



# *Pesticide Exposure & Risk*

*Chapter 5 (pg. 43)*

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- ★ **Risk**: pesticide's potential to cause harm
  - How toxic is it
  - How long were you exposed to it
- ★ **Toxicity**: pesticide's ability to cause harm
  - ai, concentration, formulation
  - You can't change a pesticide's toxicity
  - You can choose a product based on it's level of toxicity



# *Exposure*

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- ★ When we get pesticide in or on your body
- ★ Acute exposure: single dose of a pesticide
- ★ Chronic exposure: exposed over a long period
- ★ Exposure contributes to risk
- ★ How much pesticide you are exposed to = Dose
- ★ How many times exposure occurs
- ★ Dose-time relationship





# *The Risk Equation*

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★ **Risk = Toxicity x Exposure**

★ Regardless of how toxic a pesticide is, your risk will be zero if you are not exposed.

★ Least toxic pesticide is not the safest if you are frequently exposed, ie. aspirin.

★ Risk is influenced by weight, age, gender, health conditions, environment





# *What are the four routes of entry of a pesticide?*



★ **Dermal**: Absorption through the skin  
– no gloves, not washing hands



★ **Eye**: Through the eyes  
– splashing



★ **Oral**: Ingestion through the mouth  
– splashing, not washing hands

★ **Inhalation**: Taking in through breathing  
– dusts/powders, drift



*What is the most common route of entry in pesticide poisoning?*

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★ **Dermal is the most common 97%**

★ Oil based > water based > dry materials

★ The scalp, forehead, ear drums, and groin area absorb pesticides quicker.

★ Cuts and abrasions

★ Hot, sweaty skin absorbs faster





## *Exposure to Non-Applicators*

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- ★ Contact treated surfaces
- ★ Inhale vapors in pesticide storage area
- ★ Pesticides on produce at harvest





# *Toxicity of Pesticides*

*Chapter 6 (pg. 49)*

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★ Measure of a pesticide's ability to cause harm



★ Pesticide poisoning – makes you ill

★ Pesticide injury – burning sensation

★ Allergic effects – itchy eyes, skin reaction





# *Harmful Effects of Pesticides*

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- ★ **Contact effects:** appear right where pesticide exposure occurred on the body.
  - Most common form of pesticide injury
  - Itching, redness, rashes, blisters, burns
- ★ **Systemic effects:** arise at sites other than where the pesticide entered the body.
  - Vomiting, cramps, excessive sweating, difficulty breathing





## *Harmful Effects - Timing*

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- ★ **Acute effects:** occur within 24 hours
- ★ **Delayed effects:** more than 1 day later
- ★ **Chronic effects:** arise following chronic exposure.
  - Cancer, tumors, nervous disorders, birth defects, infertility





## *Harmful Effects*

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- ★ **Reversible effects:** not permanent, can be changed or remedied.
  - *Skin rash, nausea, dizziness, liver injury*
- ★ **Irreversible effects:** permanent, cannot be changed once they have occurred.
  - *Cancer, birth defects, mutations*





# *Measuring Toxicity*

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- ★ **Acute toxicity:** ability to cause harm within 24 hours after a single exposure.
- ★ **Chronic toxicity:** ability to cause harm after repeated exposure to small doses over time.



# *How do we measure Toxicity*

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- ★ LD50 and LC50
- ★ Animal studies extrapolated to humans.
- ★ Lethal dose resulting in the death of 50% of the test population (oral & dermal).
- ★ Lethal concentration of a substance in air or water required to kill 50% of the test population.





## *Toxicity Categories & Signal Words*

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★ Category I - Highly toxic

**DANGER!** (POISON! + Skull & Crossbones)\*



★ Category II - Moderately toxic

**WARNING!**



★ Category III – Slightly toxic

**CAUTION!**

★ Category IV – Relatively non-toxic

**CAUTION!** (No signal word is required)



# *Measuring Chronic Toxicity*

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★ Subjecting test animals to long term exposure to a pesticide



★ 2 years



★ More difficult to determine than acute



## *Protecting Yourself– Chapter 7*

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- ★ Never eat, drink, chew gum or use tobacco products while working with pesticides.
- ★ Wash hands before you go to the bathroom
- ★ Follow label directions on PPE.
- ★ Do not wipe your gloves on your clothes.
- ★ Wash your clothes and shower at the end of each work day.
- ★ Use common sense!!!



# *Cholinesterase Testing*

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- ★ OP and Carbamate insecticides
- ★ Cholinesterase levels vary by individual
- ★ Baseline testing recommended
- ★ Periodically retest to monitor levels







# *Role of Personal Protective Equipment (PPE)*

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- ★ Clothing and devices you wear to protect your body from exposure to pesticides
  - Keep pesticides away from your body
  - Resistant to punctures and tears
  - Well sealed at the seams
  - Comfortable without restricting movement





## *Varying Levels of Protection*

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- ★ Dependent on type and thickness
- ★ Chemical resistant vs. Waterproof



- ★ Cotton, leather and canvas

- ★ Do not use hat with cloth headband.



- ★ Do not use cloth lined gloves, boots or aprons.



## *PPE Breakdown*

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- ★ Penetration: pesticide leaks through seams, pinholes, tears, or imperfections
- ★ Permeation: pesticide seeps through PPE
- ★ Degradation: Physical breakdown of PPE material





## *PPE on the Label*

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- ★ Label will list the minimum PPE
  - ★ Listed in the “Precautionary Statements” or “Agricultural Use Requirements”
  - ★ PPE selection chart: PPE code letter (pg.61)
    - Select high resistant materials





# *Work Clothes*

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★ Long sleeved shirt

★ Long pants



★ Shoes and socks

★ Free of holes and tears

★ Tighter the weave, the better protection



★ Coveralls and aprons



## *PPE - Gloves*

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- ★ The most exposure from pesticides occurs on the hands (85%) and forearms (13%).
- ★ Most product labels require the use of waterproof or chemical resistant gloves during pesticide handling.





## *PPE – Gloves*

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- ★ Unlined elbow length chemical resistant gloves
- ★ Never use leather or cotton\* Why?
- ★ Arms lowered: sleeves outside of gloves
- ★ Arms raised: gloves outside sleeves, cuffed
- ★ Always clean gloves **before** removing them and wash hands thoroughly
- ★ Replace periodically





## *PPE - Footwear*

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- ★ Sturdy shoes and socks
- ★ No canvas or leather
- ★ “chemical resistant footwear”
  - Shoes, boots, coverings
- ★ Pant legs should be outside footwear







## *PPE - Headgear*

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- ★ Overhead exposure
- ★ Baseball caps are unacceptable
- ★ “chemical resistant headgear”
  - Wide brim hat
  - Chemical-resistant hood





## *PPE - Eyewear*

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- ★ Specified by the label
  - Goggles
  - Face shield
  - Full-face respirator
  - Shielded safety glasses
- ★ If the label requires goggles, must have immediate access to an eyewash





# *Respirators*

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- ★ Mixing & filling highly toxic pesticides
- ★ Label will tell you if it is required and which type (TC code)
- ★ Air supplying respirators – O<sub>2</sub> supply
- ★ Air purifying respirators
  - Filter - dust/mist/powders/particles
  - Remove gases/vapors- cartridge/canister



# *Correct use of Respirators*

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★ Tight enough to form a seal around face

★ Fit Test – select the right size

★ Exposed to odorant, irritant, taste agent

★ Seal Check – complete seal

★ Positive & Negative Pressure Checks





# *Replacing Filters or Respirators*

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- ★ Respirator that filters dusts/mists
  - Change when it gets hard to breathe
  - Gets torn, damaged or wet
  - If oil is present – 8 hours
- ★ Respirator that removes vapors/gases
  - Change if you taste or smell pesticide
  - Pesticide burn/stings your nose or throat
  - No instructions - replace after 8 hours





## *Maintaining PPE*

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- ★ Wash all PPE before removing them!
- ★ Disposables: worn once and thrown away
  - Gloves, non-woven garments, dust masks
- ★ Reusables: cleaned and reused
  - Protective eyewear, respirators, boots
  - Wash inside and out, dry
  - Store in a clean area protected from sunlight, moisture, heat, and pesticides





# *Laundering Work Clothes*

## *Separate from Family Laundry*

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- ★ Air out garments before washing
- ★ Wash only a few items at a time
- ★ Use HOT water at highest capacity (XL)
- ★ Pre-rinse items by using prewash cycle
- ★ Use a heavy-duty liquid detergent
- ★ Run on longest wash cycle
- ★ Line dry for 24 hours
- ★ Clean washer: run complete empty cycle w/  
detergent



*Any Questions????*



Completion of Chapters 5-7

