



Pan-Canadian Lung Cancer Screening Initiative

Lung Cancer Screening Framework for Canada



Pan-Canadian Lung Cancer Screening Initiative

Lung Cancer Screening Framework for Canada

This document has been made possible through a financial contribution from Health Canada, through the Canadian Partnership Against Cancer. The views expressed herein represent the views of the Canadian Partnership Against Cancer.

The contents of this publication may be reproduced in whole or in part, provided the intended use is for non-commercial purposes and full acknowledgement is given to the Canadian Partnership Against Cancer.

Suggested citation: Canadian Partnership Against Cancer (2014). *Pan-Canadian Lung Cancer Screening Initiative: Lung Cancer Screening Framework for Canada*. Toronto, Canadian Partnership Against Cancer.

Canadian Partnership Against Cancer

1 University Avenue, Suite 300
Toronto, Ontario, Canada M5J 2P1
Tel: 416.915.9222
Toll-free: 1.877.360.1665
www.partnershipagainstcancer.ca

Aussi offert en français sous le titre : *Initiative pancanadienne de dépistage du cancer du poumon : Cadre de dépistage du cancer du poumon pour le Canada*

CONTENTS

2	Background
2	Lung Cancer
2	Lung Cancer Screening
3	A National Approach to Lung Cancer Screening in Canada
4	Lung Cancer Screening Framework for Canada - Consensus Statements
4	Intent
4	Introduction
8	Lung Cancer Screening Consensus Statements
11	Statement References
12	Next Steps
13	Appendix A: Lung Cancer Screening Framework for Canada - Development
13	The Process
16	Appendix B: PLCSN Members, Expert Volunteers on Working Groups, and Other Participants

BACKGROUND

Lung Cancer

Lung cancer is the leading cause of cancer death in Canada.

It is estimated that 25,500 Canadians were diagnosed with lung cancer in 2013 and that some 20,200 men and women died from the disease in the same year.ⁱ The five-year relative survival rate for lung cancer is 17 percent.ⁱ

Lung cancer is the leading cause of death from cancer in Canada and is the second most common cancer in both males and females. Since the mid-1980s the incidence has been declining in men, and while fewer women than men are diagnosed with this type of cancer, the incidence among females has been increasing since 1982. These patterns reflect changes in tobacco use and quit rates: rates of smoking among men started to decline in the mid-1960s whereas declines in smoking rates among females were not observed until the mid-1980s.ⁱ

Lung cancer is a significant burden to those affected by the disease, their families, and the health care system. The treatment is complex and dependent on a number of factors including stage of diagnosis, tumour pathology, and/or the presence of other medical conditions.

Lung Cancer Screening

An international collaborative effort is underway to further our understanding of how lung cancer develops and to devise a framework for earlier detection of the disease through screening.

Cancer screening involves the use of specific tests to detect the presence of disease at an early stage so that treatment can start before the onset of clinical symptoms. The overall goal of screening is to reduce the mortality associated with the disease. With lung cancer screening there exists an important opportunity to also address primary prevention if smoking cessation programs are integrated with screening activities.

Advances in low-dose spiral computed tomography (LDCT) have led researchers to assess its efficacy as a potential lung cancer-screening test in high-risk individuals. In the United States, the National Lung Screening Trial (NLST) found that lung cancer deaths fell by 20 percent in current and/or former smokers aged 55-74 (with 30 or more pack-years smoking history) who were screened annually for three consecutive years using LDCT.ⁱⁱ The trial also found that all-cause mortality fell by seven percent among this group.

In light of these findings, the International Association for the Study of Lung Cancer (IASLC) Board of Directors struck a CT Screening Task Force to develop an IASLC position statement. This statement concluded that:

- The NLST was the first randomized controlled trial to demonstrate a significant reduction in lung cancer mortality due to LDCT screening in a high-risk population.
- There are both published data and ongoing trials and studies that could help inform the advancement of population-based lung cancer screening.

The Task Force called for the collaboration and active participation of international lung cancer clinicians and researchers to study, assess, evaluate, and refine this proposed screening approach.ⁱⁱⁱ

To that end, in 2011, IASLC hosted a CT Screening Workshop to further discuss opportunities for improving and advancing the use of LDCT in lung cancer screening. A number of Strategic CT Screening Advisory Committees were established at this time. Their stated goal was to actively engage lung cancer stakeholders, including professional societies and organizations, to focus on developing guidelines and recommendations in the following areas:

1. Identification of high-risk individuals for lung cancer screening programs;
2. Development of radiological guidelines for use in developing lung cancer CT screening programs;
3. Development of guidelines for the clinical work-up of “indeterminate nodules” resulting from CT screening programs;
4. Guidelines for pathology reporting of nodules from lung cancer CT screening programs;
5. Recommendations for surgical and therapeutic interventions of suspicious nodules identified through lung cancer CT programs; and
6. Integration of smoking cessation practices into future national lung cancer CT screening programs.^{iv}

A National Approach to Lung Cancer Screening in Canada

National experts from across Canada collaborated to discuss priorities and issues in lung cancer screening.

To identify priorities for lung cancer screening in Canada, the Canadian Partnership Against Cancer (CPAC) hosted two multi-stakeholder forums (November 22, 2011 and February 29, 2012). It was agreed by forum participants that a national network approach would be useful for both identifying and supporting national priorities.

The Pan-Canadian Lung Cancer Screening Network (PLCSN), hosted by CPAC, was subsequently established with the following mandate: to support initiatives that will inform discussions and decisions around lung cancer screening; to leverage expertise in this area; and to make use of evidence-based recommendations that support policy and best practices in lung cancer screening.

Members of PLCSN include representatives from provincial cancer care organizations, provincial and territorial ministries of health, the Public Health Agency of Canada, and non-government and professional organizations. Individual experts are also invited to

participate in PLCSN initiatives depending on the subject matter.

Recognizing that lung cancer screening was a new area of development – both in Canada and internationally – members of PLCSN agreed that developing a Lung Cancer Screening Framework for Canada would be a valuable initial project. As such, this consensus statement-based framework was developed to provide useful guidance to the provinces and territories as they address this important issue in cancer control.

The statements within this framework were developed through an extensive consultation process which took place between April 2013 and April 2014 (a detailed account of the consensus process is included as Appendix A).

LUNG CANCER SCREENING FRAMEWORK FOR CANADA - CONSENSUS STATEMENTS

Intent

This consensus statement-based framework has been designed as a tool to support Canadian jurisdictions in their deliberations and/or in planning for lung cancer screening by outlining the key elements for consideration.

The framework is not intended to be prescriptive. It is recognized that lung cancer screening, if it takes place, will evolve differently across the provinces and territories in terms of timing and approaches. In addition, there may be issues and gaps that are not identified and/or resolved in this framework; for that reason, it should be viewed as an iterative process.

Although the development of this framework was facilitated by CPAC, it will be essential to identify the most appropriate group(s) to address the specific aspects of the various statements. In some statements, these groups have been noted.

Introduction

The vast majority of lung cancers (85-90%) are associated with cigarette smoking.^v Preventing the onset of smoking and bringing about successful smoking cessation amongst current smokers, particularly by 30-40 years of age, will most effectively achieve primary prevention of lung cancer.^{vi, vii} Evidence-based smoking cessation and relapse prevention programs are critical strategies for lung cancer control.

The role of smoking cessation

This framework is focused on lung cancer screening and not on overall tobacco control or on the broader issues of chronic disease prevention. However, smoking cessation statements have been included as alignment and integration of smoking cessation programs with screening strategies can link effective primary and secondary

prevention intervention approaches. Published and ongoing modeling analyses have demonstrated that LDCT lung cancer screening, combined with smoking cessation, appears to be more cost-effective than screening alone.^{viii}

One challenge with smoking cessation programs is that long-term smokers who could potentially benefit the most often do not participate. As noted earlier, lung cancer screening presents a new opportunity for cessation programs to access a segment of smokers that have traditionally been difficult to engage.

How is lung cancer screening different from other kinds of cancer screening?

Lung cancer screening differs from the population-based screening programs that have been implemented for breast, cervical, and colorectal cancers. Whereas the population targeted in those programs are generally at average risk of developing these cancers, lung cancer screening is focused on a defined high-risk population. There is currently no evidence to support routine screening of average-risk individuals for lung cancer. The risks and complications associated with screening lower-risk cohorts (e.g., false positive findings on LDCT) likely out-weigh any potential benefits.

While the target populations may be different, the principles that guide population-based screening programs can help inform the development of an effective screening strategy for a high-risk target group. In addition, the structure of organized population-based screening provides a useful outline of program components including: an identified targeted population group; a specific screening test; identified screening intervals; policies to guide planning and delivery of screening services; coordination of diagnostic services for individuals with an abnormal screen result; quality standards and monitoring; and evaluation of cancer outcomes.^{ix}

Who might benefit from lung cancer screening?

In order to define and reach individuals who could benefit from lung cancer screening, there needs to be well-defined risk criteria which are incorporated into tools/models for use in planning and individual risk assessment. While the evidence for some key risk factors is more clearly defined, there is a need for continued work to further develop and confirm the role of known risk factors for lung cancer, including how they might be incorporated (or not) as screening eligibility criteria in the future.

Who would be eligible for lung cancer screening?

Setting criteria for eligibility to participate in screening requires consideration of multiple factors, aside from risk exposure factors. Age eligibility is an example of such a factor, and should ideally be standardized across the country, as it is for colorectal cancer screening.

It can be challenging to recruit a high-risk target population for screening as there are no centralized databases that contain risk information beyond age and sex. Therefore, it will be important to find systematic ways to reach eligible individuals and invite them to take part in screening. Development of appropriate patient education and awareness programs may help make these connections.

Developing guidelines for LDCT use in lung cancer screening

There is a clear need for guidelines pertaining to the use of the LDCT scan as the screening test for lung cancer among the high risk population. Guidelines including start and stop ages for screening and recommended interval between screenings will be essential for the implementation of lung screening in Canada – whether it is carried out in a programmatic fashion or as ad hoc, opportunistic screening.

Guidelines for screening and follow-up algorithms are also needed, and these should be based on current evidence and best practices (where the evidence is not definitive). It is likely that one clearly defined clinical pathway will not apply to all cases and circumstances and therefore options will likely vary across the country. Some of this variation will stem from differences in local expertise, resources, and services across regional jurisdictions.

In the area of pathology, much work has been done at the national level in the United States and in Canada on reporting standards. Taking this work to the next level would include the development of synoptic reporting methods for small lung biopsy specimens to facilitate quality and monitoring and evaluation.

Evaluating our efforts

As lung cancer screening is addressed in Canada, it will be important to develop performance measures to evaluate outcomes and quality control. Such measures might include, but are not limited to:

- What proportion of the target population was identified, contacted and enrolled;
- What proportion of the target population who are current smokers were offered and took advantage of the opportunity to quit smoking during or after their screening visit;
- Lung cancer mortality rates in the screened vs. unscreened target populations;
- Stage-at-diagnosis shifts observed in those lung cancers detected by screening vs. those occurring in unscreened individuals.

The statements presented in the next section of this report cover a broad scope. They include the development of screening and clinical pathways; the use of multidisciplinary approaches in patient assessment and evaluation; and setting quality standards for screening, diagnosis, and treatment.

As conversations about lung cancer screening take place in regional or provincial jurisdictions, it is intended that this framework will provide a starting point to set the stage for the development of specific clinical practice guidelines and algorithms.

As articulated through the consensus process (detailed in Appendix A), each of the statements have relevancy at national and provincial/territorial levels.

Lung Cancer Screening Consensus Statements

Smoking Cessation in Lung Cancer Screening

- Where evidence-based smoking cessation and relapse prevention programs exist and are well organized within a jurisdiction, these services (e.g., quit line promotion, physician referral, or a cessation program embedded in a screening program) should be aligned with existing or developing lung cancer screening programs.
- Periodically updated jurisdictional inventories of smoking cessation and relapse prevention programs need to be completed in order to identify existing and emerging alignment opportunities with lung cancer screening program activities.
- Where evidence-based smoking cessation services and relapse prevention programs do not exist or where their reach is very limited, filling these gaps with evidence-based approaches should occur prior to or in conjunction with initiating a lung cancer screening program.
- In all lung cancer screening programs, whether smoking cessation is offered in-house or by referral, smoking status should be monitored annually as a lung cancer screening program quality indicator.

Recruitment and Eligibility for Lung Cancer Screening

- Come to consensus, across jurisdictions, on which risk assessment models might be most suitable for use in Canada.
- Risk assessment models evaluated for use for lung cancer screening selection should consider both incidence and mortality as outcomes.
- Identify at what level of individual risk people should be screened. Consider the applicability, in the Canadian context, of various risk prediction equations and algorithms.
- Other risk factors (e.g., second hand smoke, air pollution, asbestos, etc.), in addition to the standard smoking exposure measures should be considered when possible in order to determine an individual's true overall risk.
- Define eligibility criteria for lung cancer screening that includes consideration of existing guidelines, cost-effectiveness, and validated risk-prediction models.
- Age is an important parameter when developing eligibility criteria for lung cancer screening; serious consideration should be given to standardizing upper and lower age limits across the country.
- Define or describe criteria for ineligibility of lung cancer screening.
- Determine ways to capture self reported data from potential screen-eligible persons to confirm their eligibility or ineligibility for lung cancer screening, and to support ongoing research into optimizing determination of eligibility.

Radiological Testing in Lung Cancer Screening

13. Create a standardized definition across Canada for an abnormal lung cancer screen, including identifying which abnormal results require definitive clinical work-up.
14. Develop Canadian lung cancer screening algorithms including radiologic management of abnormal findings through assessing the various protocols from randomized controlled trials, prospective studies, and existing guidelines.
15. Develop guidelines for technical parameters and dosage levels of low dose computed tomography.
16. Develop guidelines for measurement techniques and standardized reporting of low dose computed tomography, including reporting guidelines and scoring systems (e.g., LU-RADS).
17. Recommend the development and implementation of an accreditation program for lung cancer screening centres by the Canadian Association of Radiologists; where the radiologists, technologists, equipment, and quality assurance program will be assessed on quality control, image quality, radiation dose, and the use of standardized reports for lung cancer screening and diagnostic follow-up occurring in each centre.
18. Create a continuing medical education program for the radiological aspects of lung cancer screening services and programs with support from appropriate professional organizations.
20. Define the indications for, and key elements of timely multidisciplinary clinical review processes (e.g., tumour board or tumour conference) throughout the diagnostic and treatment pathways.
21. Develop algorithms for the clinical work-up of individuals with abnormal screening results, including additional imaging, biopsy, and surgical resection.
22. Based on key clinical factors, identify recommended methods of performing non-surgical and surgical biopsies.
23. When feasible, the diagnosis of lung cancer and tumour stage should be confirmed prior to treatment.
24. Outline criteria, including involvement of respirologists and thoracic surgeons, for patient assessment to determine resectability and operability.
25. Lung cancer screening strategies/programs should link to the treatment pathways for patients.
26. Develop a minimum standard for treatment services. An analysis of current practice could help to inform the standard.
27. Monitor all interventions including results and complications.

Diagnostic Follow-up and Treatment after Lung Cancer Screening

19. Recommend the development and/or implementation and measurement of quality standards for clinicians treating patients (e.g., radiologists, thoracic surgeons, respirologists, medical and radiation oncologists).

Pathology Quality and Reporting in Lung Cancer Screening

28. Pathology findings should be reported using the College of American Pathologists synoptic reporting standard, which is endorsed by the Canadian Association of Pathologists.
29. Develop synoptic reporting for lung biopsy specimens.
30. Develop recommendations for tissue submission and handling.
31. Develop recommendations related to defining parameters of an adequate specimen per procedure.
32. Cell block preparation for all lung cytology specimens is recommended.
33. Pathology reports should indicate the optimal tumour block(s) for future testing.
34. Cytology and pathology results should be correlated if possible.

Statement References

Smoking Cessation in Lung Cancer Screening

Anderson CM, Yip R, Henschke CI, Yankelevitz DF, Ostroff JS, Burns DM. Smoking cessation and relapse during a lung cancer screening program. *Cancer Epidemiol Biomarkers Prev*. 2009 Dec;18(12):3476–83.

Ashraf H, Tønnesen P, Holst Pedersen J, Dirksen A, Thorsen H, Døssing M. Effect of CT screening on smoking habits at 1-year follow-up in the Danish Lung Cancer Screening Trial (DLCST). *Thorax*. 2009 May;64(5):388–92.

Barry SA, Tammemagi MC, Penek S, Kassan EC, Dorfman CS, Riley TL, et al. Predictors of adverse smoking outcomes in the Prostate, Lung, Colorectal and Ovarian Cancer

Screening Trial. *J Natl Cancer Inst*. 2012 Nov 7;104(21):1647–59.

Carreras G, Gorini G, Paci E. Can a national lung cancer screening program in combination with smoking cessation policies cause an early decrease in tobacco deaths in Italy? *Cancer Prev Res (Phila)*. 2012 Jun;5(6):874–82.

Ferketich AK, Otterson GA, King M, Hall N, Browning KK, Wewers ME. A pilot test of a combined tobacco dependence treatment and lung cancer screening program. *Lung Cancer*. 2012 May;76(2):211–5.

McMahon PM, Kong CY, Bouzan C, Weinstein MC, Cipriano LE, Trantomano AC, et al. Cost-effectiveness of computed tomography screening for lung cancer in the United States. *J Thorac Oncol*. 2011 Nov;6(11):1841–8.

Studts JL, Ghate SR, Gill JL, Studts CR, Barnes CN, LaJoie AS, et al. Validity of self-reported smoking status among participants in a lung cancer screening trial. *Cancer Epidemiol Biomarkers Prev*. 2006 Oct;15(10):1825–8.

Styn MA, Land SR, Perkins KA, Wilson DO, Romkes M, Weissfeld JL. Smoking behavior 1 year after computed tomography screening for lung cancer: effect of physician referral for abnormal CT findings. *Cancer Epidemiol Biomarkers Prev*. 2009 Dec;18(12):3484–9.

Tammemägi MC, Berg CD, Riley TL, Cunningham CR, Taylor KL. Impact of lung cancer screening results on smoking cessation. *JNCI J Natl Cancer Inst*. 2014 Jun 1;106(6):dju084.

Taylor KL, Cox LS, Zincke N, Mehta L, McGuire C, Gelmann E. Lung cancer screening as a teachable moment for smoking cessation. *Lung Cancer*. 2007 Apr;56(1):125–34.

Tobacco Use and Dependence Guideline Panel. Treating tobacco use and dependence: 2008 update. US Department of Health and Human Services; 2008.

Townsend CO, Clark MM, Jett JR, Patten CA, Schroeder DR, Nirelli LM, et al. Relation between smoking cessation and receiving results from three annual spiral chest computed tomography scans for lung carcinoma screening. *Cancer*. 2005 May 15;103(10):2154–62.

Van der Aalst CM, de Koning HJ, van den Bergh KAM, Willemsen MC, van Klaveren RJ. The effectiveness of a computer-tailored smoking cessation intervention for participants in lung cancer screening: a randomised controlled trial. *Lung Cancer*. 2012 May;76(2):204–10.

Van der Aalst CM, van den Bergh KAM, Willemsen MC, de Koning HJ, van Klaveren RJ. Lung cancer screening and smoking abstinence: 2 year follow-up data from the Dutch-Belgian randomised controlled lung cancer screening trial. *Thorax*. 2010 Jul;65(7):600–5.

Wender R, Fontham ETH, Barrera E, Colditz GA, Church TR, Ettinger DS, et al. American Cancer Society lung cancer screening guidelines. *CA: A Cancer Journal for Clinicians*. 2013 Mar 1;63(2):106–17.

Recruitment and Eligibility for Lung Cancer Screening

Bach PB, Kattan MW, Thornquist MD, Kris MG, Tate RC, Barnett MJ, et al. Variations in lung cancer risk among smokers. *J Natl Cancer Inst*. 2003 Mar 19;95(6):470–8.

Cassidy A, Myles JP, van Tongeren M, Page RD, Liloglou T, Duffy SW, et al. The LLP risk model: an individual risk prediction model for lung cancer. *Br J Cancer*. 2008 Jan 29;98(2):270–6.

De Koning HJ, Meza R, Plevritis SK, ten Haaf K, Munshi VN, Jeon J, et al. Benefits and harms of computed tomography lung cancer screening strategies: a comparative modeling study for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2014 Mar 4;160(5):311–20.

Etzel CJ, Bach PB. Estimating individual risk for lung cancer. *Semin Respir Crit Care Med*. 2011 Feb;32(1):3–9.

Evans WK, Wolfson MC, Flanagan WM, Shin J, Goffin J, Miller AB, et al. Canadian Cancer Risk Management Model: evaluation of cancer control. *Int J Technol Assess Health Care*. 2013 Apr;29(2):131–9.

Evans WK, Wolfson M, Flanagan WM, Shin J, Goffin JR, Asakawa K, et al. The evaluation of cancer control interventions in lung cancer using the Canadian Cancer Risk Management Model. *Lung Cancer Management*. 2012 Jun 1;1(1):25–33.

Field JK, Raji OY. The potential for using risk models in future lung cancer screening trials. *F1000 Med Rep*. 2010;2.

Hoggart C, Brennan P, Tjønneland A, Vogel U, Overvad K, Østergaard JN, et al. A risk model for lung cancer incidence. *Cancer Prev Res (Phila)*. 2012 Jun;5(6):834–46.

Kovalchik SA, Tammemägi M, Berg CD, Caporaso NE, Riley TL, Korch M, et al. Targeting of low-dose CT screening according to the risk of lung-cancer death. *New England Journal of Medicine*. 2013;369(3):245–54.

Tammemägi MC, Katki HA, Hocking WG, Church TR, Caporaso N, Kvale PA, et al. Selection criteria for lung-cancer screening. *New England Journal of Medicine*. 2013;368(8):728–36.

Tammemägi MC, Pinsky PF, Caporaso NE, Kvale PA, Hocking WG, Church TR, et al. Lung cancer risk prediction: Prostate, Lung, Colorectal And Ovarian Cancer Screening Trial models and validation. *J Natl Cancer Inst*. 2011 Jul 6;103(13):1058–68.

Van Klaveren RJ, de Koning HJ, Mulshine J, Hirsch FR. Lung cancer screening by spiral CT: what is the optimal target population for screening trials? *Lung Cancer*. 2002 Dec;38(3):243–52.

Radiological Testing in Lung Cancer Screening

Aberle D, Black W, Goldin J, Patz E, Gareen I. ACRIN Protocol 6654: Contemporary screening for the detection of lung cancer. American College of Radiology Imaging Network; 2013. Available from: www.acrin.org/6654_protocol.aspx

American Lung Association. Report on lung cancer screening: providing guidance on lung cancer screening to patients and physicians. 2012 Apr 23. Available from: <http://www.lung.org/finding-cures/research-news/new-screening-guidelines/lung-cancer-screening.pdf>

Bach PB, Mirkin JN, Oliver TK, et al. Benefits and harms of CT screening for lung cancer: A systematic review. *JAMA*. 2012 Jun 13;307(22):2418–29.

Christe A, Torrente JC, Lin M, Yen A, Hallett R, Roychoudhury K, et al. CT screening and follow-up of lung nodules: effects of tube current-time setting and nodule size and density on detectability and of tube current-time setting on apparent size. *AJR Am J Roentgenol*. 2011 Sep;197(3):623–30.

Cody DD, Kim H-J, Cagnon CH, Larke FJ, McNitt-Gray MM, Kruger RL, et al. Normalized CT dose index of the CT scanners used in the National Lung Screening Trial. *AJR Am J Roentgenol*. 2010 Jun;194(6):1539–46.

Gierada DS, Garg K, Nath H, Strollo DC, Fagerstrom RM, Ford MB. CT quality assurance in the lung screening study component of the National Lung Screening Trial: implications for multicenter imaging trials. *AJR Am J Roentgenol*. 2009 Aug;193(2):419–24.

Gould MK, Donington J, Lynch WR, Mazzone PJ, Midthun DE, Naidich DP, et al. Evaluation of individuals with pulmonary nodules: when is it lung cancer? Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2013 May;143(5 Suppl):e93S–120S.

Henschke CI, Yip R, Yankelevitz DF, Smith JP, International Early Lung Cancer Action Program Investigators. Definition of a positive test result in computed tomography screening for lung cancer: a cohort study. *Ann Intern Med*. 2013 Feb 19;158(4):246–52.

Horeweg N, van der Aalst CM, Thunnissen E, Nackaerts K, Weenink C, Groen HJM, et al. Characteristics of lung cancers detected by computer tomography screening in the randomized NELSON trial. *Am J Respir Crit Care Med*. 2013 Apr 15;187(8):848–54.

Infante M, Cavuto S, Lutman FR, Brambilla G, Chiesa G, Ceresoli G, et al. A randomized study of lung cancer screening with spiral computed tomography: three-year results from the DANTE trial. *Am J Respir Crit Care Med*. 2009 Sep 1;180(5):445–53.

Jaklitsch MT, Jacobson FL, Austin JHM, Field JK, Jett JR, Keshavjee S, et al. The American Association for Thoracic Surgery guidelines for lung cancer screening using low-dose computed tomography scans for lung cancer survivors and other high-risk groups. *J Thorac Cardiovasc Surg*. 2012 Jul;144(1):33–8.

Jett JR, Midthun DE. Screening for lung cancer: for patients at increased risk for lung cancer, it works. *Ann Intern Med*. 2011 Oct 18;155(8):540–2.

Lopes Pegna A, Picozzi G, Mascalchi M, Maria Carozzi F, Carozzi L, Comin C, et al. Design, recruitment and baseline results of the ITALUNG trial for lung cancer screening with low-dose CT. *Lung Cancer*. 2009 Apr;64(1):34–40.

Lung CT Screening Reporting and Data System (Lung-RADS) version 1.0. American College of Radiology; Available from: <http://acr.org/Quality-Safety/Resources/LungRADS>

MacMahon H, Austin JHM, Gamsu G, Herold CJ, Jett JR, Naidich DP, et al. Guidelines for management of small

pulmonary nodules detected on CT scans: a statement from the Fleischner Society. *Radiology*. 2005 Nov 1;237(2):395–400.

Maldonado F, Peikert T, Midthun D. Cancer in pulmonary nodules detected on first screening CT. *N Engl J Med*. 2013 Nov 21;369(21):2060.

Manos D, Seely JM, Taylor J, Borgaonkar J, Roberts HC, Mayo JR. The Lung Reporting and Data System (LU-RADS): a proposal for computed tomography screening. *Can Assoc Radiol J*. 2014 May;65(2):121–34.

McWilliams A, Tammemagi MC, Mayo JR, Roberts H, Liu G, Soghrati K, et al. Probability of cancer in pulmonary nodules detected on first screening CT. *New England Journal of Medicine*. 2013;369(10):910–9.

Moyer VA, U.S. Preventive Services Task Force. Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2014 Mar 4;160(5):330–8.

Naidich DP, Bankier AA, MacMahon H, Schaefer-Prokop CM, Pistolesi M, Goo JM, et al. Recommendations for the management of subsolid pulmonary nodules detected at CT: a statement from the Fleischner Society. *Radiology*. 2013 Jan;266(1):304–17.

Nair A, Hansell DM. European and North American lung cancer screening experience and implications for pulmonary nodule management. *Eur Radiol*. 2011 Dec;21(12):2445–54.

National Comprehensive Cancer Network. Clinical practice guidelines for detection, prevention and risk reduction: lung cancer screening. Version 1. 2014. Available from: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#lung_screening

The National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed

tomographic screening. *New England Journal of Medicine*. 2011;365(5):395–409.

Oken MM, Hocking WG, Kvale PA, Andriole GL, Buys SS, Church TR, et al. Screening by chest radiograph and lung cancer mortality: the Prostate, Lung, Colorectal, and Ovarian (PLCO) randomized trial. *JAMA*. 2011 Nov 2;306(17):1865–73.

Pastorino U, Rossi M, Rosato V, Marchianò A, Sverzellati N, Morosi C, et al. Annual or biennial CT screening versus observation in heavy smokers: 5-year results of the MILD trial. *Eur J Cancer Prev*. 2012 May;21(3):308–15.

Pedersen JH, Ashraf H, Dirksen A, Bach K, Hansen H, Toennesen P, et al. The Danish randomized lung cancer CT screening trial—overall design and results of the prevalence round. *J Thorac Oncol*. 2009 May;4(5):608–14.

Picozzi G, Paci E, Lopez Pegna A, Bartolucci M, Roselli G, De Francisci A, et al. Screening of lung cancer with low dose spiral CT: results of a three year pilot study and design of the randomised controlled trial Italung-CT. *Radiol Med*. 2005 Feb;109(1-2):17–26.

Pinsky PF, Gierada DS, Nath PH, Kazerooni E, Amorosa J. National lung screening trial: variability in nodule detection rates in chest CT studies. *Radiology*. 2013 Sep;268(3):865–73.

Tammemägi MC, Lam S. Screening for lung cancer using low dose computed tomography. *BMJ*. 2014;348:g2253.

Van Klaveren RJ, Oudkerk M, Prokop M, Scholten ET, Nackaerts K, Vernhout R, et al. Management of Lung Nodules Detected by Volume CT Scanning. *New England Journal of Medicine*. 2009;361(23):2221–9.

Wender R, Fontham ETH, Barrera E, Colditz GA, Church TR, Ettinger DS, et al. American Cancer Society lung cancer screening guidelines. *CA: A Cancer Journal for Clinicians*. 2013 Mar 1;63(2):106–17.

Xu DM, Gietema H, de Koning H, Vernhout R, Nackaerts K, Prokop M, et al. Nodule management protocol of the NELSON randomised lung cancer screening trial. *Lung Cancer*. 2006 Nov;54(2):177–84.

Diagnostic Follow-up and Treatment after Lung Cancer Screening

Backhus L, Puneet B, Bastawrous S, Mariam M, Michael M, Varghese T. Radiographic evaluation of the patient with lung cancer: surgical implications of imaging. *Curr Probl Diagn Radiol*. 2013 Jun;42(3):84–98.

Brunelli A, Kim AW, Berger KI, Addrizzo-Harris DJ. Physiologic evaluation of the patient with lung cancer being considered for resectional surgery: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e166S–e190S.

Crinò L, Weder W, van Meerbeeck J, Felip E, ESMO Guidelines Working Group. Early stage and locally advanced (non-metastatic) non-small-cell lung cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol*. 2010 May;21 Suppl 5:v103-115.

Evans WK. Prognostic implications of treatment delays in the surgical resection of lung cancer. *Thorac Surg Clin*. 2013 May;23(2):225–32.

Howington JA, Blum MG, Chang AC, Balekian AA, Murthy SC. Treatment of stage I and II non-small cell lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e278S–e313S.

Lardinois D. Pre- and intra-operative mediastinal staging in non-small-cell lung cancer. *Swiss Med Wkly*. 2011;141:w13168.

Lin WY, Hsu WH, Lin KH, Wang SJ. Role of preoperative PET-CT in assessing mediastinal and hilar lymph node status in early stage lung cancer. *J Chin Med Assoc*. 2012 May;75(5):203–8.

McWilliams A, Shaipanich T, Lam S. Fluorescence and navigational bronchoscopy. *Thorac Surg Clin*. 2013 May;23(2):153–61.

Naidich DP, Bankier AA, MacMahon H, Schaefer-Prokop CM, Pistolesi M, Goo JM, et al. Recommendations for the management of subsolid pulmonary nodules detected at CT: a statement from the Fleischner Society. *Radiology*. 2013 Jan;266(1):304–17.

National Comprehensive Cancer Network. Clinical practice guidelines for detection, prevention and risk reduction: lung cancer screening. Version 1. 2014. Available from: http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#lung_screening.

Ost DE, Jim Yeung S-C, Tanoue LT, Gould MK. Clinical and organizational factors in the initial evaluation of patients with lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e121S–e141S.

Riquet M, Mordant P, Henni M, Wermert D, Fabre-Guillevin E, Cazes A, et al. Should All Cases of Lung Cancer be Presented at Tumor Board Conferences? *Thoracic Surgery Clinics*. 2013 May;23(2):123–8.

Rivera MP, Mehta AC, Wahidi MM. Establishing the diagnosis of lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e142S–e165S.

Sanz-Santos J, Andreo F, Serra P, Monsó E, Ruiz-Manzano J. The role of endobronchial ultrasound in central early lung cancer. *Thoracic Cancer*. 2012 May 1;3(2):139–44.

Shamji FM, Deslauriers J. Fast-tracking Investigation and Staging of Patients with Lung Cancer. *Thoracic Surgery Clinics*. 2013 May;23(2):187–91.

Shirvani SM, Jiang J, Chang JY, Welsh JW, Gomez DR, Swisher S, et al. Comparative effectiveness of 5 treatment strategies for early-stage non-small cell lung cancer in the elderly. *Int J Radiat Oncol Biol Phys*. 2012 Dec 1;84(5):1060–70.

Silvestri GA, Gonzalez AV, Jantz MA, Margolis ML, Gould MK, Tanoue LT, et al. Methods for staging non-small cell lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e211S–e250S.

Wisnivesky JP, Yung RC-W, Mathur PN, Zulueta JJ. Diagnosis and treatment of bronchial intraepithelial neoplasia and early lung cancer of the central airways: Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2013 May;143(5 Suppl):e263S–77S.

Pathology Quality and Reporting in Lung Cancer Screening

Cagle PT, Allen TC, Dacic S, Beasley MB, Borczuk AC, Chirieac LR, et al. Revolution in lung cancer: new challenges for the surgical pathologist. *Arch Pathol Lab Med*. 2011 Jan;135(1):110–6.

Diacon AH, Theron J, Schubert P, Brundyn K, Louw M, Wright CA, et al. Ultrasound-assisted transthoracic biopsy: fine-needle aspiration or cutting-needle biopsy? *Eur Respir J*. 2007 Feb;29(2):357–62.

Ellis PM, Blais N, Soulieres D, Ionescu DN, Kashyap M, Liu G, et al. A systematic review and Canadian consensus recommendations on the use of biomarkers in the treatment of non-small cell lung cancer. *J Thorac Oncol*. 2011 Aug;6(8):1379–91.

Feller-Kopman D, Yung RC-W, Burroughs F, Li QK. Cytology of endobronchial ultrasound-guided transbronchial needle aspiration: a retrospective study with histology correlation. *Cancer*. 2009 Dec 25;117(6):482–90.

Guimaraes MD, de Andrade MQ, da Fonte AC, Chojniak R, Gross JL. CT-guided cutting needle biopsy of lung lesions—an effective procedure for adequate material and specific diagnose. *Eur J Radiol*. 2011 Dec;80(3):e488–490.

Lindeman NI, Cagle PT, Beasley MB, Chitale DA, Dacic S, Giaccone G, et al. Molecular testing guideline for selection of lung cancer patients for EGFR and ALK tyrosine kinase inhibitors: guideline from the College of American Pathologists, International Association for the Study of Lung Cancer, and Association for Molecular Pathology. *J Thorac Oncol*. 2013 Jul;8(7):823–59.

Nizzoli R, Tiseo M, Gelsomino F, Bartolotti M, Majori M, Ferrari L, et al. Accuracy of fine needle aspiration cytology in the pathological typing of non-small cell lung cancer. *J Thorac Oncol*. 2011 Mar;6(3):489–93.

Schwartz AM, Rezaei MK. Diagnostic surgical pathology in lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest*. 2013 May 1;143(5_suppl):e251S–e262S.

Travis WD, Brambilla E, Noguchi M, Nicholson AG, Geisinger K, Yatabe Y, et al. Diagnosis of lung cancer in small biopsies and cytology: implications of the 2011 International Association for the Study of Lung Cancer/American Thoracic Society/European Respiratory Society classification. *Arch Pathol Lab Med*. 2013 May;137(5):668–84.

Travis WD, Brambilla E, Noguchi M, Nicholson AG, Geisinger KR, Yatabe Y, et al. International association for the study of lung cancer/American thoracic society/European respiratory society international multidisciplinary classification of lung adenocarcinoma. *J Thorac Oncol*. 2011 Feb;6(2):244–85.

Trkanjec, J. T. The role of transbronchial lung biopsy in the diagnosis of solitary pulmonary nodule
2003 27(2):669-75.

Unver E, Yilmaz A, Aksoy F, Baysungur V, Celik O, Genc O, et al. Does needle size affect diagnostic yield of transthoracic needle biopsy in malignant pulmonary lesions? Comparison of 18-, 22- and 25-gauge needles in surgical specimens. *Respirology*. 2006 Sep;11(5):648–51.

Wehrschoetz M, Wehrschoetz E, Portugaller HR. Number of Biopsies in Diagnosing Pulmonary Nodules. *Clin Med Insights Circ Respir Pulm Med*. 2010 Jul 8;4:9–14.

Yao X, Gomes MM, Tsao MS, Allen CJ, Geddie W, Sekhon H. Fine-needle aspiration biopsy versus core-needle biopsy in diagnosing lung cancer: a systematic review. *Curr Oncol*. 2012 Feb;19(1):e16–e27.

NEXT STEPS

It is very likely that different approaches will be considered and implemented across the country for lung cancer screening, as has been seen with the development of other existing provincial/territorial cancer screening programs. With lung cancer screening at such an early stage, provinces/territories have an opportunity to coordinate their planning and decision making. This framework will help facilitate the collection of data and best practices to optimize organized approaches to lung cancer screening.

PLCSN and additional working group members will determine the priority areas of this framework and discuss which items are most relevant to advance on a pan-Canadian level.

As new guidelines or other information becomes available, the need for revisions to this framework will be considered.

APPENDIX A: LUNG CANCER SCREENING FRAMEWORK FOR CANADA - DEVELOPMENT

The Process

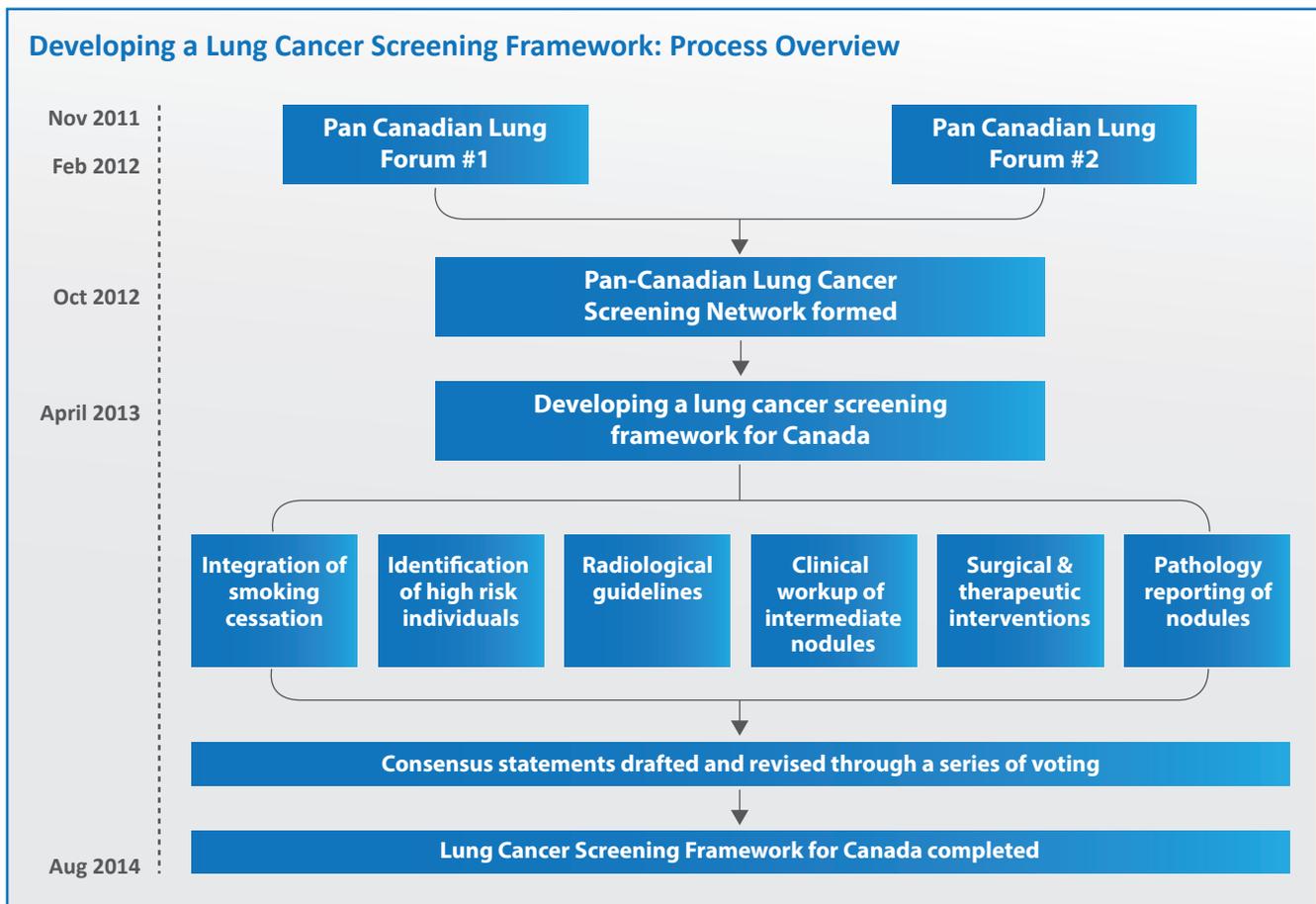
Key areas of consideration for lung cancer screening were identified through an extensive consultation process.

The first priority initiative identified by members of the PLCSN was the development of a Lung Cancer Screening Framework for Canada to provide useful guidance to the provinces and territories as they address this important issue in cancer control.

To begin discussions, pan-Canadian working groups – with chairs and co-chairs – were formed with nominated PLCSN

members and other expert volunteers. Using the IASLC recommendation areas as a guide,^{iv} these groups were tasked with developing consensus statements in one of the following priority areas:

- Smoking cessation and lung cancer screening;
- Identification of high-risk individuals and lung cancer screening eligibility;
- Development of radiological guidelines;
- Clinical work-up of indeterminate;
- Recommendations for surgical and therapeutic interventions of suspicious nodules; and
- Pathology reporting of nodules.



Individual working groups produced the first draft of statements during an in-person PLCSN meeting on April 25, 2013. Following this meeting, working group chairs conducted literature reviews and linked relevant evidence to the corresponding statements via an online consensus platform.^x

The online platform, which used a systematic approach incorporating a modified Delphi technique, allowed the working groups to provide feedback and indicate their level of agreement (vote) for each statement using the following scale:

- Disagree strongly;
- Disagree with major reservation;
- Disagree with minor reservation;
- Agree with major reservation;
- Agree with minor reservation; or
- Agree strongly.

A first round of voting occurred during the summer of 2013. Working group members voted and provided feedback only on those statements that were within their working group area of focus.

In the fall of 2013, following the second revision of the statements, working group members were invited to vote and provide feedback on the entire set of statements after which subsequent revisions took place. A final round of voting occurred during an in-person meeting held on October 2-3, 2013 in Halifax, Nova Scotia. Close to 50 participants, including members of PLCSN, additional working group members, and provincial and territorial cancer screening leads were in attendance.

The process of voting at this meeting began with the chairs and co-chairs of each of the working groups presenting their group's most recent draft statements to highlight key elements and evidence. Each presentation was followed by a facilitated discussion, and minor revisions were made to the statements. Then voting took place, statement by statement.

Votes were weighted such that working group members' votes were worth three times more than non-working group members. This weighting was implemented to reflect working group members' expertise with the subject matter.

In addition, attendees were asked to assess whether the focus of each statement was relevant at a pan-Canadian or provincial/territorial level, neither, or both.

To offer an opportunity for further reflection and input after the in-person meeting, the set of revised statements was re-circulated to all attendees for comment. This input was reviewed by working group chairs/co-chairs and incorporated into the statements.

At this point, a draft framework document including the most recent statements and a detailed account of the development process was circulated in December 2013 for feedback. A revised and more complete framework document was circulated in April 2014 for a last round of feedback. This final framework was completed in May 2014.

APPENDIX B: PLCSN MEMBERS, EXPERT VOLUNTEERS ON WORKING GROUPS, AND OTHER PARTICIPANTS

Heather Bryant

Chair, Pan-Canadian Lung Cancer Screening Network
Vice-President Cancer Control
Canadian Partnership Against Cancer

Maureen Baikie

Deputy Chief Medical Officer of Health,
Department of Health and Social Services
Government of Nunavut

Gillian Bromfield

Director, Cancer Control Policy
Canadian Cancer Society

Donna Bush

Team Lead, Provincial Health Services
Authority
Ministry of Health, British Columbia

Theresa Callaghan

Provincial Director
Diagnostic Imaging Services
Health PEI

Katherine Canil

Chief of Surgery, Department of Health and
Social Services
Nunavut, Qikiqtaaluk/Baffin Region

Dafna Carr

Director
Policy, KTE and Primary Care
Prevention and Cancer Control
Cancer Care Ontario

André Corriveau

Chief Public Health Officer
Department of Health and Social Services
Government of the Northwest Territories

Connie Côté

Senior Director
Canadian Lung Association

Dan Coulombe

Director of Operations
New Brunswick Cancer Network

Marla Delaney

Colorectal Cancer Screening Coordinator,
Chronic Disease Prevention & Management
Unit
Health PEI

Greg Doyle

Chair, National Committee
Canadian Breast Cancer Screening Initiative
Eastern Health

Ford Elms

Staff Pathologist
Health Sciences Centre, Eastern Health

Richard Finley

Thoracic Surgeon
Vancouver General Hospital

Bill Flanagan

Chief of Microsimulation
Health Analysis Division
Statistics Canada

Colin Foley

Staff Radiologist
Health PEI- Queen Elizabeth Hospital

Claire Marie Fortin

Senior Manager, Policy and Guidelines
Cancer Care Ontario

Jason Garay

Director, Evaluation and Reporting
Cancer Screening, Prevention and Cancer
Control
Cancer Care Ontario

Gary Gelfand

Clinical Assistant Professor
Departments of Surgery/ Oncology
University of Calgary

John Granton

Associate Professor of Medicine
University of Toronto
Director, Pulmonary Hypertension programme,
Toronto General Research Institute, University
Health Network

Jonathan Greenland

Divisional Chief, Radiation Oncology, Eastern
Health
Clinical Assistant Professor of Medicine,
Memorial University of Newfoundland

Anne-Marie Grenier

Specialist in Public Health and Preventive
Medicine,
Screening Medical Advisor
Quebec Ministry of Health

Karen Grimsrud

Senior Medical Advisor and Director,
Prevention Guidelines Division, Public Health
Agency of Canada

Marion Harrison

Director, Screening Programs
CancerCare Manitoba

Amy Henderson

Manager, Health Communications
The Lung Association

Chris Hergott

Associate Professor, Respiriology and
Interventional Pulmonary Medicine, University
of Saskatchewan
Royal University Hospital

Pam Hoeschle

Leadership Development Committee,
Canadian Association of Medical Radiation
Technologists

Meaghan Horgan

Senior Policy Lead, Policy and Guidelines
Cancer Care Ontario

Diana Ionescu

Clinical Associate Professor
University of British Columbia,
Staff Pathologist
BC Cancer Agency

Michael Johnston

Director
Beatrice Hunter Cancer Research Institute,
Professor of Surgery
Dalhousie University

Nora Johnston

Director, Wellness Branch
Alberta Health

Lisa Kan

Senior Director, Cancer Screening Programs
BC Cancer Agency

Kami Kandola

Office of the Chief Public Health Officer,
Department of Health and Social Services
Government of the Northwest Territories

Jon Kerner

Senior Scientific Lead for Population Health and Knowledge Management
Canadian Partnership Against Cancer

Eshwar Kumar

Co-Chief Executive Officer
New Brunswick Cancer Network, Health and Wellness
New Brunswick Department of Health

Stephen Lam

Lung Cancer Expert
Terry Fox Research Institute,
Senior Lead Researcher,
BC Cancer Research Centre
Chair of Lung Tumour Group,
BC Cancer Agency
Professor of Medicine,
University of British Columbia

Jean Latreille

Directeur, Direction de la lutte contre le cancer
Ministère de la santé et des services sociaux

Natasha Leigh

President
Lung Cancer Canada

Neil MacDonald

Acting Assistant Deputy Minister, Family and Population Health
Alberta Health

Paul MacEachern

Respirologist,
Clinical Assistant Professor
University of Calgary

Dawn MacIsaac

Acting Manager PEI Cancer Treatment Center
Queen Elizabeth Hospital

Daria Manos

Thoracic Radiologist and Section Head, Chest Radiology,
QE II Health Sciences Centre Halifax,
Chair, Lung Cancer Screening Steering Committee
Cancer Care Nova Scotia,
Assistant Professor
Dalhousie University

John Mayo

Director of Advanced Cardiac Imaging
Vancouver General Hospital,
Professor of Radiology and Cardiology
University of British Columbia

Donna Maziak

Professor
University of Ottawa
Program Director, Surgical Oncology Division of Thoracic Surgery
Ottawa Hospital

Anthony Miller

Professor Emeritus
Dalla Lana School of Public Health, University of Toronto

Teresa Mrozek

Executive Director
Cancer and Diagnostic Care Manitoba Health

Michelle Mujoomdar

Assistant Chief Scientist
Canadian Agency for Drugs and Technologies in Health

Renelle Myers

Respirologist
University of Manitoba
Lead, Lung Cancer Screening Project,
CancerCare Manitoba

Erika Nicholson

Director, Cancer Prevention and Early Detection,
Cancer Care Nova Scotia

Robert Nuttall

Assistant Director, Cancer Control Policy
Canadian Cancer Society

Lawrence Paszat

Emerging Evidence Scientist
Institute for Clinical Evaluative Sciences

Gefei Qing

Staff Pathologist, Winnipeg Health Sciences Centre
Assistant Professor, Department of Pathology
University of Manitoba

Heidi Roberts

Professor of Radiology University of Toronto
Staff Radiologist and Section Head, Chest Imaging Joint Department of Medical Imaging UHN/MSH/WCH
Site Director for Medical Imaging, Women's College Hospital

Réjean Savoie

Co-Chief Executive Officer
New Brunswick Cancer Network
Health and Wellness
New Brunswick Dept of Health

Harmon Sekhon

Pathologist, Director of Cytopathology
Deputy Head, Division of Anatomic Pathology
Assistant Professor, University of Ottawa
PI, Ontario Tumour Bank Ottawa-site, OICR

Kathy Simpson

General Practitioner of Oncology
College of Family Physicians of Canada

Paul Sinclair

INSINC Consulting Inc.

Nancy Staniland

Director, Cancer Screening Programs
Population and Public Health
Alberta Health Services

Martin Tammemagi

Professor, Epidemiology
Faculty of Applied Health Sciences
Brock University

Jana Taylor

Board Member, Canadian Association of Radiologists
Practising Thoracic and Abdominal Radiologist,
McGill University Health Centre Assistant Professor McGill University, International Early Lung Cancer Action Project

Kathryn Taylor

Member, Cancer Control, Lombardi Cancer Center
Professor, Oncology,
Georgetown University Medical Center

Yvonne Taylor

Provincial Leader
Early Detection, Population Health Division
Saskatchewan Cancer Agency

Jon Tonita

VP of Population Health
Saskatchewan Cancer Agency

Vamsee Torri

Clinical Assistant, Professor of Medicine
Allan Blair Cancer Center
University of Saskatchewan

Ming Tsao

Molecular Lung Pathologist
Princess Margaret Hospital University Health
Network

Yee Ung

Disease Pathway Management
Lead for Lung Cancer, Odette Cancer Centre

Rosaire Vaillancourt

Thoracic Surgeon
Institut universitaire de cardiologie et de
pneumologie de Québec

Elaine Warren

Program Director
Cancer Care Program
Eastern Health

Sherri Wright

Assistant Deputy Minister of Health Services
Government of Yukon

Zhaolin Xu

Staff pathologist, Queen Elizabeth II Health
Science Centre
Associate Professor
Dalhousie University

Huiming Yang

Provincial Medical Officer of Health, Healthy
Living
Medical Director, Screening Programs
Alberta Health Services

CPAC Staff**Susan Fekete**

Director, Screening and Early Detection
Canadian Partnership Against Cancer

Verna Mai

Expert Lead, Screening
Canadian Partnership Against Cancer

Neetu Shukla

Screening Analyst, Screening and Early
Detection
Canadian Partnership Against Cancer

Candice Anderson

Screening Analyst, Screening and Early
Detection
Canadian Partnership Against Cancer

Carol Irwin

Coordinator, Screening and Early Detection
Canadian Partnership Against Cancer

ⁱ Canadian Cancer Society's Advisory Committee on Cancer Statistics. Canadian Cancer Statistics 2013. Toronto, ON: Canadian Cancer Society; 2013.

ⁱⁱ National Lung Screening Trial Research Team: Aberle DR, Adams AM, Berg CD, et al. Reduced lung-cancer mortality with low-dose computed tomographic screening. *New England Journal of Medicine* 2011; 365-409.

ⁱⁱⁱ IASLC-CT-Screening-Task-Force. IASLC's 2011 statement on CT screening for Lung Cancer. Available at https://www.iaslc.org/sites/default/files/wysiwygassets/iaslc_2011_statement_on_ct_screening_for_lung_cancer.pdf. Accessed November 1, 2013.

^{iv} Field JR, Smith RA, Aberle DR, et al. International Association for the Study of Lung Cancer Computed Tomography Screening Workshop 2011 Report. *Journal of Thoracic Oncology* 2012:10-19

^v Wingo PA, Ries LA, Giovino GA, et al. Annual report to the nation on the status of cancer, 1973-1996, with a special section on lung cancer and tobacco smoking. *Journal of the National Cancer Institute*. Vol. 91, Issue 8, April 21, 1999, p.675-90.

^{vi} Peto R, Darby S, Deo H, et al. Smoking, smoking cessation, and lung cancer in the UK since 1950: combination of national statistics with two case-control studies. *British Medical Journal*, Vol. 321, August 5, 2000.

^{vii} Halpern MT, Gillespie BW, Warner KE. Patterns of Absolute Risk of Lung Cancer Mortality in Former Smokers. *Journal of the National Cancer Institute*, Vol. 85, No. 6, March 17, 1993.

^{viii} Villanti AC, Jiang Y, Abrams DB, et al. A Cost-Utility Analysis of Lung Cancer Screening and the Additional Benefits of Incorporating Smoking Cessation Interventions. *PLOS ONE*, Vol. 8, Issue 8, August 2013.

^{ix} Cancer screening in the European Union. Report on the implementation of the council recommendation on cancer screening (First Report). Edited by L von Karsa, A Anttila, G Ronco, A Ponti, N Mamila, M Arbyn, N Segnan et al.

^x INSINC Consulting Inc., Guelph, Ontario, Canada, EDC Solutions, Atlanta, Georgia, USA.



1 University Avenue, Suite 300
Toronto, Ontario, Canada M5J 2P1

Tel: 416.915.9222
Toll-free: 1.877.360.1665

partnershipagainstcancer.ca