

***Radon and Respiratory Health: Addressing
Hidden Housing Hazards in Health Center
Communities***



February 12th, 2026 | 3 pm EST

Zoom Orientation

1

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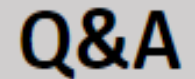
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Questions



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- training and technical assistance
- public health programming
- consultation
- direct care

To learn more about NNCC, please visit our website at www.nurseledcare.org.

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Jillian Bird, MS, RN
Director of Training and Technical Assistance



Matt Beierschmitt, MPP
Assistant Director of Training and Technical Assistance



Fatima Smith, MPH, CHES
Project Manager



Regina Brecker, MPH, CHES
Project Coordinator



Lucy Lunay
Program Intern



Anna Fry, MPH, BSN, RN
Clinical Nurse Educator



Today's Agenda

5 min - Welcome

10 min - Nate Burden, Radon Scientist and Consultant

- What is radon?
- What health centers need to know
- HUD's role in mitigation

20 min- Nate Burden, Radon Scientist and Consultant

- Health impacts of radon exposure
- Educating patients on risks

10 min- NCHPH

- Screening, education, and mitigation strategies for health centers

10 min - Questions & Wrap-Up



National Center for Health in Public Housing

- **Who we are:** Established in 2001, NCHPH provides technical assistance to enhance the capacity of Public Housing Primary Care (PHPC) health centers and other health centers that want to provide primary care to residents of public housing, with the goal of assisting health centers in meeting program requirements, improving performance, supporting program development and data analysis.
- **Our mission:** To provide training, technical assistance, data analysis, partnership building for health centers to support improved health outcomes for residents of public housing.

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National Center for Health in Public Housing



Bob Burns, MPA
Director



Jose Leon, MD
Chief Medical Officer



Kevin Lombardi MD, MPH
Director of Research



**Fide Pineda Sandoval,
MPH, CHES**
Training and Technical
Assistance Manager



Olajumoke Oladipo, MPH
Health Communications and
Research Analyst

Learning Outcomes

By the end of this webinar, participants will be able to:

- Discuss the serious health risks associated with radon exposure and its impact on community health
- State how radon contributes to chronic conditions like COPD and Congestive Heart Failure and increases the risk of developing lung cancer
- Describe prevention and mitigation strategies for better health outcomes



Subject Matter Expert



Nate Burden

Environmental Services Training Director, Fidelity
Inspection and Consulting Services

RADON: A PREVENTABLE INDOOR AIR QUALITY RISK FOR THE BUILT ENVIRONMENT: A FOCUSED TRAINING, ASSESSMENT, AND RECOMMENDED ACTION/SOLUTIONS PRESENTATION

Presenter: Nathaniel L. Burden, Jr.,
nateburden@msn.com

- Radon Scientist, National Radon Training Instructor (Spruce Environmental)
- PA DEP Radiation Protection Advisory Committee member
- PA Chapter President & sit on Board of Directors: Indoor Environments Association dba American Association of Radon Scientists and Technologists (AARST)



Radon Facts

What is Radon? It is an odorless, colorless, tasteless radioactive gas scientists and doctors have proven can cause cancer.



-Radon is produced by the breakdown of uranium in soil, and rocks

-Radon is the the second leading cause of lung cancer in the United States today

-The EPA says 15 percent of homes in the U.S. have unsafe radon levels

-Radon carries approximately 1000 times the risk of death as any other EPA carcinogen



RADON 101 REVIEW

- Why is this radioactive toxic radon gas pollutant in our homes, schools, workplaces, and child care facilities a big deal?
- This radioactive toxic pollutant can cause lung cancer and other health risks to us and our children.
- If this is such a danger to us and our children, why isn't it a priority to everyone?
- Why is radon testing not required for all homes, schools, workplaces, and childcare facilities (**BUILT ENVIRONMENT**)?
- **THE ANSWER IS BECAUSE RADON IS INVISIBLE!!!!**



RISK PERCEPTION IS THE PROBLEM

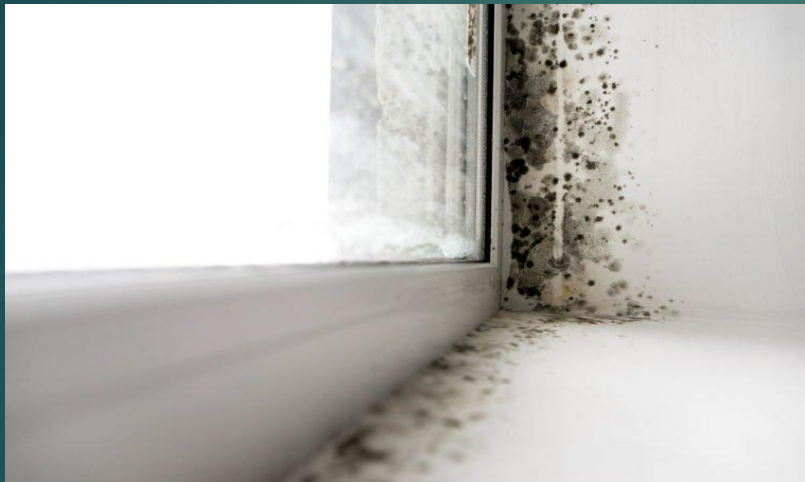


PERCEPTION, MANY TIMES IS REALITY

- Can't see it.
- Can't smell.
- Can't taste it or feel it.
- In many minds of the public and us, the radon risk is not truly real!.
- It is not on the public's radar.
- Because the risk is not perceived or believed, does the danger and outcome disappear?



Radon Threat Is Invisible, Tasteless, And Odorless, But If..



<https://www.rd.com/health/wellness/hidden-signs-of-toxic-mold/>

People would then test and mitigate radon gas, if it offended the senses!

Radon does not impact the senses!

**HOW DO I CONVINCe YOU ABOUT THE RADON HEALTH RISK
AND THAT YOU SHOULD TAKE ACTION?**

READING THE SIGNS OF RISK: LOOK CLOSER!



Sometimes, it's the small details that count.

Before we talked about radon, let's talk about lung cancer

- Cancer is when cells' DNA/genes are damaged and cannot be repaired by the body.
- The damaged cells lose their growth control, and multiply.
- These cancer cells can create tumors and can spread and migrate to other areas of the body.

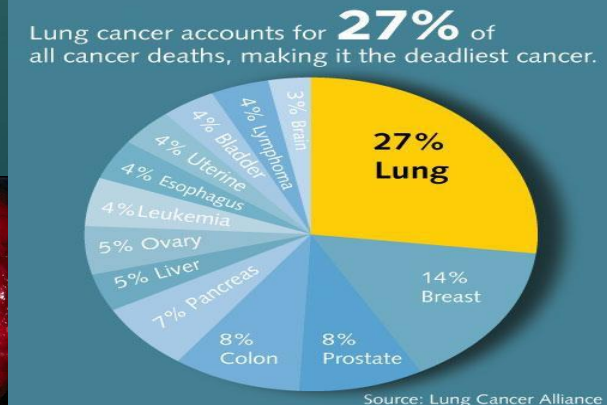
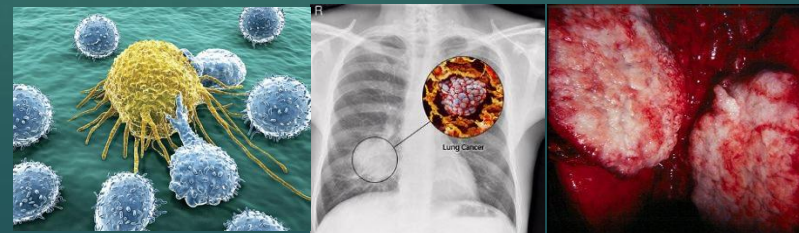
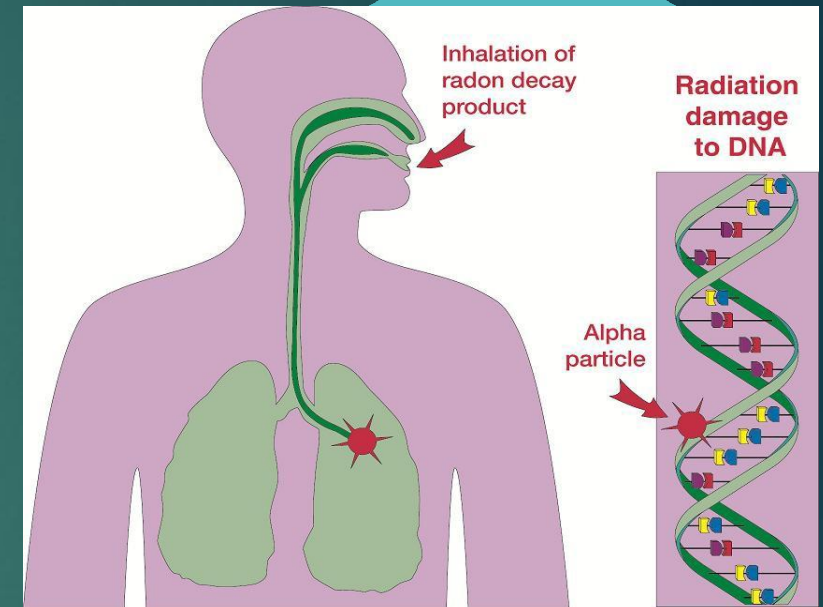
Lung cancer is the #1 cancer killer compared to other cancer types.

- Lung cancer usually is not diagnosed till later stages.
- The latter the stage diagnosis, the less survivability.

It was estimated for 2019, more than 228,000 people will be diagnosed with lung cancer.

Smoking is the number one cause of lung cancer, RADON IS THE SECOND LEADING CAUSE OF LUNG CANCER



For never-smokers, radon-induced lung cancer is the Number #1 cause of lung cancer.





LUNG CANCER



Figure 3. Leading Sites of New Cancer Cases and Deaths – 2024 Estimates

	Male					Female		
Prostate	299,010	29%		Breast	310,720	32%		
Lung & bronchus	116,310	11%		Lung & bronchus	118,270	12%		
Colon & rectum	81,540	8%		Colon & rectum	71,270	7%		
Urinary bladder	63,070	6%		Uterine corpus	67,880	7%		
Melanoma of the skin	59,170	6%		Melanoma of the skin	41,470	4%		
Kidney & renal pelvis	52,380	5%		Non-Hodgkin lymphoma	36,030	4%		
Non-Hodgkin lymphoma	44,590	4%		Pancreas	31,910	3%		
Oral cavity & pharynx	41,510	4%		Thyroid	31,520	3%		
Leukemia	36,450	4%		Kidney & renal pelvis	29,230	3%		
Pancreas	34,530	3%		Leukemia	26,320	3%		
All sites	1,029,080			All sites	972,060			

	Male					Female		
Lung & bronchus	65,790	20%		Lung & bronchus	59,280	21%		
Prostate	35,250	11%		Breast	42,250	15%		
Colon & rectum	28,700	9%		Pancreas	24,480	8%		
Pancreas	27,270	8%		Colon & rectum	24,310	8%		
Liver & intrahepatic bile duct	19,120	6%		Uterine corpus	13,250	5%		
Leukemia	13,640	4%		Ovary	12,740	4%		
Esophagus	12,880	4%		Liver & intrahepatic bile duct	10,720	4%		
Urinary bladder	12,290	4%		Leukemia	10,030	3%		
Non-Hodgkin lymphoma	11,780	4%		Non-Hodgkin lymphoma	8,360	3%		
Brain & other nervous system	10,690	3%		Brain & other nervous system	8,070	3%		
All sites	322,800			All sites	288,920			

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates do not include Puerto Rico or other US territories. Ranking is based on modeled projections and may differ from the most recent observed data.

©2024, American Cancer Society, Inc., Surveillance and Health Equity Science

An estimated 234,580 new cases of lung and bronchial cancer were diagnosed in 2024.

Around 125,070 people died from lung cancer in 2024.

81% of lung cancer deaths in 2024 were attributed to cigarette smoking.

Lung cancer accounts as the most deadliest cancer – Source: American Lung Association

Radon is estimated to be responsible for approximately 21,000 lung cancer deaths annually, representing roughly 3% to 14% of all lung cancer cases.

Cancer Type	Estimated Deaths in 2019	
Lung Cancer	142,670	
Colorectal Cancer	51,020	
Breast Cancer (Female)	41,760	
Liver and Bile Duct	31,780	
Prostate Cancer	31,620	
Leukemia	22,840	
LUNG CANCER CAUSED BY RADON	21,000	(1995 estimate)
Non-Hodgkin Lymphoma	19,970	
Bladder Cancer	17,670	
Kidney and Renal Pelvis Cancer	14,770	

Radon is the #1 Reason Non-Smokers Get Lung Cancer



What can be done to keep
lungs healthy?

- Test your home for radon gas
- Review your test results
- Follow what is recommended
- Lower your radon levels if they are high

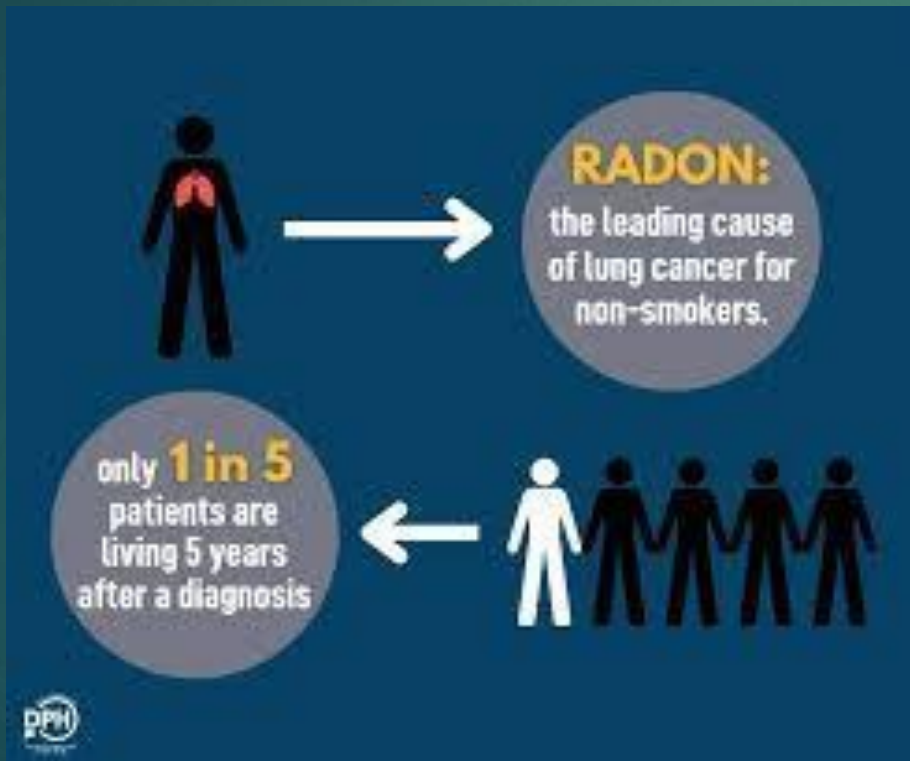


Table 1. Risk factors for the development of lung cancer in never-smokers

Radon

Indoor air pollution, eg. second-hand smoke

Occupational exposure, eg. paint, paint thinners

Burning biomass fuels

History of lung disease, eg. pulmonary tuberculosis

Ionising radiation

Family history

Studies on Radon and Lung Cancer: A Good Starting Reference Review

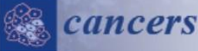



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► [Cancers \(Basel\)](#). 2022 Jun 27;14(13):3142. doi: [10.3390/cancers14133142](https://doi.org/10.3390/cancers14133142)

Radon and Lung Cancer: Current Trends and Future Perspectives

[Mariona Riudavets](#)^{1,†}, [Marta Garcia de Herreros](#)^{2,†}, [Benjamin Besse](#)^{1,*}, [Laura Mezquita](#)^{2,3,4}

Editors: Paul Hofman, Sendurai A Mani, George A Calin, Ignacio I Wistuba, Fabrizio Bianchi

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Molecular drivers in NSCLC are more often described in non-smoker patients and a potential association between radon exposure and oncogenic-driven NSCLC has been postulated.

Radon causes DNA damage and high genomic tumor instability, but its exact carcinogenesis mechanism and relationship with lung cancer remains unknown.

EPA Radon Risk

Lifetime Risk of Lung Cancer Death (Per Person) From Radon Exposure in Homes

RADON LEVEL (pCi/L)	NEVER SMOKERS	CURRENT SMOKERS	GENERAL POPULATION
20	36 out of 1,000	26 out of 100	11 out of 100
10	18 out of 1,000	15 out of 100	56 out of 1,000
8	15 out of 1,000	12 out of 100	45 out of 1,000
4	73 out of 10,000	62 out of 1,000	23 out of 1,000
2	37 out of 10,000	32 out of 1,000	12 out of 1,000
1.25	23 out of 10,000	20 out of 1,000	73 out of 10,000
0.4	73 out of 100,000	64 out of 10,000	23 out of 10,000

Estimated Risks at the EPA Action Level (4 pCi/L)

Never Smokers 7/1000 | Smokers 6/100

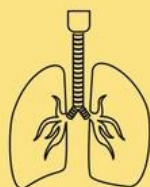


Radon is a cancer-causing gas

It comes from the radioactive decay of uranium and radium and exists naturally in rocks like granite. Colorado's large amount of granite translates to much higher levels of Radon than national averages.



Like carbon monoxide it is tasteless, colorless and odorless.



Radon breaks down into radioactive particles

Which are inhaled and become trapped inside the lungs. As these particles break down further they can damage the lung tissue and alter the DNA of the cells.



Radon is a leading cause of lung cancer

Only smoking causes more lung cancer deaths than exposure to Radon.



CARCINOGEN THAT CAUSES LUNG CANCER

Class A: Carcinogenic to Humans

RADON IS AN EPA "CLASS A" HUMAN

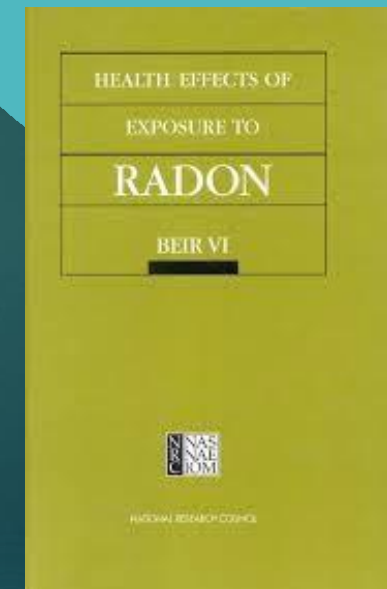
- Class B: Likely to be Carcinogenic to Humans
- Class C: Suggestive Evidence of Carcinogenic Potential
- Class D: Inadequate Information to Assess Carcinogenic Potential
- Class E: Not Likely to be Carcinogenic to Humans

Group A - Carcinogenic to Humans: Agents with adequate human data to demonstrate the causal association of the agent with human cancer (typically epidemiologic data).

The Weight of Evidence:

1. **Epidemiology**-human data—dose response assessment
2. **Results** of long-term experimental **animal bioassays**
3. **MECHANICS/SCIENCE**: Supporting data, including a variety of short-term tests for genotoxicity and other relevant properties, pharmacokinetic and metabolic studies, and structure-activity relationships

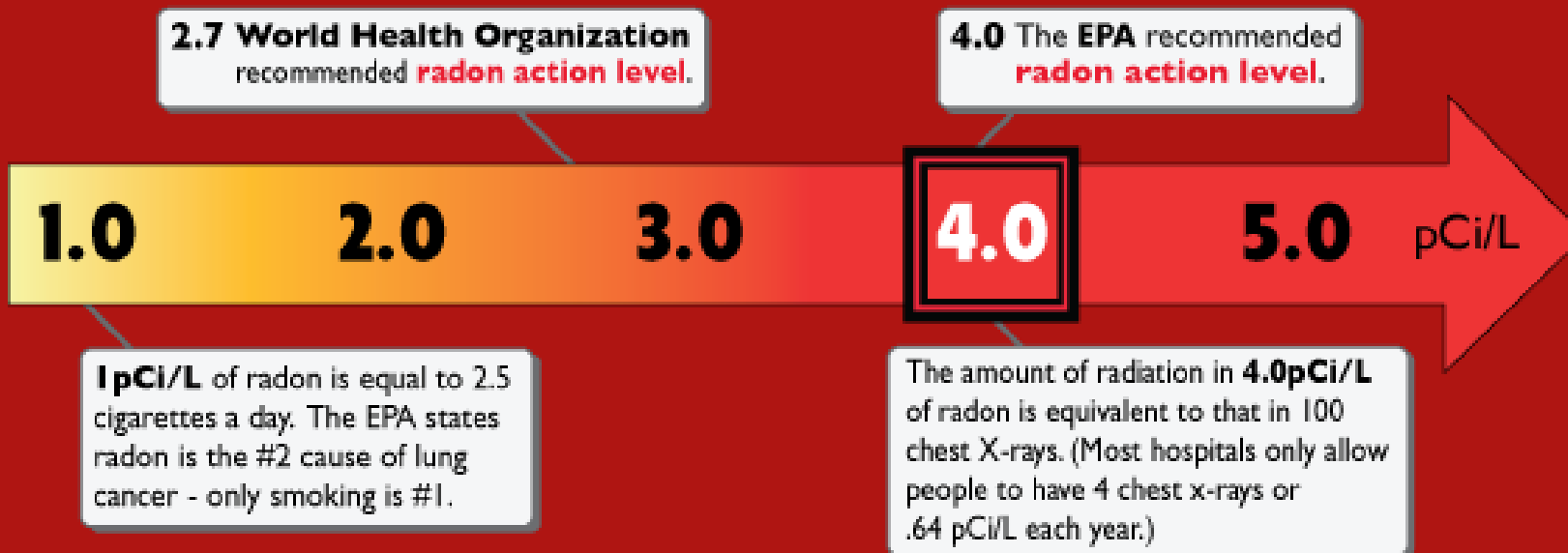
THERE IS NO DOUBT THAT EXPOSURE TO **RADIOACTIVE RADON GAS** AND ITS **RADIOACTIVE DECAY PRODUCTS** CAN CAUSE LUNG CANCER!



EPA RADON ACTION LEVEL:

KEEP IN MIND THAT EVEN RADON LEVELS BELOW 4.0 pCi/L, STILL POSE A RISK. THE **GOAL IS TO MITIGATE THE RADON LEVELS AS LOW AS ACHIEVABLE.**

TESTING: The only way to know if you have a radon problem

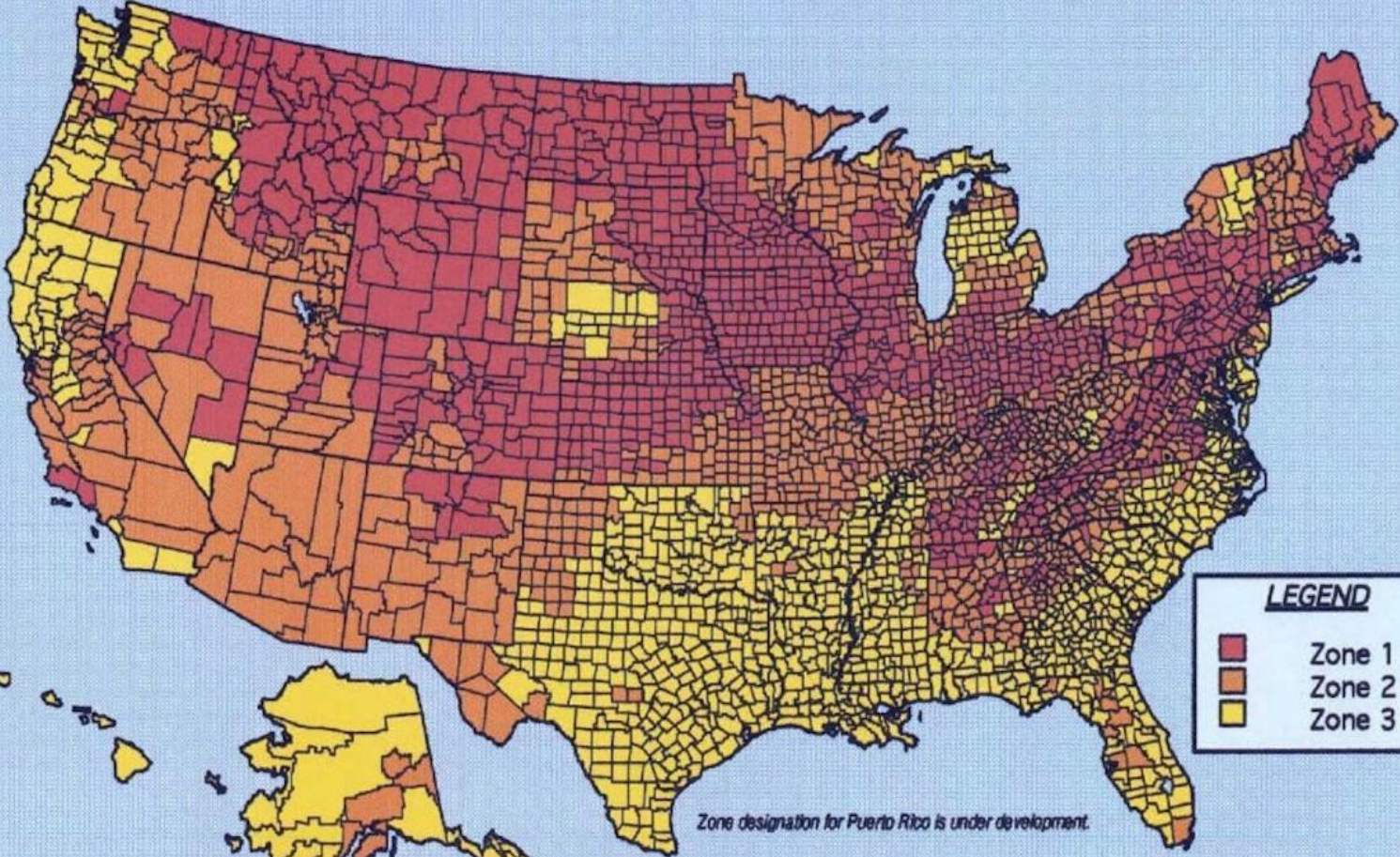


The EPA says radon poses a greater health risk to children than to adults.

Information Provided By: **National Radon Defense**



EPA Map of Radon Zones



LEGEND

- Zone 1
- Zone 2
- Zone 3

The purpose of this map is to assist National, State, and local organizations to target their resources and to implement radon-resistant building codes. This map is not intended to be used to determine if a home in a given zone should be tested for radon. Homes with elevated levels of radon have been found in all three zones. All homes should be tested regardless of geographic location.

IMPORTANT : Consult the EPA Map of Radon Zones document (EPA-402-R-93-071) before using this map. This document contains information on radon potential variations within counties. EPA also recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.

Guam - Preliminary Zone designation

5 things you should know about RADON:

- It's the #1 cause of lung cancer in non-smokers in the U.S.
- It's found everywhere in Pennsylvania.
- Testing is the only way to know if your home is at risk.
- Testing is easy and inexpensive.
- 40 % of Pa. homes have radon levels above recommended safe levels.



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

For more information visit
www.dep.pa.gov/radon or call
1.800.23.RADON.

PLEASE NOTE, THERE IS NO SAFE RADON LEVEL! THE EPA 4 PCI/L IS NOT BASED FULLY ON HEALTH RISK!

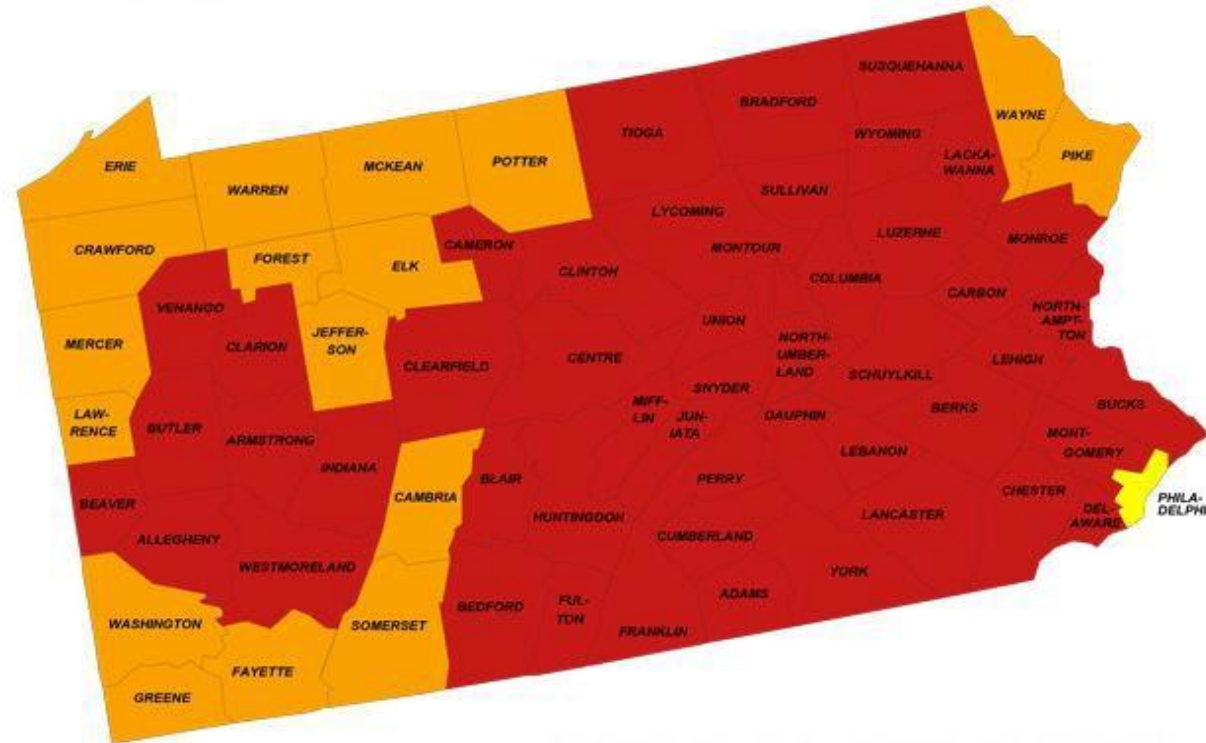
PENNSYLVANIA - EPA Map of Radon Zones

<http://www.epa.gov/radon/zonemap.html>

The purpose of this map is to assist National, State and local organizations to target their resources and to implement radon-resistant building codes.

This map is not intended to determine if a home in a given zone should be tested for radon.

All homes should be tested, regardless of zone designation.



WARNING: THE ONLY WAY TO KNOW IF YOU HAVE ELEVATED RADON IS TO TEST!!!!
ELEVATED RADON LEVELS HAVE BEEN FOUND IN THE YELLOW LOW POTENTIAL RADON ZONE ALSO.
The map zones are a potential guide only?

PENNSYLVANIA HAS THE HIGHEST RADON LEVELS MEASURED IN THE OVER 17,000 PCI/L.

EPA ACTION LEVEL IS 4 PCI/L IN LEHIGH COUNTY

	Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (pico curies per liter) (red zones)	Highest Potential
	Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones)	Moderate Potential
	Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones)	Low Potential

Key Conclusions about Radon

Radon is responsible for about 21,000 lung cancer deaths every year.

-- U. S. Environmental Protection Agency

Each year, lung cancer caused by radon costs about \$2 billion in medical care expenses and lost productivity.

-- Centers for Disease Control and Prevention





PENNSYLVANIA

The Radon Report Card: Risk and Response

Population and Lung Cancer Total Population: 12,800,922

Lung Cancer Deaths: **6,778**

Age-Adjusted Lung Cancer Incidence Rate (per 100,000) **60**

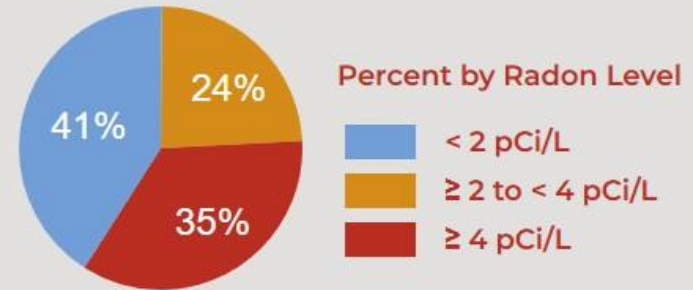
Lung Cancer Cases **10,805**

Radon-Induced Lung Cancer Cases **3,018**

* Medical Costs (hospital, medicine, doctors) **\$607,000,000**

* Economic Costs (lost wages / productivity) **\$637,000,000**

Buildings and Exposure Potential Pre-Mitigation Radon Tests: 940,627



Housing Units by Structure Type

	1 to 4 Units	5 or More Units	Total
Existing	5,004,266	687,557	5,691,823
New	16,442	7,097	23,539

Public Schools: 2,947

Statewide Radon Policies

Credential Required	✓	State Certification
Radon Standards in Effect	✓	PA Testing and Mitigation; EPA Schools; ANSI-AARST Multifamily
Homebuyer Protection Required	✓	Disclosure Only
Radon System Requirement for New Homes	✗	No
Type of New Home Where Required		N/A
Standard/Code for Radon System in New Homes		N/A
School Testing Required	✗	No
Radon System Requirement for New Schools	✗	No

EPA and ANSI-AARST Radon Measurement Standards recommend fixing a building with a radon level ≥ (above or equal to) 4 pCi/L and consider fixing it if any radon level is ≥ 2 and < (below) 4 pCi/L.



DELAWARE

The Radon Report Card: Risk and Response

Population and Lung Cancer Total Population: 965,479

Lung Cancer Deaths: 529 **Age-Adjusted Lung Cancer Incidence Rate (per 100,000) 58**

Lung Cancer Cases 802

Radon-Induced Lung Cancer Cases 71

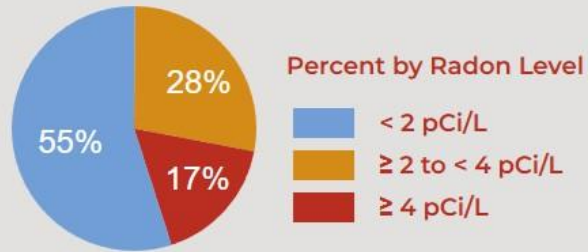
* Medical Costs (hospital, medicine, doctors) \$14,000,000

* Economic Costs (lost wages / productivity) \$15,000,000

Statewide Radon Policies

Credential Required	✗	None
Radon Standards in Effect	✗	None
Homebuyer Protection Required	✓	Notification & Disclosure
Radon System Requirement for New Homes	✗	No
Type of New Home Where Required		N/A
Standard/Code for Radon System in New Homes		N/A
School Testing Required	✗	No
Radon System Requirement for New Schools	✗	No

Buildings and Exposure Potential Pre-Mitigation Radon Tests: 12,214



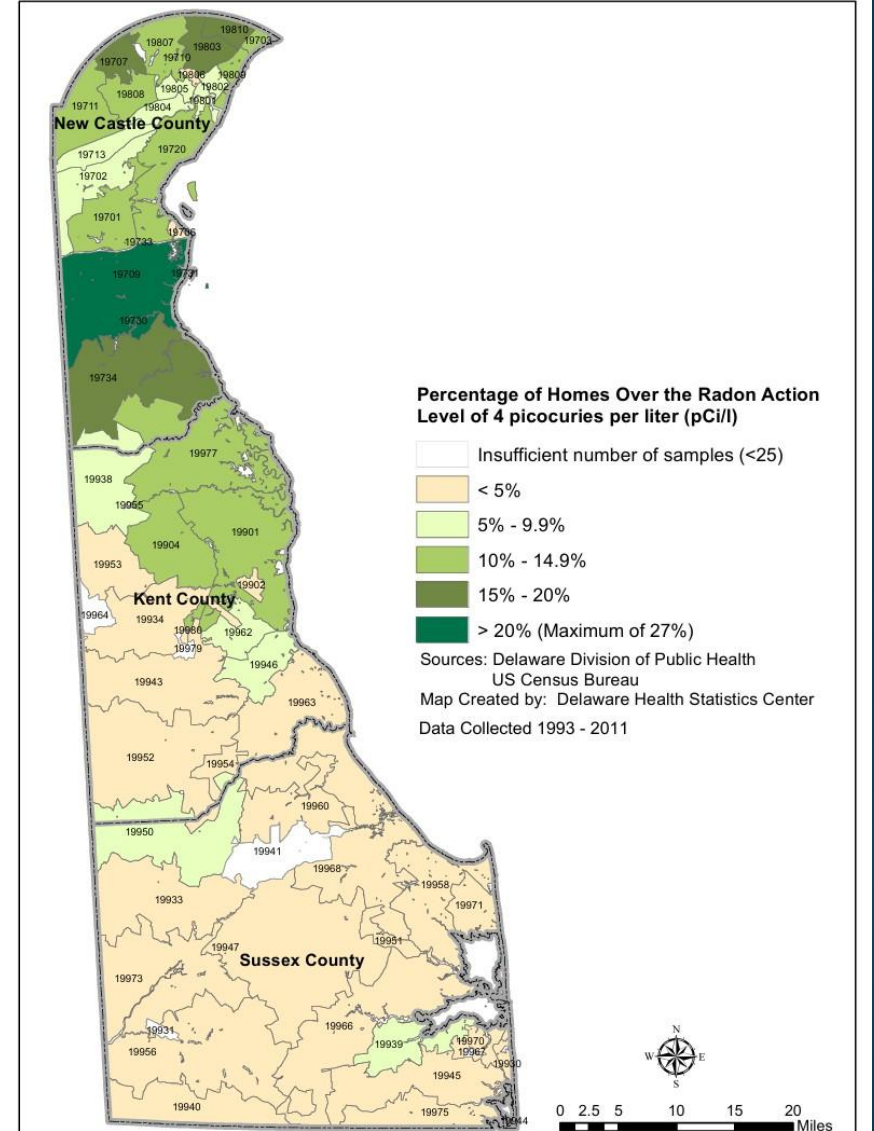
Housing Units by Structure Type

	1 to 4 Units	5 or More Units	Total
Existing	373,376	59,542	432,918
New	5,824	715	6,539

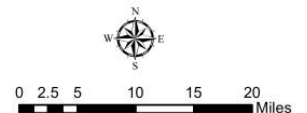
Public Schools: 225

EPA and ANSI-AARST Radon Measurement Standards recommend fixing a building with a radon level ≥ (above or equal to) 4 pCi/L and consider fixing it if any radon level is ≥ 2 and < (below) 4 pCi/L.

Delaware Radon Incidence by ZIP Code



Total Population; Lung Cancer Deaths; Age-Adjusted Lung Cancer Rate (per 100,000); Lung Cancer Deaths: CDC US Cancer Statistics (2018). Estimated Radon-Induced Lung Cancer Cases: Lung Cancer Cases weighted by scaled mean radon levels, CDC Environmental Public Health Tracking Network (2008-2017), National Cancer Institute, Cancer Trends Progress Report (2022) and Productivity Costs of Cancer Mortality in the US (2008). Statewide Radon Policies: IEA staff compilation, 2025. Pre-Mitigation Radon Tests from Labs: CDC Environmental Public Health Tracking Network (2008-2017). Existing Housing Units and New Housing Units: US Census (2019). Public Schools: National Center for Educational Statistics (2020-2021).



RADON LEVELS IN VARIOUS PA LOCATIONS

Penn Hills,



Radon Test Data by Zip Code

Zip Code	Location	Num of Tests	Max Result pCi/L	Avg Result pCi/L
15235	BASEMENT	5185	101.7	4.8
15235	FIRST FLOOR	270	53.4	3.6

THE ONLY WAY TO KNOW YOUR RADON LEVELS IN YOUR BUILDING IS TO TEST!

RADON TESTING IN A BUILDING SHOULD BE A "STANDARD OF CARE" in Pennsylvania.

Almost every single county in PA has shown some levels above 4.0 pCi/L

<http://cedatareporting.pa.gov/Reportserver/Pages/ReportViewer.aspx?/Public/DEP/RP/SSRS/RadonZipWexford,PA>

Emmaus,



Radon Test Data by Zip Code

Zip Code	Location	Num of Tests	Max Result pCi/L	Avg Result pCi/L
18049	BASEMENT	4108	1440.4	8.3
18049	FIRST FLOOR	519	81.2	4.6

Doylestown,



Radon Test Data by Zip Code

Zip Code	Location	Num of Tests	Max Result pCi/L	Avg Result pCi/L
18901	BASEMENT	16156	427.8	5.4
18901	FIRST FLOOR	3930	155.8	3.4



Radon Test Data by Zip Code

Zip Code	Location	Num of Tests	Max Result pCi/L	Avg Result pCi/L
15090	BASEMENT	11576	240.9	8.6
15090	FIRST FLOOR	943	66.5	5.8

Radon by the Numbers



21,000
lung cancer deaths per year

#1

environmental
cause of **any** cancer



#1

cause of lung cancer among
people who have **never** smoked



10x

risk of lung cancer
among **people who**
smoke compared with people who
never smoked with same radon exposure



1 in 15

homes in the US have
high radon levels



If radon levels are ≥ 4.0 pCi/L, EPA recommends installing a radon reduction system.

This equals...

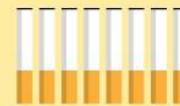


200
chest x-rays per year

or

8

cigarettes per day



pCi/L is shorthand for picocuries per liter, the units of measurement of the amount of radon in an air sample.

2 steps

to protect yourself
from radon-associated
lung cancer:

Test your home's
radon levels.



Fix your home if radon
levels are
 ≥ 4 pCi/L.



www.cdc.gov/radon

Data sources: Environmental Protection Agency (EPA) and the American Association of Radon Scientists & Technologists

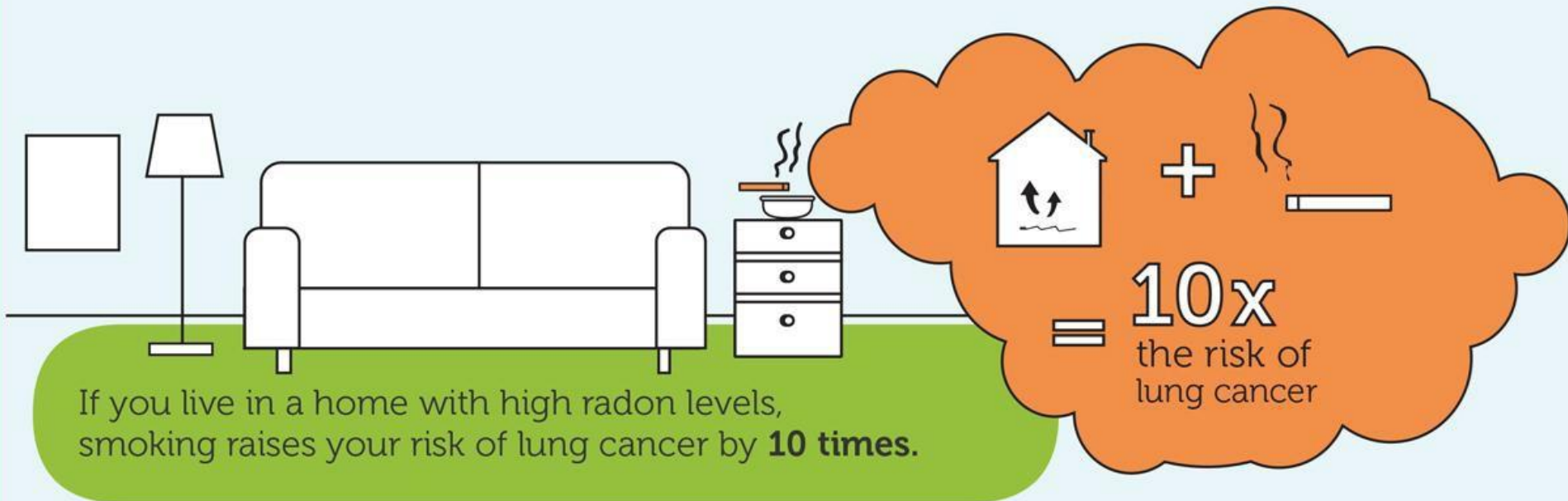
Radon exposure is preventable. We can act to reduce lung cancer risk for all **Built Environments** (both facilities and home-base)

Did you know?

- **11-15% of 230,000 lung cancer cases are attributable to radon**
- **EPA estimates that 21,000 radon induced lung cancer deaths occur annually**
- Radon is carcinogenic, and long-term exposure to radon can cause lung cancer
- **PA (Lehigh County) has the highest recorded radon level in the US (greater than 17,000 pCi/L)**
- About 40% of PA homes have elevated radon levels (above 4 pCi/L)



Radon and Smoking: A Dangerous Combination



Learn more by calling the National Radon Hotline:

1-800-SOS-RADON (1-800-767-7236)

Source: U.S. Environmental Protection Agency

- Radon-induced Chromosome Damage in Blood Lymphocytes of Smokers
- <https://scialert.net/fulltext/?doi=rjet.2012.51.58>
- **CONCLUSION: The present study reveals significantly higher frequency of chromosome aberrations in smoker cells exposed in vitro to radon compared to non-smokers. Thus the synergistic effect of smoking and radon is well established.**

Research Journal of Environmental Toxicology

Year: 2012 | Volume: 6 | Issue: 2 | Page No.: 51-58

DOI: 10.3923/rjet.2012.51.58



CrossMark
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RESEARCH ARTICLE

Radon-induced Chromosome Damage in Blood Lymphocytes of Smokers

C. Meenakshi

Indira Gandhi Centre for Atomic Research, Radiological Safety Division, Kalpakkam-603102, Tamil Nadu, India

Mary N. Mohankumar

Indira Gandhi Centre for Atomic Research, Radiological Safety Division, Kalpakkam-603102, Tamil Nadu, India

> Int J Environ Res Public Health. 2020 Apr 24;17(8):2946. doi: 10.3390/ijerph17082946.

Residential Radon Exposure and Cigarette Smoking in Association with Lung Cancer: A Matched Case-Control Study in Korea

Eung Joo Park^{1,2}, Hokyoo Lee^{3,4}, Hyeon Chang Kim^{3,5}, Seung Soo Sheen⁶, Sang Baek Koh⁷, Ki Soo Park⁸, Nam Han Cho⁹, Cheol-Min Lee¹⁰, Dae Ryong Kang^{1,2}

Affiliations + expand

PMID: 32344675 PMCID: PMC7215527 DOI: 10.3390/ijerph17082946

Abstract

Residential radon exposure and cigarette smoking are the two most important risk factors for lung cancer. The combined effects thereof were evaluated in a multi-center matched case-control study in South Korea. A total of 1038 participants were included, comprising 519 non-small cell lung cancer cases and 519 age- and sex- matched community-based controls. Residential radon levels were

FULL TEXT LINKS



ACTIONS



SHARE



PAGE NAVIGATION



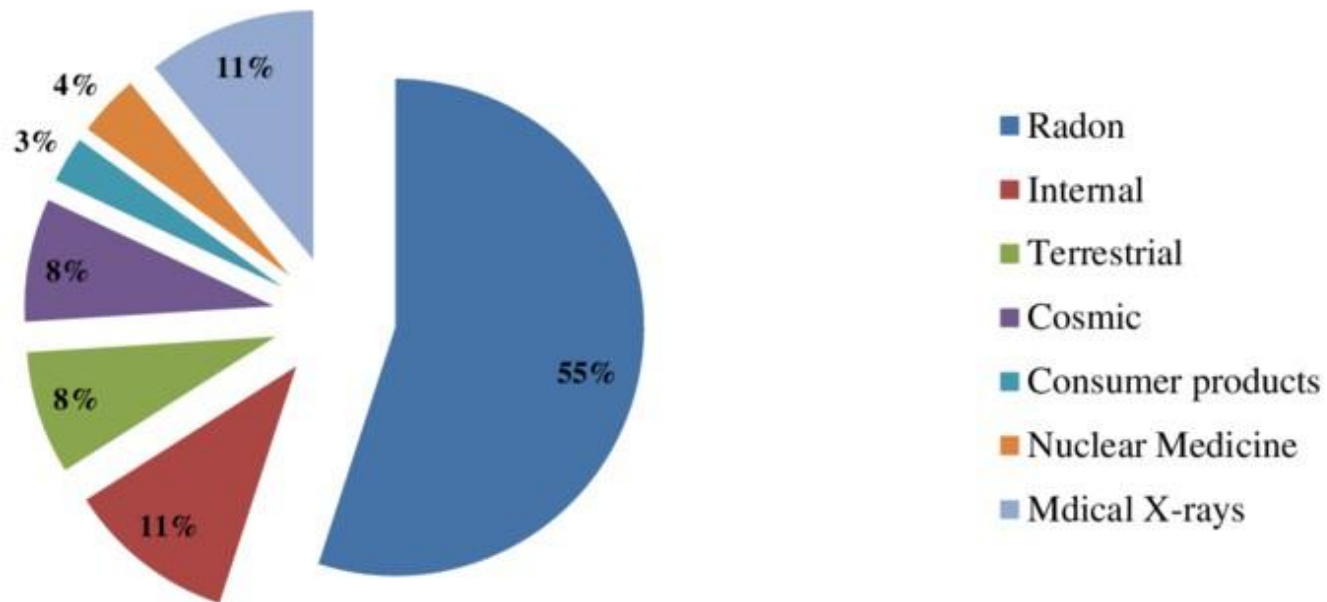
Conclusion: In conclusion we found both residential radon and cigarette smoking to be associated with increased odds for lung cancer, and the difference in ORs (odds ratios) according to radon exposure was much greater in smokers than in non-smokers.

Therefore, preventative strategies targeting radon-related lung cancer should emphasize, in addition to radon-reducing repairs and ventilation, both smoking cessation and withdrawing from second-hand smoking.

Recommendation: Should consider combining radon and smoking cessation messaging together for the public.

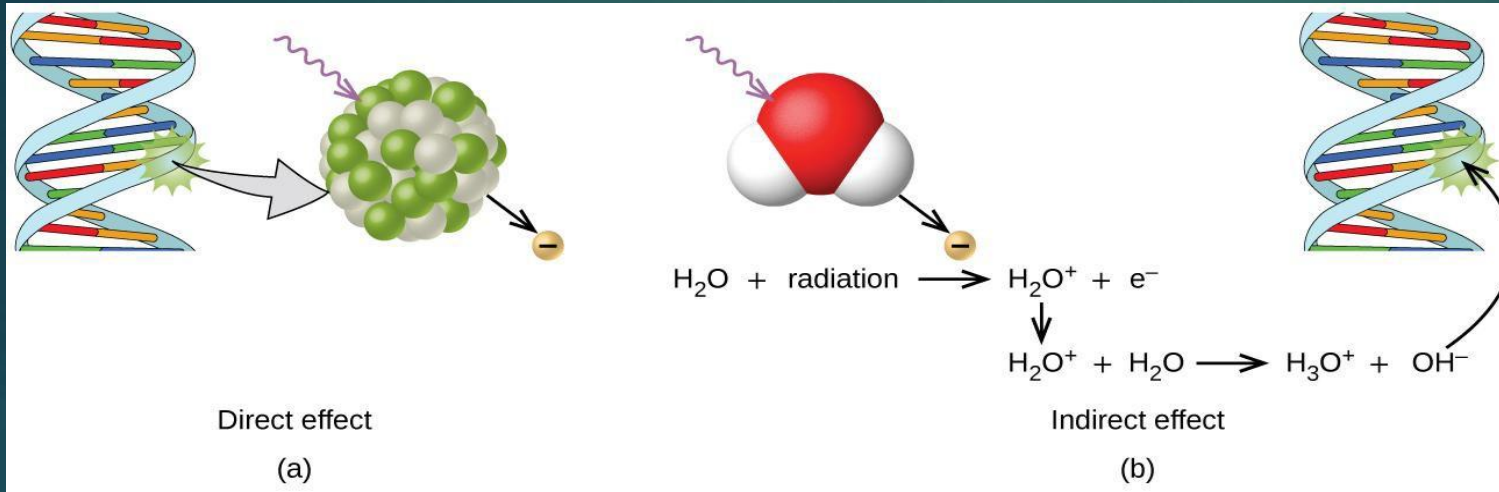
Radon poses the greatest ionizing radiation exposure to the public built environments (homes, schools, childcare buildings, workplaces, etc.)

Ionizing Radiation Exposure to the Public



Radon and decay products dose exposure is accumulative from all built environments (home, school, workplace)

THE FORENSICS OF RADON DECAY PRODUCTS ALPHA RADIATION DAMAGE TO LUNG CELLS: THE BULLETS OF RADIATION TO THE LUNG CELLS!



SO IT IS POSSIBLE EVEN ONE ALPHA PARTICLE IMPACT COULD CAUSE A LUNG CELL TO GO CANCEROUS.

THE HIGHER THE RADON LEVEL, THE HIGHER THE RISK

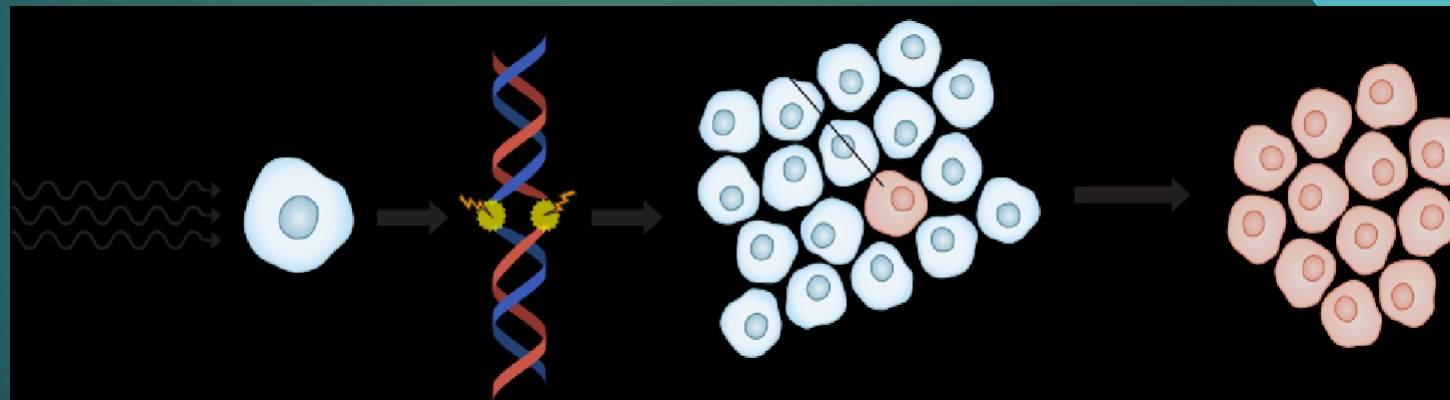
THE LONGER THE EXPOSURE THE HIGHER THE RISK

IF YOU SMOKE, THE RISK OF LUNG CANCER IS HIGHER

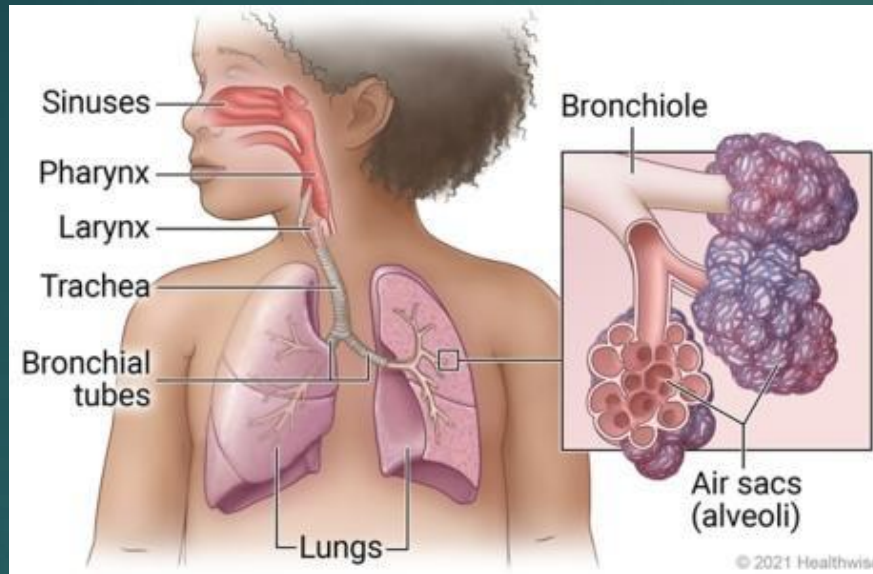
GENETIC DISPOSITION ALSO PLAYS A PART.

LATENCY PERIOD IS AROUND 5-25 YRS RADON EXPOSURE

Keep in mind that cells can repair some damage, but not all. Other factors, genetic predisposition, other carcinogenic exposures. Long-term and cumulative damage.



THE KEY POINT FOR RADON TOXICITY FOR CHILDREN



U.S. Department of
Health and Human Services
Agency for Toxic Substances
and Disease Registry

How Can Radon Affect the Health of Children

A child's different lung shape, size, and breathing rates as compared with adults means higher estimated radiation doses.

- Risk of lung cancer in children resulting from exposure to radon may be almost twice as high as the risk to adults exposed to the same amount of radon.
- If children are also exposed to tobacco smoke, the risk of lung cancer is at least 20 times greater.

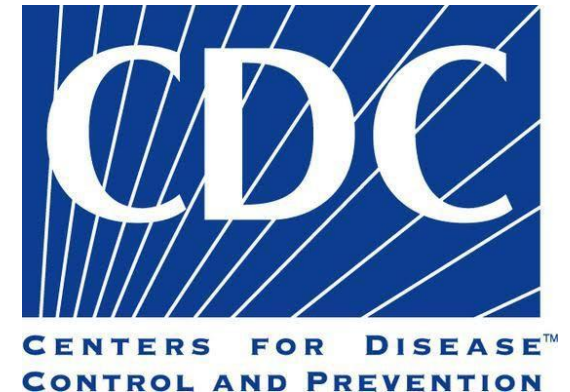
Key Conclusions About Radon

Radon is responsible for about 21,000 lung cancer deaths every year.

- U. S. Environmental Protection Agency

Each year, lung cancer caused by radon costs about \$2 billion in medical care expenses and lost productivity.

- Centers for Disease Control and Prevention



Radon Entry Into the Built Environment

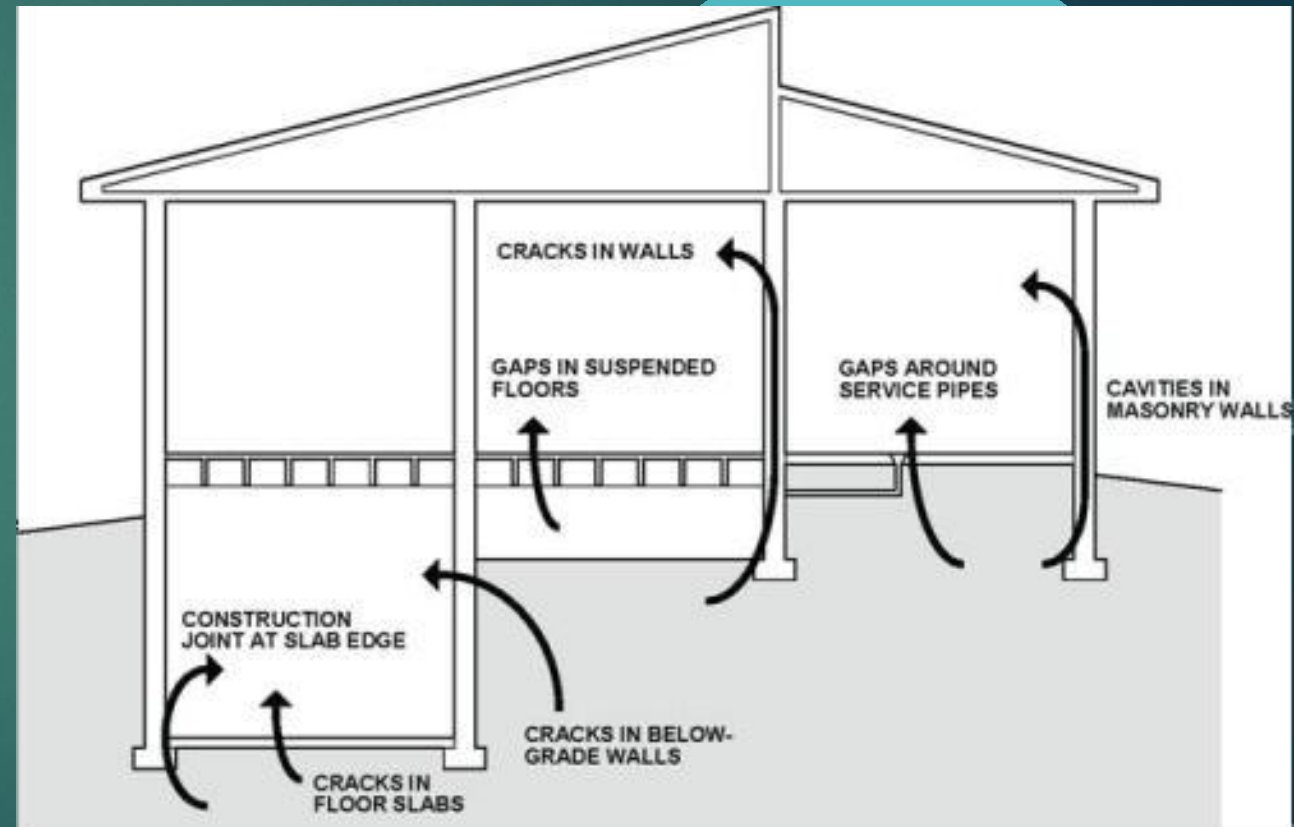
HOW RADON ENTERS A BUILDING



1) FRACTURED BEDROCK
2) SOIL
3) WELL WATER

4) LOOSE FITTINGS
5) GROUNDWATER
6) CRACKS

7) DRAINS
8) SUMP
9) WINDOWS



CRACKS IN WALLS

GAPS IN SUSPENDED FLOORS

GAPS AROUND SERVICE PIPES

CAVITIES IN MASONRY WALLS

CONSTRUCTION JOINT AT SLAB EDGE

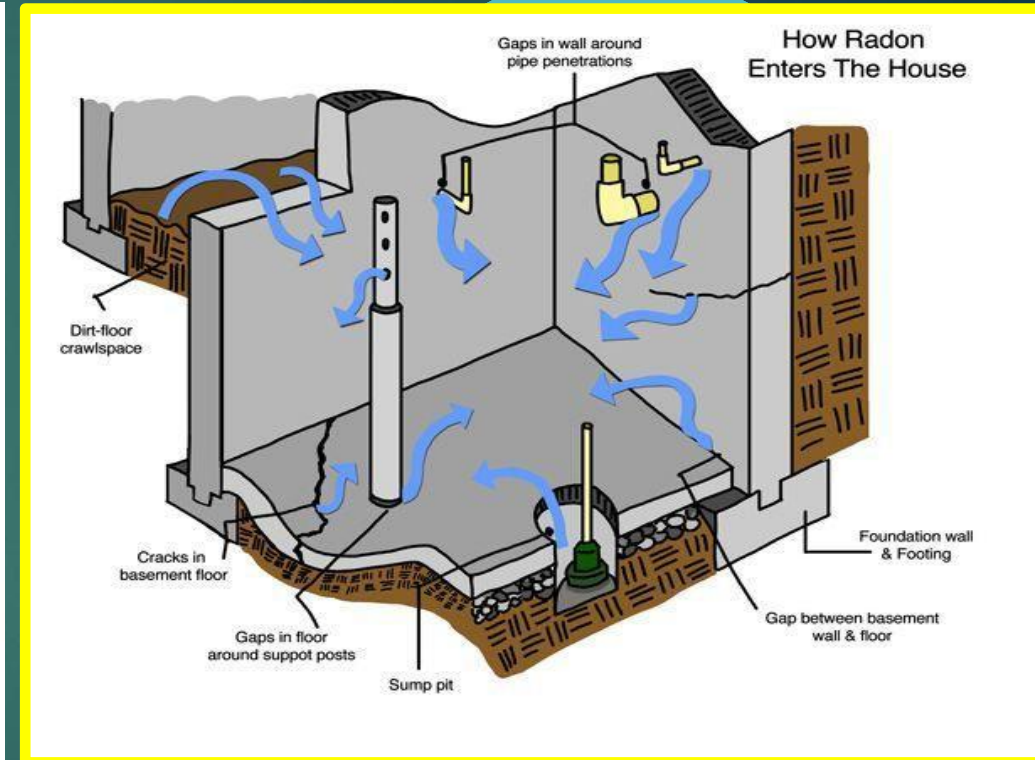
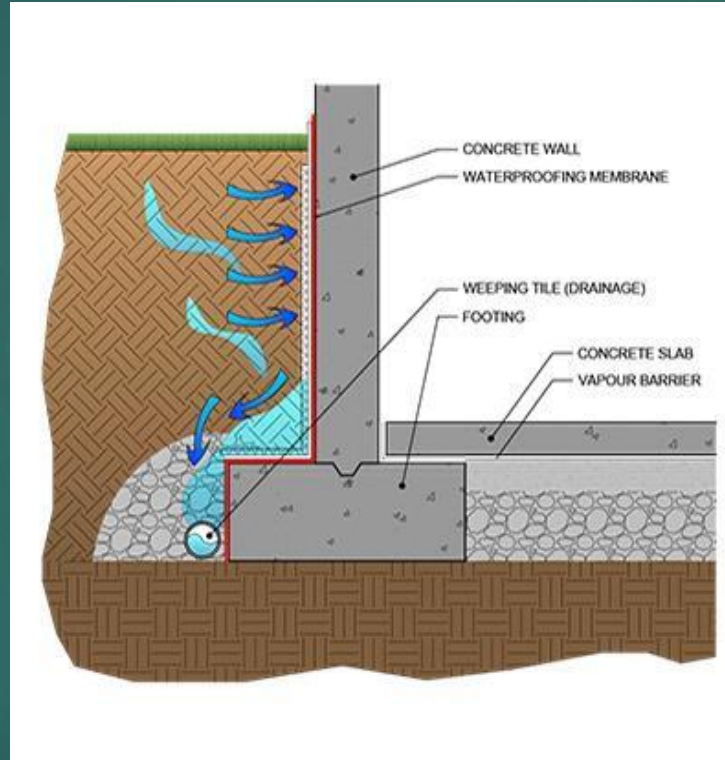
CRACKS IN BELOW-GRADE WALLS

CRACKS IN FLOOR SLABS

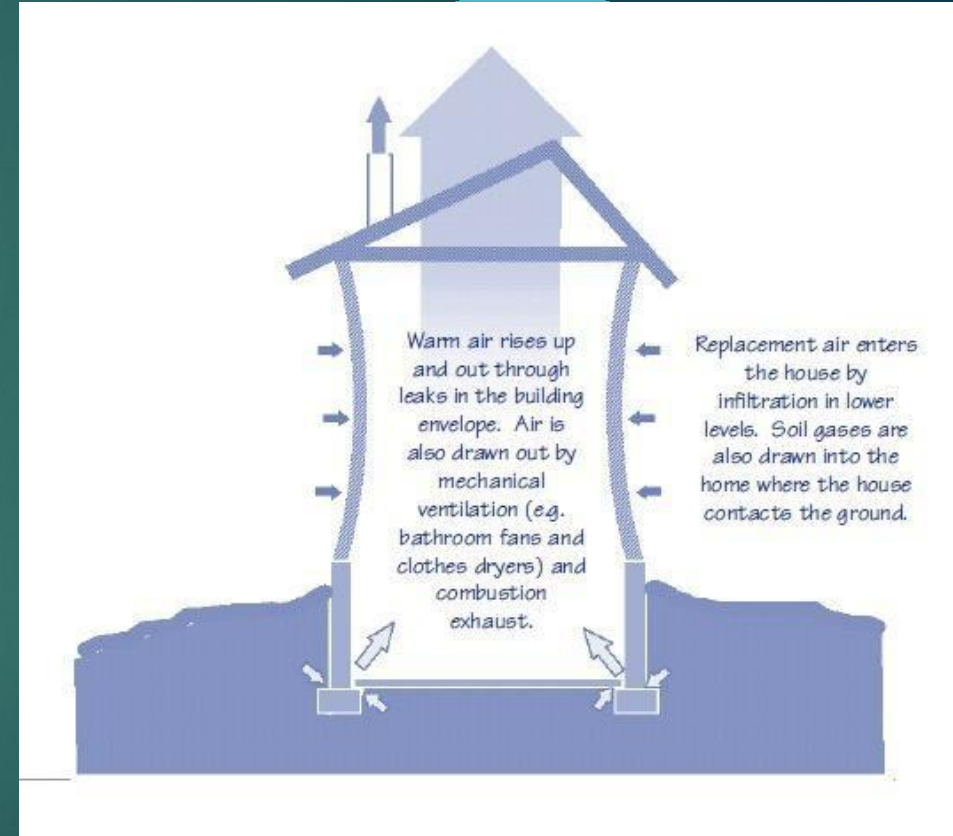
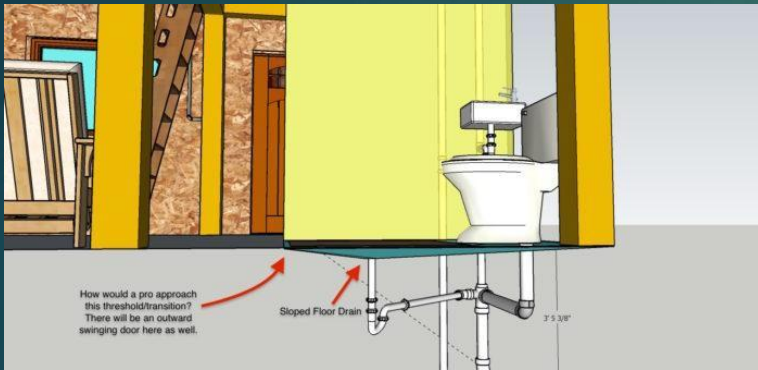
Basements or below grade spaces can be a major source of radon entry



www.bigstock.com · 340176220



Even slab on grade buildings can have elevated radon levels!



RADON ENTRY BASICS

Radon varies constantly

Lowest level



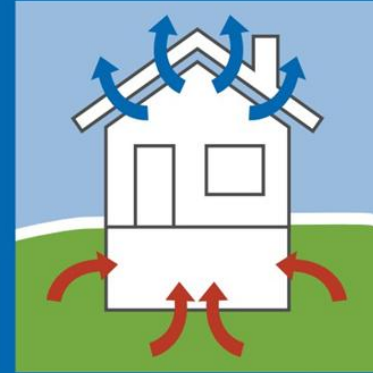
SUMMER

Highest level



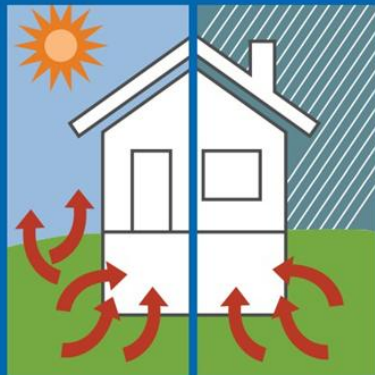
WINTER

Environmental effects: frost or other factors that “cap” soil



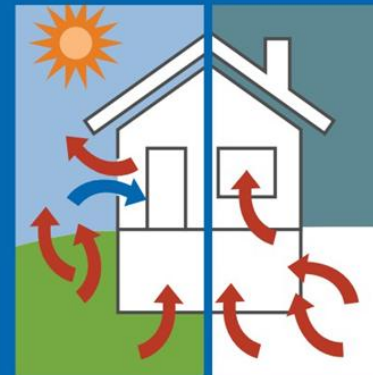
- Frost can “cap” the soil so negative pressure of buildings is exerted on larger area.
- Asphalt aprons around large buildings can have the same effect.

Rain effects



- Can “cap” the soil.
- Can displace and force soil gas into building.
- Often accompanied with barometric pressure changes.

Effects of open windows

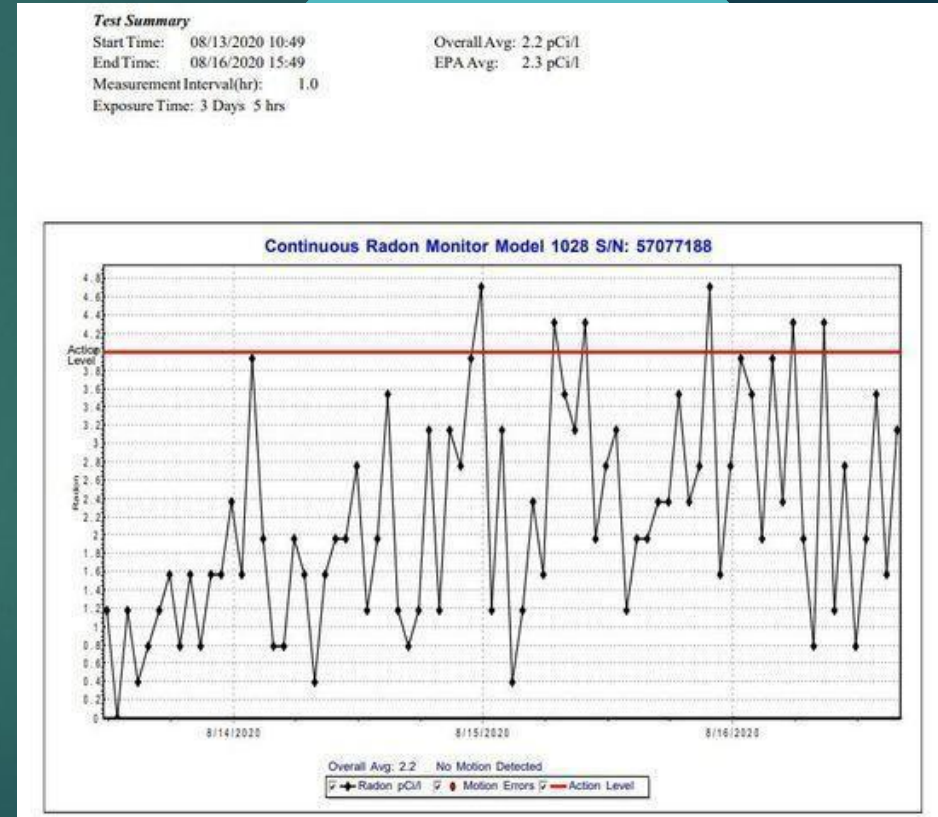
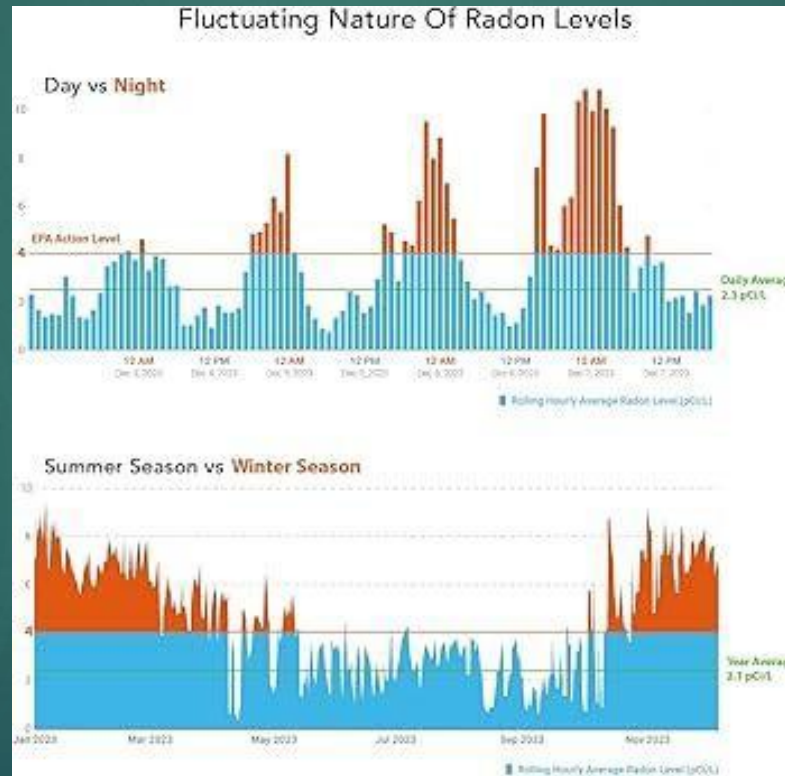
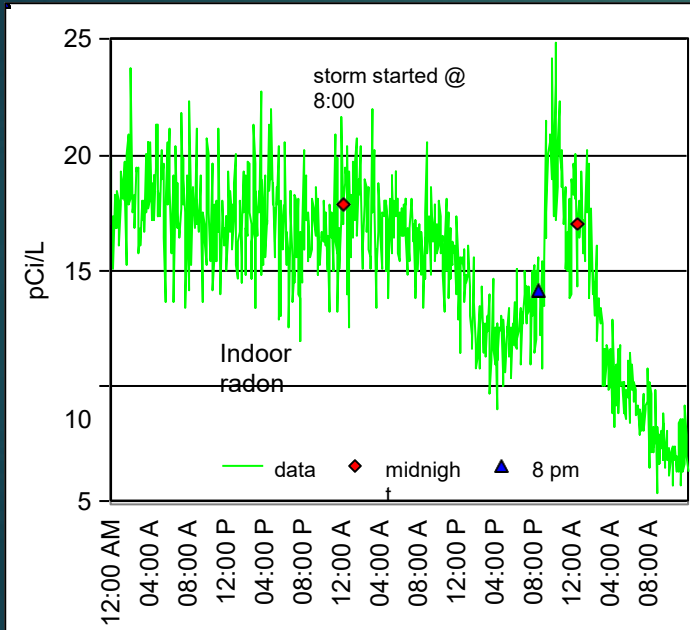


- Reduces vacuum and thereby reduces radon entry into building.
- Increases natural ventilation and radon dilution.
- Open windows do not reflect radon potential.

Rate of Radon Entry Varies

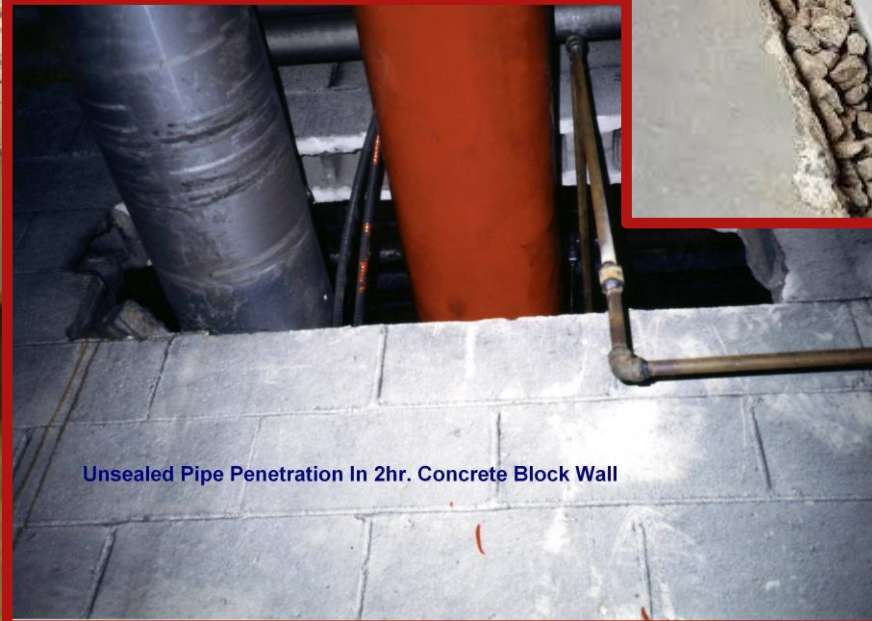
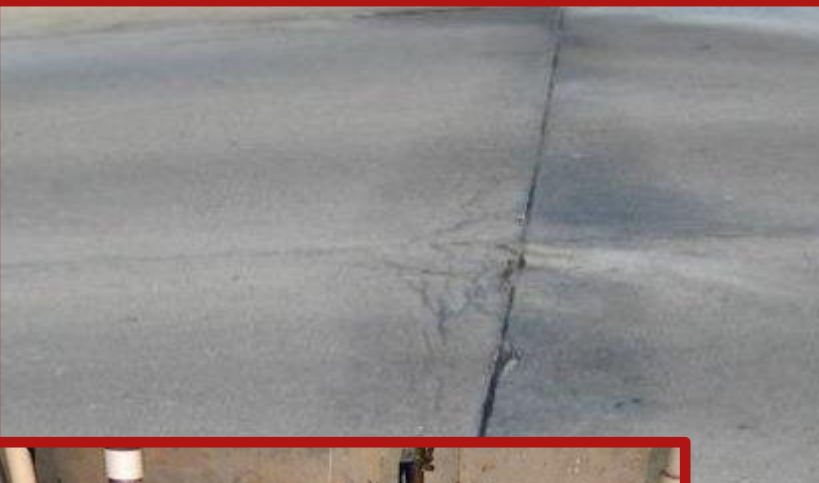
Radon concentrations can change rapidly in home

- Temperature and seasonal changes
- Weather changes
- Use of ventilation features in home



THE MAIN FOCUS ON RADON TEST LEVELS IS THE AVERAGE EXPOSURE RESULTS FOR A SPECIFIED TIME DURATION.

Radon Entry Into School Buildings/Houses



Unsealed Pipe Penetration In 2hr. Concrete Block Wall



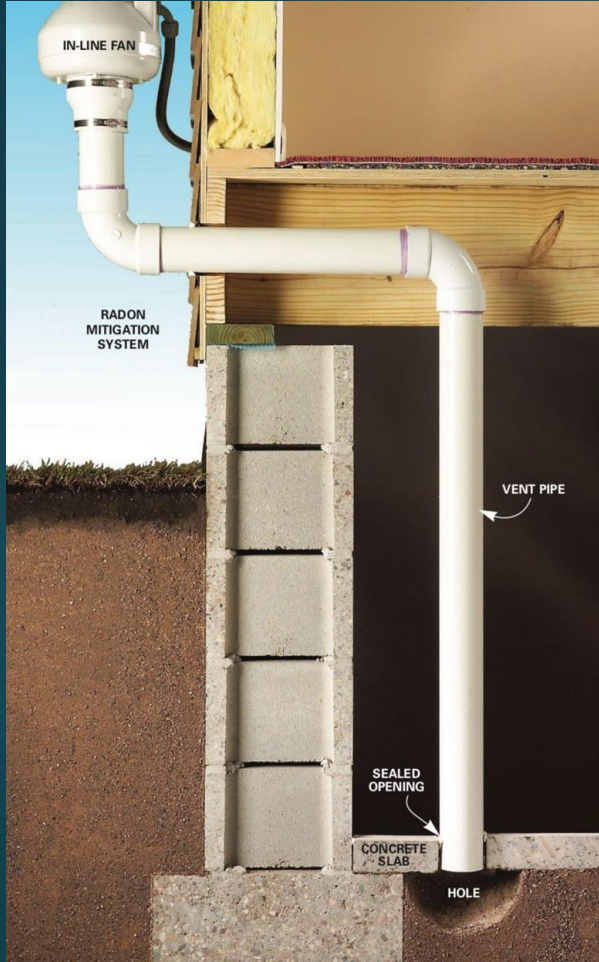
Radon Test Kits

THE ONLY TO KNOW IS TO TEST



- ✓ **Easy to use to determine if your home has elevated radon levels**
- ✓ **Cost in range of \$20 per test kit, that includes laboratory analysis**
- ✓ **Can be purchase at hardware stores, online or directly from radon test manufacturers**
- ✓ **CANCER BRIDGES WILL HAVE 65 FREE RADON TEST KITS TO PROVIDE FOR THIS PROGRAM**
- ✓ **Tests duration of 3-5 days. Recommend placing detectors in lowest livable room**
- ✓ **If radon levels low and if changes made to house, test every 5 yrs. KEEP RECORDS**

RADON MITIGATION SYSTEM FOR LOWERING THE RISK



Installed by a PA certified mitigator

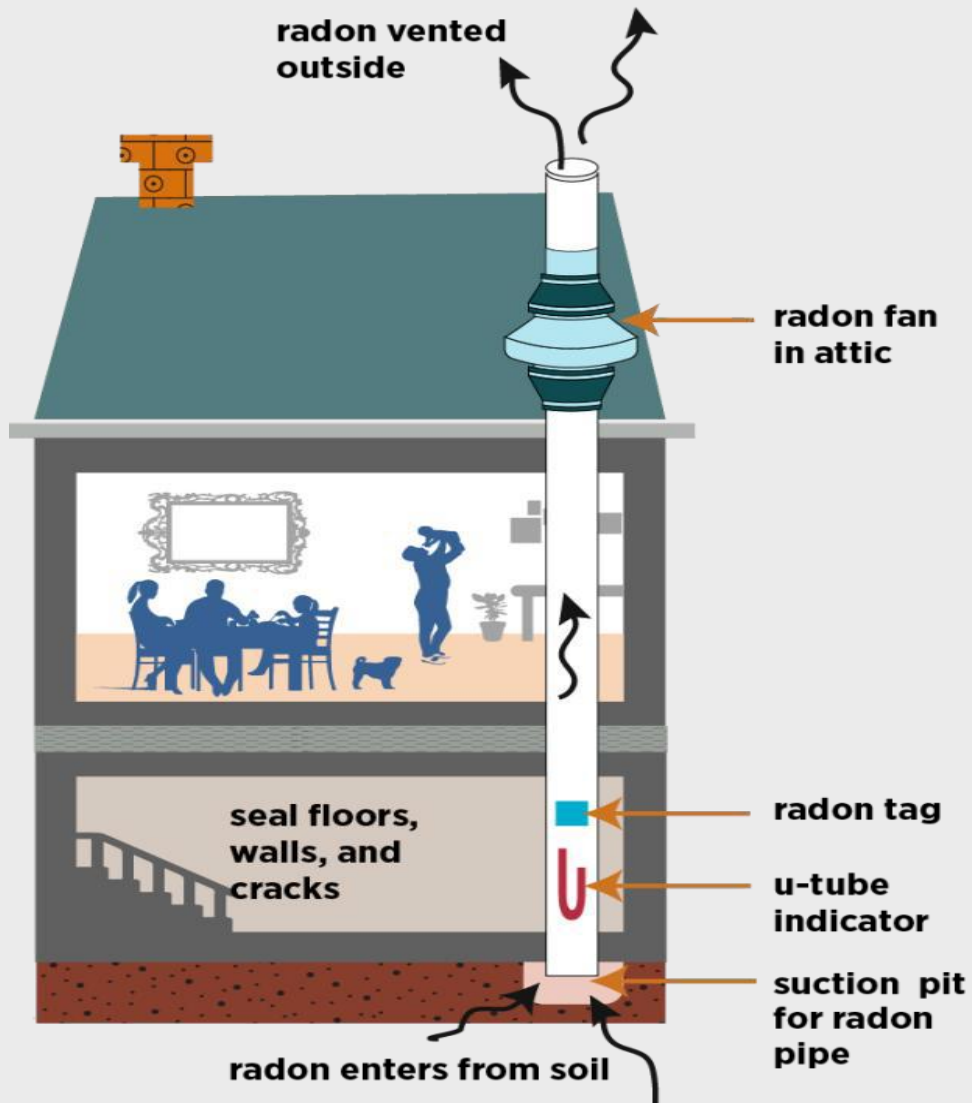
Cost Range:
\$1100-\$1500+

Check on the PA DEP website
to see certified mitigators in
your area - PA DEP RADON
SERVICES DIRECTORY

<https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Certification/Pages/ServicesDirectory.aspx>



Radon mitigation components



Radon active soil depressurization mitigation system:

- Installed by a state certified radon mitigator.
- Removes the radon gas under the slab foundation floor before it can enter in the living space.
- **The radon mitigation system also can remove below slab soil moisture that can reduce contribution to the relative humidity/dampness from soil. Like sub-slab dehumidifier.-BENEFIT!**
- The installed mitigation system is quiet and can last for many years.
- **The house with a radon mitigation system should retest for radon every 2 years.**

Exterior appearance of basic house radon mitigation systems



Radon resistant design should be in new construction buildings

BUILDING RADON OUT

WITH SIMPLE CONSTRUCTION METHODS

Visit www.epa.gov/iaq/radon or call 1-800-55-RADON

- Radon vent pipe exits roof like a plumbing vent pipe
- Electrical junction box provided in attic for later installation of fan to increase system performance if radon test is elevated
- Builder installs vent pipe through house's conditioned space
- 3" or 4" PVC Schedule 40 vent pipe stubbed up through slab
- Slab perimeter crack sealed with polyurethane caulk
- 6 mil. polyethylene sheeting over gravel layer or optional geotextile matting (special options available for crawl space)

- Radon is a naturally occurring radioactive gas that causes thousands of lung cancer deaths every year.
- Radon is found in homes throughout the U.S.
- Radon enters homes through cracks in the walls, joints, and foundation.
- Homes can be built to resist radon entry.
- Radon resistance is a valuable feature to health-conscious homebuyers.

ANSI/AARST CCAH 2020 rev. 5/23

AARST CONSORTIUM ANSI
An American National Standard

Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses

AARST CONSORTIUM ON NATIONAL STANDARDS
www.standards.aarst.org

Copyright © 2023 AARST 527 N Justice Street, Hendersonville, NC 28730

Much cheaper in building radon resistant design in new construction.

Can be as as much as 10-20 time cheaper than installing a mitigation system after the building is constructed.

A Guide for Health Care Providers and Patient Health History Form



Reducing the Risks From Radon: Information and Interventions

A Guide for Health Care Providers

Indoor Air Quality (IAQ)

The Role of Health Care Providers in Reducing the Burden of Radon-Induced Lung Cancer

The homes of health care providers have some of the highest rates of radon testing. Testing for radon reduces the risk of developing lung cancer. Lung cancer's very high incidence rate and associated mortality rate are even more tragic because lung cancer is preventable. This is why, in addition to encouraging patients to stop smoking, it is important for health care providers to educate their patients about radon and encourage radon testing of their homes. One way to do this is for physi-

cians and other health care providers to include questions about radon testing on their patient history forms. A brief encounter and resulting intervention can have lifelong consequences for patients and their families. Because health care providers are the primary advisors on health and disease prevention, they are in a unique position to play a vital role in informing the public about the serious risk posed by protracted radon exposure and in providing educational resources and contacts for radon testing and remediation methods for reducing elevated indoor radon levels.

Do you smoke? Yes No

If yes, how much per day? _____

If you are a former smoker, when did you stop? _____

Have you tested your home for radon? Yes No

Do you have a living will or advance medical directive? Yes No

“

Primary care visits serve as key opportunities to ask about home radon levels and educate patients.

Dr. Timothy Mullett

Medical Director, Markey Cancer Center Affiliate Network at the University of Kentucky



CS345577-A

www.cdc.gov/radon



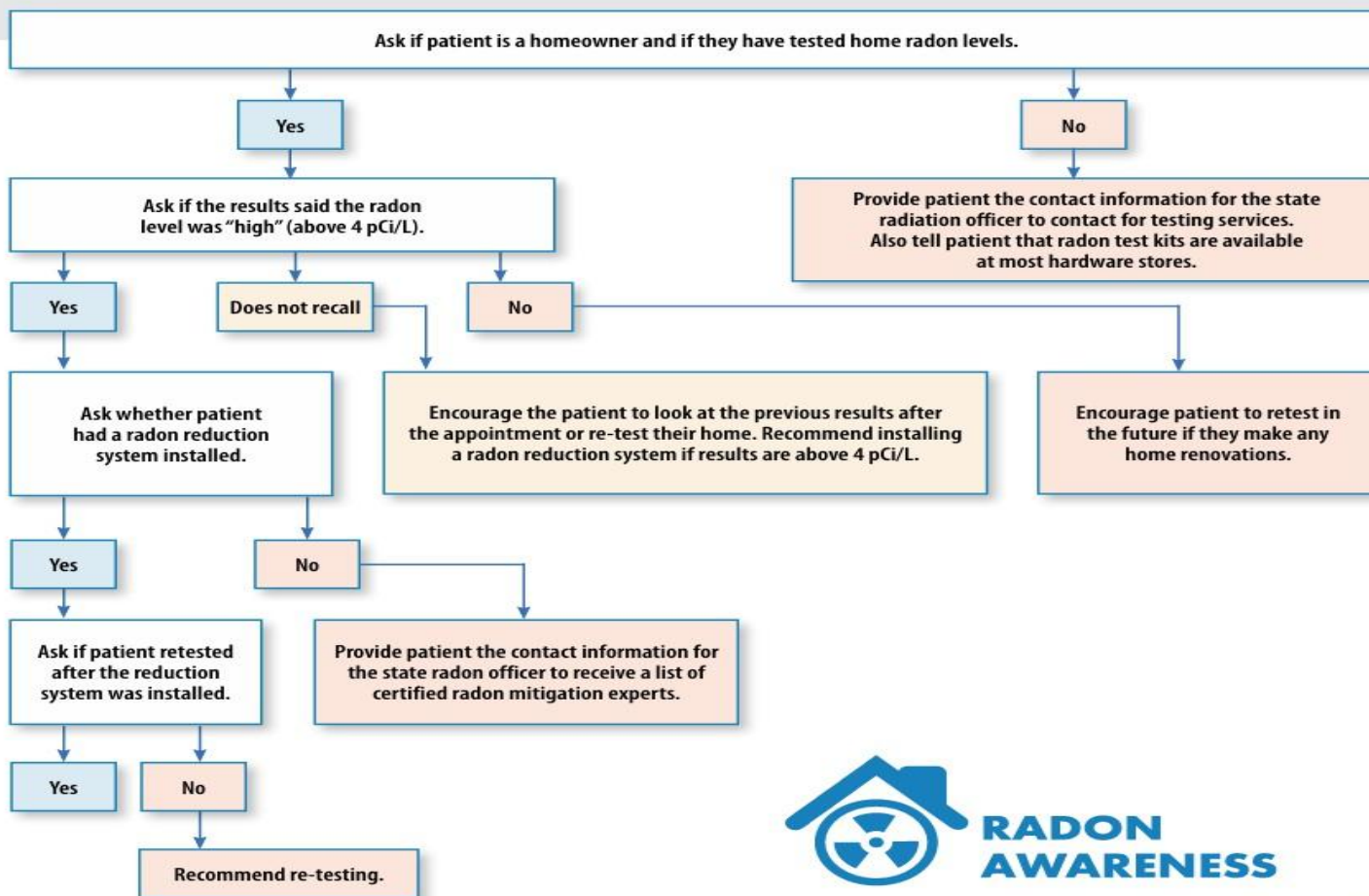
Talk to Your Patients about Radon

Accessible link: <https://www.cdc.gov/radon/talk-to-your-patients.html>

Radon is the leading environmental cause of cancer deaths in the United States. Long-term exposure to high radon levels can cause lung cancer, including in people who have never smoked. The Environmental Protection Agency estimates that 21,000 people die from radon-associated lung cancer each year.

Patients can prevent radon-associated lung cancer by testing their homes and installing radon reduction systems, if needed. Unfortunately, there is a lack of awareness about radon in the general population. As a clinician, you can help protect your patients from this risk through education and recommendations based on their specific situation.

Below is a decision tree to help guide your patient interactions about radon. You may want to begin by telling your patient about the health effects from radon exposure, or sharing educational materials. Free resources are available on CDC's Radon Communication Materials webpage (www.cdc.gov/radon/communications/index.htm).



For more information: cdc.gov/radon/radon-healthcareproviders

Consider having hospital and doctors' offices have a radon risk/testing video messaging on there tv screens.



CONCLUSION AND CALL FOR ACTION

- Recommendation that all diagnosed lung cancer patients under treatment, have their homes tested for radon. Can provide guidance.
- Home user continuous radon monitors can be used to monitor the radon levels in the patient's home.
- Remember the best solution for elevated radon levels is to have a radon mitigation system installed.
- Consider testing hospitals, urgent care centers, senior care centers, gyms and childcare built environments.



SunRADON luft



Airthings Wave Home
Use Radon Detector



Ecosense Radon
Eye/EcoCube

Recommended possible radon studies and projects

- Radon gas (monatomic) blood gas absorption, especially for children built environments and gyms. This could be linked to blood type cancers.
- A study of radon exposure possible impact on lung cancer treatment patients in their homes.
- **A potential for nurses and community health workers to alert and provide communities radon risk reduction outcomes combine with other IAQ Health Homes risk**
- **Provide a national certification training program for nurses on “radon risk reduction (Could be co-partner certification with the national radon certification program and states (NRPP/IEA)**
- **Provide free radon mitigations for medically underserved communities**
- **Basic children elementary school nurses training module on “PROTECTING YOUR LUNGS NOW AND FOR THE FUTURE DREAMS”**
- **“I want to play in sports. I want to be a singer. I want to be in the trades. I want to be a doctor or nurse....”**



MOVES FOR RADON EJ

1. **Communicate to medically underserved communities radon risks and radon testing**
2. **Any identified elevated radon house is mitigated at no cost to the homeowner/landlord. (Avg. cost for mitigation: \$1500)**
3. **Homeowner/occupants is provided training/tools on improving indoor air quality**
4. **WITHOUT BUILT-IN RADON MITIGATION, THEN YOU'RE NOT PROVIDING REAL RADON RISK REDUCTION TO THOSE IMPACTED FAMILIES AND COMMUNITIES**

If opportunity doesn't knock,
build a door.

-Milton Berle

www.IAmPowerLiving.com

“One kind deed is more beautiful than a thousand good intentions.” - **Matshona Dhliwayo**

Radon Mitigation Strategies for Health Centers

Screening Strategies in Health Center Settings

- Include home environment health questions (housing type, basement use, prior radon testing) in patient intake, risk assessments and nonclinical needs screenings.
- Identify patients living in high-risk housing (public, multi-unit, older buildings).
- Use referrals and follow-up workflows for radon testing.



Patient and Community Education Approaches

- Explain radon risks using plain language and community-focused materials.
- Educate patients on home testing options and EPA action levels.
- Leverage community health workers to support outreach and follow-up.

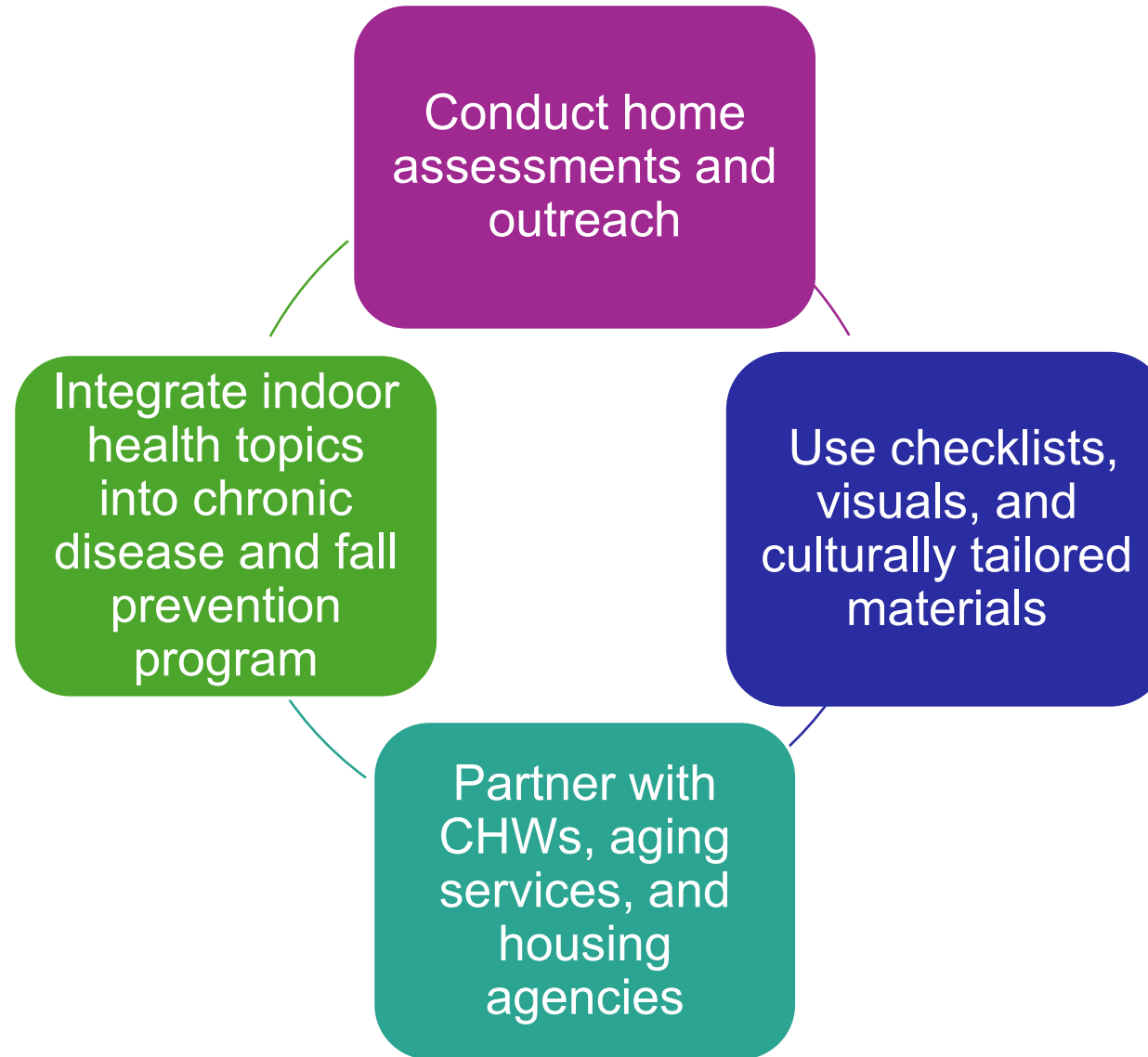


Partnering with External Partners


- Collaborate with state and local radon programs and environmental health agencies.
- Engage housing authorities, property managers, and public housing partners.
- Integrate radon efforts into broader community health needs and chronic disease initiatives.



Role of Health Educators and CHWs



Identifying Health Hazards



Conduct home assessments and outreach

- Provide in-home assessments
- Identify health and safety hazards
- Provide guidance to address hazards
- Conduct interviews with residents and health center patients on illness management

Using Checklists



Use checklists,
visuals, and
community-focused
materials

- Employing picture cards & handouts
- Manuals designed for medically underserved communities
- Booklets that are community-focused


Partner with CHW Organizations



Partner with
CHWs, aging
services, and
housing
agencies

- Liaisons that bridge gaps between residents and various community resources
- Eviction prevention efforts
- Serve as resource navigators

Integrating Prevention Programs



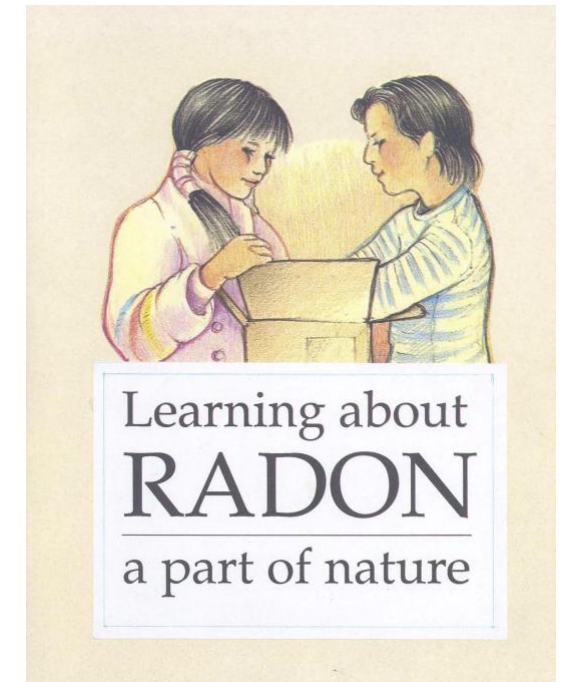
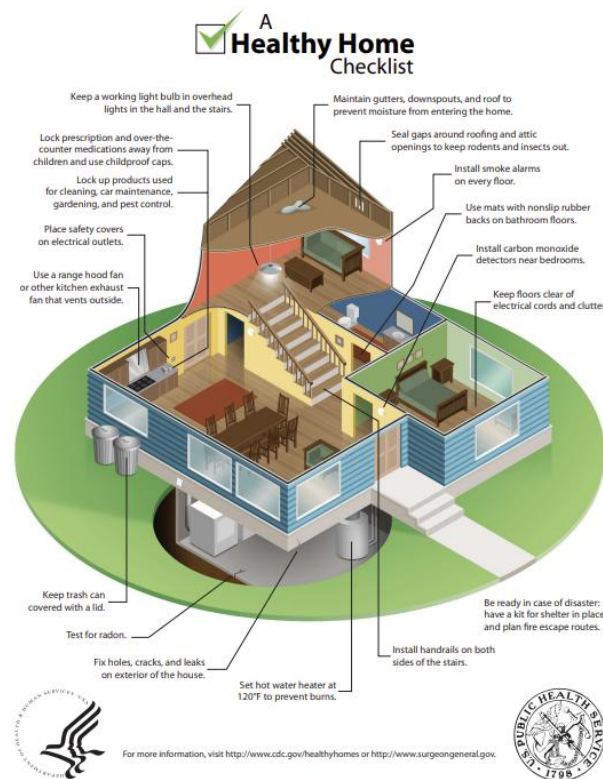
Integrate indoor health topics into chronic disease and fall prevention program

- Helping residents understand how to better manage their chronic conditions.
- Refer residents to outpatient services in case of an unintentional injury
- Serve as health navigators



Resources for Health Centers

- [A Healthy Home Checklist – HHS](#)
- [Healthy Housing Toolkit for Counselors](#)
- [EPA Radon Publications, Webinars, and Videos](#)
- [Do-It-Yourself Healthy Homes Check Up](#)
- Free Radon Testing Kits from Local Health Departments – [Directory of Local Health Departments](#)



Questions?

This presentation is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling \$550,000 (NNCC) and \$668,000 (NCHPH) with 0 percent financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by, HRSA, HHS, or the U.S. Government.



Evaluation



Evaluation & Contact Hours: Environmental Hazards & Lung Disease- Radon & Community Health

Thank you for participating in today's training. Please complete the following evaluation to provide feedback on the training and suggest future training topics. If you seek continuing nursing professional development contact hours, please provide the required information to receive your certificate. For any questions or concerns, please contact Regina Brecker at rbrecker@phmc.org.

Would you like Nursing Continuing Professional Development credit for this training? *

Send me a copy of my responses



Certificate

Once you submit the evaluation, please wait approximately **20 minutes** for your certificate to arrive. It will come from “Smartsheet Automation,” and be linked at the **very bottom of the email** (as seen below). You will not need to request access.

NNCC Certificate for Optimizing Case Management for Patient-Centered T...

SA Smartsheet Automation <automation@app.smartsheet.com>
To Regina Brecker 10:27 AM

If there are problems with how this message is displayed, click here to view it in a web browser.

If you have any questions or need further assistance, please feel free to reach out to Jillian Bird at jbird@phmc.org or Regina Brecker at rbrecker@phmc.org

Thank you for your participation!

ANCC115 2025.09.25 Optimizing Case Mgmt-Telehealth

Details Changes since 9/25/25, 10:25 AM

1 row added , 1 row changed
1 attachment added

1 row added or updated (shown in yellow)

Row 2

First and Last Name	Regina Brecker
---------------------	----------------

Changes made by web-form@smartsheet.com, automation@smartsheet.com

1 attachment added

Optimizing Case Management for Patient-Centered Telehealth Care- Certificate.pdf (126k) added by automation@smartsheet.com on Row 2: Regina Brecker

Access Health Center Resources

NNCC Resource Library



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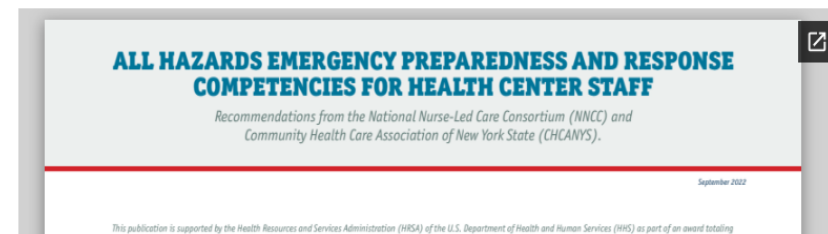
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All Hazards Emergency Preparedness and Response Competencies for Health Center Staff

To successfully perform their assigned emergency/disaster roles, health center staff must understand how their organization will respond to hazards, including the use of altered management structures and modified operations. The National Nurse-Led Care Consortium (NNCC) and the Community Health Care Association of New York State (CHCANYS) created a set of competencies to improve the emergency and disaster preparedness of all health center staff. This publication provides a comprehensive overview of those competencies and sub-competencies, as well as a description of their development process. The competencies are intended to form the foundation of health center staff education and preparedness for all-hazards emergency and disaster response and will allow health centers to direct their limited training time and resources to cover the most essential preparedness aspects.



Upcoming Trainings

February 19, 2026 – 3 pm EST

- Comprehensive Case Management for Prenatal Care in FQHCs: Improving Access and Outcomes
- Registration: https://us02web.zoom.us/webinar/register/WN_tZvwoSTTT3-ey4vVznEgmg

March 5, 2026 – 3 pm EST

- Expanding Access: Leveraging Patient Support Services to Increase Cancer Screening Rates
- Registration: https://us02web.zoom.us/webinar/register/WN_B8A7zQ1XTbqemrnfPh8cWg

March 11, 2026 – 2 pm EST

- Health Center Preparedness & Response Forum Series - Workforce Readiness
- Registration:

https://us02web.zoom.us/webinar/register/WN_8c4vJMkpS_uL7Bnl7X6Hsw



Thank You!

If you have any further questions
or concerns please reach out to
Regina Brecker at rbrecker@phmc.org

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