How public health professionals can help reduce radon risk in Canada

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Environmental Health, BC CDC

Disclosures

Funding for our work comes from the provincial and federal governments

We declare no commercial interest in the radon industry

In particular, we do not sell radon test kits or mitigation services

Anne-Marie is part of the Take Action on Radon program, funded by Health Canada

Today

Very brief overview of radon gas

- Health effects
- Latest epidemiologic evidence

Radon exposure in Canada

- Updates estimates

Grassroots initiatives

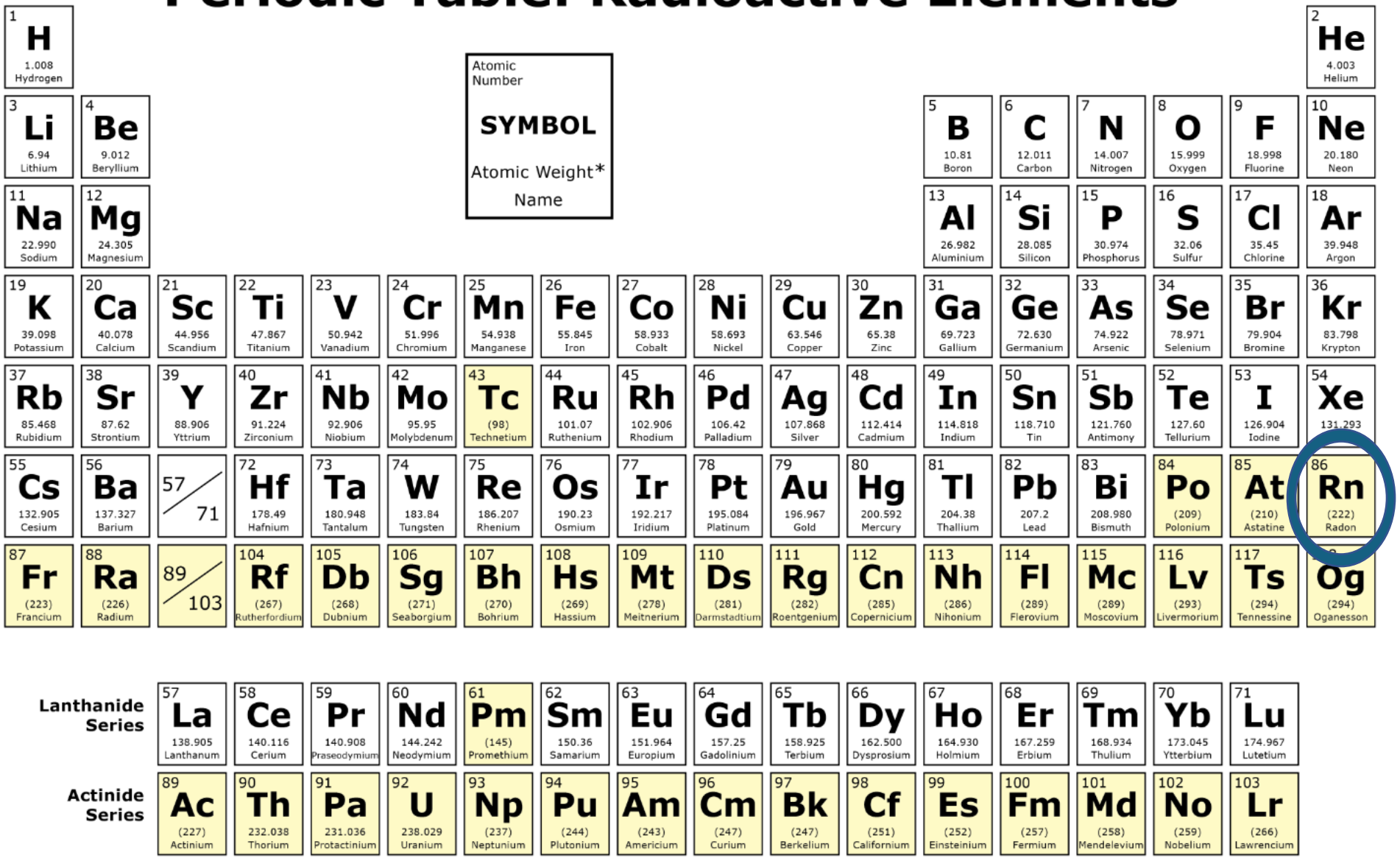
- Take Action on Radon
- Cancer Agency programs

Provincial initiatives

- BC CDC

(radon testing photo made possible by Take Action on Radon- images are free at Pixabay- please use!)

Periodic Table: Radioactive Elements



*() indicates the mass number of the longest-lived isotope.

Based on NIST 2017 Periodic Table

Radon is an:

- **Invisible**
- **Odorless**
- **Colorless**
- **Tasteless**
- ***Radioactive***

Gas

Radon gas comes from the decay of radium (Uranium)

Uranium and its decay products present in soils across Canada

Some regions naturally have more uranium

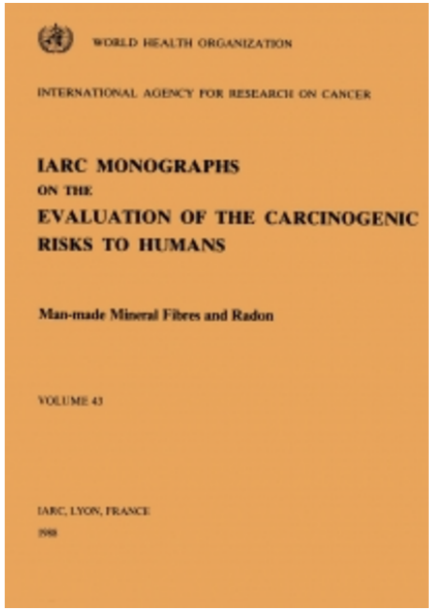
Radon is the only GAS phase of uranium decay

- Radon gas is *mobile*

Alpha particle radiation

- High LET (linear energy transfer)

Radon is a Group1 IARC designated carcinogen



Man-Made Mineral Fibres and Radon

IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans Volume 43

IARC

1988

ISBN-13

978-92-832-1243-0

ISBN-13

978-92-832-1243-0

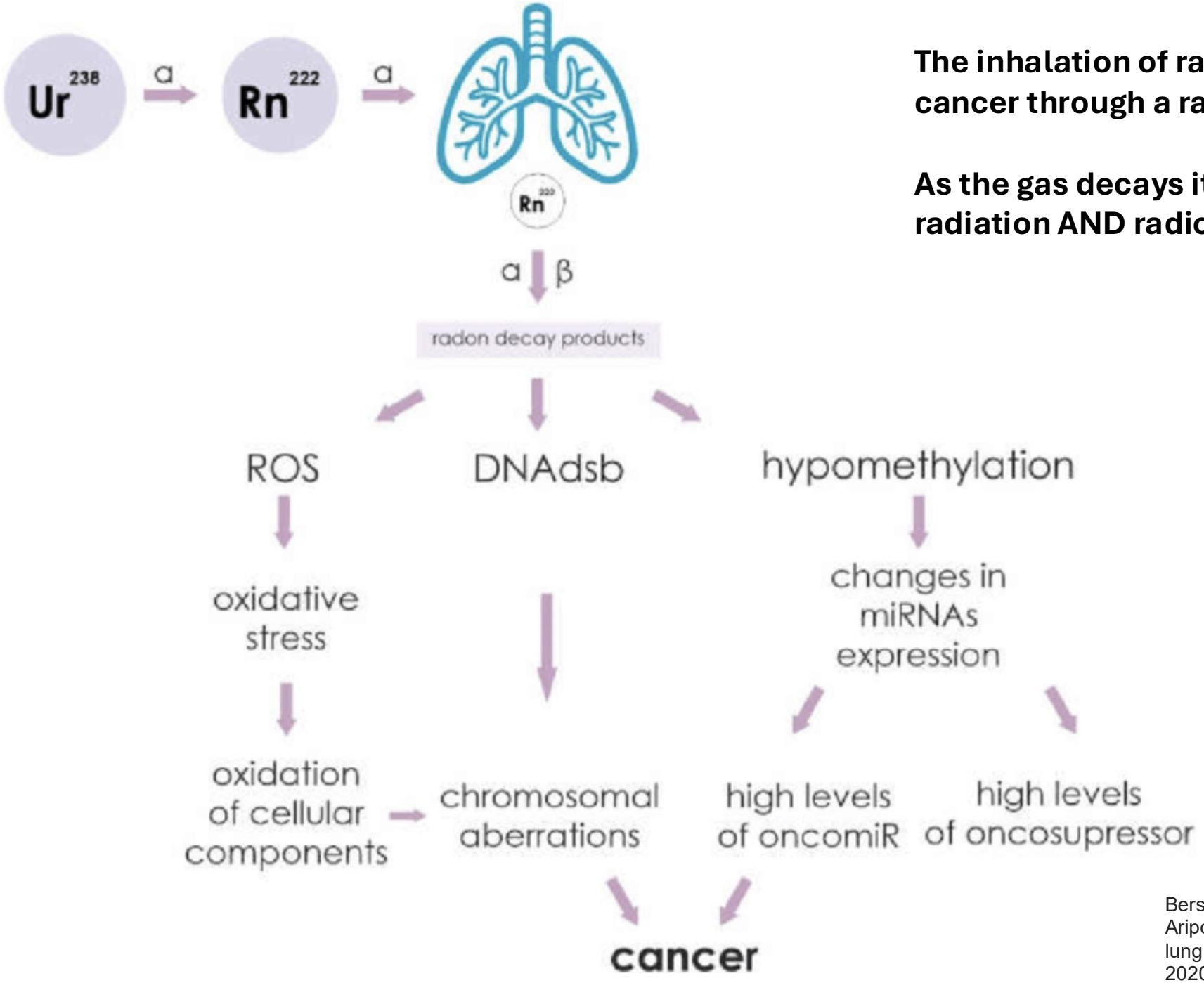
4.5 Evaluation[1]

There is *sufficient evidence* for the carcinogenicity of radon and its decay products in experimental animals.

There is *sufficient evidence* for the carcinogenicity of radon and its decay products in humans.

Overall evaluation

Radon and its decay products *are carcinogenic to humans (Group 1).*

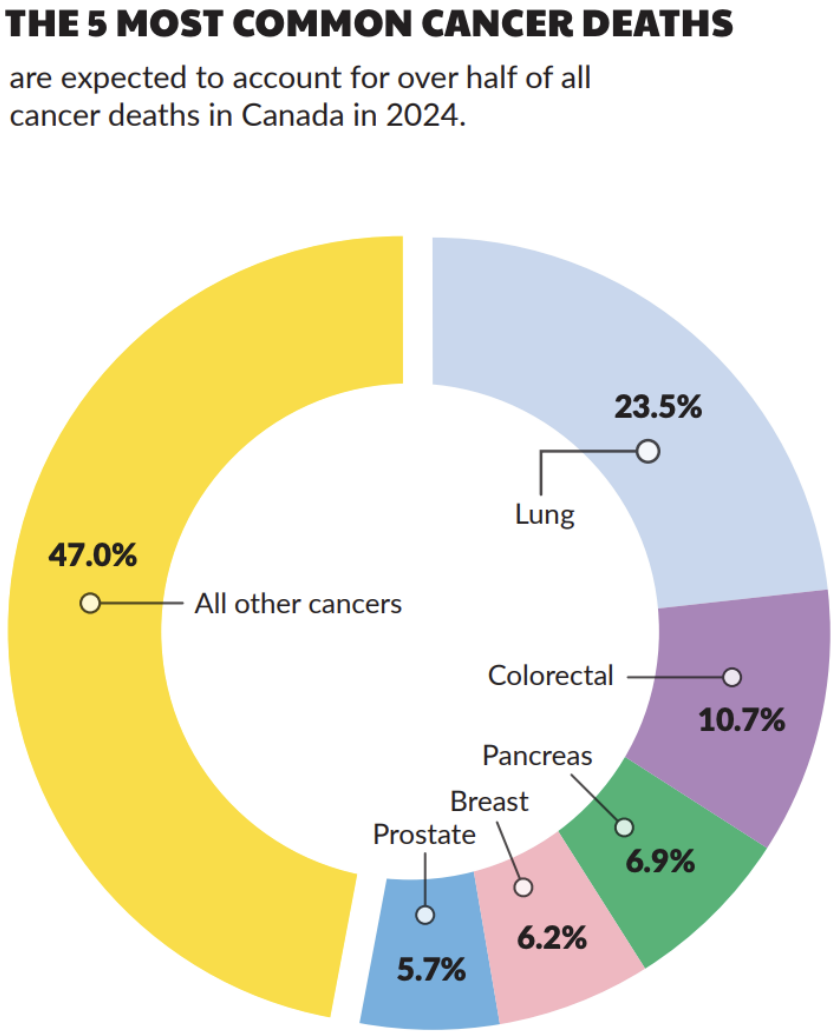


The inhalation of radon gas can cause lung cancer through a range of mechanisms

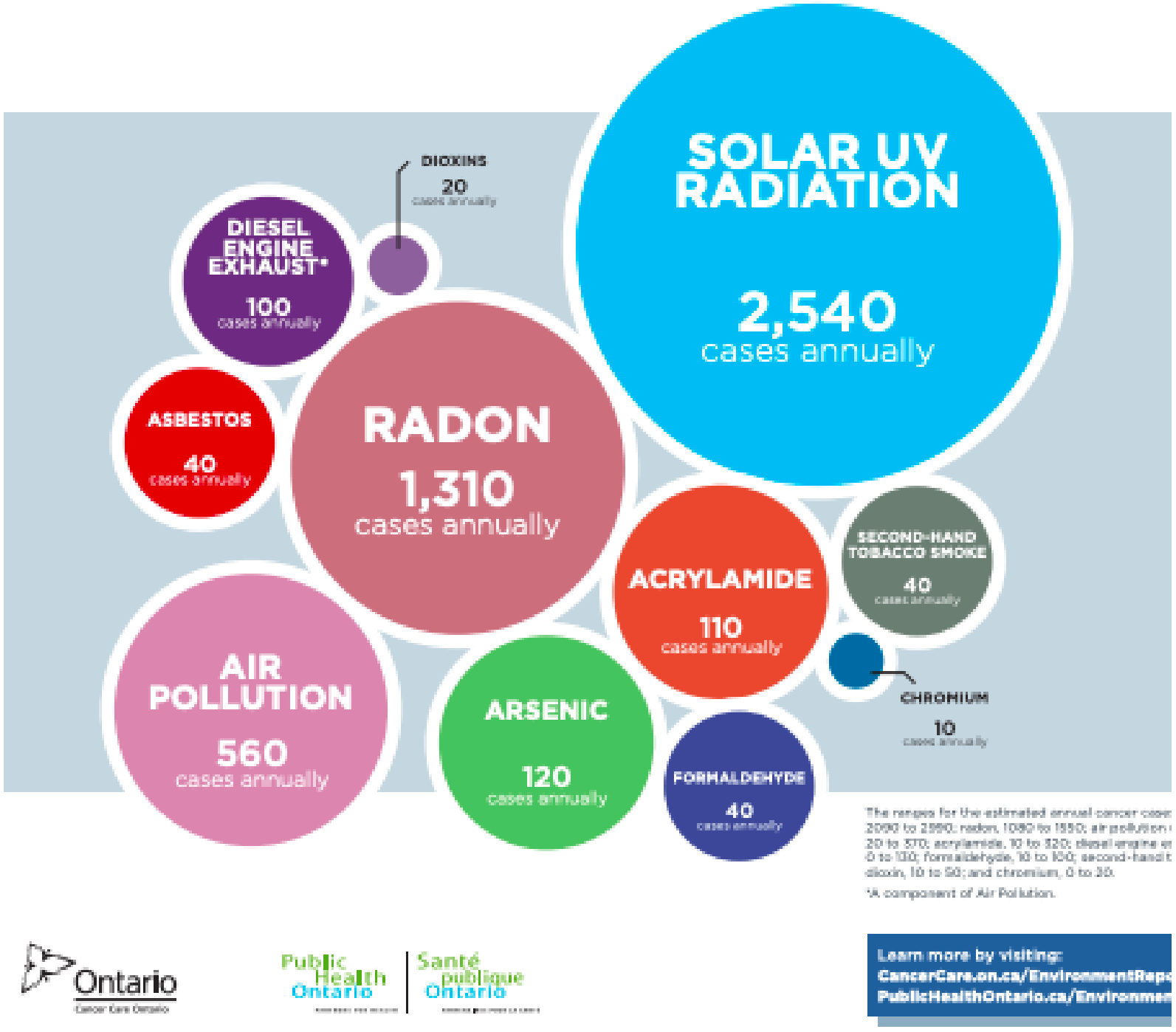
As the gas decays it releases alpha particle radiation AND radioactive progeny

Bersimbaev R, Pulliero A, Bulgakova O, Kussainova A, Aripova A, Izzotti A. Radon biomonitoring and microRNA in lung cancer. International journal of molecular sciences. 2020 Mar 20;21(6):2154.

Lung cancer prevention remains a challenge



5 year survival rate for lung cancer= ~22%



Ontario
Cancer Care Ontario

Public Health Ontario | Santé publique Ontario

Beyond smoking:

Ontario research shows that **Radon** is the most significant **environmental exposure** for lung cancer *(2016)*

Health effects of radon exposure *beyond* lung cancer

Evidence for other cancers

- Leukemia (childhood and adult) and Lymphoma (see J. Chen 2024) 
- Gastric Cancer (ingestion of water contaminated with radon)

Follow up of radon-exposed occupational cohorts 

- Other lung diseases
- Cerebrovascular diseases

Exposure during pregnancy (USA- TX, CT, MA)

- Outcome include low birth weight, other fetal outcomes
- Maternal outcomes- *hypertension*
- Cohort and ecological designs

Challenges for public health researchers

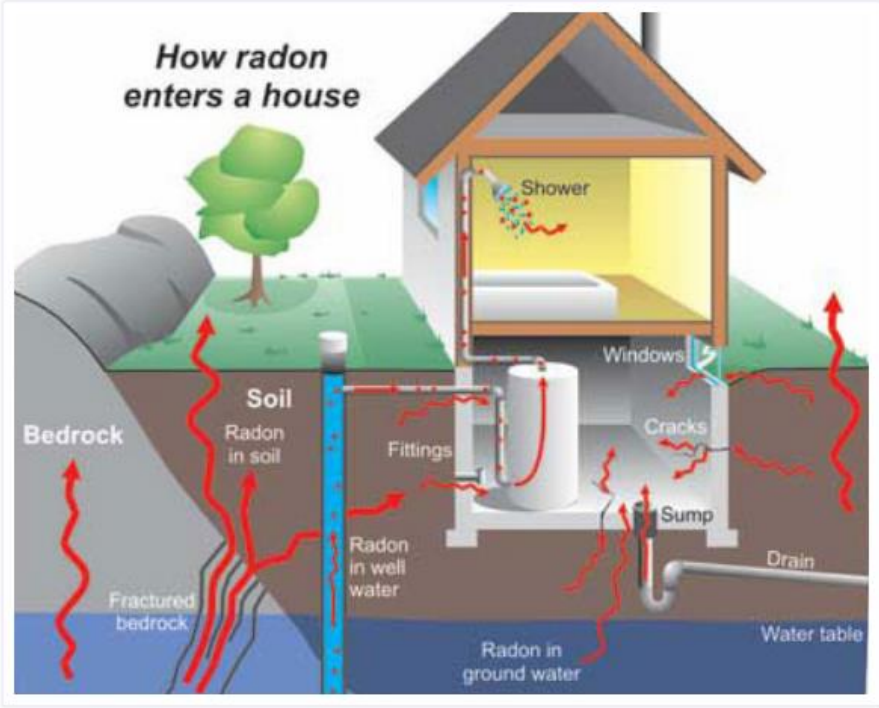
Exposure assessment remains challenging

- Indoor radon levels can vary significantly by home
- Age of home not a good proxy

Residential histories difficult to construct

Exposures from work and school

- Cholowsky, Natasha L., et al. "Consequences of changing Canadian activity patterns since the COVID-19 pandemic include increased residential radon gas exposure for younger people." *Scientific Reports* 13.1 (2023): 5735.



Health Canada, *Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors*

More testing provides more insights for research

Radon levels are *increasing* in Canada
(Dr. Jing Chen, Health Canada 2021)

Fig. 2

Geometric mean radon concentrations in homes built in different years.

Source

A Summary of Residential Radon Surveys and the Influence of Housing Characteristics on Indoor Radon Levels in Canada

Health Physics121(6):574-580, December 2021.

Similar results found in USA…

PAPER · OPEN ACCESS

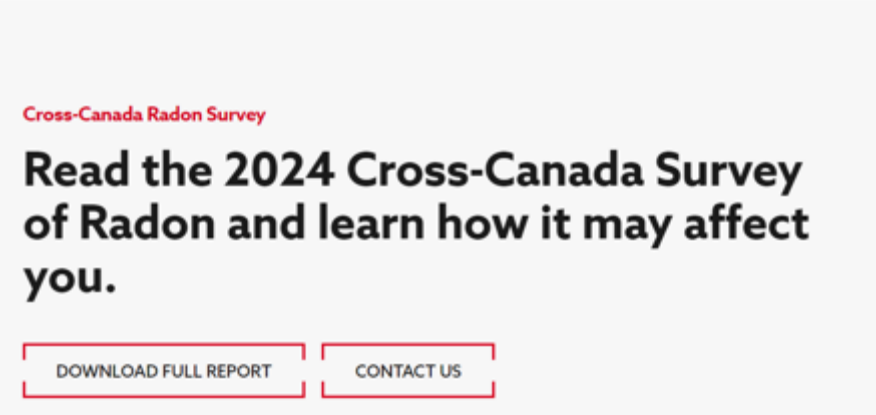
Geologic, seasonal, and atmospheric predictors of indoor home radon values

Ellen J Hahn[3,1], William C Haneberg[2], Stacy R Stanifer[1], Kathy Rademacher[1], Jason Backus[2] and Mary Kay Rayens[1]

Published 21 June 2023 · © 2023 The Author(s). Published by IOP Publishing Ltd

Environmental Research: Health, Volume 1, Number 2

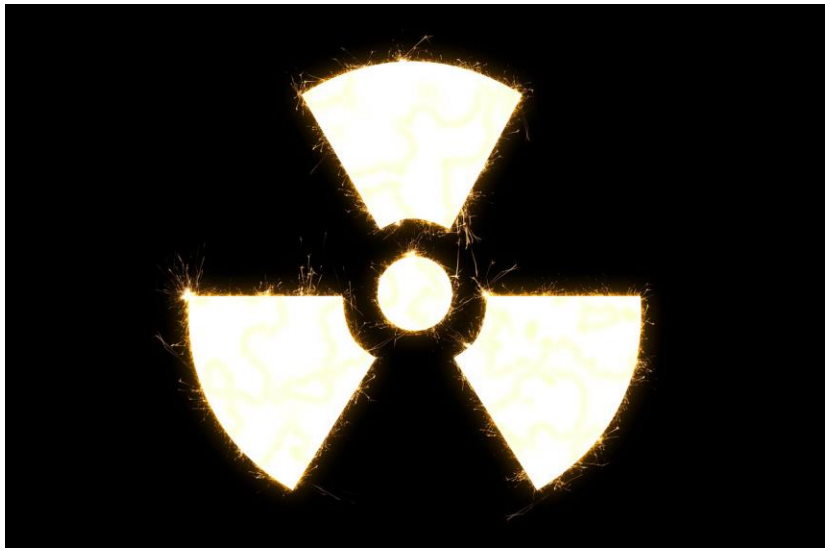
CROSS-CANADA RADON SURVEY

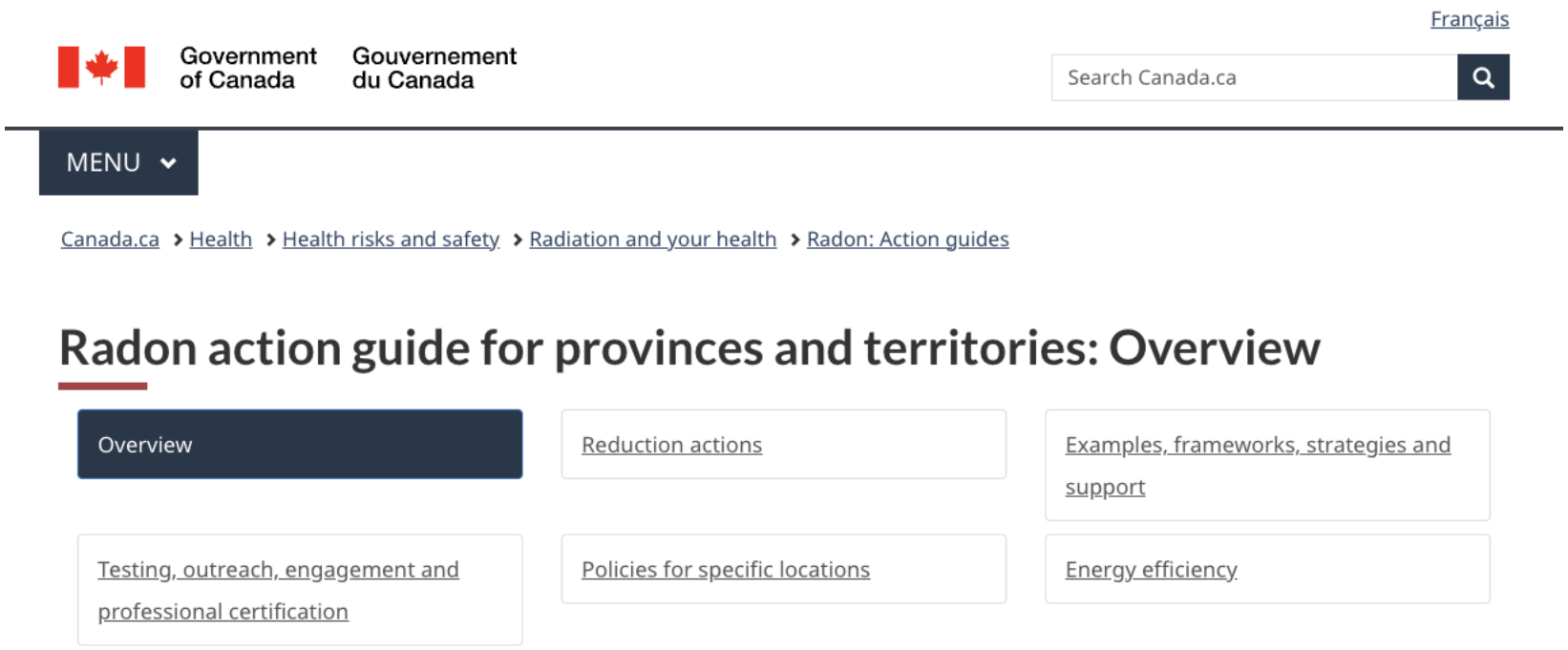


A recent analysis of 75 000 radon measurements from across Canada

- "The results of this study indicate that approximately 1 out of 5 people (17.8%) living in Canada resides in a building where radon levels are equal to or greater than 200 Bq/m_3."

How can public health professionals get involved?

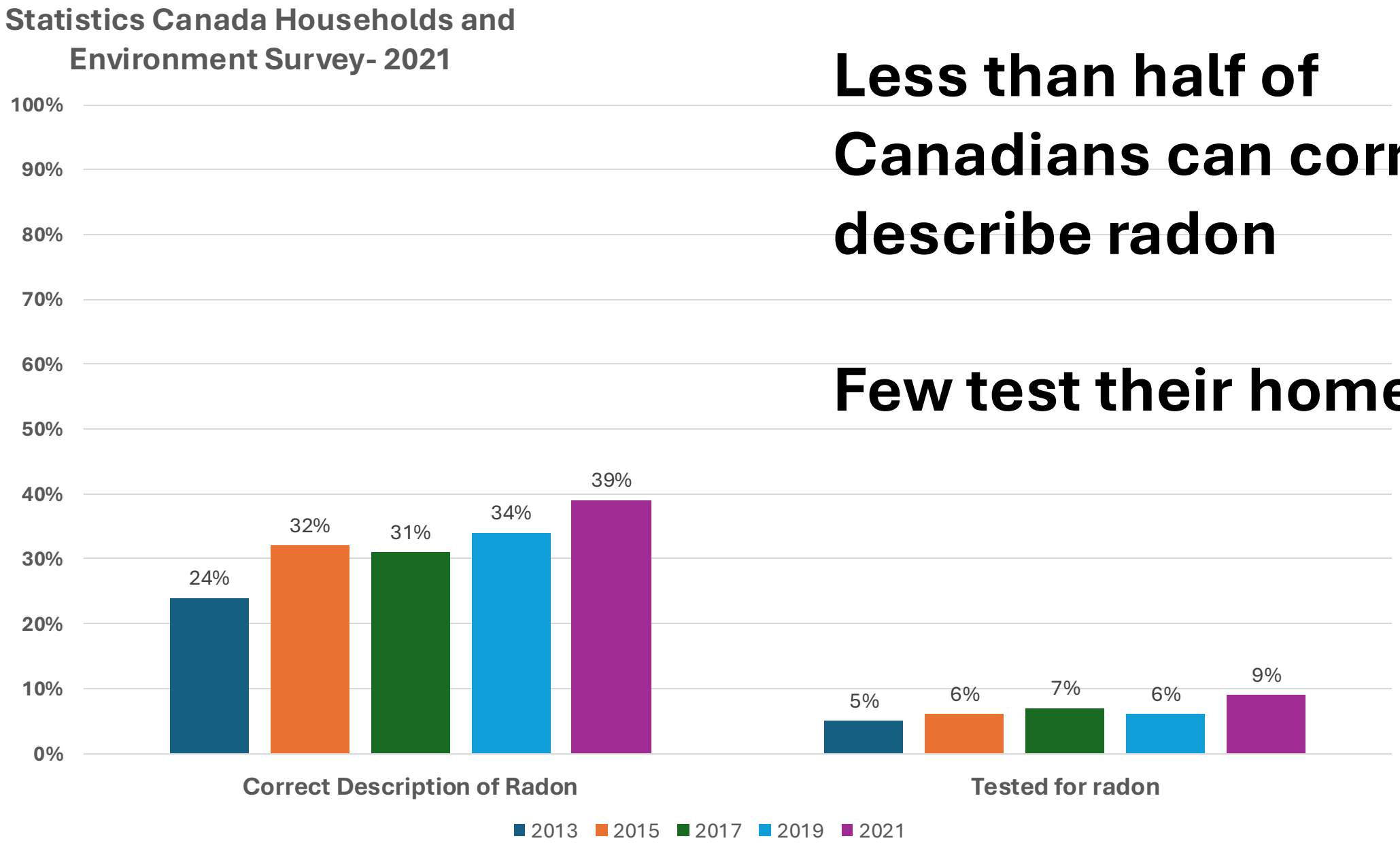




Key activities

- Education and awareness
- Supporting community testing
- Creating databases and maps
- Updating worker and tenant protections

https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon/action-guides/provinces-territories.html

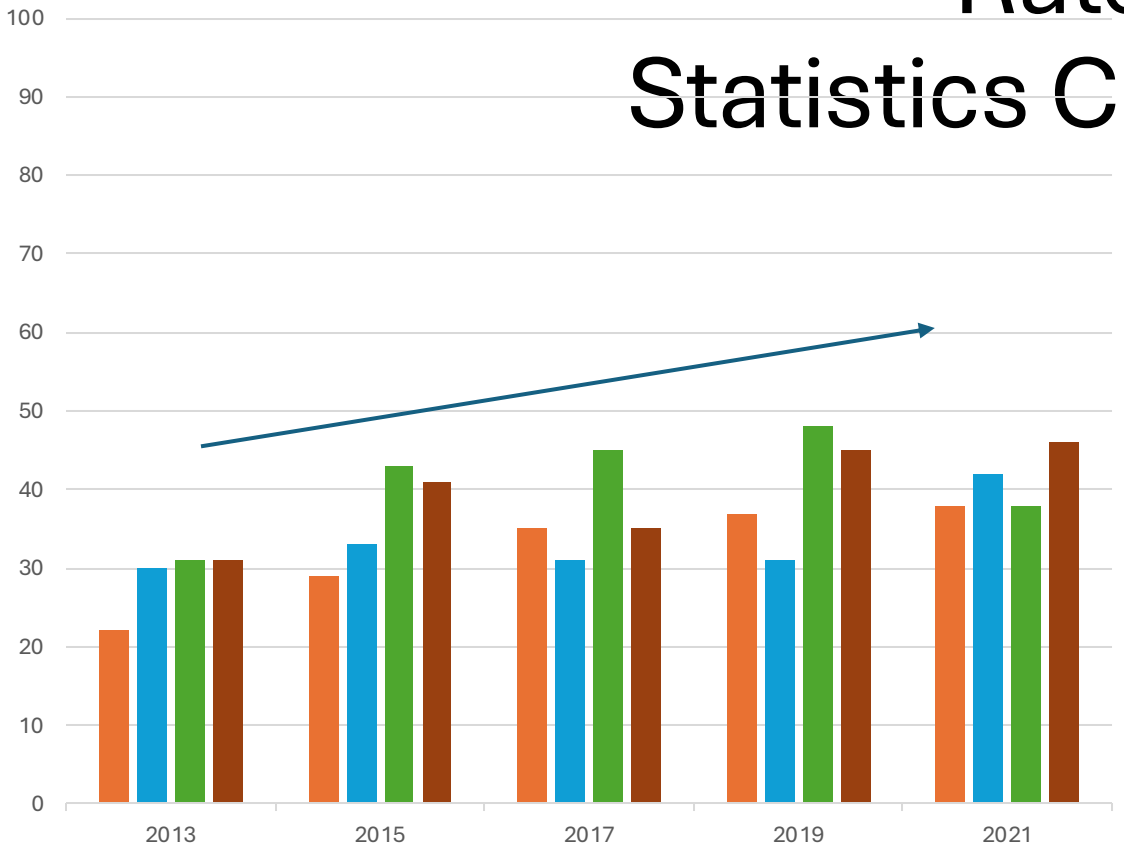


Less than half of Canadians can correctly describe radon

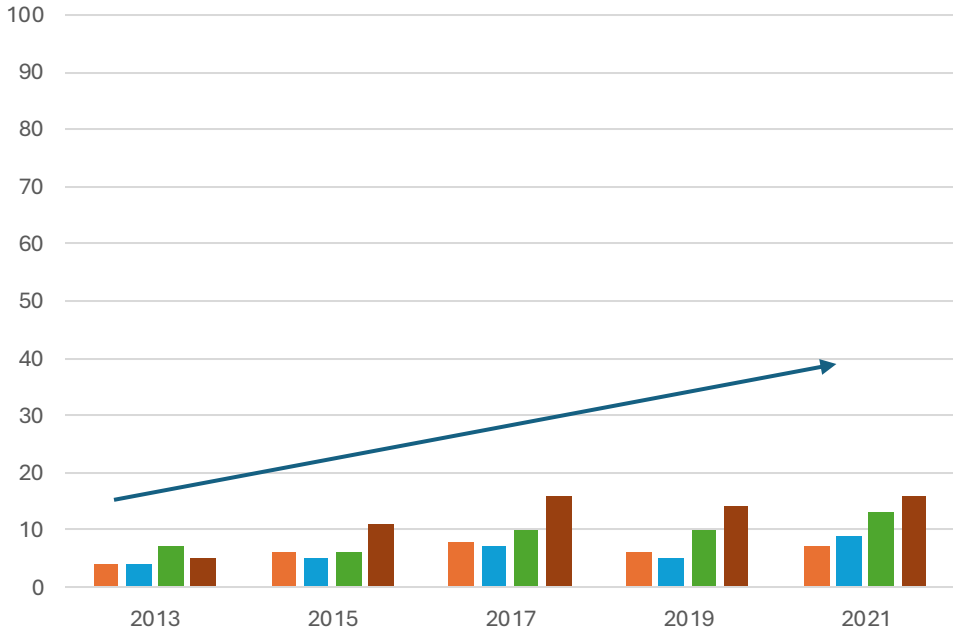
Few test their homes

Date from Table: 38-10-0086-01 (formerly CANSIM 153-0098)

Selected Provinces- Radon Knowledge and Testing Rates by Year
Statistics Canada as of 2021



Correctly describe radon gas



Tested for radon

British Columbia Quebec Manitoba Nova Scotia

Date from Table: 38-10-0086-01 (formerly CANSIM 153-0098)

Education and Awareness by Public Health

Interior Health

About IH | Get Involved | HealthLink BC | Stories@IH | Media Centre & Ale

Toxic Drug Crisis | Heal

Meet Greg, an air quality expert who wants you to test for radon

November 8, 2023

Dr. Silvina Mema, deputy chief medical health officer for Interior Health (left), and Greg Baytalan, air quality & radon expert, showing off a radon testing device.

You can't see it, taste it or smell it, but radon gas is found everywhere in Canada. Caused by the natural breakdown of uranium in soil and rocks, radon dissipates outdoors, but builds up indoors – in homes, workplaces, schools and leisure spaces.

Grey Bruce Public Health

HOME | YOUR HEALTH | YOUR ENVIRONM

Your Environment / Healthy Housing / Radon

Radon

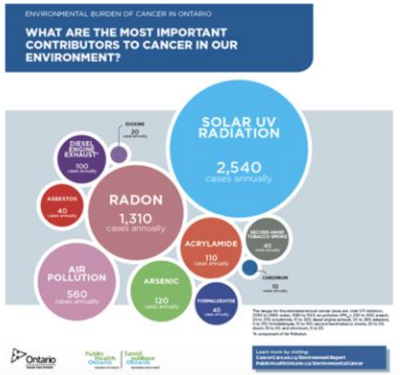
Radon

Every Home in Grey-Bruce Should Test for Radon

Radon is an invisible, odourless, tasteless radioactive gas that comes naturally from the ground. Radon can seep into and build up in any home - regardless of the home's size or the year it was built.

The only way to know if radon is in your home - or the level of radon in your home - is to test for it.

Long-term exposure to Radon is linked to approximately **16% of lung cancer deaths in Canada**. It is the second-leading cause of lung cancer after smoking and the leading cause of lung cancer for people who have never smoked.



Microsoft P

Showcase Radon Action Month (Lung Cancer Awareness Month)

We're lighting up a variety of city signs in **PURPLE** to pay homage to Radon Action Month.

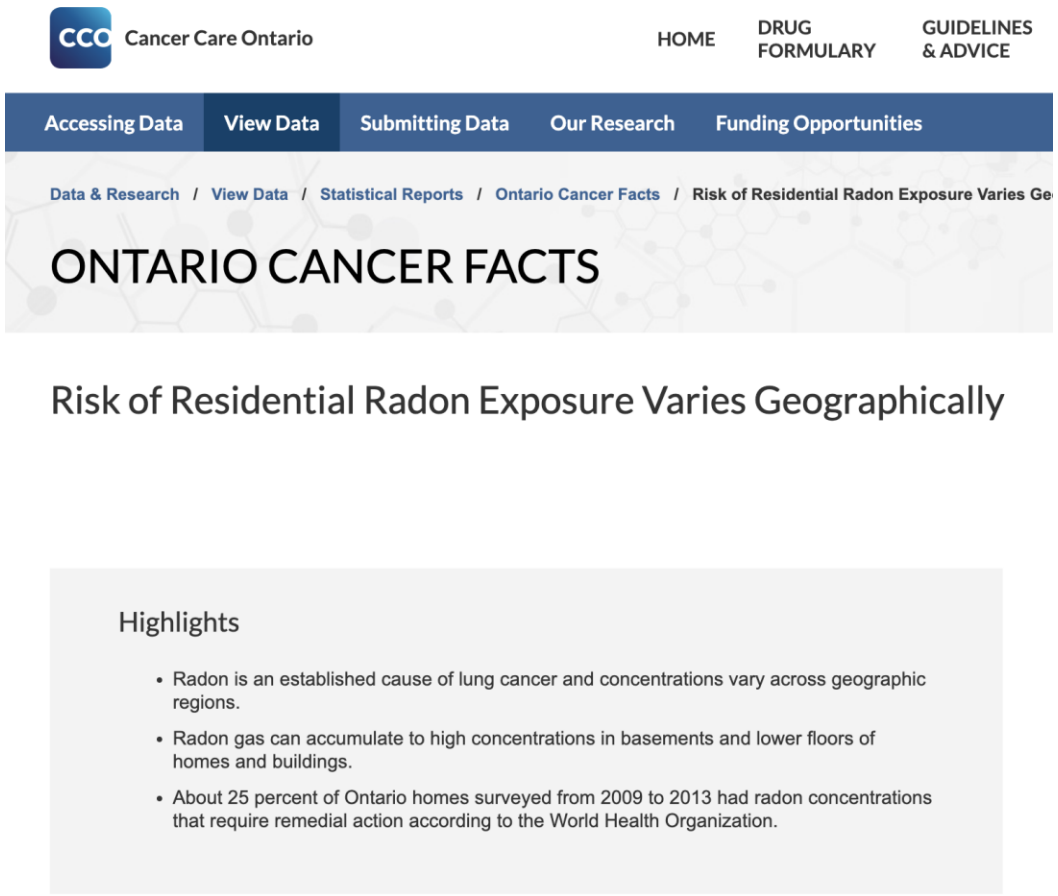
Vancouver Science World, November 24th

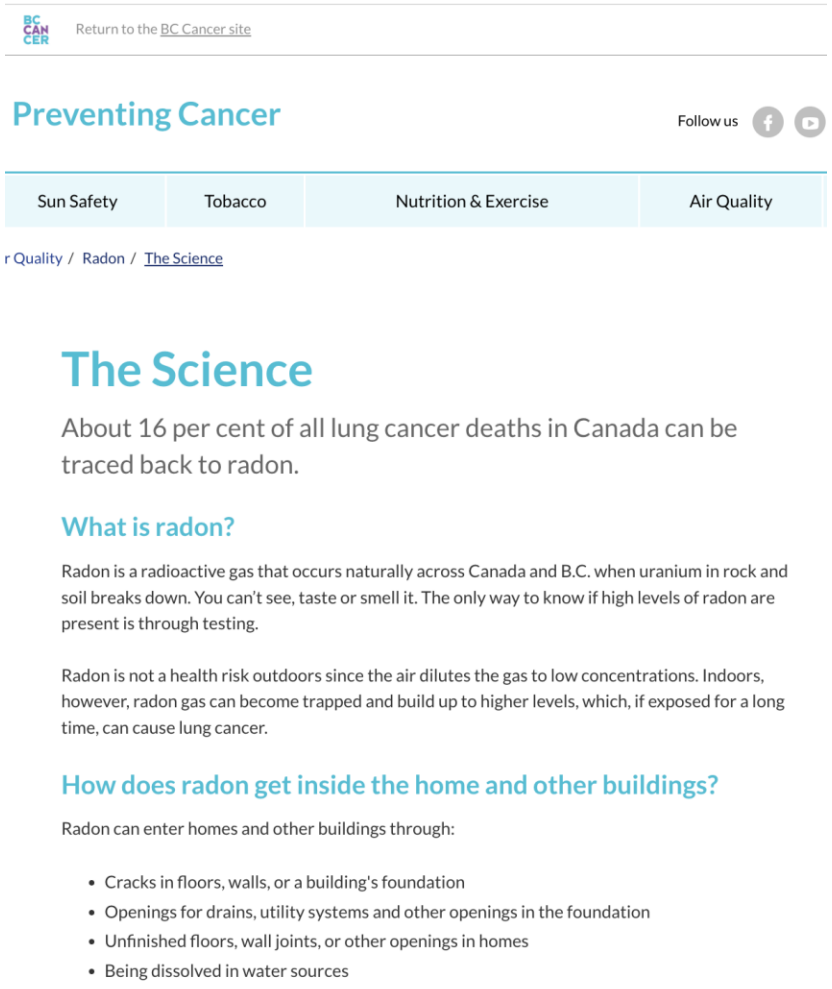
Edmonton High Level bridge, November 25th

Winnipeg Esplanade bridge and city sign, November 25th

Calgary Tower, November 25th

Engage with provincial Cancer agencies





Support Radon at local Libraries

Over 500 libraries across Canada now lend electronic radon monitors

- Very popular- see wait lists

Funding Models

- Internal or competitive grants (STEM/STEAM)
- Partnering with other agencies/ individuals

New pilot program with Health Canada 2023

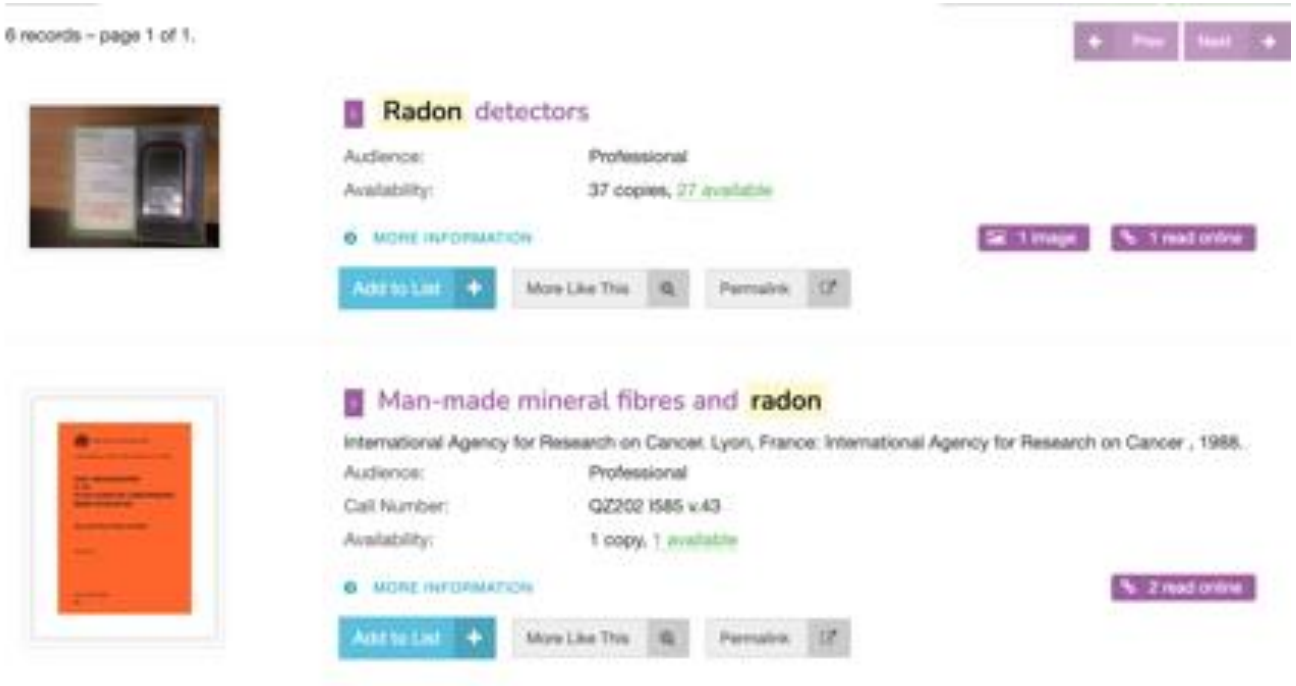
- Alpha Track detectors coupons

Librarians are awesome people!

Want to get involved? Reach out:
https://takeactiononradon.ca/resources/lending-programs/

The BC Cancer Library

Delivering timely service and evidence-informed resources to people in BC and the Yukon facing cancer and those involved in oncology care or research.



Connect with non-profits to promote test kit **access**

GNB Home Contacts Français Departments Services Search

New Brunswick Nouveau Brunswick CANADA

Office of the Chief Medical Officer of Health (Public Health)

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Healthy Environments

Radon

What is radon?

Radon is an odourless, radioactive gas formed from the breakdown of uranium. It has no odour, colour or taste.

Exposure to high levels of radium over a lifetime results in an increased risk of developing lung cancer, especially if the person who is exposed is a smoker.

Radon is found naturally in the environment and is common in New Brunswick. It moves freely through the soil and can seep into buildings through cracks in foundation walls and floors or gaps around pipes and cables.

In a poorly ventilated space, radon can accumulate to high levels and can be addressed by improving a building's ventilation and closing entry points.

The current Canadian guideline for radon in indoor air for dwellings is 200 Becquerels per cubic metre (200 Bq/m3). Please refer to the frequency asked questions or links provided for more information on the radon.

Resources

- Radon FAQs

Related Links

- New Brunswick Lung Association
- About Radon (Health Canada)
- WorkSafeNB

Shop News Newsletter English

NB LUNG POUMON NB

Donate About Us Lung Health Environmental Health

ENVIRONMENTAL HEALTH:

RADON

DID YOU KNOW?

New Brunswick geology is high in uranium, which emits radon gas.

Purchase a Radon Test Kit

Each Radon Test Kit purchased from NB Lung includes

- A CNRPP-Certified long-term testing device
- All shipping costs, including a pre-paid return envelope
- Lab Fees for analysis at RPC, your local New Brunswick lab
- Support for NB Lung's outreach programs

Radon comes from uranium based rock.

You can't see, smell or taste it, but radon is in all homes.

It seeps into buildings through cracks in floors, walls, pipes, and foundations. Our houses are designed to trap air indoors and protect us from extreme weather, but unfortunately this also traps radon. Long-term exposure to high levels of radon poses a serious health risk.

1 in 4 New Brunswick homes have high radon.

It's naturally occurring, and it's nobody's fault.

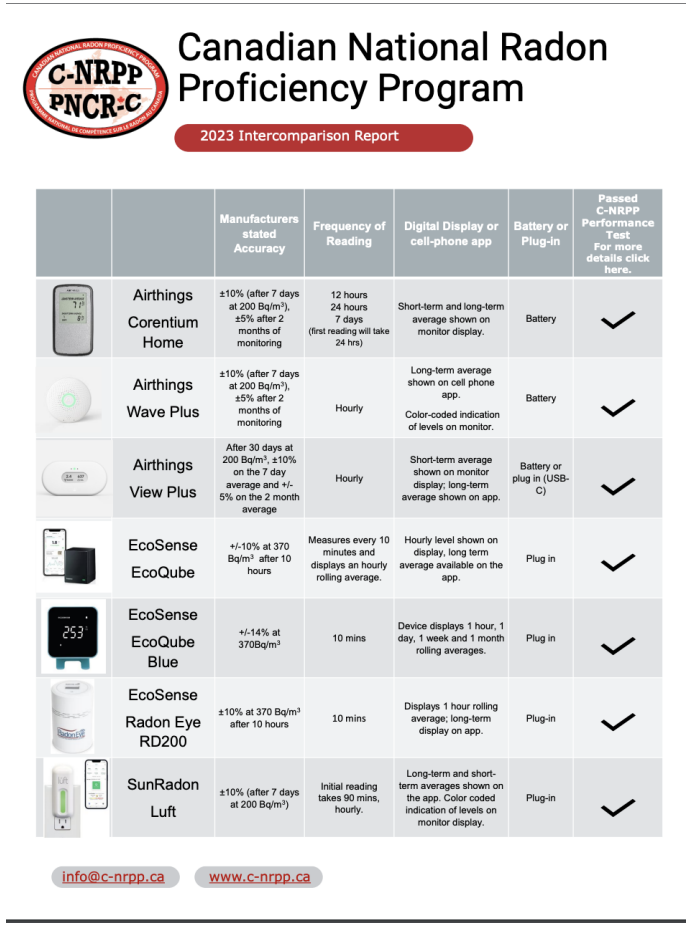
Radon gas is radioactive. It decays quickly, releasing tiny radioactive particles. When inhaled, these particles can damage the cells inside our lungs. Over time this damage can lead to lung cancer.

If you purchase a radon test kit from NB Lung this November and your home tests above the Health Canada safety guidelines you will be entered into a draw for one of two $1,000 radon mitigation grants!

Homes tested by NB Lung before November 2024 will also be eligible for the draw. Funding for these radon mitigation grants is provided by Health Canada and grants will be applied to your mitigation invoice from a

Few hardware stores carry radon detectors….

Learn about radon testing



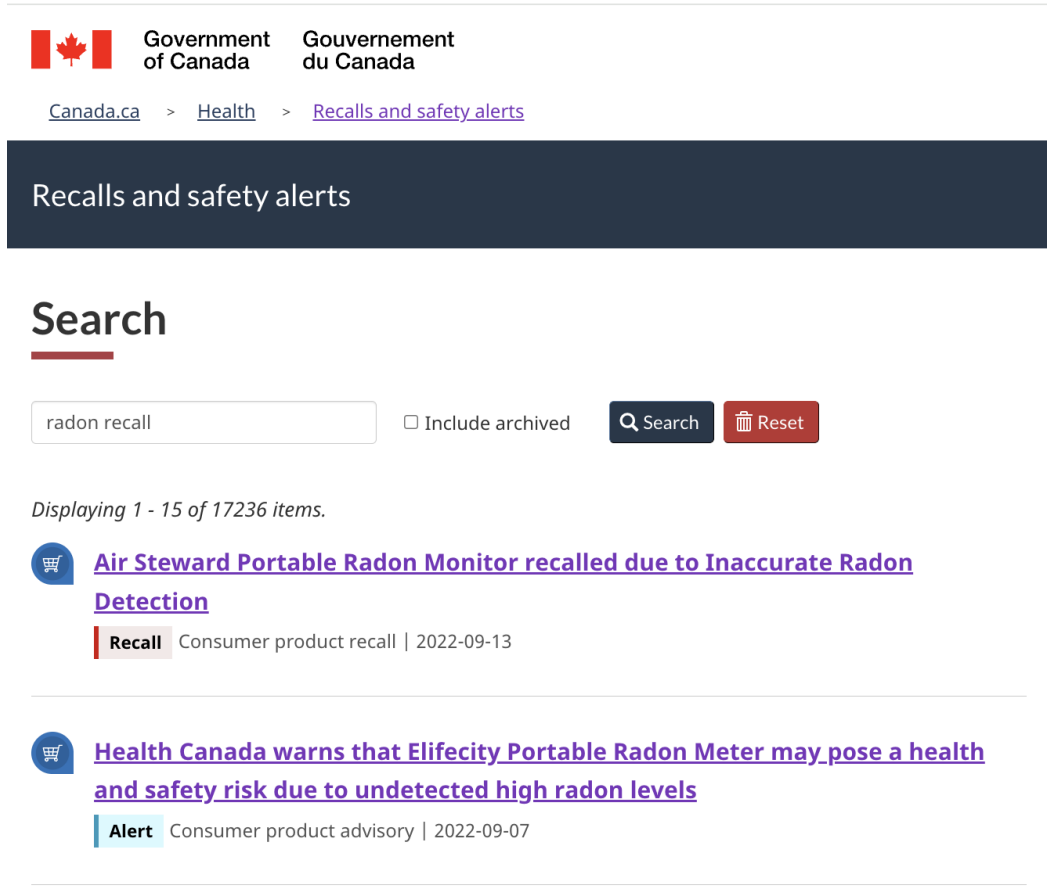
Canadian National Radon Proficiency Program

2023 Intercomparison Report

		Manufacturers stated Accuracy	Frequency of Reading	Digital Display or cell-phone app	Battery or Plug-in	Passed C-NRPP Performance Test For more details click here.
	Airthings Corentium Home	±10% (after 7 days at 200 Bq/m³), ±5% after 2 months of monitoring	12 hours 24 hours 7 days (first reading will take 24 hrs)	Short-term and long-term average shown on monitor display.	Battery	✓
	Airthings Wave Plus	±10% (after 7 days at 200 Bq/m³), ±5% after 2 months of monitoring	Hourly	Long-term average shown on cell phone app. Color-coded indication of levels on monitor.	Battery	✓
	Airthings View Plus	After 30 days at 200 Bq/m³, ±10% on the 7 day average and +/- 5% on the 2 month average	Hourly	Short-term average shown on monitor display; long-term average shown on app.	Battery or plug in (USB-C)	✓
	EcoSense EcoQube	+/-10% at 370 Bq/m³ after 10 hours	Measures every 10 minutes and displays an hourly rolling average.	Hourly level shown on display, long term average available on the app.	Plug in	✓
	EcoSense EcoQube Blue	+/-14% at 370Bq/m³	10 mins	Device displays 1 hour, 1 day, 1 week and 1 month rolling averages.	Plug in	✓
	EcoSense Radon Eye RD200	±10% at 370 Bq/m³ after 10 hours	10 mins	Displays 1 hour rolling average; long-term display on app.	Plug-in	✓
	SunRadon Luft	±10% (after 7 days at 200 Bq/m³)	Initial reading takes 90 mins, hourly.	Long-term and short-term averages shown on the app. Color coded indication of levels on monitor display.	Plug-in	✓

info@c-nrpp.ca www.c-nrpp.ca

https://c-nrpp.ca/testing-for-radon/



Government of Canada / Gouvernement du Canada

Canada.ca > Health > Recalls and safety alerts

Recalls and safety alerts

Search

radon recall ☐ Include archived Search Reset

Displaying 1 - 15 of 17236 items.

Air Steward Portable Radon Monitor recalled due to Inaccurate Radon Detection

Recall Consumer product recall | 2022-09-13

Health Canada warns that Elifecity Portable Radon Meter may pose a health and safety risk due to undetected high radon levels

Alert Consumer product advisory | 2022-09-07

https://recalls-rappels.canada.ca/en

Engage with testing programs- university, community, non-profit testing programs

EVICT RADON
NATIONAL STUDY

SFU Citizen Scientist Project for Radon Gas

Donna Schmidt Lung Cancer Prevention Society

Reducing Risk of Lung Cancer from Radon

Citizen Scientist
SIMON FRASER UNIVERSITY

Community Testing Initiative: 100 Radon Test Kit Challenge

Objectives:

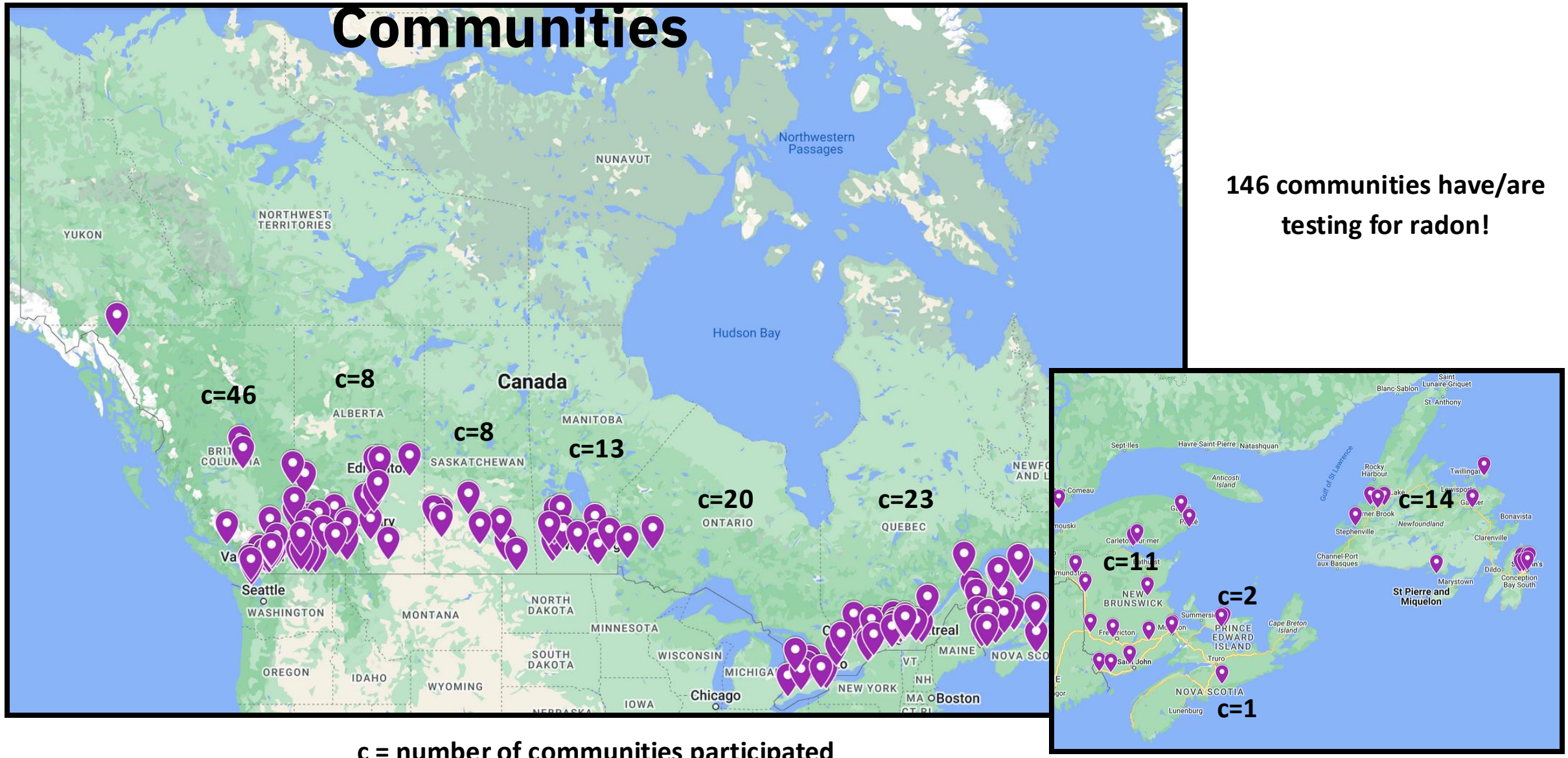
- Increase # of Canadians testing for radon
- Develop a grassroots approach to testing
- Evaluate yearly

Methods:

- Provide 100 **free** test kits
- Use local contacts and community liaisons
- Provide group and one-on-one support
- Inclusive, low barrier program

100 Radon Test Kit Challenge

Communities



146 communities have/are testing for radon!

c = number of communities participated

Program Overview and timeline

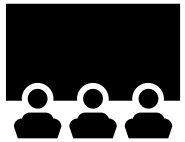
Early Fall 2023

Preparation & planning

Advertise your Community Event

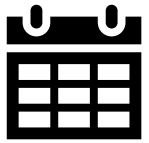
Oct/Nov 2023

Receive the detectors



Awareness Event & detector distribution

Spring 2024

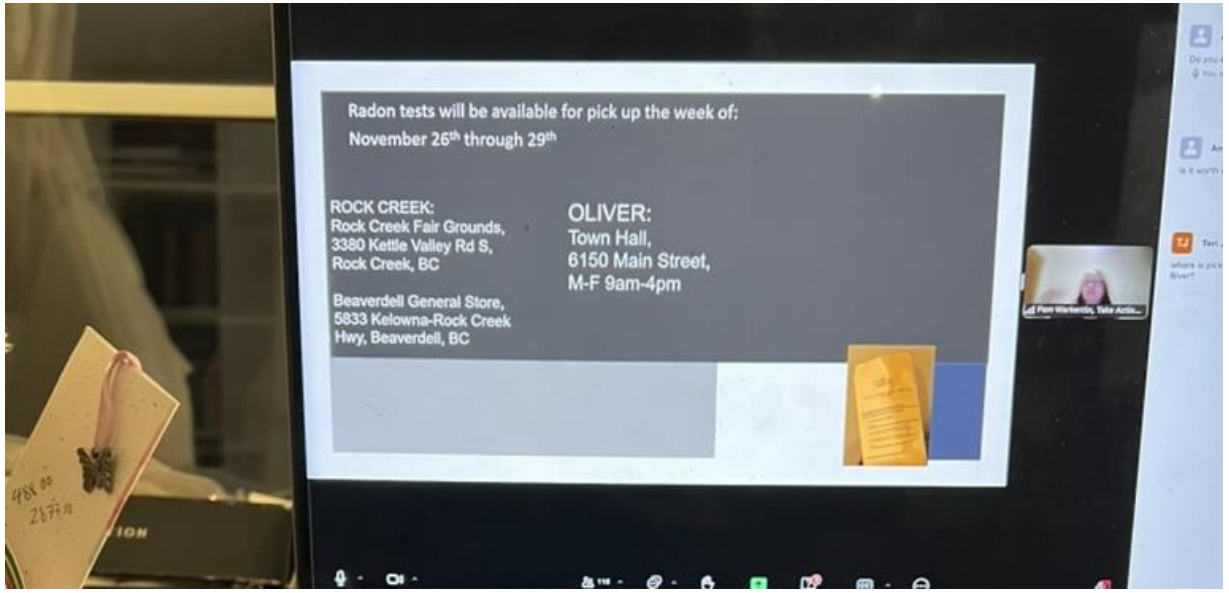


Send in your list & wait 100 days

Community collection period

Receive reports

Public Health professionals can encourage communities to apply to take part AND can participate in all steps if they like



Community education sessions- in person or online

Communication back to individual and community

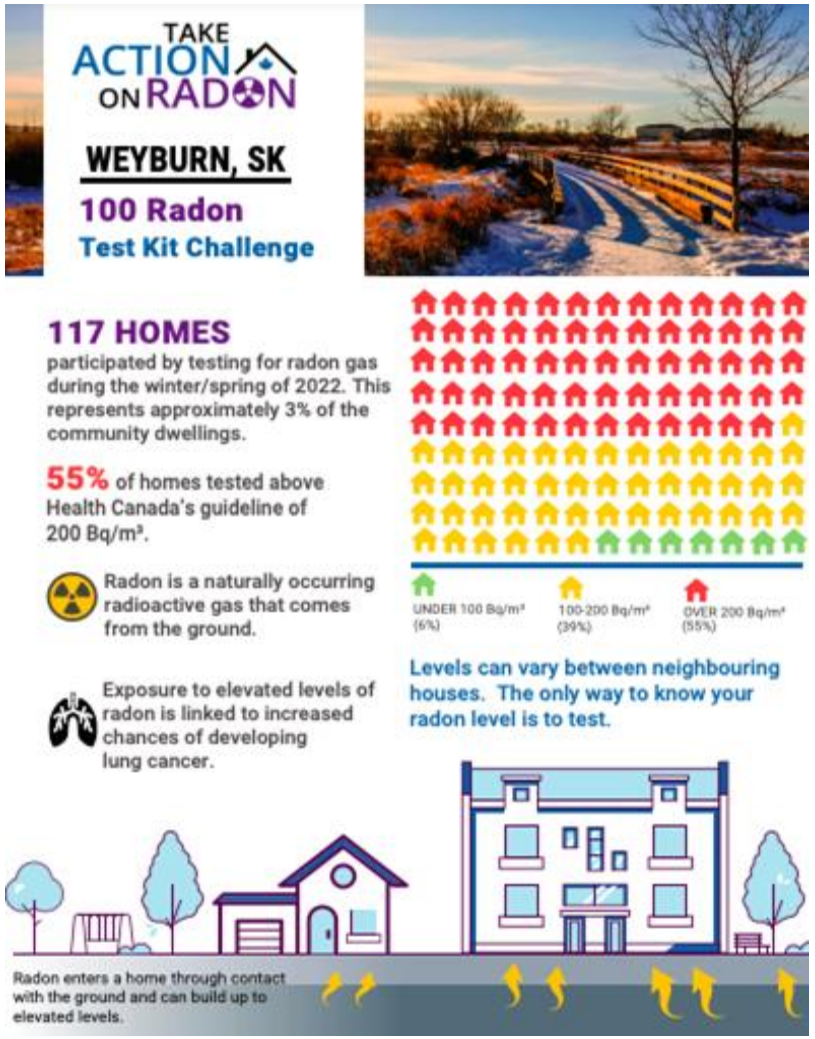
RAPPORT DE MESURE DE RADON

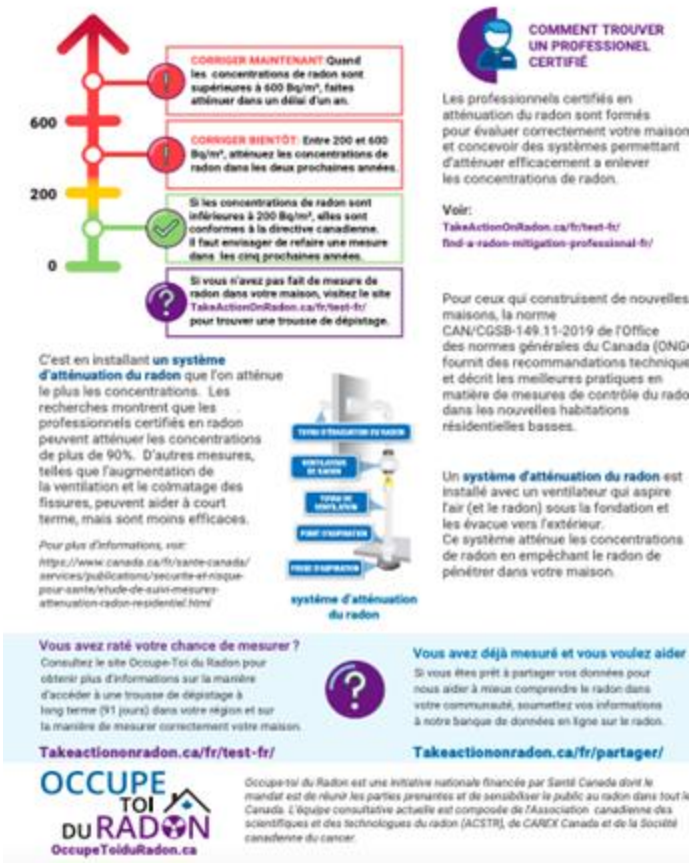
Description of the measurement

Informations du site et adresse

Résultats d'analyse

Each participants receive their own data





Orient participants to mitigation resources

Aggregated Community Report

See more community reports online: https://takeactiononradon.ca/resources/100-radon-test-kit-challenge/

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LOCAL NEWS NOW

ON AIR NOW
9:00 PM - 12:00 AM
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NEWS | QUESTION OF THE DAY | SHOWS | COMMUNITY | MEMBERS | CONTACT US | CAREERS

Local News

Big Uptake in City of Mount Pearl's Radon Test Kit Program

Oct 16, 2024 | 7:31 AM

The City of Mount Pearl is partnering with the Canadian Association of Radon Scientists and Technologists in encouraging residents to participate in the Radon Test Kit Challenge.

Radon is a colourless, odorless gas, that has been identified by Health Canada as the leading cause of lung cancer in non-smokers in the country.

CHATHAM DAILY NEWS

News / Local News

Results show some C-K homes tested for radon had levels above Canadian guideline

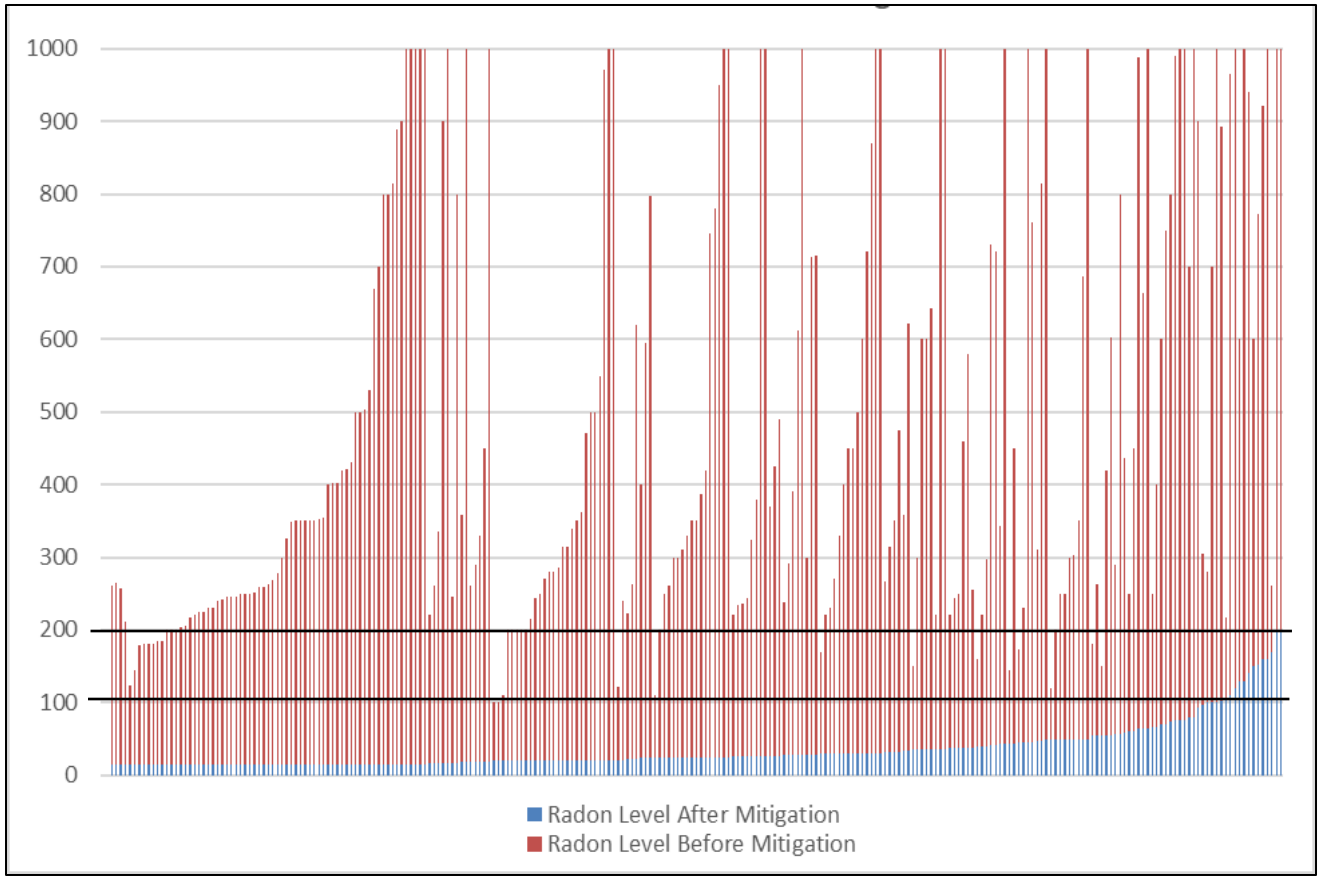
Ellwood Shreve
May 29, 2021 • June 2, 2021 • 2 minute read • Join the conversation

Chatham-Kent public health inspector Scott Dawson displays one of the radon test kits Chatham-Kent Public Health provided to homeowners during this past winter to measure to see if the cancer-causing gas was in their home. Ellwood Shreve/Postmedia Network PHOTO BY ELLWOOD SHREVE /Ellwood Shreve/The Daily News

The results from the 100 Radon Test Kit Challenge taken by some Chatham-Kent residents this past winter shows one in four homes tested have radon levels above the Canadian guideline.

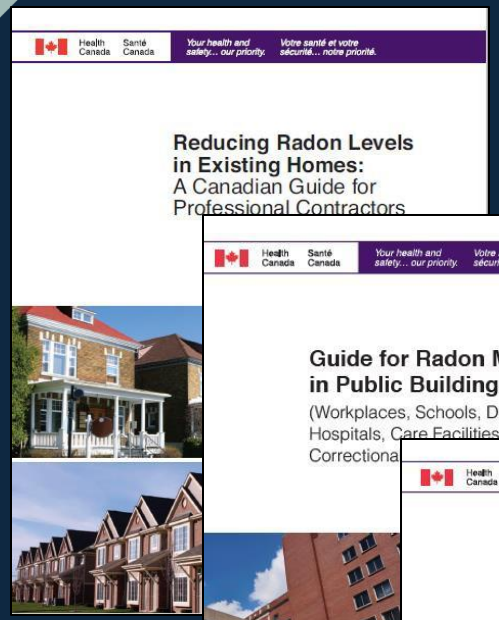
Promote Radon Mitigation Information

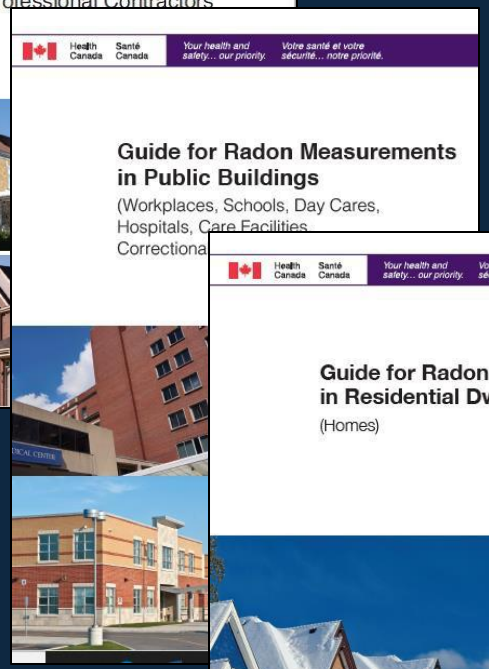
- all homes can be fixed!

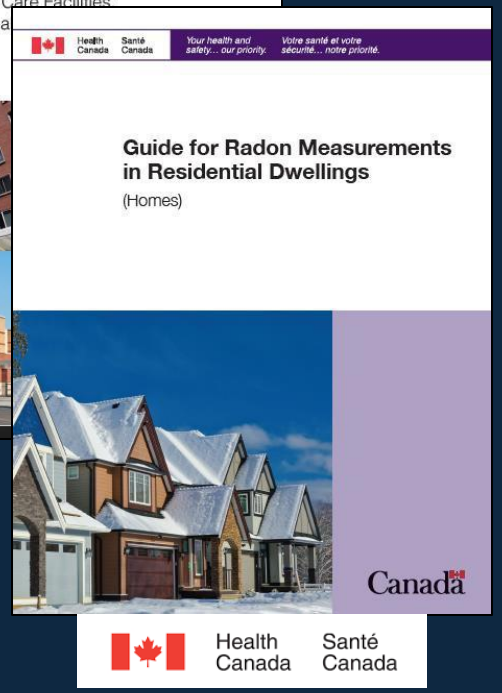


https://takeactiononradon.ca/radon-reduction-sweepstakes-report-2018-2019

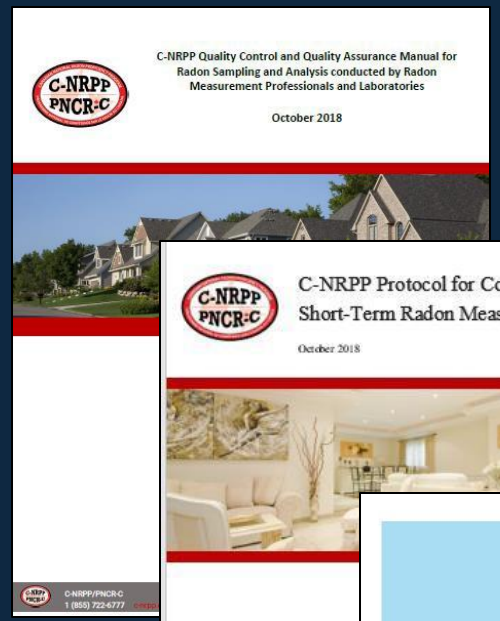
Many national guides and resources

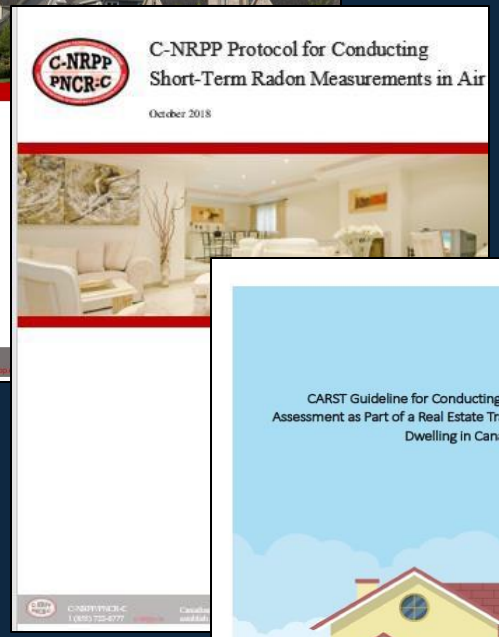


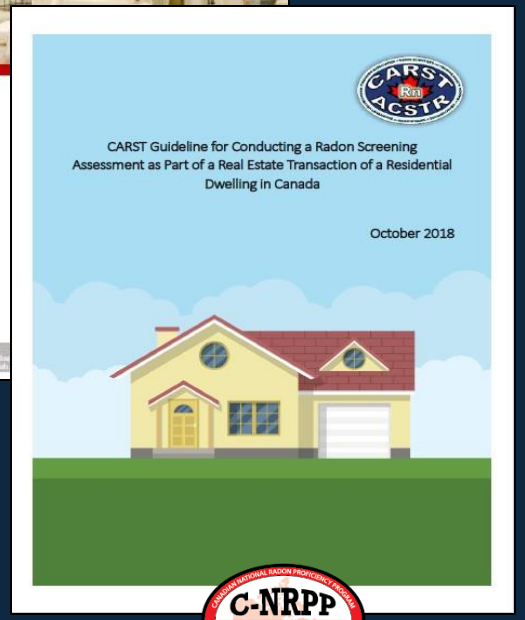




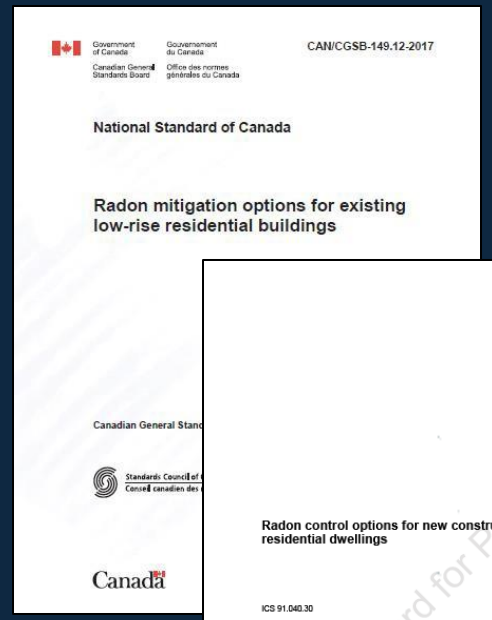
Guidance Documents

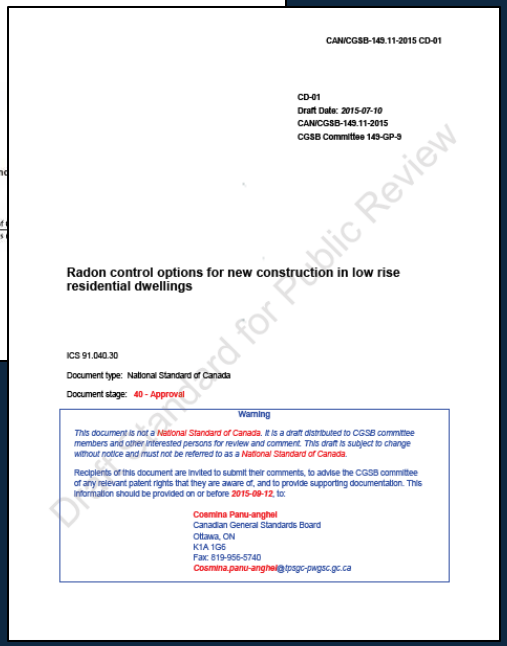






Best Practices





Standards

In summary

Radon exposure in Canada continues to pose a problem

- New building codes are being implemented
- BUT people still need to test
- More research highlights other potential health outcomes of concern

Many steps that public health professionals can take to get involved

- **Simple**- promote existing resources, point to test kit providers, rely key information about mitigation and health impacts
- **Moderate**- engage with libraries, give webinars or talks, get involved in testing programs
- **More engagement-** build provincial resources that can help guide your own policy and practice

Thanks for listening!

Thank you to Riley Condon, Jeff Trieu, and the Take Action on Radon program for their assistance with this presentation

Questions?

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Cats like radon testing too but prefer digital monitors because they have a box…