

Review

Residential Radon Exposure and Lung Cancer Prevention in Canadian Primary Care: A Narrative Review and Practice Algorithm

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Abstract

Residential radon is an invisible radioactive gas produced during the uranium-238 decay series and is an established cause of lung cancer. In Canada, recent national surveillance suggests that about one in five residential buildings may exceed the national radon guidelines, yet household testing remains uncommon. This narrative clinical review translates international and Canadian evidence into practical primary-care and hospital-to-community actions. Evidence was prioritized from carcinogen classifications, World Health Organization guidance, pooled residential case-control analyses, Canadian surveillance and guidance, and the peer-reviewed literature on mechanisms, histology, and risk communication. Radon-222 can enter buildings from soil gas; its short-lived progeny deposits in the respiratory tract and emits high-linear-energy-transfer alpha particles that can damage bronchial epithelial DNA. Because elevated levels cannot be reliably predicted from symptoms, smoking status, house age, or community maps, clinicians should use a simple workflow: ask about prior testing and lower-level occupancy; test with a long-term, approved device in the lowest occupied level; act by interpreting the result, advising mitigation, and directing patients to certified radon professionals when needed; document the exposure assessment, result, advice, referral, and retesting plan; and follow up after mitigation or major building changes. This review clarifies Canadian residential and workplace guidance, contrasts global reference-level approaches, and distinguishes radon prevention from lung cancer screening. No individual patient information or human-subject data are reported.

Keywords: radon; residential exposure; lung cancer; Canadian primary care; family medicine; hospital care; indoor air; environmental health; mitigation; risk communication



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1. Introduction

Radon-222 and its short-lived decay products are classified by the International Agency for Research on Cancer as carcinogenic to humans [1]. Radon is colourless, odourless, and tasteless, and therefore cannot be detected by patients or clinicians without measurement [2,3]. The public health importance of radon is not speculative: pooled residential studies from Europe and North America show that lung cancer risk increases as long-term indoor radon concentration rises [4,5]. A recent meta-analysis also supports a measurable association between residential radon and lung cancer among people who have never smoked [6].

Globally, the World Health Organization estimates that radon contributes to approximately 3–14% of lung cancers, depending on national radon distributions and smoking prevalence, and reports an approximate 16% increase in lung cancer risk for each 100 Bq/m³ increase in long-term average radon concentration [2,3]. In Canada, radon is relevant to daily primary care because exposure occurs mainly in buildings where people spend their ordinary time: homes, basement offices, schools, hospitals, and workplaces [7,8].

This article provides a practical, literature-based clinical approach for Canadian primary care, family medicine, and hospital-to-community counselling. The aim is not to prove causation in any individual case, which is rarely possible for a single environmental exposure, but to translate the strongest available evidence into feasible clinical actions: ask, test, act, document, and follow up.

2. Methods and Scope of the Review

This narrative clinical review was designed for practice translation rather than original epidemiological analysis. Evidence was prioritized in the following order: international carcinogen classifications and public health guidance; pooled residential radon epidemiology; mechanistic and histology-focused peer-reviewed literature; current Canadian federal guidance on radon measurement, interpretation, and mitigation; Canadian aggregate exposure and awareness data; and the peer-reviewed literature relevant to primary-care communication. Sources were identified from PubMed, Health Canada, the World Health Organization, the International Agency for Research on Cancer, the Joint Research Centre of the European Commission, the Canada Gazette, and recent Canadian radon surveillance resources. The search was updated on 29 June 2026.

No private clinical records, patient images, patient quotations, local audit data, quality-improvement data, survey data collected by the authors, or individual-level human-subject data were used. The brief clinical scenario below is an illustrative composite created only to introduce the clinical problem. It is not a report of an identifiable patient.

3. Scientific and Clinical Background

3.1. Physical Origin and Indoor Accumulation

The residential radon problem begins in geology but becomes clinically important indoors. Radon-222 is produced in the uranium-238 decay series, through radium-226, in rocks and soils [2,3,9]. As a noble gas, radon can separate from its mineral source, move with soil gas, and enter buildings through foundation cracks, slab penetrations, sump openings, service entries, floor drains, crawl spaces, and other ground-contact pathways [7,10]. Outdoor radon is usually diluted rapidly; indoor radon can accumulate when entry from soil exceeds removal by ventilation.

Radon is often discussed as a heavy, dense gas, and this is partly useful for patient education. Clinically, however, high indoor values are not explained by density alone. Soil gas pressure, the stack effect during heating seasons, ventilation, foundation contact, and building openings strongly influence where radon enters and accumulates [10]. These factors explain why basements, ground floors, basement bedrooms, home offices, playrooms, workshops, and secondary suites deserve attention. They also justify testing in the lowest occupied level rather than relying on a main-floor impression of air quality [8,10].

3.2. Biological Mechanism and Lung Cancer Pathology

The carcinogenic hazard is driven mainly by inhaling the radon progeny rather than by radon gas alone. Short-lived decay products, including polonium isotopes, can attach to aerosols and deposit on the bronchial and bronchiolar epithelium [9,11]. Their alpha emissions have high linear energy transfer, depositing substantial energy over a short

distance. This can cause clustered DNA damage, including double-strand breaks, and can contribute to oxidative stress, genomic instability, and malignant transformation in respiratory epithelial cells [9,11].

Radon-related lung cancers are not histologically unique. A lung cancer cannot be labelled as radon-caused on pathology alone, and histology should not be used to attribute an individual cancer retrospectively. At the population level, however, histology-specific studies are clinically useful because they remind physicians that radon prevention is relevant beyond one tumour subtype. A meta-analysis of case-control studies reported associations between residential radon and major histological types of lung cancer, while a systematic review identified small-cell lung carcinoma as a subtype with an important radon signal in both the residential and miner literature [12,13]. Adenocarcinoma also remains clinically important, particularly because it is common among never-smokers, but the evidence does not support using subtype to exclude radon relevance [12,13]. Tobacco smoke and radon interact strongly at the risk-communication level, so radon counselling should reinforce, not replace, smoking cessation [2,3].

3.3. Which Patients Should Be Asked First?

A universal testing message is simplest and scientifically safest, but clinicians can still prioritize the first conversation. Radon questions are especially relevant when patients spend prolonged time in a basement or ground-floor room; work from a basement home office; sleep in a basement bedroom; live in a ground-contact suite; have children using lower-level playrooms; smoke or have recently quit; have chronic respiratory disease, lung nodules, or a personal or family concern about lung cancer; or report a home renovation, energy retrofit, foundation repair, or ventilation change since any prior radon test [8,10,13]. Occupational history should include underground mining, uranium work, tunnelling, caves, underground utilities, water-treatment facilities, and other ground-contact or poorly ventilated workplaces, while recognizing that most population exposure occurs in homes rather than in mines [2,3,14,15].

4. Why Radon Belongs in Canadian Primary and Hospital Care

4.1. Burden, Awareness, and the Clinical Gap

The 2024 Cross-Canada Survey of Radon Exposure in Residential Buildings, prepared by the Evict Radon National Study team in collaboration with Health Canada, CAREX Canada, and the British Columbia Centre for Disease Control, reported that approximately 17.8% of Canadian residential buildings were at or above 200 Bq/m³ and that an additional 24.2% were between 100 and 199 Bq/m³ [16]. A Canadian Medical Association Journal practice summary reported that radon accounts for approximately 16% of lung cancer deaths in Canada, or more than 3000 deaths annually [17]. The Cross-Canada report also emphasized that there are no radon-free areas in Canada and that maps should not be used to decide whether a specific household should test [16].

Awareness and uptake remain low. In the 2023 National Radon Awareness Survey, only about 8–10% of Canadian householders reported that their home had been tested, and 84% were unaware of programmes or activities to help residents learn about or deal with radon [18]. A survey of family physicians in a high-radon U.S. state found that many physicians understood radon as radioactive, but most did not routinely inform patients about radon or discuss the combined hazards of radon and smoking [19]. The Canadian family medicine literature has similarly argued that family physicians can make radon prevention more visible, practical, and patient-centred [20].

4.2. Geography, Maps, Cold Climates, and Regulation

Radon-prone areas can be identified for public health planning, but household testing remains necessary. European authorities maintain indoor radon maps based on national data aggregated into 10 km by 10 km grid cells, and Canada now has increasingly detailed national and regional radon surveillance [16,21,22]. Studies from Canada show regional variation, higher average levels in some rural communities, and meaningful household-to-household variability even within the same broad region [16,21,23].

Geology matters because uranium-rich bedrock, granite and some shale formations, fractured rock, permeable soils, and mining or extractive regions can increase radon potential. Building factors also matter: foundation openings, finished basements, air-tight construction, energy retrofits, winter heating, closed windows, and stack effect can raise indoor concentrations [10,14]. In cold regions such as much of Canada, heating-season testing is preferred because indoor radon levels are often higher when homes are closed and pressure differences pull soil gas indoors [10]. These facts support a clear clinical message: local maps can help target campaigns, but a patient cannot infer a safe home from geography, house age, or visual inspection.

Canada has a national radon guideline of 200 Bq/m³ for residential homes, public buildings, and workplaces with normal occupancy greater than 4 h per day [8]. The federal role is largely guideline-setting, creating technical standards, and providing professional certification support and public education, while provinces and territories hold important powers over buildings, public health, tenancy, real estate, and many workplaces [14]. For federally regulated workplaces, the Canada Gazette published amendments under the Canada Labour Code that lowered the radon exposure limit from 800 Bq/m³ to 200 Bq/m³ and described the requirement as outcome-based rather than a single prescriptive testing schedule [15]. This is different from the European Union approach, where the Basic Safety Standards Directive requires member states to establish national radon action plans and national reference levels, not exceeding 300 Bq/m³, for indoor radon exposure [24]. For clinicians, the practical implication is that counselling should not wait for a legal trigger. Health action begins with testing the building where the patient spends time.

4.3. The Clinical Role Is Prevention, Not Retrospective Attribution

For an individual patient with lung cancer, it is generally not possible to state that radon definitively caused the malignancy. Multiple inherited, environmental, occupational, inflammatory, and stochastic factors may interact over decades. The clinical value of radon history is therefore strongest in prevention, family and household counselling, documentation of relevant environmental exposure, and mitigation of current or future exposure. Primary-care clinicians can normalize radon testing as part of preventive care. Hospital clinicians, respirologists, oncologists, internists, discharge teams, and allied health professionals can reinforce the same message when caring for patients with chronic respiratory disease, lung nodules, lung cancer, or family concern about home exposure. The opportunity is practical: radon can be tested, reduced, and retested [8,10,25].

5. Clinical Scenario

A primary-care clinician learns during a preventive-care visit that a patient works most days in a finished basement home office and has never tested the home for radon. The patient has never smoked and assumes that lung cancer risk is negligible. This common scenario illustrates why radon counselling belongs in routine care: exposure cannot be sensed, cannot be ruled out by a regional map, and may be influenced by where and how long a person spends time indoors.

6. The Ask–Test–Act–Document–Follow Up Algorithm

Table 1 summarizes the proposed clinical workflow. The algorithm begins with ordinary history-taking and ends with documented follow up, because radon prevention fails when testing advice is given once and never closed in the record.

Table 1. Practical algorithm for radon counselling in Canadian primary-care and hospital-to-community practice.

Step	Clinical Action	Documentation, Referral, and Follow Up
Trigger	Use radon counselling during preventive visits, respiratory reviews, smoking cessation visits, home office or basement occupancy histories, prenatal or child health visits, chronic disease reviews, lung nodule or lung cancer discussions, and discharge or survivorship counselling.	Document why the issue was raised, especially lower-level occupancy, smoking history, household concern, respiratory context, or building changes.
Ask	Ask: Has your home ever been tested for radon? If yes, ask when, for how long, which level was tested, what the result was in Bq/m ³ , and whether renovations, energy retrofits, foundation work, or ventilation changes occurred afterward.	Record prior test status, approximate date, result, duration, device or laboratory if known, room and level tested, and whether the result can be considered a long-term measurement.
Test	If the home has not been tested, recommend a long-term test in the lowest occupied level. Health Canada recommends testing for at least 91 days and preferably during the heating season. Use a C-NRPP-approved long-term device or qualified radon professional when possible [10,26].	Document test advice, intended location, planned duration, and whether the patient was directed to Health Canada, C-NRPP, a reputable laboratory, public health resources, or a community/library test-kit programme.
Act	Interpret the long-term result using current guidance. Above 200 Bq/m ³ , advise mitigation to reduce the level as low as reasonably achievable; higher results should prompt earlier action [19,20]. Consider feasible reduction even below 200 Bq/m ³ when exposure time is high or patient preference is strong.	Record the result in Bq/m ³ , interpretation, advice given, mitigation plan, smoking cessation support if relevant, and whether referral to a certified mitigation professional or workplace/landlord route was recommended.
Refer	For elevated residential results, direct patients to a C-NRPP-certified radon mitigation professional. For workplace, school, rental, public building, or multi-unit concerns, involve the appropriate building owner, occupational health and safety lead, public health/environmental health unit, landlord/condominium board, or employer.	Record the referral/resource provided, responsible party, patient preference, and any barriers such as cost, rental status, or uncertainty about who controls the building.
Document and follow up	After mitigation, advise post-mitigation testing. Retest after major renovations, energy retrofits, excavations near the foundation, ventilation changes, or when the lowest occupied level changes. Homes with active mitigation systems should also be retested periodically [10].	Record mitigation completed or declined, post-mitigation result, date for follow-up, retesting interval, and residual counselling that lower radon is safer but no level is considered completely risk-free.

6.1. Ask: Make Radon Visible in History

The most efficient opening question is simple: “Has your home ever been tested for radon?” If the answer is no, the next step is not to estimate risk from a map, postal code, neighbourhood reputation, or housing age, but to recommend testing. If the answer is yes, clinicians should ask when the test was performed, how long it ran, which level was tested, what the result was, and whether the building has changed since testing.

Lower-level occupancy is clinically relevant because testing should capture the air people actually breathe. A finished basement bedroom, home office, recreation room, suite, or workshop may be more relevant than the main floor if that is where a person spends substantial time. Clinicians should also ask about household members because radon mitigation benefits everyone who shares the building, not only the patient in the exam room.

6.2. Test: Use Long-Term Measurement and Validated Devices

Radon varies hour to hour, day to day, and seasonally; therefore, longer tests more accurately estimate average exposure. Health Canada recommends testing for at least 91 days and preferably during the heating season, with placement in a normal occupancy area of the lowest lived-in level of the home [10]. Short-term tests may have limited uses, but they should not be used to provide false reassurance when the clinical question is long-term household exposure.

Family physicians do not need to become building scientists, but they should be able to answer the basic device question. Health Canada recommends long-term devices that have passed C-NRPP performance testing. Common options include alpha-track detectors, electret ion chambers, and electronic radon monitors suitable for long-term measurement when they meet performance requirements [10]. Many passive kits are mailed to a laboratory after the exposure period. Electronic radon monitors can display readings during testing, but clinicians should remind patients that the interpretation should be based on an appropriate long-term average rather than a single-day value.

A practical patient instruction is: “Use a recognized long-term radon test, place it in the lowest occupied level where your household spends time, leave it in place for the recommended period, follow the laboratory or device instructions, and keep the result.” Clinics can reduce friction by linking patients to Health Canada guidance, C-NRPP resources, local public health pages, reputable test-kit suppliers, and community programmes such as library lending initiatives where available [7,10,14,26].

6.3. Act and Refer: Interpret the Number, Reduce Exposure, and Identify the Right Non-Medical Specialist

Table 2 provides a practical interpretation framework for long-term residential results. The thresholds are policy tools, not biological cut-offs. A result of 195 Bq/m³ is not biologically different from 205 Bq/m³. The clinical goal is to reduce avoidable cumulative exposure, with urgency increasing as the measured concentration rises.

Table 2. Interpreting long-term residential radon results for patient counselling.

Long-Term Result	Clinical Interpretation	Action for the Clinician
Less than 100 Bq/m ³	Below the WHO recommended reference level and below the Canadian guideline. Risk is lower, but radon is not considered completely risk-free [2,3,8].	Document the result. Consider retesting after major renovations, ventilation changes, energy retrofits, excavation near the foundation, or a change in lower-level occupancy [10].
100–199 Bq/m ³	Below the Canadian guideline but at or above the WHO recommended reference level of 100 Bq/m ³ [3,8].	Discuss that further reduction may be reasonable if feasible, particularly with substantial lower-level occupancy, household concern, or smoking exposure. Document shared decision-making.
200 Bq/m ³ or higher	At or above the Canadian guideline. Health Canada recommends corrective action to reduce exposure and mitigation within 1 year, or sooner if the level is higher [8,10].	Recommend mitigation and post-mitigation testing. Direct the patient to Health Canada resources and a C-NRPP-certified mitigation professional when possible [10,25,26].

Table 2. Cont.

Long-Term Result	Clinical Interpretation	Action for the Clinician
Very high or rapidly rising electronic-monitor readings	A high electronic reading should prompt careful confirmation of device placement, duration, and device limits. Some devices require verification at very high readings [10].	Do not ignore a very high reading. Recommend confirmatory long-term or professional measurement if needed, and early consultation with a C-NRPP-certified measurement or mitigation professional.

Mitigation is usually a building intervention rather than a medical treatment. Common approaches include sealing entry pathways and active sub-slab or sub-soil depressurization, depending on building design [25]. The clinician's task is to advise action, direct patients to credible resources, encourage certified mitigation where appropriate, and arrange follow-up testing rather than simply recording the initial value.

Table 3 summarizes who should be contacted after an elevated radon level is found. Most referrals are not medical referrals. They are referrals to building, environmental, workplace, or public health expertise.

Table 3. Who to involve when an elevated radon result is identified.

Situation	Who Should Be Involved	Primary-Care Role
Owner-occupied home above 200 Bq/m ³	C-NRPP-certified radon mitigation professional; reputable measurement laboratory or device provider if the test quality is uncertain [10,25,26].	Explain the result, recommend timely mitigation, document advice, and arrange follow-up to confirm post-mitigation retesting.
Rental home, condominium, or multi-unit building	Landlord, property manager, condominium board, tenant-support resources, and local public health or environmental health unit if there is uncertainty or dispute.	Encourage written sharing of the result, provide credible guidance, and document barriers that may prevent the patient from controlling the building intervention.
Workplace, school, clinic, hospital, or public building	Employer, occupational health and safety lead, building operator, occupational hygienist, radiation safety officer where applicable, and public health/environmental health authorities.	Advise the patient to report the concern through workplace or institutional channels. For federally regulated workplaces, note the 200 Bq/m ³ outcome-based exposure limit [15].
Patient who smokes or recently quit	Smoking cessation programme, pharmacist, respiratory educator, or other local cessation supports, in addition to radon mitigation resources.	Pair radon counselling with cessation support because tobacco smoke and radon together markedly increase lung cancer risk [2,3].
Symptoms, abnormal imaging, or eligibility for lung cancer screening	Diagnostic pathway, respirology, oncology, radiology, or a lung screening programme according to local criteria.	Do not treat radon testing as diagnostic testing. Investigate symptoms or abnormal imaging promptly, and use low-dose CT screening only according to established eligibility criteria [27].

6.4. Document and Follow Up: Make Prevention Auditable

Radon prevention is easy to lose in a patient's chart unless the note is specific. A useful record includes: prior test status; device type if known; test location; start and end dates; duration; result in Bq/m³; whether the test met long-term criteria; relevant occupancy pattern; interpretation; advice given; referral or resource provided; mitigation completed, planned, or declined; post-mitigation result; and the retesting plan. If the patient declines testing or mitigation, document the discussion without judgement.

A practical electronic medical record phrase is: “Radon counselling provided. Long-term test recommended for the lowest occupied level. Patient advised that elevated radon is reduced through building mitigation rather than medical treatment. Result should be documented in Bq/m³; if above 200 Bq/m³, mitigation and post-mitigation retesting are recommended. Retest after major renovation, energy retrofit, foundation work, ventilation change, or change in lower-level occupancy.”

7. Risk Communication and Implementation

Radon counselling should be specific, calm, and action-oriented. Avoid implying that every elevated result predicts cancer, or that a low result eliminates risk. A balanced message is: “Radon is common and invisible. The only way to know your level is to test. If the level is elevated, proven building interventions can reduce exposure.”

For clarity, radon testing should be described as an environmental exposure assessment that enables prevention. Mitigation is the risk-reducing intervention, and retesting confirms whether exposure is reduced. None of these steps diagnose lung cancer.

Smoking history remains important because tobacco smoke and radon together increase lung cancer risk [2,3]. For patients who smoke or recently quit, radon counselling should be paired with tobacco cessation support. For patients who have never smoked, counselling should avoid the misleading reassurance that non-smokers have no lung cancer risk.

Clinicians should also separate prevention from screening. Routine low-dose CT screening solely because of radon exposure is not currently established in Canadian primary-care recommendations. The Canadian Task Force on Preventive Health Care recommendation focuses on adults aged 55 to 74 years with substantial smoking history and recommends against routine low-dose CT screening for other adults [27]. Patients with symptoms or abnormal imaging need diagnostic assessment, not screening.

Implementation does not require a large clinic project. A clinic can add one radon question to preventive-care templates, chronic cough/asthma/COPD reviews, home office histories, and smoking cessation visits. A patient-facing handout can direct patients to Health Canada guidance, C-NRPP-certified resources, local test-kit options, and public health or library programmes when available [7,10,14,26]. Hospital teams can include radon testing advice in discharge or survivorship materials for patients and families when appropriate, while avoiding any suggestion that radon can be assigned as the cause of an individual cancer.

8. Ethical and Regulatory Considerations

This article is a literature-based narrative clinical review and practice algorithm. It does not report a case, case series, patient image, patient quotation, medical record extract, local audit, quality-improvement project, survey, interview, or secondary analysis of private data. The clinical scenario is an illustrative composite used only for education. On that basis, institutional ethics review is not applicable. If authors later add details from an actual patient, written consent for publication and journal-specific case-report requirements should be addressed before submission.

The regulatory discussion is included to help clinicians counsel patients responsibly. It is not legal advice. Clinicians should direct patients with rental, workplace, school, public building, or occupational concerns to the relevant building owner, employer, public health or environmental health authority, occupational health and safety process, or legal/tenant resource as appropriate.

9. Conclusions

Radon exposure is a common, invisible, and modifiable lung cancer risk that is well suited to Canadian primary-care prevention and hospital-to-community counselling. Clin-

icians do not need to estimate geological risk or prove individual causation. They need a reproducible workflow: ask whether the home has been tested; recommend long-term testing in the lowest occupied level; interpret the result using current guidance; advise mitigation and retesting when indicated; identify the right radon, building, public health, or workplace contact; and document the discussion. A concise Ask–Test–Act–Document–Follow up approach can make radon counselling practical, auditable, and patient-centred.

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Abbreviations

ALARA, as low as reasonably achievable; Bq/m³, becquerels per cubic metre; C-NRPP, Canadian National Radon Proficiency Program; CT, computed tomography; EMR, electronic medical record; ERM, electronic radon monitor; EU, European Union; IARC, International Agency for Research on Cancer; LDCT, low-dose computed tomography; LET, linear energy transfer; WHO, World Health Organization.

References

1. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Radiation. In *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 100D*; International Agency for Research on Cancer: Lyon, France, 2012. Available online: <https://www.ncbi.nlm.nih.gov/books/n/iarcmono100d/> (accessed on 29 June 2026).
2. World Health Organization. Radon. Available online: <https://www.who.int/news-room/fact-sheets/detail/radon-and-health> (accessed on 29 June 2026).
3. World Health Organization. *WHO Handbook on Indoor Radon: A Public Health Perspective*; Zeeb, H., Shannoun, F., Eds.; World Health Organization: Geneva, Switzerland, 2009. Available online: <https://www.who.int/publications/i/item/9789241547673> (accessed on 29 June 2026).
4. Darby, S.; Hill, D.; Auvinen, A.; Barros-Dios, J.M.; Baysson, H.; Bochicchio, F.; Deo, H.; Falk, R.; Forastiere, F.; Hakama, M.; et al. Radon in homes and risk of lung cancer: Collaborative analysis of individual data from 13 European case-control studies. *BMJ* **2005**, *330*, 223. [CrossRef] [PubMed]
5. Krewski, D.; Lubin, J.H.; Zielinski, J.M.; Alavanja, M.; Catalan, V.S.; Field, R.W.; Klotz, J.B.; Letourneau, E.G.; Lynch, C.F.; Lyon, J.I.; et al. Residential radon and risk of lung cancer: A combined analysis of 7 North American case-control studies. *Epidemiology* **2005**, *16*, 137–145. [CrossRef] [PubMed]

6. Cheng, E.S.; Egger, S.; Hughes, S.; Weber, M.; Steinberg, J.; Rahman, B.; Worthington, J.; Lew, J.B.; Caruana, M.; Prigge, E.S.; et al. Systematic review and meta-analysis of residential radon and lung cancer in never-smokers. *Eur. Respir. Rev.* **2021**, *30*, 200230. [CrossRef] [PubMed]
7. Health Canada. Understanding Radon and Protecting Your Patients. Available online: <https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/radon-health-professionals-understanding-protecting-patients.html> (accessed on 29 June 2026).
8. Health Canada. Government of Canada Radon Guideline. Available online: <https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon/government-canada-radon-guideline.html> (accessed on 29 June 2026).
9. National Research Council. *Assessment of the Scientific Information for the Radiation Exposure Screening and Education Program*; National Academies Press: Washington, DC, USA, 2005. [CrossRef] [PubMed]
10. Health Canada. Guide for Radon Measurements in Residential Dwellings (Homes). Available online: https://publications.gc.ca/collections/collection_2025/sc-hc/H129-166-2025-eng.pdf (accessed on 29 June 2026).
11. Robertson, A.; Allen, J.; Laney, R.; Curnow, A. The cellular and molecular carcinogenic effects of radon exposure: A review. *Int. J. Mol. Sci.* **2013**, *14*, 14024–14063. [CrossRef] [PubMed]
12. Li, C.; Wang, C.; Yu, J.; Fan, Y.; Liu, D.; Zhou, W.; Shi, T. Residential radon and histological types of lung cancer: A meta-analysis of case-control studies. *Int. J. Environ. Res. Public Health* **2020**, *17*, 1457. [CrossRef] [PubMed]
13. Rodriguez-Martinez, A.; Torres-Duran, M.; Barros-Dios, J.M.; Ruano-Ravina, A. Residential radon and small cell lung cancer: A systematic review. *Cancer Lett.* **2018**, *426*, 57–62. [CrossRef] [PubMed]
14. Health Canada. Radon Action Guide for Provinces and Territories: Overview. Available online: <https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon/action-guides/provinces-territories.html> (accessed on 29 June 2026).
15. Government of Canada. Regulations Amending Certain Regulations Made Under the Canada Labour Code, SOR/2026-10. *Can. Gaz. Part II* **2026**, *160*, 47–168.
16. Cross-Canada Radon Survey Working Group. *Cross-Canada Survey of Radon Exposure in Residential Buildings of Urban and Rural Communities*; Evict Radon National Study: Calgary, AB, Canada; Health Canada: Ottawa, ON, Canada; CAREX Canada: Vancouver, BC, Canada; British Columbia Centre for Disease Control: Vancouver, BC, Canada, 2024. Available online: <https://crosscanadaradon.ca/survey/> (accessed on 29 June 2026).
17. Mema, S.C.; Baytalan, G. Radon and lung cancer risk. *CMAJ* **2023**, *195*, E850. [CrossRef] [PubMed]
18. Health Canada. National Radon Awareness Survey. 2023. Available online: https://publications.gc.ca/collections/collection_2023/sc-hc/H14-436-2023-eng.pdf (accessed on 29 June 2026).
19. Schmitz, D.; Klug, M.G.; Schwartz, G.G. Radon knowledge and practices among family physicians in a high radon state. *J. Am. Board Fam. Med.* **2021**, *34*, 602–607. [CrossRef] [PubMed]
20. Garcia-Rodriguez, J.A. Radon gas-the hidden killer: What is the role of family doctors? *Can. Fam. Physician* **2018**, *64*, 496–501. [PubMed]
21. Khan, S.M.; Pearson, D.D.; Eldridge, E.L.; Morais, T.A.; Ahanonu, M.I.C.; Ryan, M.C.; Taron, J.M.; Goodarzi, A.A. Rural communities experience higher radon exposure versus urban areas, potentially due to drilled groundwater well annuli acting as unintended radon gas migration conduits. *Sci. Rep.* **2024**, *14*, 3640. [CrossRef] [PubMed]
22. European Commission, Joint Research Centre. European Indoor Radon Map: Indoor Radon Concentration. Available online: <https://remon.jrc.ec.europa.eu/About/Atlas-of-Natural-Radiation/Digital-Atlas/Indoor-radon-AM/Indoor-radon-concentration> (accessed on 29 June 2026).
23. Stanley, F.K.T.; Zarezaadeh, S.; Dumais, C.D.; Dumais, K.; MacQueen, R.; Clement, F.; Goodarzi, A.A. Comprehensive survey of household radon gas levels and risk factors in southern Alberta. *CMAJ Open* **2017**, *5*, E255–E264. [CrossRef] [PubMed]
24. European Union. Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation. *Off. J. Eur. Union* **2014**, *L13*, 1–73.
25. Health Canada. Radon—Reduction Guide for Canadians. Available online: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/radon-reduction-guide-canadians-health-canada.html> (accessed on 29 June 2026).
26. Canadian-National Radon Proficiency Program. Find a Radon Professional. Available online: <https://c-nrpp.ca/find-a-professional/> (accessed on 29 June 2026).
27. Canadian Task Force on Preventive Health Care. Recommendations on screening for lung cancer. *CMAJ* **2016**, *188*, 425–432. [CrossRef] [PubMed]

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