



# Indoor Air Quality in Rental Housing

## Town Health Officer Training

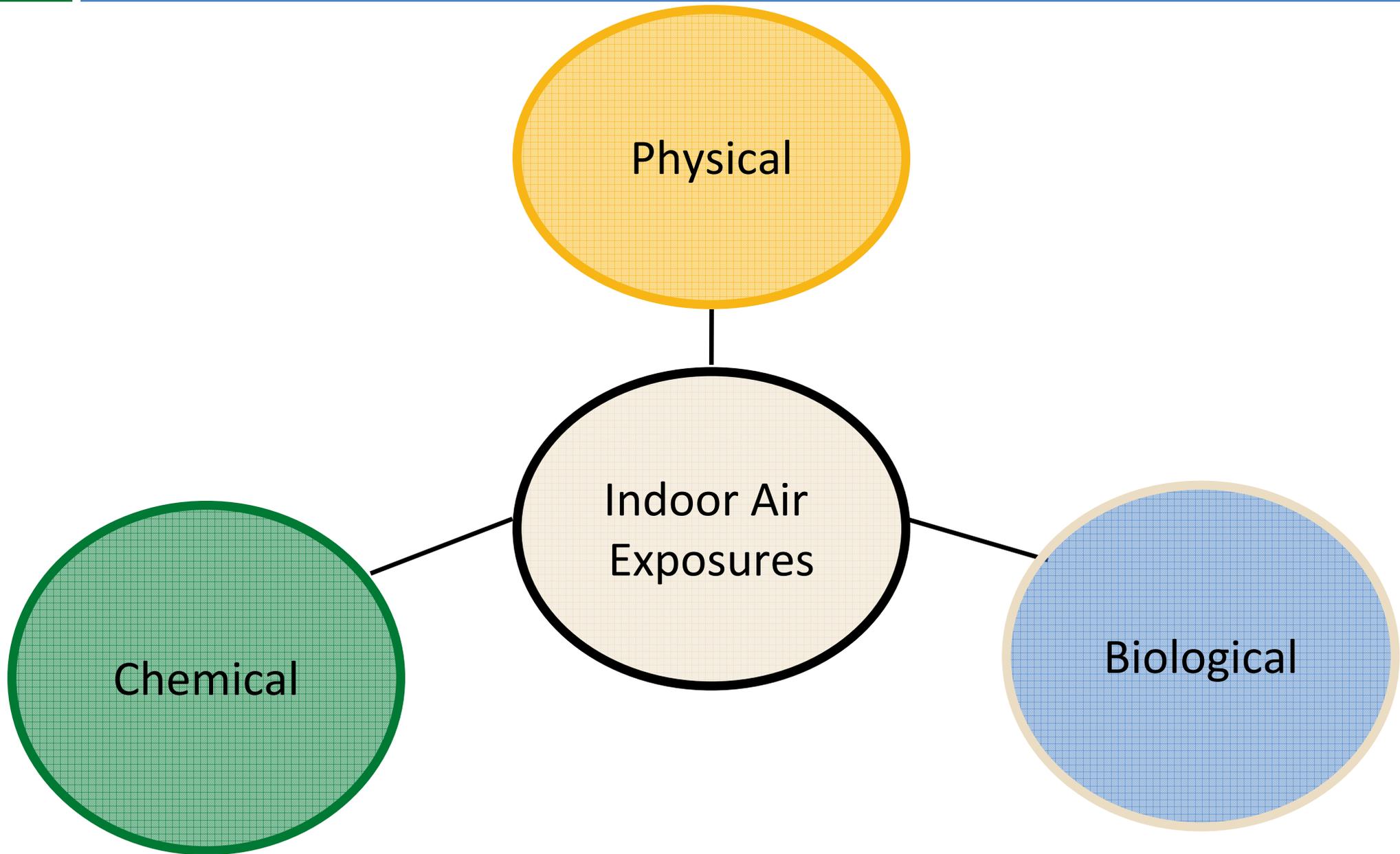
# Why Indoor Air Quality Matters

- Americans spend up to 90% of their time indoors
- Indoor air pollutants can be 2-5 times higher than outdoors
  - ▣ New houses are more airtight
  - ▣ Old houses are becoming better sealed
  - ▣ Many homes lack appropriate ventilation

# Health Effects of Poor Indoor Air quality

- ❑ Asthma
- ❑ Allergy
- ❑ Irritation
- ❑ Lethargy
- ❑ Physical discomfort
- ❑ Chemical sensitivity
- ❑ Cancer
- ❑ Death

# Contributors to Poor Indoor Air Quality



# Vermont Healthy Homes Principles



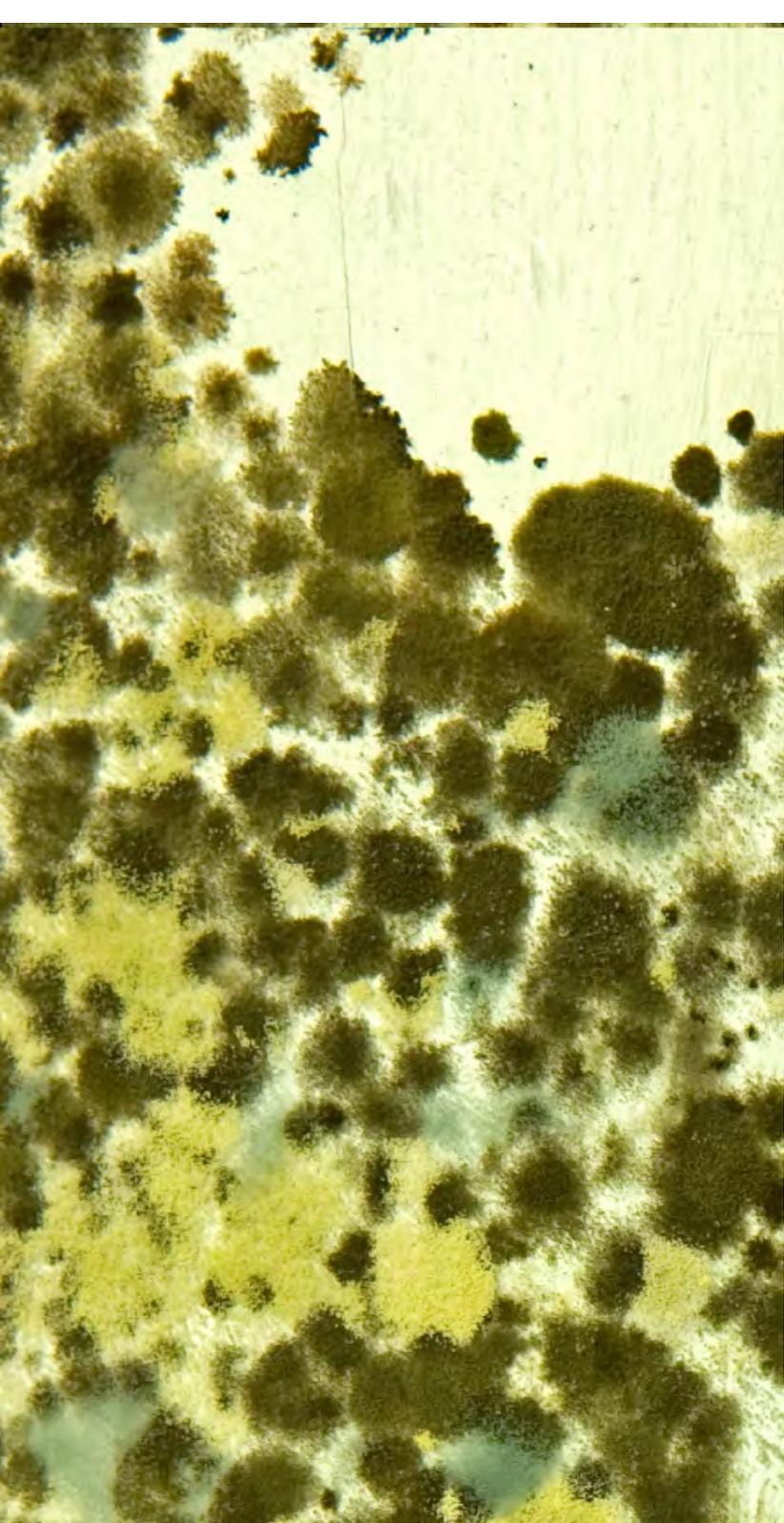
A healthy home is well ventilated, dry, clean, safe, maintained, environmentally sustainable and free of pests, toxins and dangerous gasses.

# Rental Housing Health Code and IAQ



- Addresses only a limited number of IAQ measures
- Many IAQ problems are not addressed

# Asthma and Allergy Triggers



# Asthma and Allergy Triggers

- ❑ Animal dander
- ❑ Cockroach parts / feces
- ❑ Chemicals
  - ▣ Pesticides
  - ▣ Cleaning products
- ❑ Dust
- ❑ Strong odors
- ❑ Mold

# “Mold” and “Mildew”

- ❑ Terms used to describe fungus
- ❑ There are many different types of fungi
- ❑ Common throughout nature
- ❑ Vary in color and appearance



# All mold needs to grow is

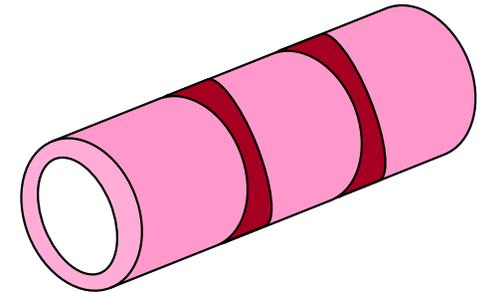
- Organic matter
- Water or moisture



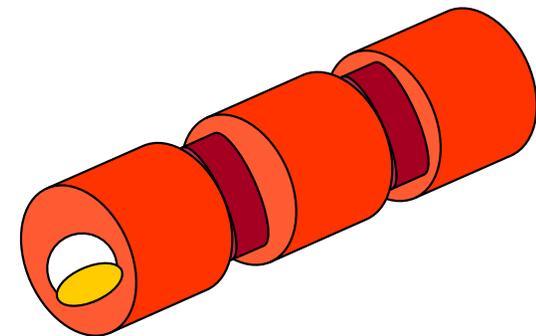
# Health Effects of Mold

- These effects depend on the type of mold and individual sensitivity:
  - ▣ Irritation
  - ▣ Allergic symptoms
  - ▣ Asthma exacerbation
- Fungal infections
- Refer to physician for all health effects and symptoms

Normal Airway



Constricted Asthmatic Airway



# “Toxic Black Mold”

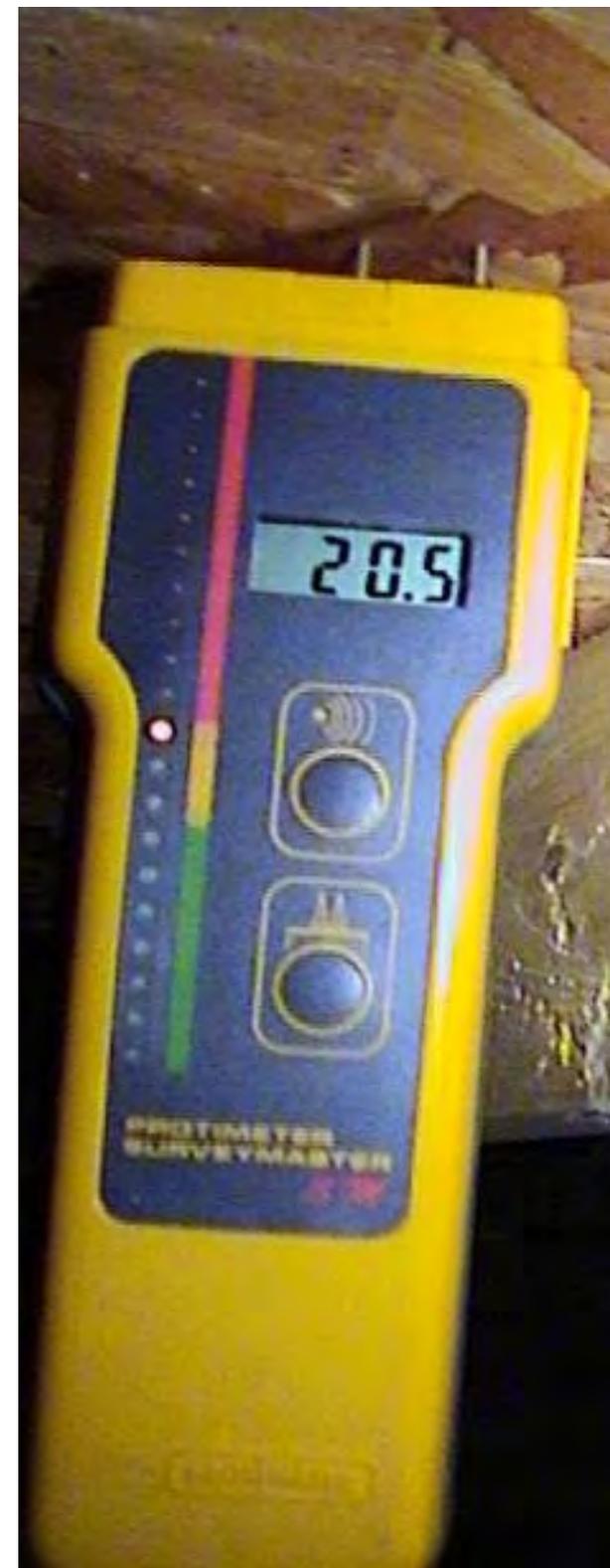
- “Toxic black mold” doesn’t really mean anything
- “Toxic black mold” usually refers to *Stachybotrys chartarum*
- Toxicity in residential settings is controversial



# Identifying a Mold Problem

Primary strategy: building investigation – not air testing

- Use eyes and nose
- Find the source of water / moisture
- May require increasingly invasive building investigation methods



# Places to Look for Mold

- ❑ Basements
- ❑ Attics
- ❑ Flooded areas
- ❑ Bathrooms
- ❑ Kitchens
- ❑ Closets
- ❑ Furniture
- ❑ Mattresses
- ❑ Windows and windowsills
- ❑ Carpeting
- ❑ Food storage areas
- ❑ Between furniture and outside walls
- ❑ Around appliances
- ❑ Where have THOs found mold?



# Air Testing is not the First Step

- ❑ Unnecessary if mold is visible
- ❑ Testing includes sampling, culturing and identification – all are complex
- ❑ Results typically show the presence of mold
- ❑ Interpretation is difficult because there are no health standards or laws
- ❑ Scientific testing is often expensive
- ❑ Rarely does mold testing reveal a clear answer

# Fixing Mold Problems

- ❑ No license or certification for mold contractors in VT
- ❑ Fix water / moisture intrusion
- ❑ Manage indoor relative humidity (RH)
- ❑ Remove damaged building materials and items
- ❑ Clean hard building materials and items



# Remove Damaged Soft Building Materials and Items

- ❑ Building materials and other items have a 48 hour limit
- ❑ Items that can be and are laundered do not need to be discarded



# Clean Hard Building Materials and Items

- Hard or nonporous building materials and items can be washed
- Different opinions on best practices
- Biocides are not recommended



# Applicable Rental Housing Health Code for Mold

- Flooring
- Plumbing
- Garbage
- Bathroom ventilation
- Weathertight / watertight
- Standing water
- Clothing dryers
- Vaporizers or humidifiers

Carbon Monoxide

# Sources of Carbon Monoxide

- Incomplete combustion of fuels
  - ▣ Kerosene or gas space heaters
  - ▣ Backdrafting chimneys
  - ▣ Woodstoves and fireplaces
  - ▣ Gas water heaters
  - ▣ Gas ovens and stoves
  - ▣ Attached garages (internal combustion engines)

# Health Effects of Carbon Monoxide



High Concentrations

Death

Moderate  
Concentrations

Impaired vision and coordination

Headaches

Dizziness

Confusion

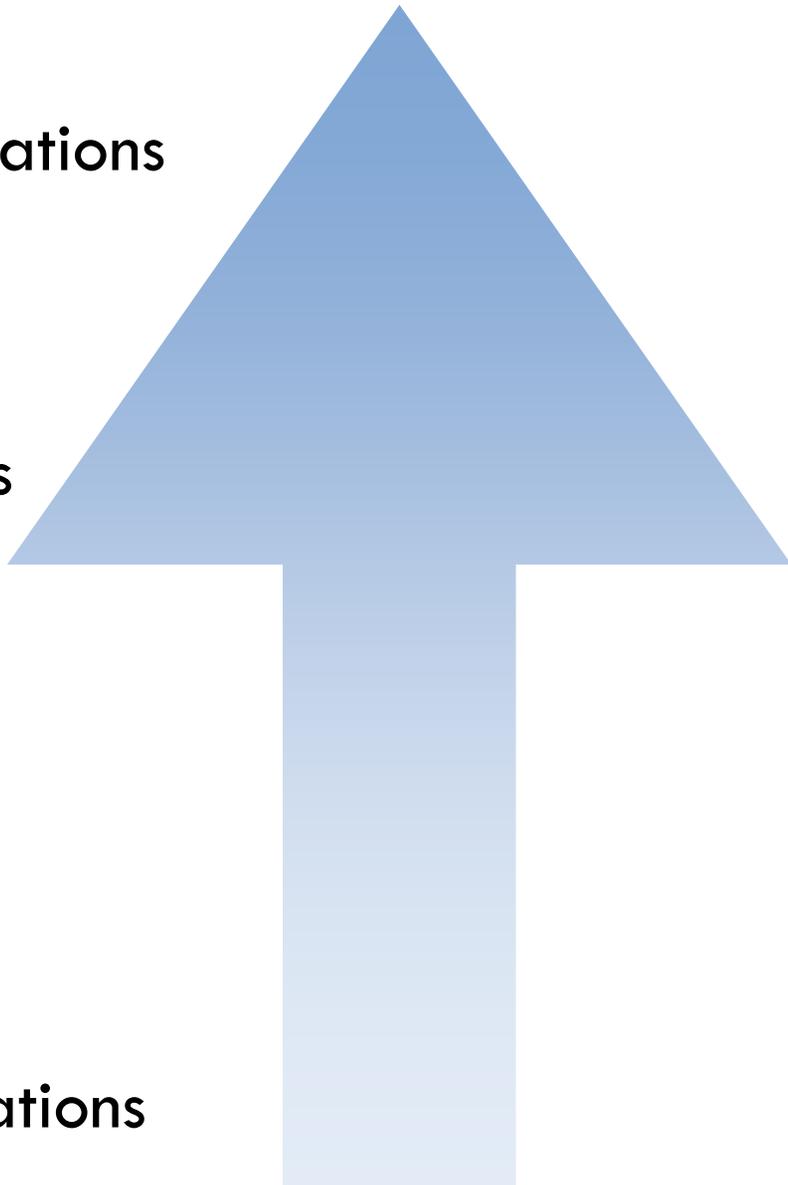
Nausea

Flu-like symptoms that clear up  
after leaving house

Low Concentrations

Fatigue

Chest pain in people with heart  
disease



# Applicable Rental Housing Health Code for Carbon Monoxide

- RHHHC, § V, B: Heating facilities shall be properly functioning and in good repair.
- RHHHC, § V, D: Heating facilities shall be vented to the outside. Unvented fuel fired space heaters are prohibited.

Ventilation

# Ventilation



- Provides fresh outdoor air
- Removes pollutants
- Mechanical ventilation
- Natural ventilation

# Ventilation in Rental Housing Health Code

- RHHC, § VI, A (1): Every habitable room must have a window or door on an outside wall to admit fresh air.
- RHHC, § VI, A (5): All clothing dryers shall be vented directly to the exterior of the building.

Temperature

# Temperature

- Affects comfort and health
- May cause or complicate potentially serious health problems
  - ▣ Hypothermia
- May affect mental health

# Temperature in Rental Housing Health Code

- RHHC, § V, A: Heat must be provided when outside temperature is below 55°F.
- RHHC, § V, B: Heating facilities shall be properly functioning and in good repair.
- RHHC, § V, A: Rooms must be able to maintain a temperature of 65 °F.

Pests

# Pests



- Rodents and insects can contribute asthma and allergy triggers to indoor air
- Commonly controlled by using pesticides

# Pesticides

- Over 75% of US households report using pesticides indoors
- Products used to control
  - ▣ Insects
  - ▣ Termites
  - ▣ Rodents
  - ▣ Fungi
  - ▣ Microbes
- Pesticides are sold as
  - ▣ Sprays
  - ▣ Liquids
  - ▣ Sticks
  - ▣ Powders
  - ▣ Crystals
  - ▣ Balls
  - ▣ Foggers

# Health Effects of Pesticides

- Poisoning
- Possible effects are depend on active and “inactive” ingredients
  - ▣ Neurological effects
  - ▣ Cancer
  - ▣ Central nervous system and liver damage

# Pests and Rental Housing Health Code

- RHHHC, § IV, A: Owner shall keep pests out of common spaces and when infestation spreads beyond 2 units.
- RHHHC, § IV, B: Occupant shall maintain unit free from pests.
- RHHHC, § IV, C: Extermination shall be accomplished by eliminating harborage place, removing food and breeding area, and by poisoning, spraying, fumigating or trapping.

Radon

# Radon in Air

- THO inspection checklist recommends testing for radon
- Naturally occurring in bedrock and soil gas
- Colorless, odorless, tasteless
- No apparent short-term effects
- Leading cause of cause of lung cancer in US among nonsmokers
  - 20,000 lung cancer deaths per year in the US

# Radon in Air

- Entry from soil into house
- Radon liberated from water



# Radon Testing

- ❑ Radon must be tested for
- ❑ Short-term or long-term test
- ❑ Test kits available from the Department of Health
- ❑ Can't really test until house is built
  - ▣ New home radon resistant construction



Questions?

Chris Zuidema

Public Health Industrial Hygienist

[Christopher.Zuidema@state.vt.us](mailto:Christopher.Zuidema@state.vt.us)

(802) 865-7762











