaminated clothing is not removed promptly
 - Eyes, eardrums, scalp and groin absorb more rapidly than rest of body
- **Inhalation** – Breathe in particles – 2nd most common route
 - Dry formulations, fumigants greatest risk
- **Oral** – ingestion
 - Major absorption site = small intestine
 - Hands not washed before eating/smoking; pesticides stored in food containers

Personal Protective Equipment

- Requirements are based on the route of entry, toxicity and formulation of the pesticide.
 - Long-sleeved shirt, long pants or coveralls - tightly woven fabric or waterproof material
 - Rubber gloves – unlined/elbow length. Shirt sleeves worn over gloves
 - Waterproof boots – pant legs over boots
 - Eye Protection – safety glasses/goggles or face shield
 - Dust mask or cartridge respirator

Measuring Acute Toxicity

- **Lethal Dose Fifty** (LD₅₀)
 - Amount of pesticide that has killed 50% of the test animal population via dermal or oral exposure.
 - Measured in # milligrams per kilogram of the animal's body weight = ppm.
 - Low LD₅₀ – high toxicity
- **Lethal Concentration Fifty** (LC₅₀)
 - Based on inhalation exposure
 - Measured in mg/L

Label Signal Words

- Based on Oral or Dermal LD₅₀ values in mg/kg (ppm)
 - **Danger** = Highly toxic - 0 to 50
 - **Warning** = Moderately toxic - 50 to 500
 - **Caution** = Slightly toxic - 500 to 5,000
- Based on Inhalation LC₅₀ values in mg/L
 - **Danger** - 0 to 0.2
 - **Warning** - 0.2 to 2.0
 - **Caution** - 2.0 to 20

Pesticide Poisoning Symptoms

- Similar to heat exhaustion, food poisoning, asthma
- **Acute poisoning** – single exposure
 - Symptoms may be immediate or delayed
- **Chronic poisoning** – repeated, small, non-lethal doses over time
 - Specific symptoms or general decline in health

General Symptoms

- Each chemical family attacks the body in different ways (Refer to manual)
- **General symptoms:**
 - **Mild** – headache, fatigue, dizziness
 - **Moderate** – nausea, diarrhea, excessive salivation, stomach cramps
 - **Severe** – fever, intense thirst, rapid breathing, vomiting, pinpoint pupils, unconsciousness

First Aid for Pesticide Poisonings

- In all poisoning emergencies – Call ambulance or doctor **FIRST!**
- Only exception – when you are alone with the victim.
 - You must ensure that victim is breathing and that he/she is no longer exposed before leaving to make phone call.

First Aid

- **Skin Exposure**
 - Wash all exposed skin thoroughly
 - Remove clothing if contaminated
 - If chemical burn results – do not use ointments, greases, etc. Cover loosely with soft cloth
- **If in Eyes**
 - Wash with 5+ gallons of clean running water

First Aid

- **Inhalation Exposure**
 - Remove victim from exposure ASAP
 - If victim is in enclosed area – use respirator! **Do not become a victim yourself**
 - Administer artificial respiration if not breathing
 - If convulsing – keep airway clear
 - Keep victim warm



First Aid

■ Oral Exposure

- If you don't know what pesticide the victim swallowed – NEVER INDUCE VOMITTING! Dilute with water.
- Don't induce vomiting if the victim is unconscious or has swallowed corrosive pesticides (strong acid or alkali) or liquid formulations containing petroleum distillates.
- Induce vomiting if the label says to do so.



Antidotes for Pesticide Poisoning

- Always bring label to hospital / doctor
- Organophosphates and Carbamates
 - Both work by inhibiting cholinesterase
 - Antidote = atropine sulfate
- Chlorinated hydrocarbons
 - Barbiturates for convulsions; calcium gluconate IV
- Chlorophenoxy herbicides (2,4-D, 2,4,5 -T)
 - No antidote; maintain life support