Chapter 17
Chemical Hazards

Types of chemicals

- **Carcinogens** - cause cancer; may be lag; arsenic, benzene, formaldehyde, radiation, PCBs, vinyl chloride

- **Mutagens** - cause changes in DNA

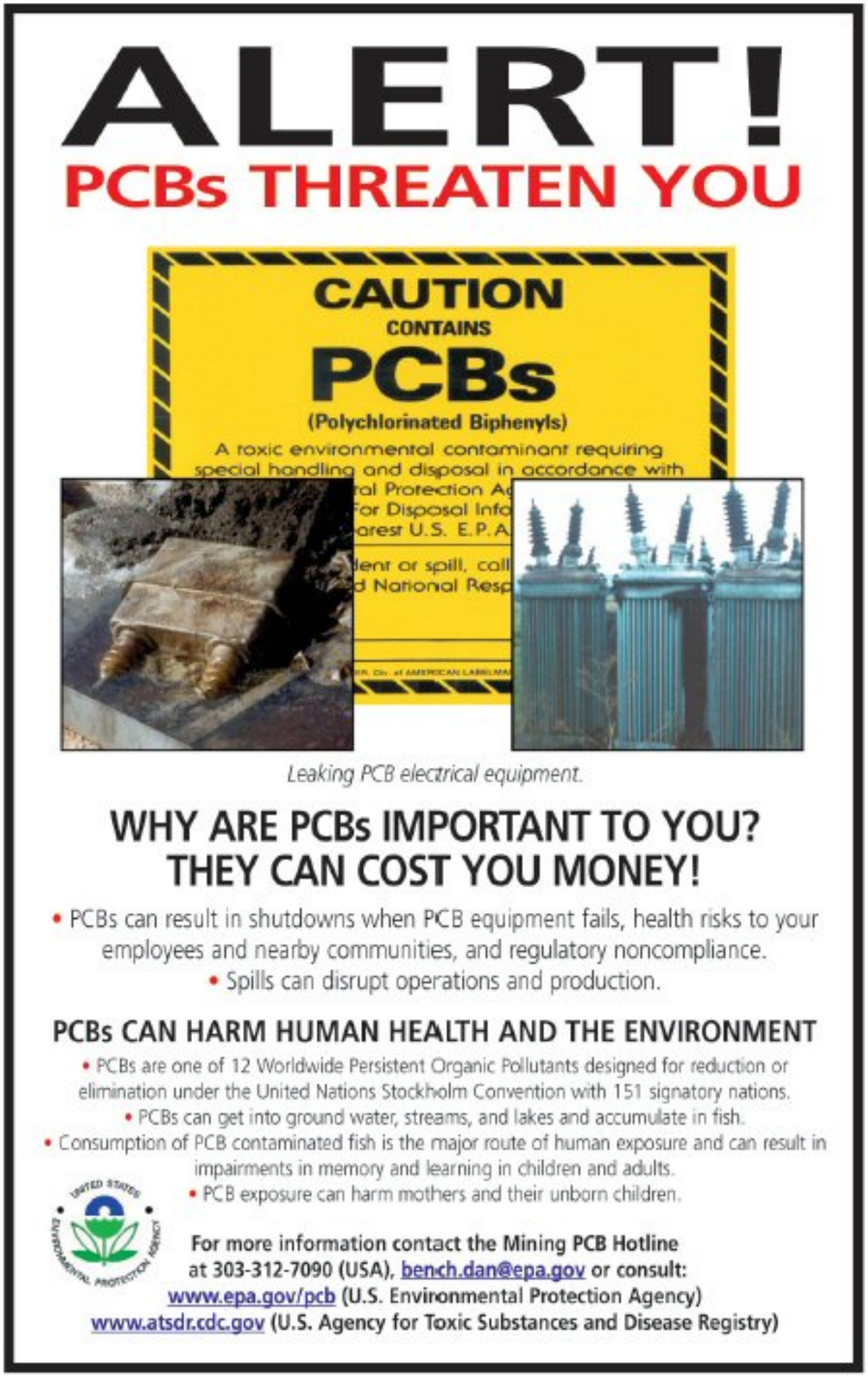
- **Teratogens** - cause birth defects; alcohol, some drugs, benzene, formaldehyde, lead, mercury, phthalate a, vinyl chloride

- **Neurotoxins** -affect brain, spinal cord; lead, pesticides, methyl mercury

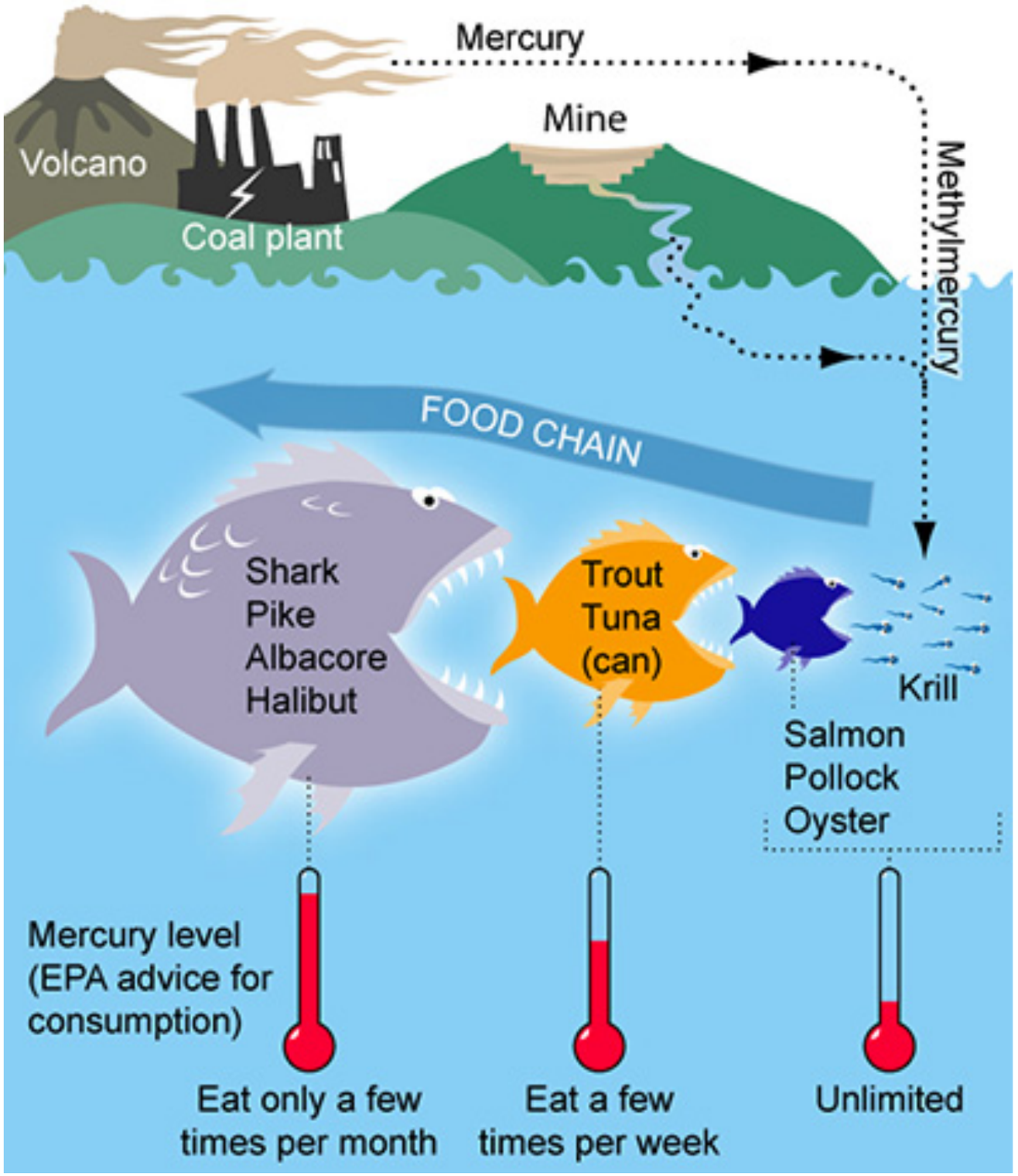
- **Endocrine system** - affects on growth, reproduction, development, learning ability, behavior; HAAs, hormone blockers, thyroid disrupters

PCBs

- Class of chemicals
- Contain Cl
- Oils or liquids - can get into air
- Widely used as lubricants, hydraulic fluid, insulators in electrical systems, in paints, fire retardants, fabrics, preservatives, pesticides
- Banned 1977
- Break down slowly: in soil, water, air, fish, birds, our bodies
- Released during manufacture, use and disposal
- Can biomagnify



Mercury


Mercury
Volcano
Coal plant
Mine
Methylmercury
FOOD CHAIN
Shark
Pike
Albacore
Halibut
Trout
Tuna
(can)
Krill
Salmon
Pollock
Oyster
Mercury level
(EPA advice for
consumption)
Eat only a few
times per month
Eat a few
times per week
Unlimited

Mercury

- Neurotoxin, teratogen - mostly brain damage in fetuses and young children
- Bacteria convert it to methyl mercury (more toxic)
- Can biomagnify
- Humans: inhale it, eat fish, HFCS

Endocrine Disruptors

- Pituitary, thyroid, adrenal, pancreas, reproductive organs
- HAAs -hormonally active agents; bind to cells like hormones and disrupt hormone function
- Some mimic hormones causing underproduction or overproduction or interfere with the way hormones naturally work
- Estrogen mimics - Males becoming more female; seen in lab animals
- Thyroid disrupters - growth, weight-control, brain, behavioral problems, early puberty, breast cancer, prostate disease, etc.
- Examples include: BPA, DDT, weed killer, PCBs

BPA

- Endocrine Disruptor
- Mimics estrogen
- In hard, shatterproof plastics, food,packaging, lines cans
- Avoid heat
- Recycle codes 3 and 7 possibly contain BPA
- FDA- levels in foods are low
- Banned in some products
- Banned in some places

Phthalates

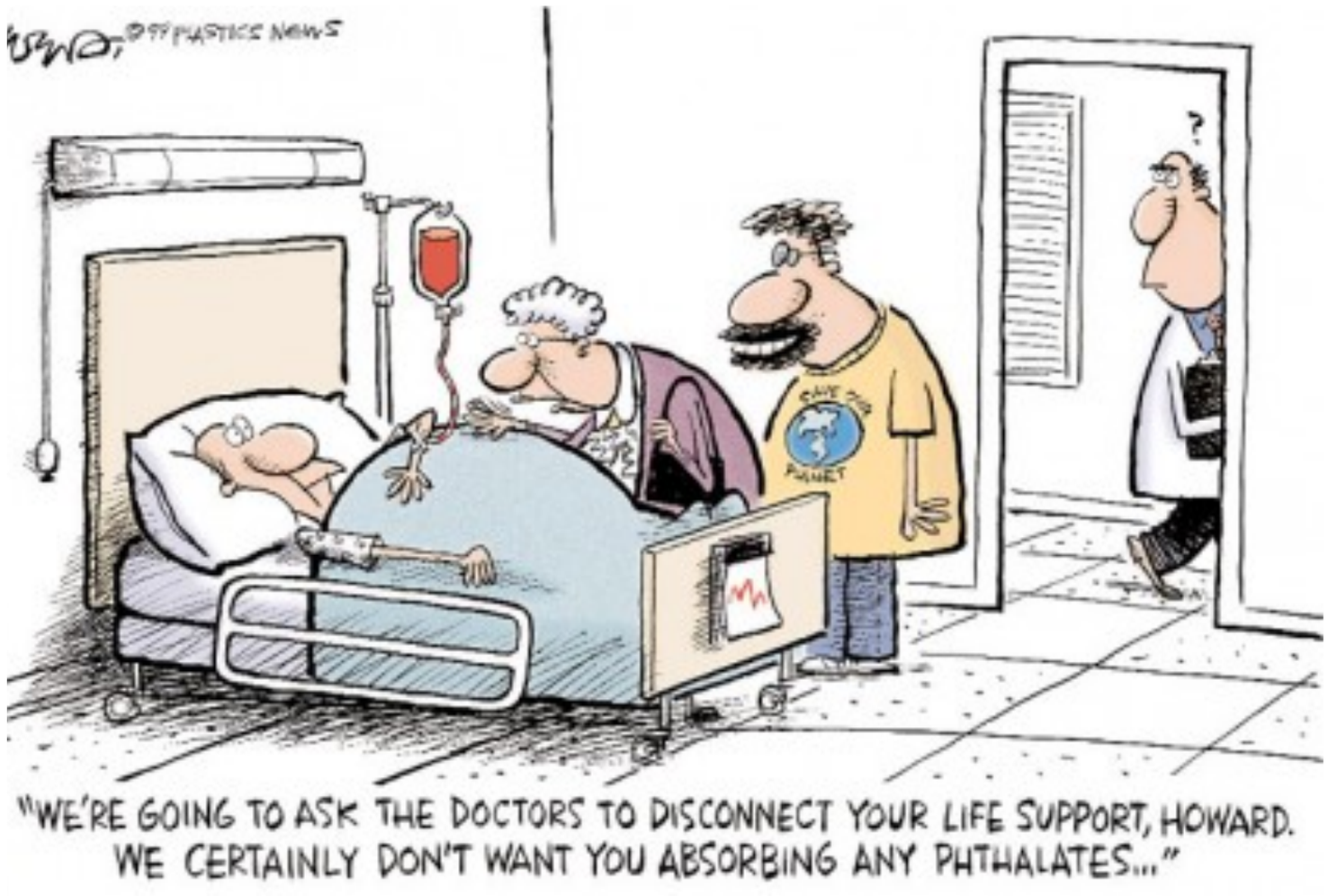
- Softens PVC

- Perfumes, baby lotion, baby powder, hair sprays, shampoo, nail polish, cosmetics,

- Toys, teething rings, IV bags, medical tubing

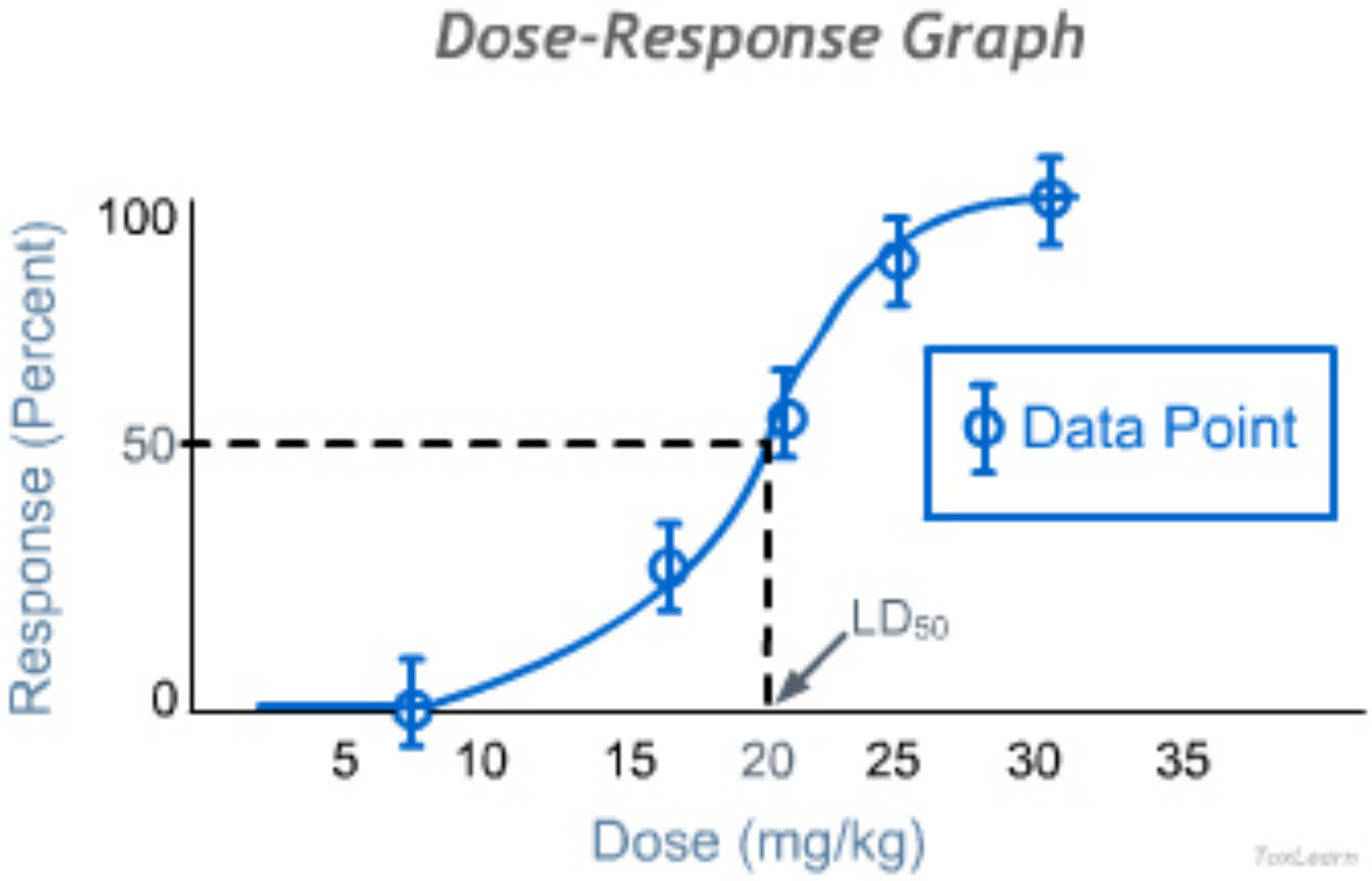
- Birth defects, liver cancer, kidney damage, premature breast development, immune system depression

- **Banned** by EU and 14 other countries

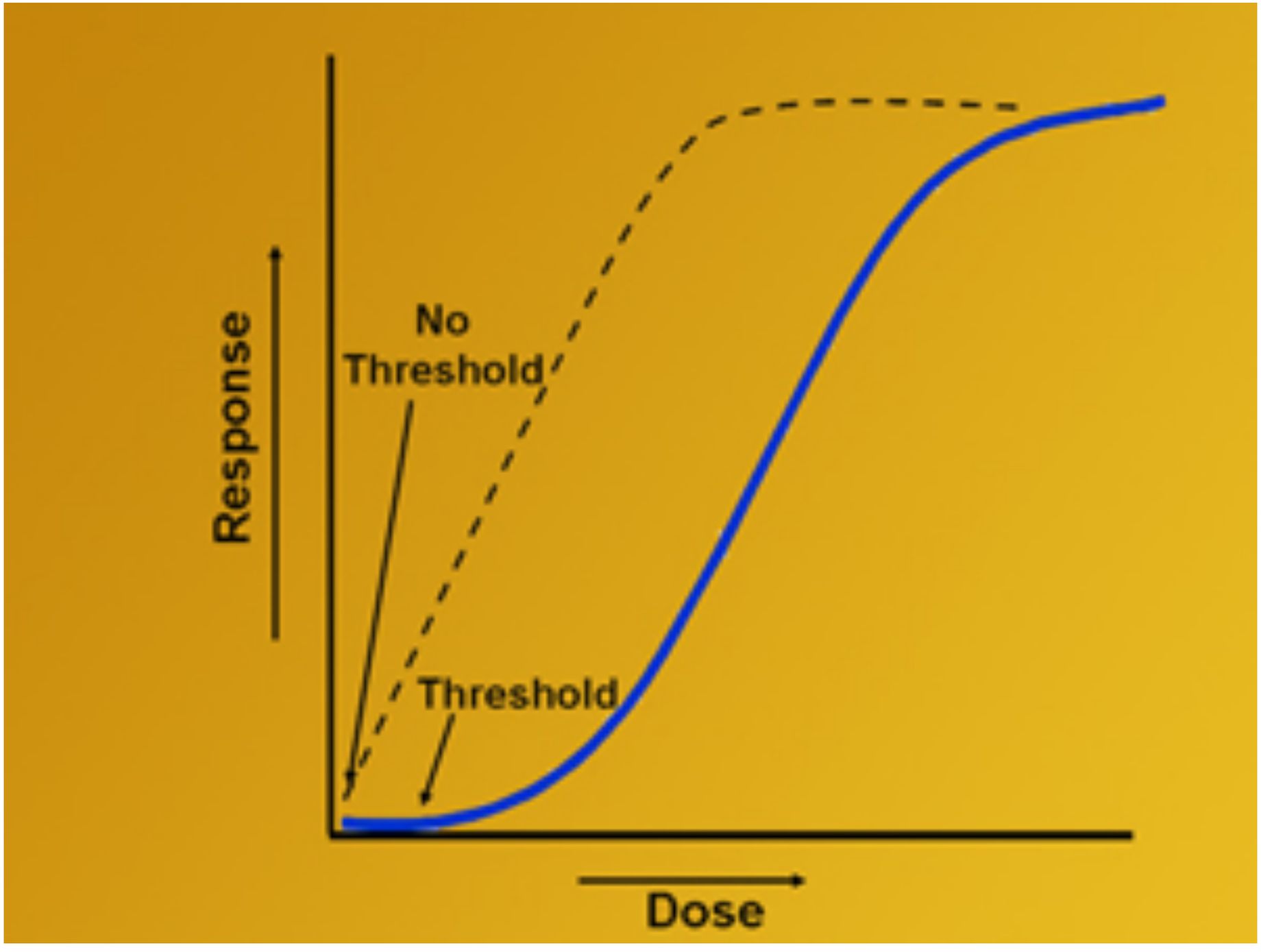


Toxicity

- Depends on dose
- Genetic makeup
- Age
- Weight
- Immune system
- Overall health
- How exposed: ingested, inhaled, absorbed thru skin
- Substance's persistence - how quickly it breaks down
- Biomagnification and place on food chain



"Mg/kg" refers to the amount of the chemical in milligrams per kilogram of body weight of the subject.


Response
No
Threshold
Threshold
Dose

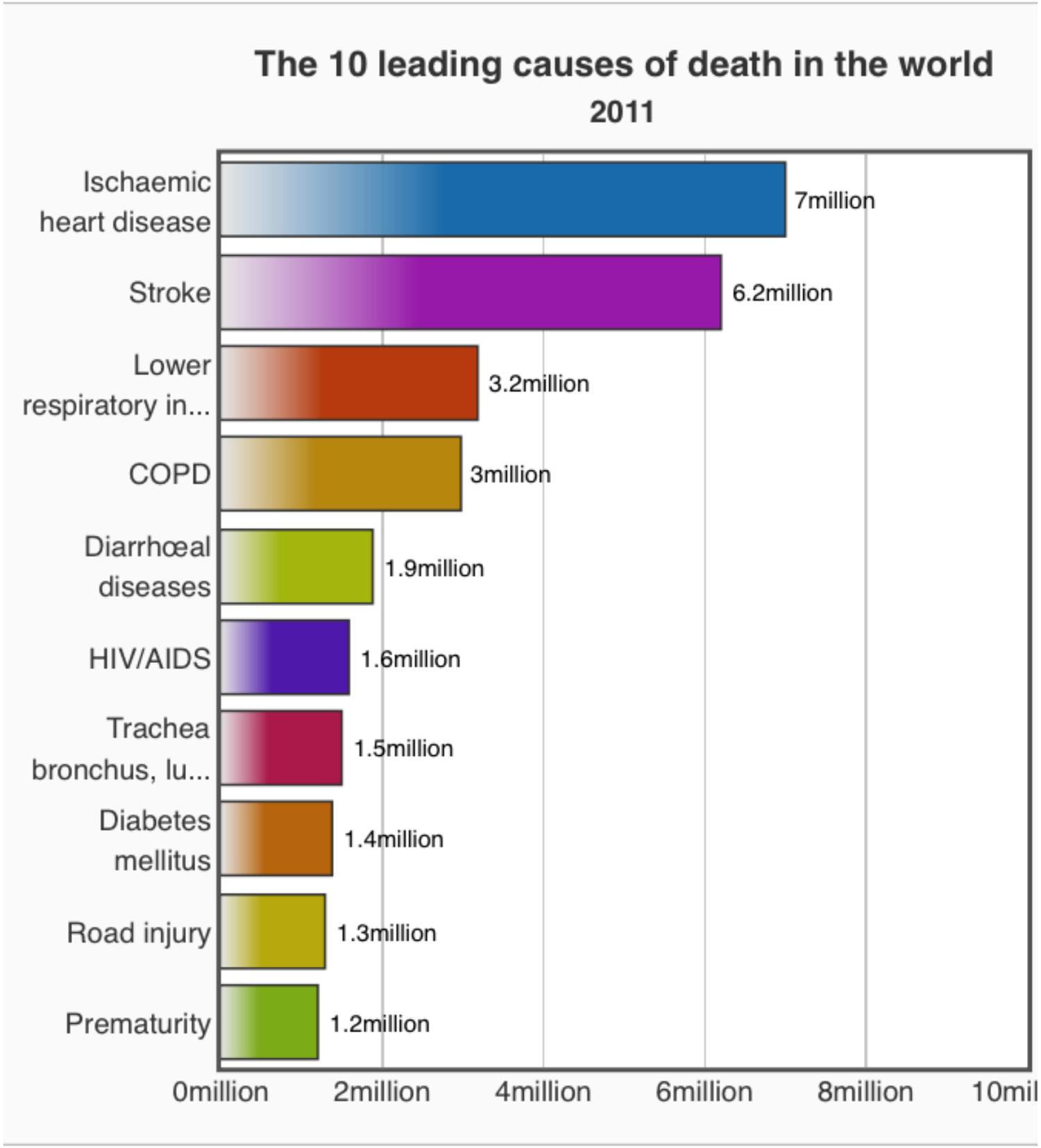
How do we know??

- Info from lab animals
- Case reports from Drs
- people exposed to so many...hard to tell effects of just one

Risk Analysis

- Identifying hazards and their risks and making decisions about reducing or eliminating risks
- Often people are misinformed

What do you think top ten causes of death are worldwide?


The 10 leading causes of death in the world
2011
Ischaemic heart disease
7million
Stroke
6.2million
Lower respiratory in...
3.2million
COPD
3million
Diarrhœal diseases
1.9million
HIV/AIDS
1.6million
Trachea bronchus, lu...
1.5million
Diabetes mellitus
1.4million
Road injury
1.3million
Prematurity
1.2million
0million
2million
4million
6million
8million
10mil