

Hazard Communication & Right-to-Know Laws



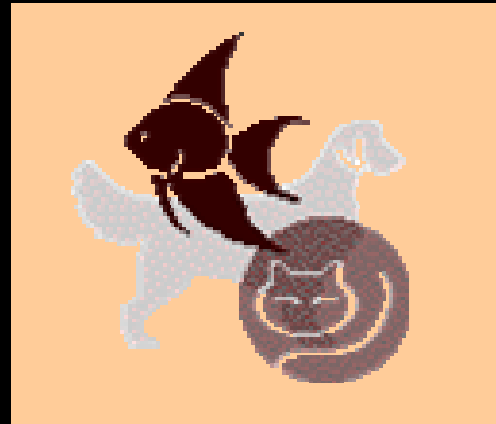
for Pedagogues and School Staff



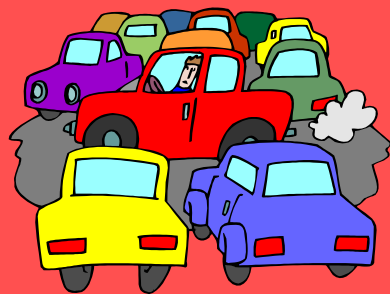
Joel Klein
Chancellor

Toxicology

Definition



Toxicology is the study of the harmful effects of chemicals on biological systems



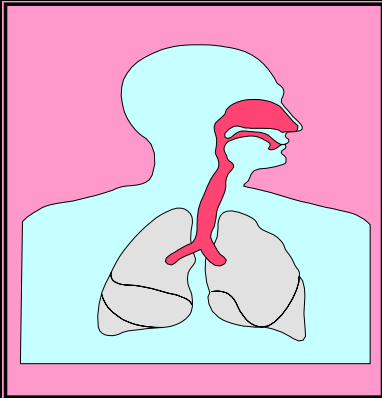
Chemicals



are part of everyday life



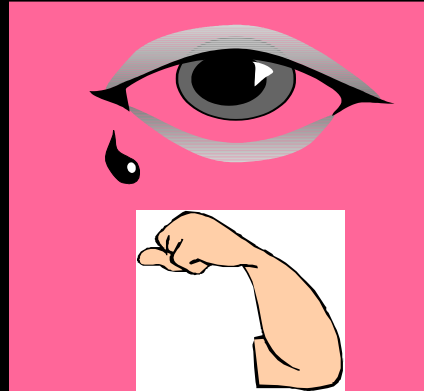
How do Chemicals Enter The Body?



Inhalation

You can breathe toxic dusts, gases, or fumes.

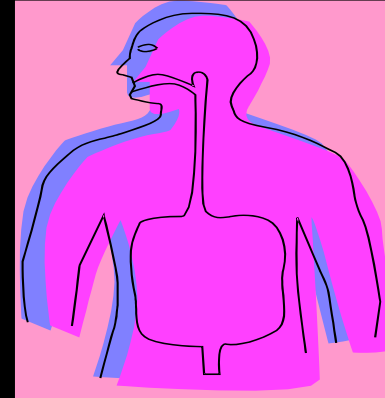
These can harm your respiratory system or pass from your lungs into your bloodstream and harm another part of your body.



Absorption

Toxic liquids can cause damage if they come into contact with your skin or eyes.

Some toxic liquids can pass through your skin and enter the bloodstream and cause harm to another part of the body.



Ingestion

Toxic substances can get into your body if you eat or smoke without washing contaminated hands.



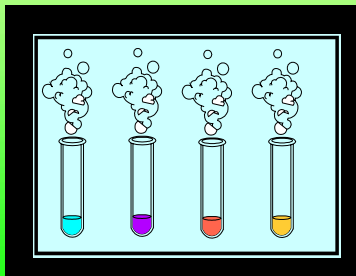
Injection

Toxic substances can get into your body if you eat or smoke without washing contaminated hands.

Physical Manifestations of Chemicals

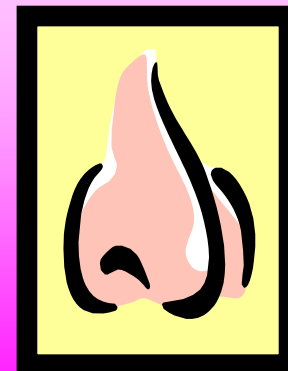
Vapors

- The gaseous form of substances that are normally in the solid or liquid state at room temperature.
- The vapor can be changed back to the solid or liquid state either by increasing or decreasing the temperature alone.
- Vapors can be inhaled



Gases

- Gases can be inhaled
- Some gases are:
 - easy to detect
 - some are odorless and colorless
 - some even deaden your sense of smell



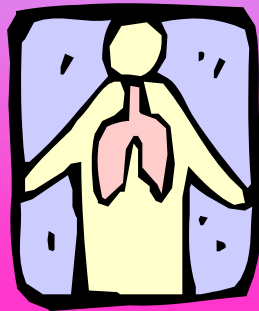
Solids

- A solid is a material which retains its form, such as a stone.
- Most solids are generally not hazardous since they are not likely to be absorbed into the body.
- Examples of hazardous solids:
 - Moth balls – *inhalation hazard*
 - Rodent bait – *ingestion hazard*



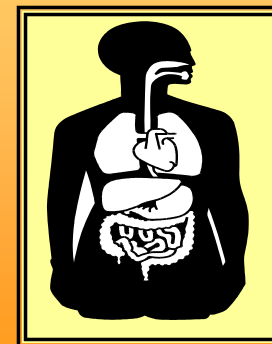
Dusts

- Dusts are tiny solid particles that can be inhaled.
- Larger dust particles are trapped in the mucous and hairs of the nose and windpipe.
- Smaller dust particles can be breathed deeply into the lungs.



Fumes

- Fumes are formed when a solid, especially metals are heated to very high temperatures and become vaporized.
 - Example: welding fumes
- Fumes can be inhaled.

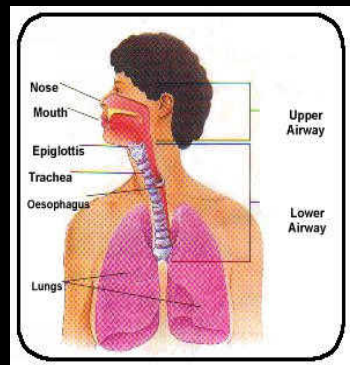


Basic Defense Mechanisms

The Respiratory System

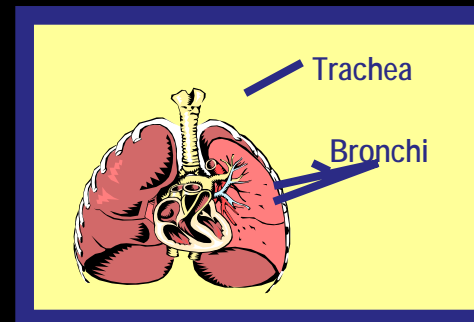
Upper Respiratory System

- Coughing
- Sneezing
- Nose hairs
- Mucous



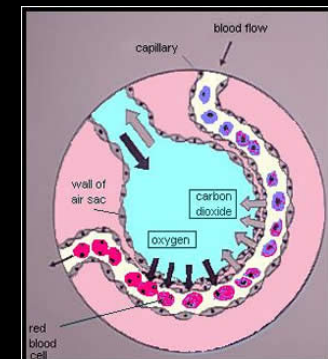
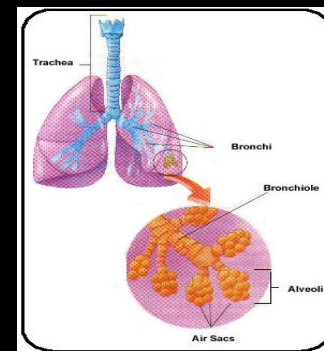
Lower Respiratory System

- Cilia
- Mucous
- Muco-cilliary escalator



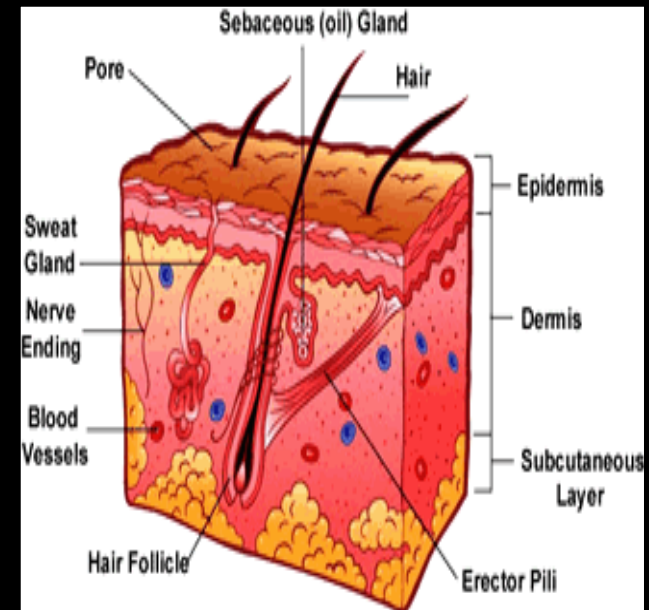
Alveoli Level

- Immune System
 - macrophages



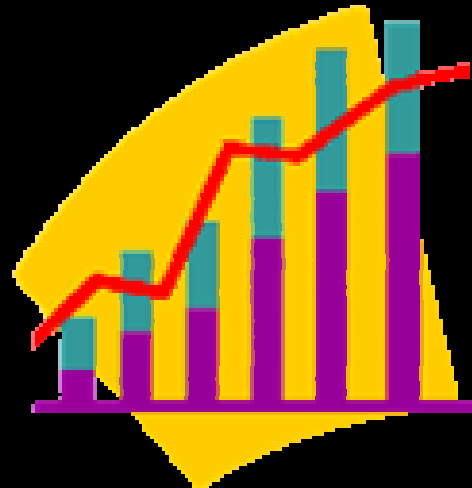
Skin

- Largest body organ
- Waterproof protective layer against:
 - Organisms
 - Chemicals
- Overexposure to solvents denaturizes the skin, leading to:
 - Cuts
 - Breaks
 - Dry skin



Dose-Response Relationship

The greater the amount of a substance
that enters the body,
the greater is the health effect on the body



Types of Health Effects

Sensitization

- This is another word for allergy
- Some people are allergic to a particular substance while others are not
- Allergic responses may not have an effect after the initial exposure, but later contact with the substance may cause an allergy to develop



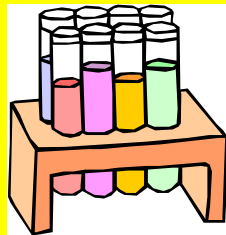
Synergistic

- Two or more agents that act together to produce a total effect greater than the sum of the separate effects.
- Example:
 - ethanol + chlorine = chloroform
 - ammonia + bleach = chlorine gas



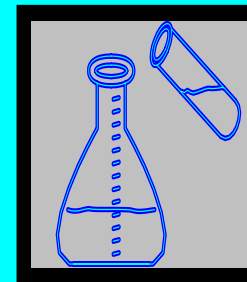
Additive

- The effects of multiple chemicals at a time or the effects of the different hazards may be additive.
- Examples:
 - $3 + 6 = 9$
 - Colorants-inorganic or organic matter to color compounds.



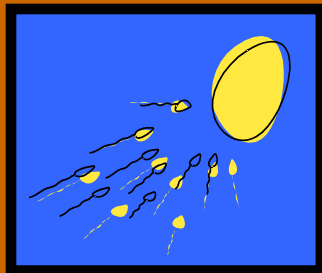
Antagonistic

- Interaction of two chemicals in which the resultant toxic effect is lower than the chemicals' individual actions.
- Example includes:
 - Methanol and ethanol exposure.



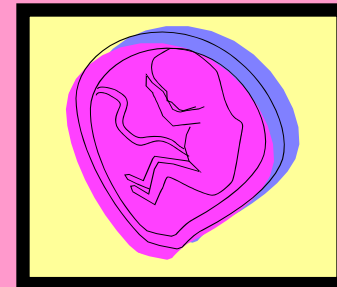
Mutagens

- Mutagens causes a change in the genetic make-up of a cell
- In reproductive cells (sperm or eggs), the mutagen can cause sterility or birth defects
 - Example: x-rays



Teratogens

- These substances cause malformations or birth defects by damaging the developing embryo
- Example: Thalidomide



Carcinogens

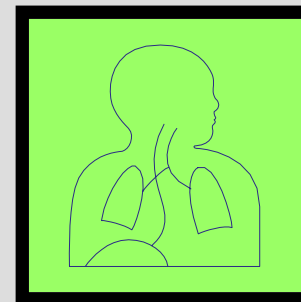
- Cancer causing agents
- A chemical is considered to be a carcinogen if it has been positively evaluated by:
 - International Agency for Research on Cancer (IARC),
 - Annual Report on Carcinogens, by the National Toxicology Program (NTP)
 - OSHA



Example: Asbestos

Target Organs

- The organ of the body most affected by the exposure to a particular substance.
- Target organs are body organs that are affected by exposure to hazardous chemical, physical, or biological agent.
- Example:
 - Mercury – neurological
 - Hepatitis - liver



Types of Target Organ Effects

HEPATOTOXINS	liver
NEPHROTOXINS	kidney
NEUROTOXINS	nervous system damage
PULMONARY	lung damage
HEMATOPOIETIC	blood system damage
REPRODUCTIVE TOXINS	reproductive system
CUTANEOUS HAZARDS	skin damage
OPTICAL HAZARDS	eye damage

Exposure Assessment & Control

Biological Threshold Level

Some substances have measurable exposure levels below which most people will not likely show any health effects



PEL - Permissible Exposure Levels

An exposure limit published and enforced by OSHA as a legal standard

TLV - Threshold Limit Value

A time-weighted average guideline concentration under which most people can work consistently for 8 hours a day for 40 hours with no harmful effects

Determining Exposure

Practical Clues to Exposure

Odor

Not reliable as a warning clue

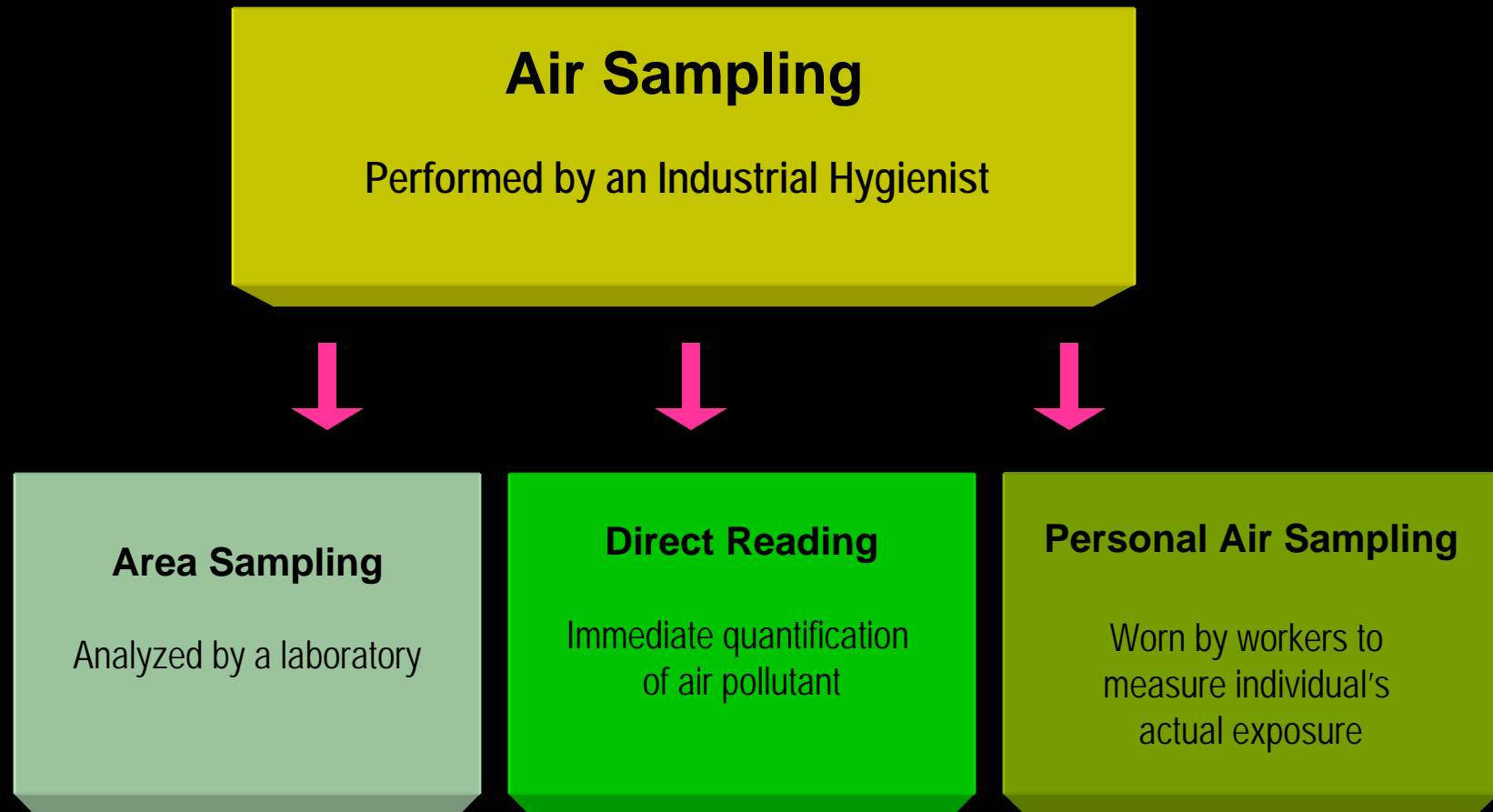
Settled Dust

Immediate symptoms

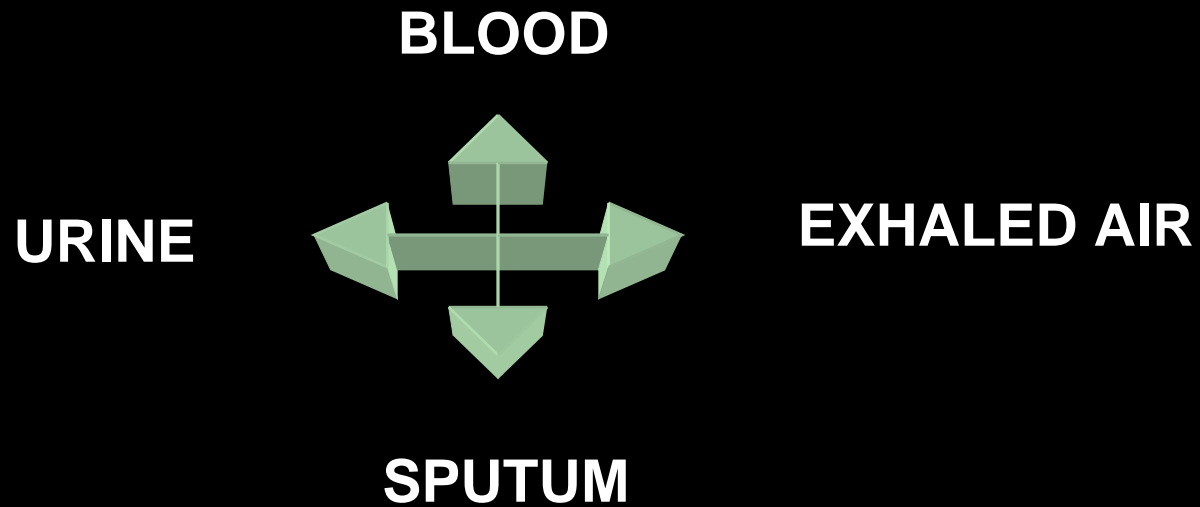
Particles in Nose

Taste

Environmental Monitoring



Biological Monitoring



Chemical levels and/or its breakdown products are measured

Example: blood lead levels

Controlling Exposure

Methods of Controlling Exposure

BEST

1

Engineering Controls

Remove the hazard at the source

2

Administrative Controls

Reduce exposure by changing job task or policies

3

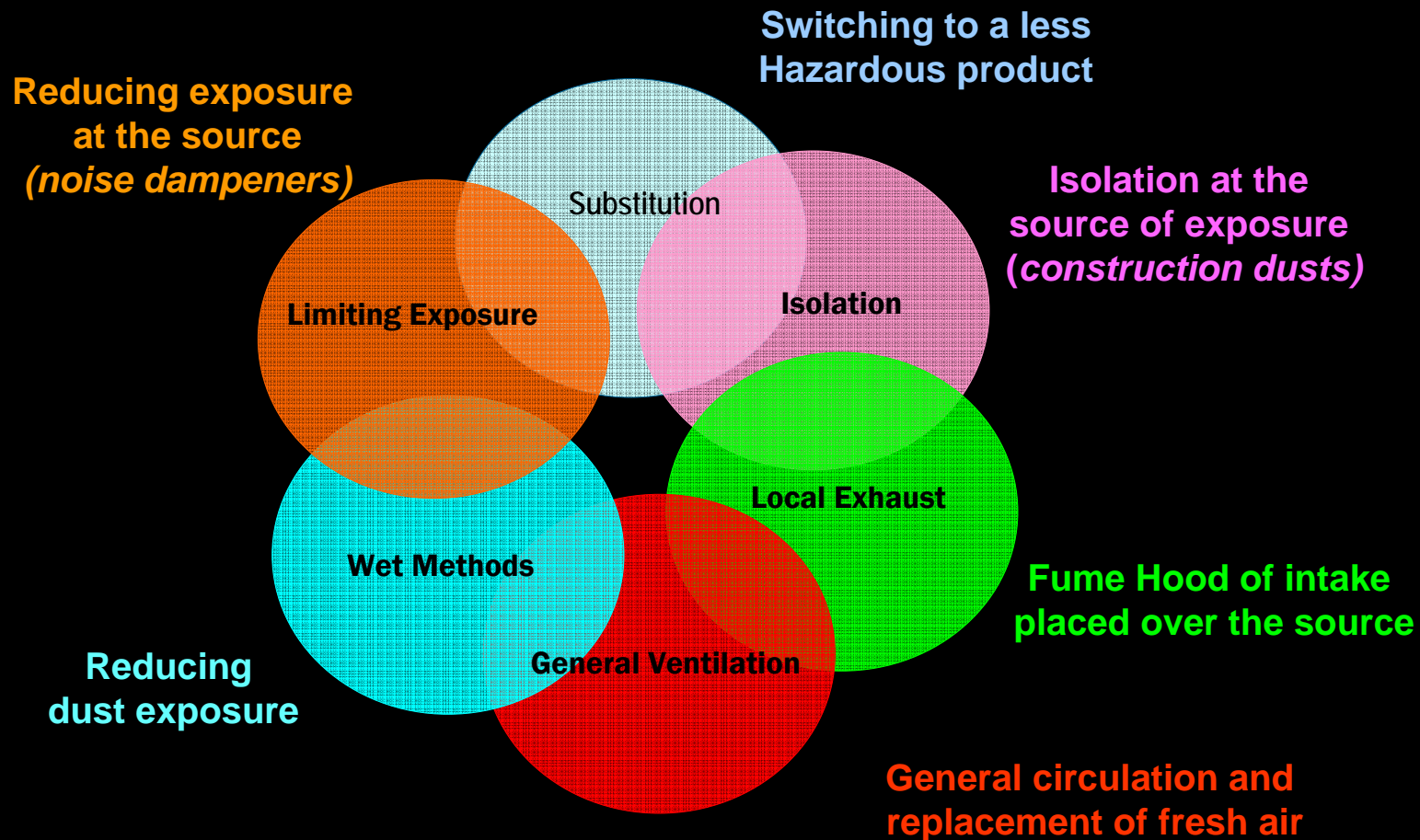
Personal Protective Equipment

Used after
Engineering & Administrative Controls have failed

LAST
RESORT

Engineering Controls

Reduce the hazard at the source of exposure



Administrative Controls

Seek to control employees' exposure by changing the way a task is performed

Training employees on workplace exposures

Time rotation based on task

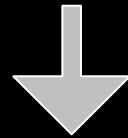
Establishing safety policies

Workplace hygiene

Proper waste disposal

Personal Protective Equipment (PPE)

Should be used when
engineering controls are ineffective



Employees wear PPE
to protect them
from their environment

gloves



aprons



respirators



boots



Protective
clothing



ear protection



goggles

