

Regulating and Responding to Pesticide Use and Safety Issues

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Pesticides

Very special chemicals!

Preserve safe uses!

You make a difference—
know your stuff!

We live in a chemical world!

More than 31,000,000 known

- Origin

Natural and Synthetic

- Class

Organic and Inorganic

- Use

Process •• ***Commercial Products*** •• Pollutants

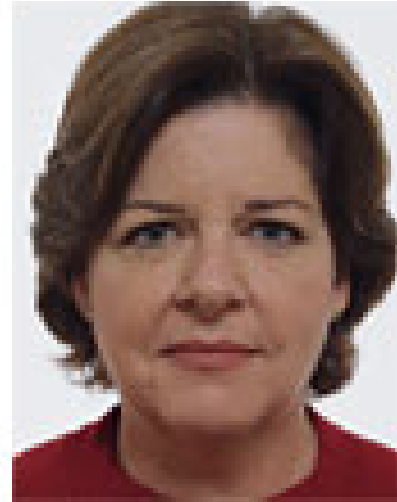
Foods • Drugs • Cosmetics • Pesticides

Pesticide

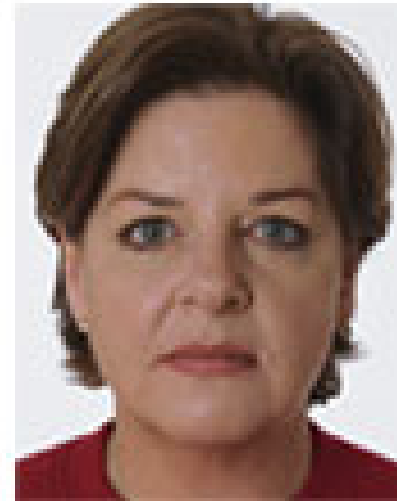
Pesticide. Any substance which alone, in chemical combination, or in any formulation with one or more substances is defined as a pesticide in section 2(u) of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136(u) et seq).

BOTOX: *Botulinus* toxin

Before



After



How much is too much? *How little is OK?*

Exposure

- Dose makes the poison.
- All-or-none.

Response

- Safe levels of everything.
- Any change spells harm.

Safety Evaluation

- Aware testing limitations
- Testing irrelevant.

Pesticide Perceptions in our Chemical World

Toxicology

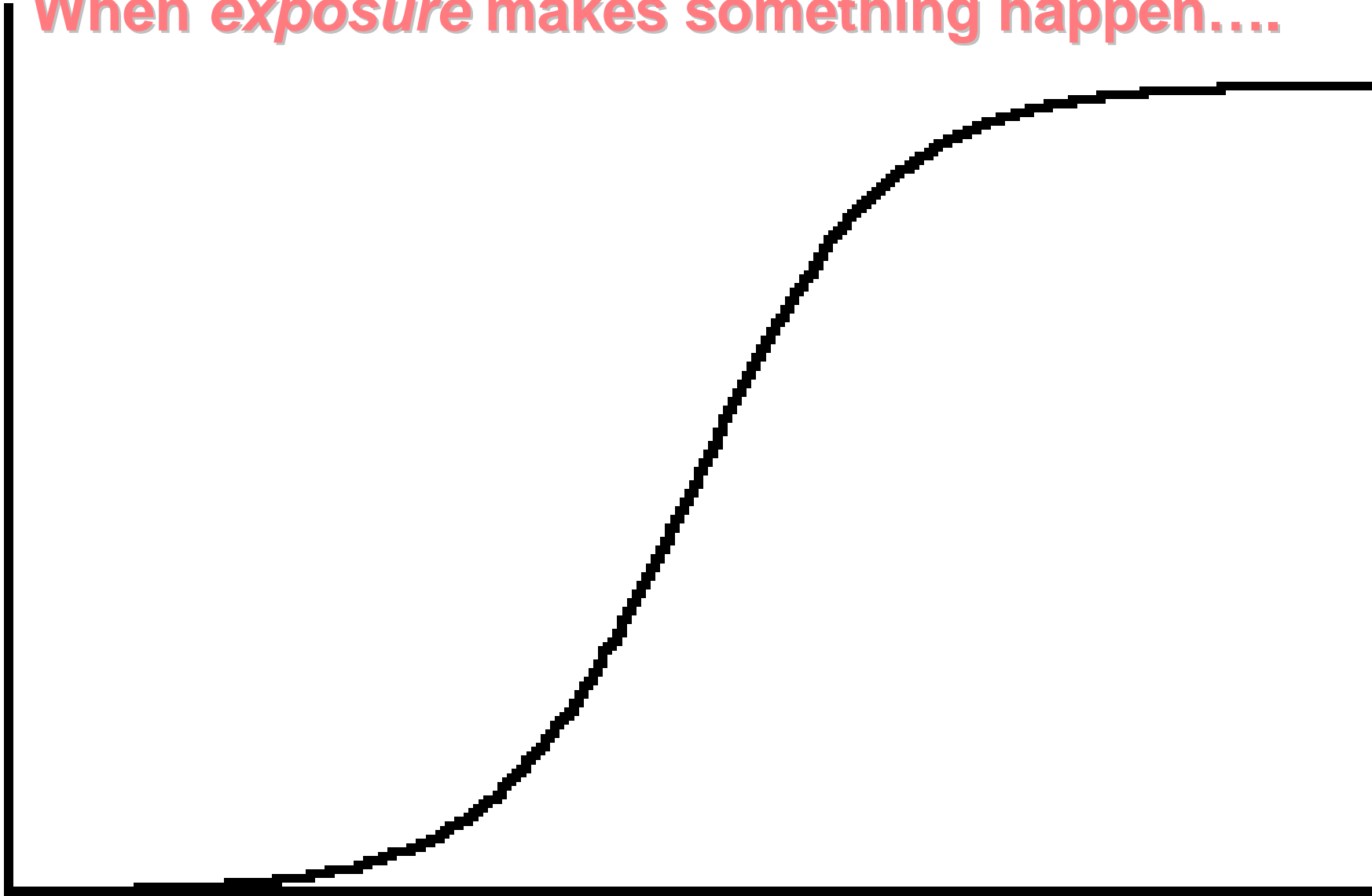
Scientific study of adverse effects of chemicals

- **Effects** are determined by dose
- Principle codified by a physician, alchemist, philosopher: Paracelsus, 1450
- *If dose determines a poison, there must be a safe level of everything!*

When exposure makes something happen....

Response

$\log[\text{Dose}]$



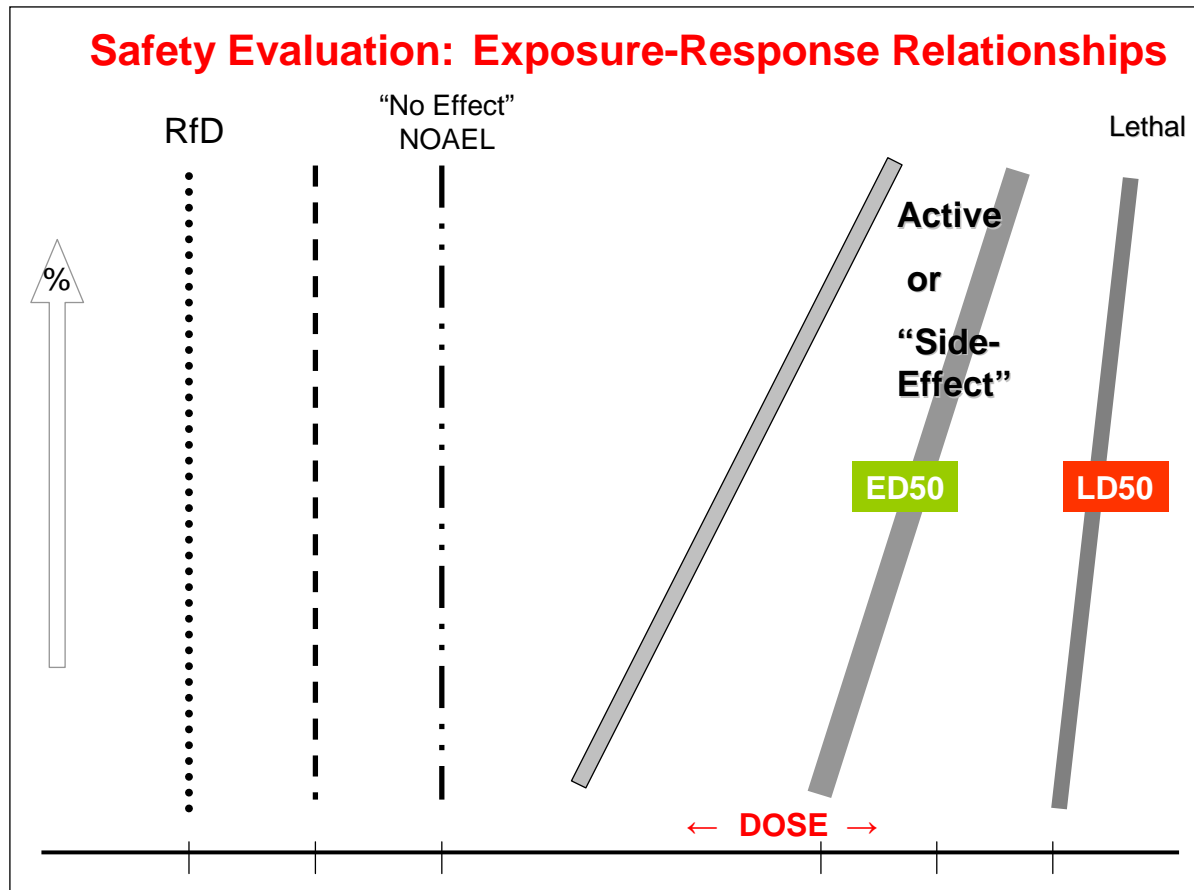
“When it comes to chemicals-Is the issue really dose?”

1. Toxicologist: Dose determines a poison. 1450 Paracelsus
There is a safe level of everything.

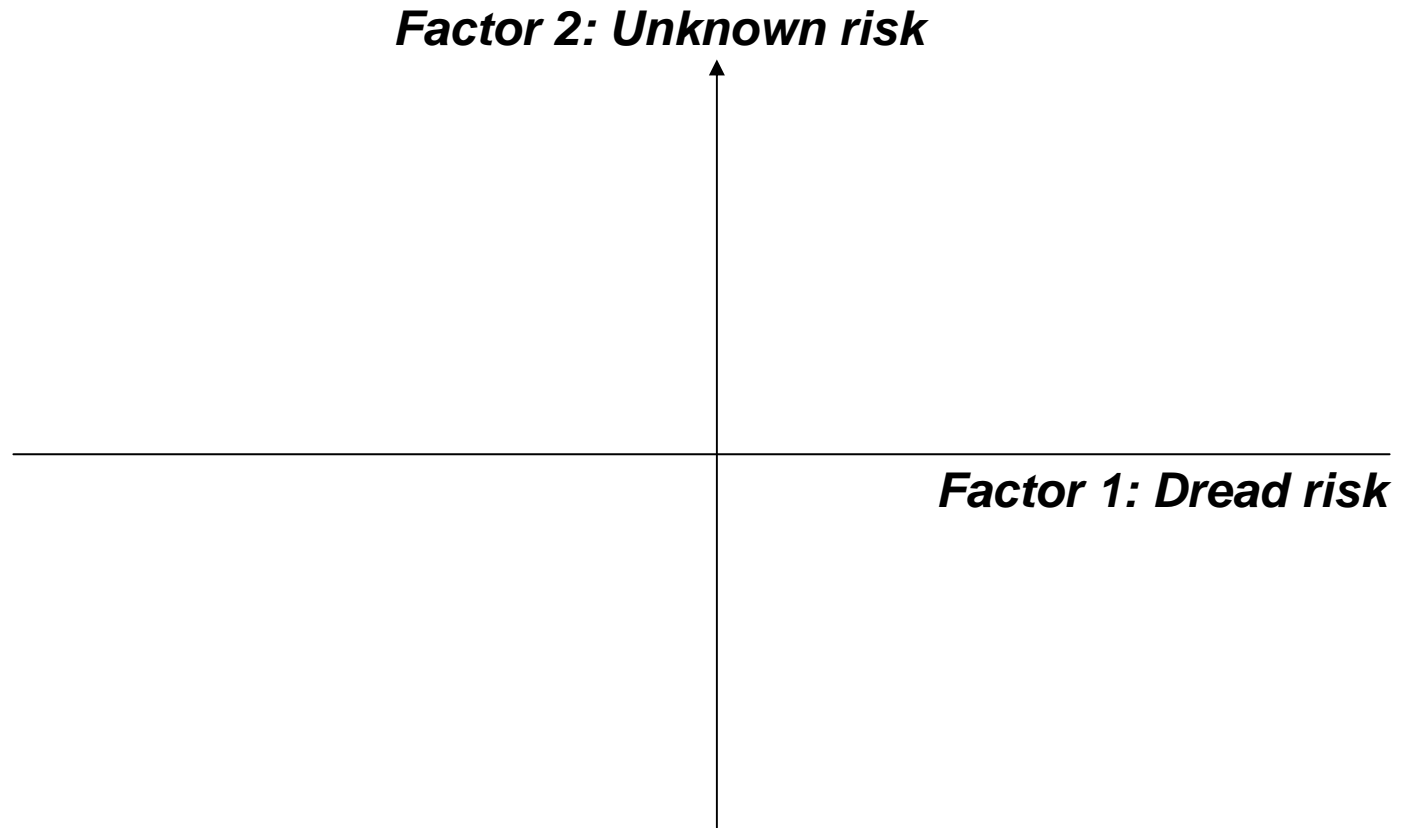
2. Chemicals of concern: Natural and synthetic substances

3. Occurrence (use, technology): Food Drugs Pesticides Others

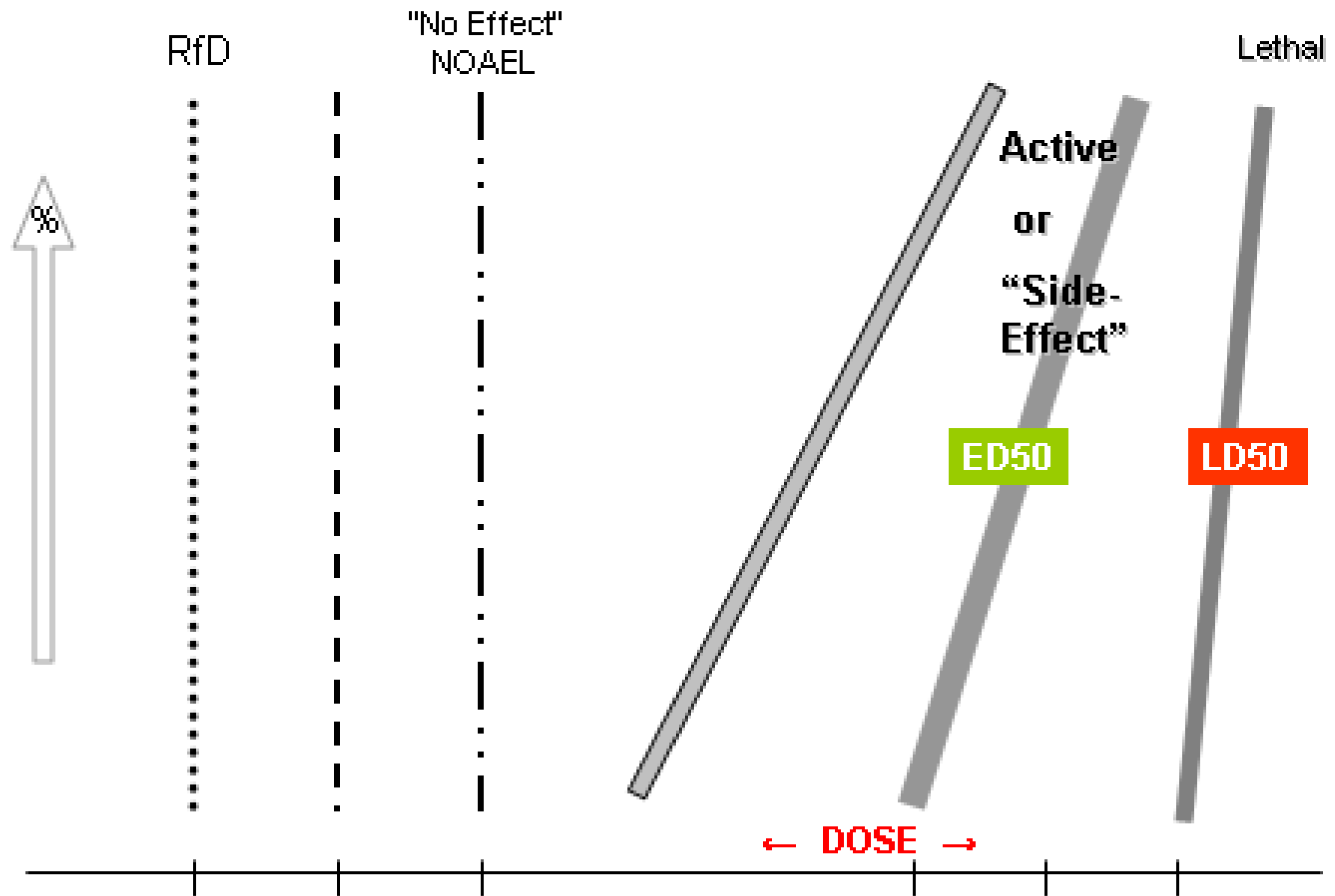
4. Common denominators in toxicology and safety evaluation



5. Facts and Fears: Understanding perceived risk (Slovic et al 1980)



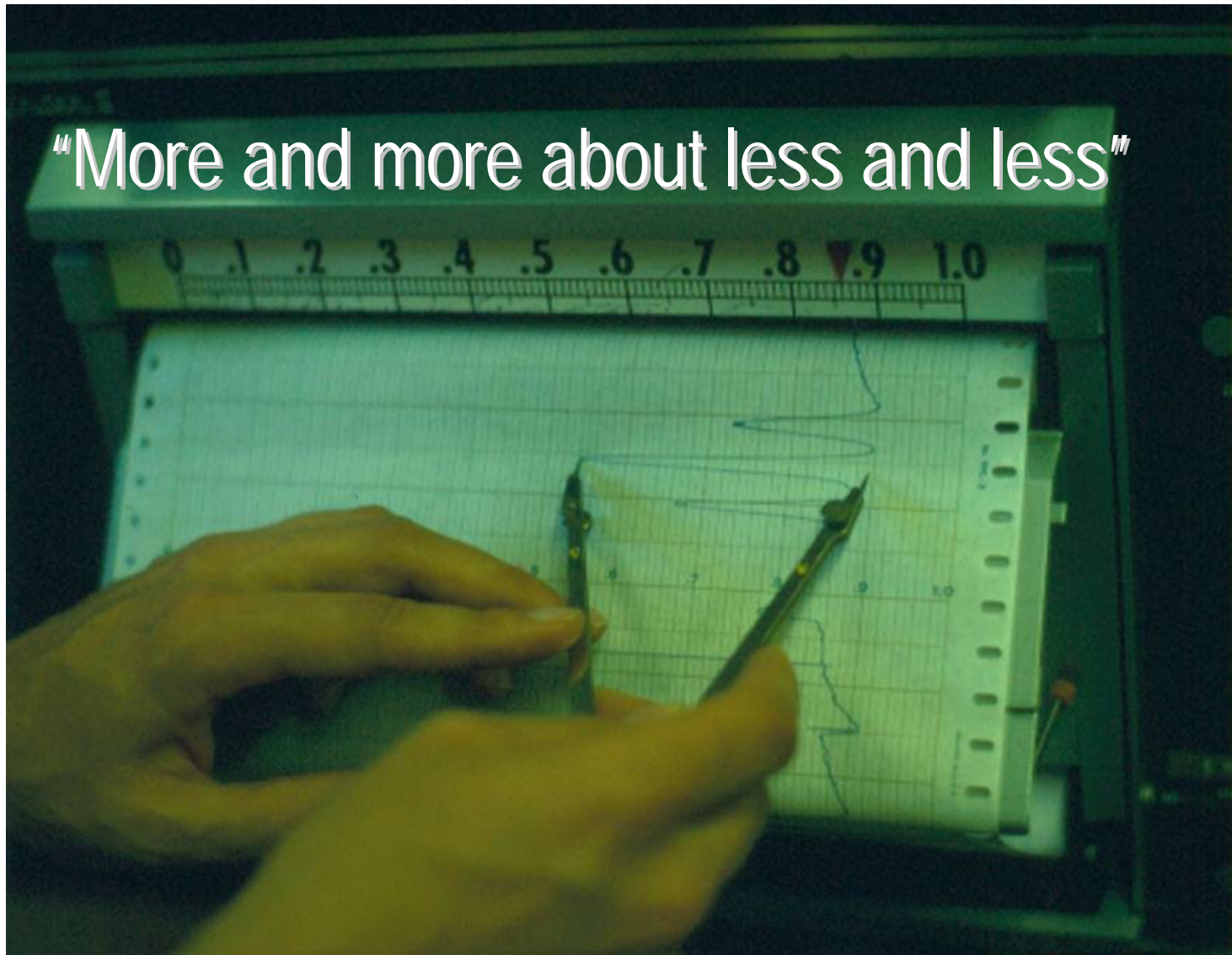
Safety Evaluation: Exposure-Response Relationships



Regulation: How much is too much? How little is OK?

- LD50
 - ED50
 - Threshold or Low Observed Adverse Effect Level
 - No Observed Adverse Effect Level
 - » No Observed Effect Level
 - Uncertainty factors
 - Species 1/10
 - Intraspecies 1/10
 - Special (children) 1/10
- *Reference Dose* (mg/kg-day)

"More and more about less and less"



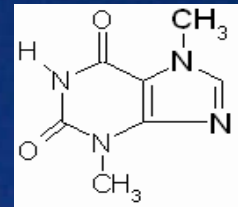
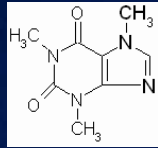
Chocolate can contribute significant portions of dietary antioxidants...Waterhouse, UCD 1996

Slow plaque buildup due to oxidation of Low-Density Lipoproteins (LDL)

1.5 oz milk chocolate = 5 oz red wine

380


organic chemicals



Theobromine lethality in dogs: 250-500 mg/kg

Chocolate organics mimic cannabanoids at receptor (THC); *chocolate high*!

Est. dose 25# chocolate/130# adult!

A photograph of a man with dark hair and glasses, wearing a dark shirt, holding a red and yellow Washington apple in his right hand. He is looking slightly upwards and to the right. The background is a dark, textured surface with diagonal lines.

Chensheng Lu, holding a Washington apple, studied the pesticide levels in Mercer Island children. The children ate a variety of conventional produce from area groceries and then switched to organic.

Harmful pesticides found in everyday food products

Mercer Island children tested in yearlong study

What about the pesticide exposure that the consumer wants to avoid...

Residue to Dose

- Residue level, ppm
- Amount eaten, g
- 50 g strawberries
- 1 ppm insecticide
- $50 \text{ g} \times 1 \text{ ug/g} = 50 \text{ ug}$

- Dosage is amount per body weight
- 50 ug/100 kg or 0.5 ug/kg

If 2 tablets acetaminophen

- 6,500 ug/kg

Pesticide residues are tiny!

But this is about residues!

- Residue, 1 ppm
- No Effect Level
5 mg/kg

• *How much at one meal?*
 $[5 \text{ mg/kg}] / [0.5 \text{ ug/kg}] =$
10,000 servings!

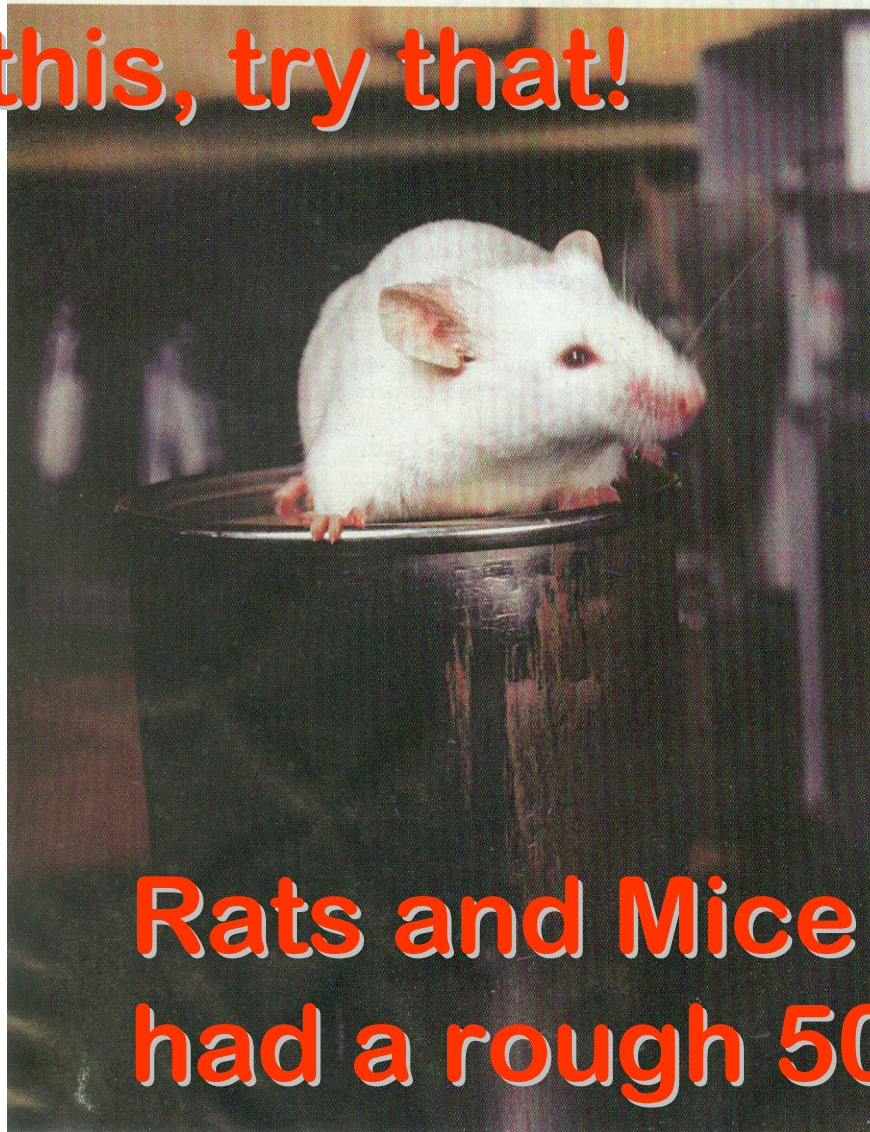
- More than 100 full 8 pound trays to get to “No Effect” Level

But don't worry....

*Vitamin C abdominal
pain & diarrhea*

*Will protect you from the
NOAEL pesticide!*

Take this, try that!



**Rats and Mice have
had a rough 50 years!**

Advocacy further declares...

"There is a growing consensus in the scientific community that small doses of pesticides and other chemicals can adversely affect people."

Risk_{None/Big numbers!} ? Just a minute...

Chemicals, including pesticides, are not associated with risk unless they cause a harmful response in a vulnerable group of exposed people.

1. Chemical

2. Exposure

3. *Harm*

Your Experience and Public and Regulatory Perceptions of Pesticide Safety and Risk, 2008

Simply don't match!

Regain public confidence in pest
control by responsibly reversing
fallacies! *Safe use practices!*

Bob Krieger
PCEP, UCR 2008