

Terms	Terms (cont)	Environmental Exposure Hierarchy (cont)
Enviro PH: Study of the impact that environmental factors have on health outcomes	Building related symptoms: health outcomes (e.g. headache, fatigue, eye complaints)	Exposure > Dose depends on: building type, location, ventilation, etc.
Precautionary Principle: If you're unsure about risks, be safe	Common BRS: headache, fatigue, eye complaints	Exposure > Dose depends on: building type, location, ventilation, etc.
Causation: Cant be proven	Building related illness: diagnosable illness whose cause can be directly linked to the building	Driving & Traffic Mortality
Hill's Criteria of Causation: Temporality, dose response, biological plausibility, strength of effect, consistency	Exs: Toxicity (carbon monoxide poisoning), infectious disease (legionnaires), allergy, dose response, biological plausibility, strength of effect, consistency	Traffic Mortality Stats
Healthy Worker Effect: Ppl in workforce are inherently healthier than non-working	Pathogenic: visible disease	What kills? speed, fatigue, cell phone
POPs: Persistent organic pollutants - Chemicals that persist in env. & body	Chemical half-life: persistence of chems in the body (blood/urine)	1993 Israel ↑ speed limit 90 to 100 km/h
Lipophilic: Stored in fat tissue (organic compounds)	Organic & Inorganic: w/ & w/o carbon	Cases
Bioaccumulate: Builds up in body, usually lipophilic	Organic solvent: organic substance	Lead: 1975 ↓ lead in gas → ↓ in air
Biomagnification: Builds up through the food chain	Environmental Exposure Hierarchy	Minamata Disease: Minamata Japan
Heavy Metals: Naturally occurring, common in industry (ie lead, mercury, arsenic, cadmium)	Exposure isn't dose, but it is used to calculate dose	
Endocrine Disruptors: Substances that either block, mimic, or antagonize normal hormone function	Co-exposure can confound - need to measure all	
Teratogenic: Causes mutations	Environmental Exposure Hierarchy	
Ionizing: Carcinogenic, causes mutations	Bioactive Dose	
Non-ionizing: Non-mutation causing	Internal Dose	
Lead: Metal, affects nervous system (poisonous @ 10 micrograms/liter of blood)	Personal Exposure	
Idiopathic Disease: "Idiots" don't know what's causing it	Ambient Exposure	
Sick Building Syndrome: a medical condition in which people in a building suffer from symptoms of illness	From top to bottom: the higher, the better the assessment. Co-exposure	
	How to Measure Exposure	
	Type of Env. chem or phys (i.e. radiation, noise, heat, etc)	
	Medium of Env. i.e air, water, soil pollution	
	Location of Env. i.e. ambient, work, residential	
	Duration of exposure time avg or cross-sectional	

Synthetic Chemical Compounds - Qs

What chemicals being used?
 What actual exposure? (concentration, amounts, route of exposure)
 Are exposure levels health concern?
 200k+ can never know toxicity of all

Water Pollution

Definition: Any chem, bio, or phys change in water quality that has a harmful effect on living organisms or unanticipated injuries

Composed of:

- Organic Chemicals** oil, gas, plastics, pesticides, herbicides, household water cleaners, etc.
- Plant Nutrients** water soluble nitrates, ammonia & phosphates (from sewage), agriculture & urban fertilizers
- Sediment** soils/ silts from land erosion (can disrupt photosynthesis, destroy spawning grounds, clog rivers & streams)
- Inorganic Chems** Acids & toxic chems, often from runoff, industries & household cleaners
- Oxygen Demanding Wastes:** Organic waste that needs oxygen, often from animal waste, paper mills, & food processing
- Infectious Agents:** bacteria & viruses, often from animal waste

Routes Industrial waste, urban runoff, ground water contamination

How to Measure Water Quality?

Bacterial Counts Fecal coliform counts from animals' intestines

- 0 per 100ml for drinking
- >200 per 100ml for swimming

Sources: humans, birds, animals

Dissolved Oxygen: Bio. O₂ Demand (BOD) aka amount of O₂ consumed by aquatic decomposers

Chemical Analysis: look for presence of inorganic or organic chems.

Suspended Sediment: water clarity

Water Pollution (cont)

Drinking Water

- Purify drinking water via heat & UV exposure, reverse osmosis filter, etc.
- Bottled water may get contaminated long as life expectancy

Basis Drinking Water Standards Politically powerless

Primary source in toxicology & drinking water standards

Pros: control of exposure levels, living conditions, chance of followup

Cons: is animal model appropriate for human effects? no exposure conditions

Ground water

Why is ground water pollution a serious problem? Exposed to pesticide residues, wood preservatives, dust, out of sight (under ground)

Causes: Low flow rates, low O₂, few bacteria, cold temps, etc.

Prevention: monitor aquifers, find less hazardous subs., leak detection

Ocean Pollution Sources: large amounts of untreated raw sewage, leaking globally

Solutions: Reverse household water cleaners, greatly ↓ nonpoint runoff, reuse

Physical Hazards

Most Common Symptom of Occupation

Noise Induced Hearing Loss (NIHL)

Industries @ risk Petroleum, lumber

Control Measures 1. Engineering

Fields of Toxicology

Descriptive Toxicology testing on

Mechanic Toxicology ID & understand

Fields of Toxicology (cont)	Radiation (cont)	Air Pollution (cont)
Regulatory Toxicology Estab of stnrds All used for risk assessment	Exposures to nonionizing radiation: smart air, wireless tech, WII games, remote controls, WIFI, cellphones, radars, RF radio equip, radio/tv station workers, security chips Medical irradiation: <i>diagnostic radiology</i> = x-rays, CT, catheterizations, angiography, guided surgery & <i>nuclear medicine</i> = RA material injected IV then tracked by Gamma ray cam, heart scan, bone scan Climate Change monitoring	Criteria Air Pollutants & Order, of Particulate Matter Definition = Shmutz - Mixture of Types: UFP (<0.1 microns), PM2.5 Where to? 5-10 micrometers: naso 3-5 Micrometers: trachea 2-3 micrometers: bronchial tubes 1-2 MMs: Bronchioles 0.1-1MMs: alveoli (blood stream) -Assoc iated w ↑ pulmonary ER vi -Needs to be 2.5 or smaller to af
Environmental vs... Enviro Larger affected population Smaller concentrations Fewer exposures Regional monitoring Occ. health issues become enviro health issues	Effects Gradual inc. in temp Enviro MD ↑ in sea level → salinated water tropical region ↑ → malaria, dengue, etc ↑ air pollution → cardio pulmonary, morbidity, & mortality ID env. exposure of the ind Temp extremes Make connection btwn exposure & disease heat waves → dehydration & heat stroke drought → crops & drinkable water ↑ fires → burn injuries, air pollution Cold events → frost bite, hypothermia Extreme climate events drowning, displacement ↓ drinkable water ↑ infectious diseases	Indoor Air Quality Exposures: biomass (fuel 4 cooking, mold Illness: sick building syndrome (mold, morbidity, & mortality) Problem of cooking & heating: appr indoor, contained, higher exp. fuels emit particulates, 2004: indoor smoke from solid fuel
Enviro PH Recognizing disease in specific community ID env. exposures in comm. Make connection btwn exposure & disease Reduce exposure to pollution	State of research very new & active area, lack of good research (poor c	Air Pollution Definition A complex mixture of gases, particulates, metals (i.e. arsenic Measures: Personal (expensive) & Ambient (cheaper, use area monitors to Natural sources: pollen, fungi, dust Anthropogenic sources: point (stays in place, i.e. factory) & mobile
Radiation Exposures to Env. Radiation: coal burning (power stations), phosphate industry (middle east phosphates high in uranium), household heating & cooking (less today), gypsum phosphate (industry, less today), radon exposure (basements, underground parking, etc), nuclear energy use, nuclear disasters, watches, fluorescent signs, fire detectors, air travel, industrial use (checking pipes, bottle filling of soft drinks, density measures, ground moisture detectors)		