

# Recommendations on Screening for Lung Cancer 2016

Canadian Task Force on Preventive Health Care  
(CTFPHC)

Putting Prevention  
into Practice

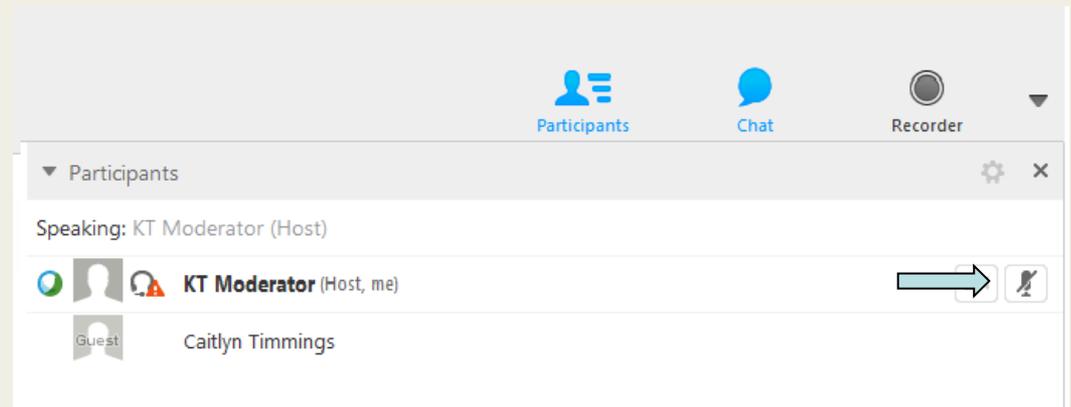


Canadian Task Force on Preventive Health Care  
Groupe d'étude canadien sur les soins de santé préventifs

# WebEx – How can I participate today?

**Audio option-** you can ask questions and participate directly in the discussion by unmuting your audio.

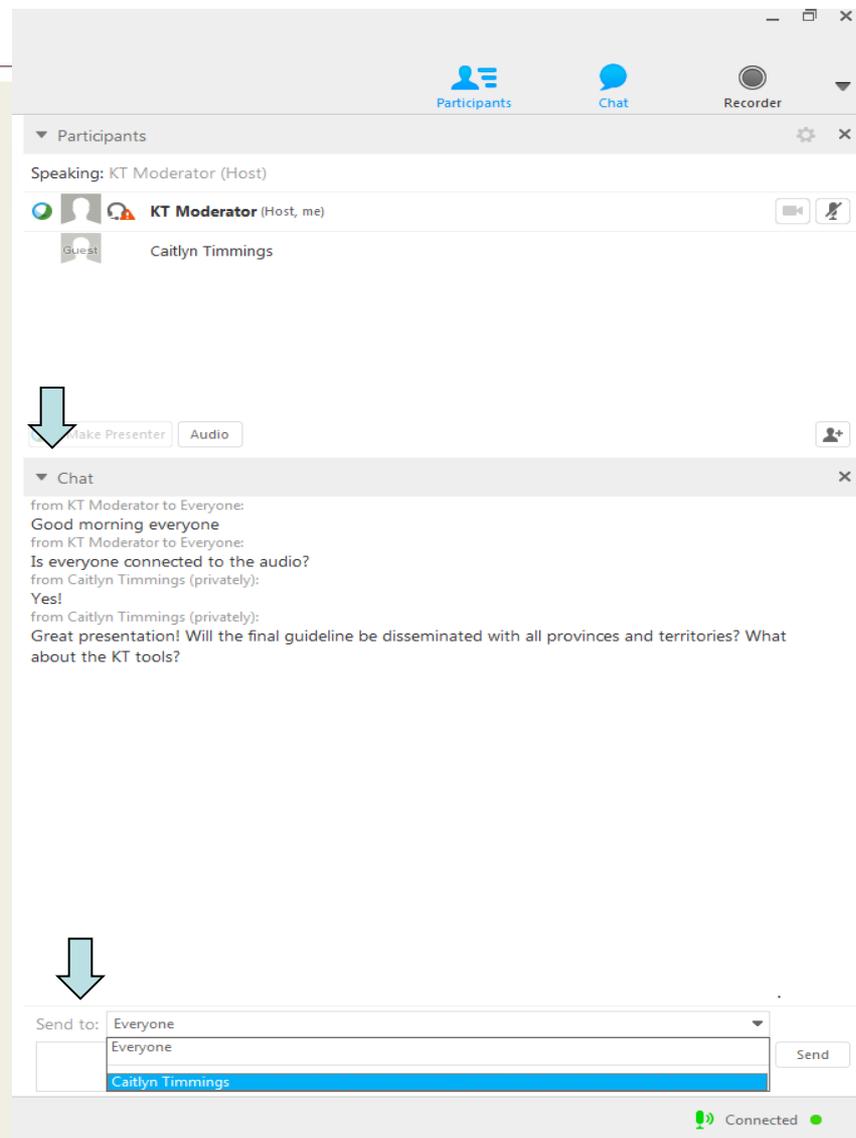
- Mute or unmute your audio on your phone or by clicking on the microphone next to your name in the participant list.



# WebEx – How can I participate today?

**Chat Box option-** you can also type your questions or comments into the chat box.

1. You can send comments to everyone
2. You can send comments directly to the KT moderator (to read to the group) or to individual participants



# Use of slide deck

- These slides are made available publicly as an educational support to assist with the dissemination, uptake and implementation of the guidelines into primary care practice.
- Some or all of the slides in this slide deck may be used in educational contexts.

# Overview of Presentation

- Background on Lung Cancer
- Methods of the CTFPHC
- Recommendations and Key Findings
- Implementation of Recommendations
- Conclusions
- Questions and Answers

# CTFPHC Working Group Members

## **Task Force Members:**

- Gabriela Lewin (Chair)
- James Dickinson
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- Maria Bacchus
- Harminder Singh
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## **Public Health Agency:**

- Kate Morissette\*
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- Donna Fitzpatrick-Lewis\*
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**Screening for Lung Cancer**

**BACKGROUND**

# Background

- Lung cancer is the most common cause of cancer-related deaths and the most commonly diagnosed cancer among Canadians
- In 2015, an estimated 26,600 Canadians were diagnosed with lung cancer, and 20,900 died from the disease
- Mortality is extremely high in late stage lung cancer, but much lower in earlier stages
  - The 5-year relative survival rate for Stage 4 lung cancer is 1%, compared to a 5-year relative survival rate of 50-80% for Stage 1A lung cancer (depending on the source).
- In Canada, more than 85% of cases are related to smoking tobacco

# Smoking History

- Those with a history of heavy smoking are at the greatest risk for lung cancer
- Smoking history often measured in pack-years: the product of the average number of packs smoked daily and the number of years of smoking
- For example, an individual who smoked 1 pack a day (20 cigarettes) for 30 years, and an individual who smoked 2 packs a day for 15 years, would both have a 30 pack-year history

# Screening Tests for Lung Cancer

- Low dose computed tomography (LDCT)
- Chest x-ray (CXR)
- Chest x-ray (CXR) with sputum cytology (SC)
- Tobacco control and smoking cessation initiatives are critical for prevention and for reducing the morbidity and mortality due to lung cancer.

# Screening for Lung Cancer

## **METHODS**

# Methods of the CTFPHC

- Independent panel of:
  - Clinicians and methodologists
  - Expertise in prevention, primary care, literature synthesis, and critical appraisal
  - Application of evidence to practice and policy
- Lung Cancer Working Group
  - 6 Task Force members
  - Establish research questions and analytical framework

# Methods of the CTFPHC

- Evidence Review and Synthesis Centre (ERSC)
  - Undertakes a systematic review of the literature based on the analytical framework
  - Prepares a systematic review of the evidence with GRADE tables
  - Participates in working group and task force meetings
  - Obtain expert opinions

# CTFPHC Review Process

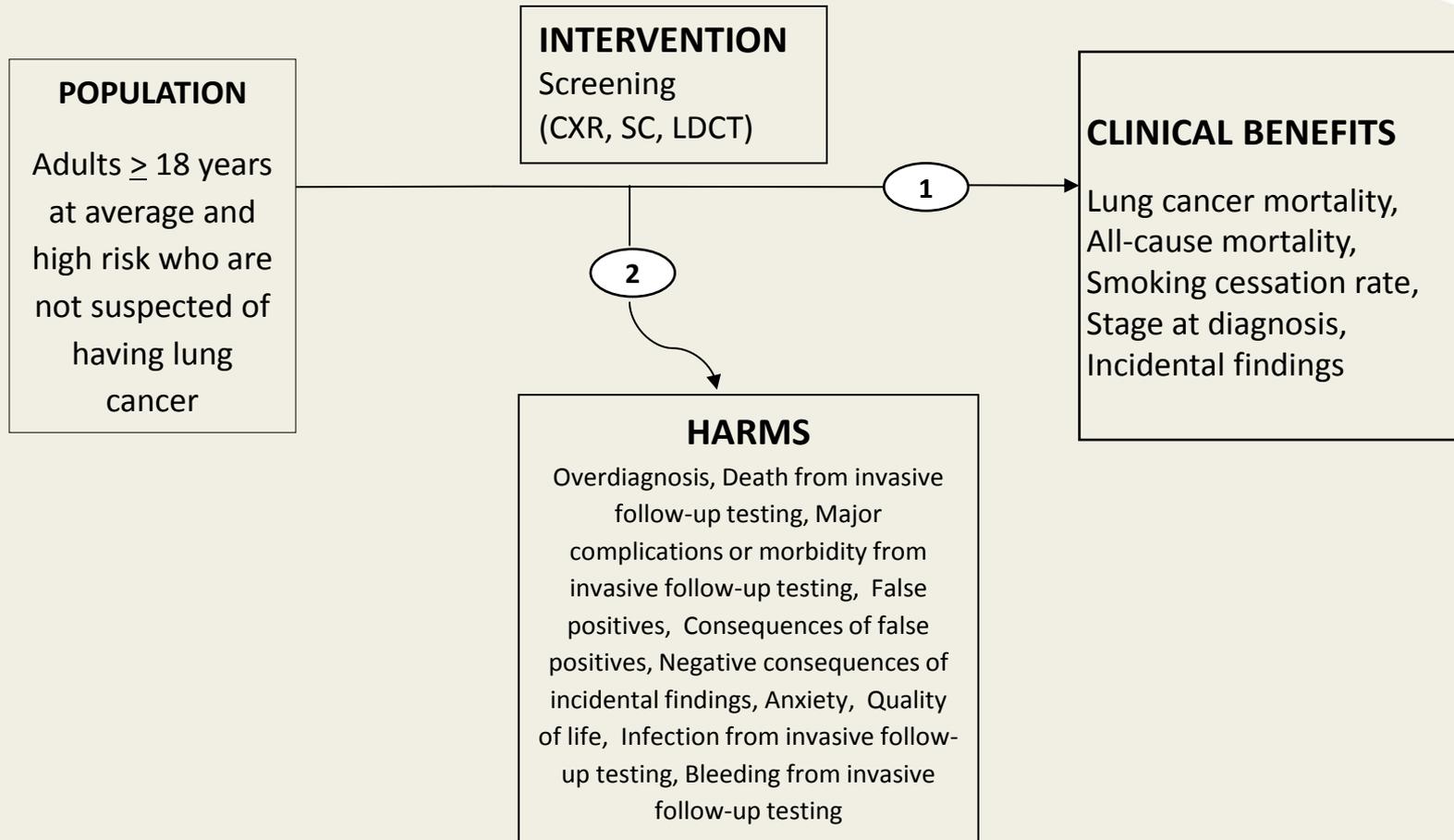
- Internal review process involving guideline working group, Task Force, scientific officers and ERSC staff
- External review process involving key stakeholders
  - Generalist and disease specific stakeholders
  - Federal and P/T stakeholders
- CMAJ undertakes an independent peer review journal process to review guidelines

# Research Questions

- The systematic review for screening for lung cancer included:
  - (2) key research questions with (2) sub-questions
  - (7) supplemental or contextual questions

For more detailed information please access the systematic review [www.canadiantaskforce.ca](http://www.canadiantaskforce.ca)

# Analytical Framework: Screening



# Eligible Study Types

- **Population:** Asymptomatic adults 18 years and older who are at average or high risk but are not suspected of having lung cancer. Includes current, former, and second-hand smokers, as well as those with exposures to substances that may affect risk or increase risk
- **Language:** English, French
- **Study type:**
  - Randomized control trials (RCTs), either with comparison groups of no screening or comparison between tests; or any quantitative study design (with or without comparison groups)
- **Critical Outcomes:**
  - lung cancer mortality and all-cause mortality
  - overdiagnosis, death from invasive follow-up testing, and major complications or morbidity as a result of invasive follow-up testing

# How is Evidence Graded?

The “**GRADE**” System:

- **G**radings of **R**ecommendations, **A**ssessment, **D**evelopment & **E**valuation

What are we grading?

## 1. **Quality of Evidence**

- Degree of confidence that the available evidence correctly reflects the theoretical true effect of the intervention or service.
- high, moderate, low, very low

## 2. **Strength of Recommendation**

- the balance between desirable and undesirable effects; the variability or uncertainty in values and preferences of citizens; and whether or not the intervention represents a wise use of resources.
- strong and weak

# How is the Strength of Recommendations Determined?

The strength of the recommendations (strong or weak) are based on four factors:

- **Quality** of supporting evidence
- Certainty about the **balance between desirable and undesirable** effects
- Certainty / variability in **values and preferences** of individuals
- Certainty about whether the intervention represents a **wise use of resources**



# Interpretation of Recommendations

Implications	Strong Recommendation	Weak Recommendations
For patients	<ul style="list-style-type: none"><li>• Most individuals would want the recommended course of action;</li><li>• only a small proportion would not.</li></ul>	<ul style="list-style-type: none"><li>• The majority of individuals in this situation would want the suggested course of action but many would not.</li></ul>
For clinicians	<ul style="list-style-type: none"><li>• Most individuals should receive the intervention.</li></ul>	<ul style="list-style-type: none"><li>• Recognize that different choices will be appropriate for individual patients;</li><li>• Clinicians must help patients make management decisions consistent with values and preferences.</li></ul>
For policy makers	<ul style="list-style-type: none"><li>• The recommendation can be adapted as policy in most situations.</li></ul>	<ul style="list-style-type: none"><li>• Policy making will require substantial debate and involvement of various stakeholders.</li></ul>

## **Screening for Lung Cancer**

# **RECOMMENDATIONS & KEY FINDINGS**

# Lung Cancer 2016 Guidelines

These guidelines provide recommendations for practitioners on preventive health screening in a primary care setting:

- These recommendations apply to **adults aged 18 years and older** and who are **not suspected of having lung cancer**
- These recommendations do not apply to adults with:
  - A history of lung cancer
  - Suspected lung cancer

# Low dose computed tomography (LDCT)

**Recommendation:** For adults aged 55 to 74 years with at least a 30 pack-year smoking history, who currently smoke or quit less than 15 years ago, we **recommend annual screening with LDCT up to three consecutive times.**

- *Weak recommendation; low quality evidence*

**Screening should ONLY be carried out in health care setting with expertise in early diagnosis and treatment of lung cancer**

# Low dose computed tomography (LDCT)

## **Basis of the recommendation:**

- The recommendation to screen the high-risk population places a relatively high value on a small benefit for reduced lung cancer mortality and the known poor prognosis of untreated lung cancer; but a relatively lower value on the risk of side effects, overdiagnosis, and the lack of data comparing LDCT to no screening
- A weak recommendation means that most eligible people would want to be screened for lung cancer, but many may appropriately choose not to be screened.

# Low dose computed tomography (LDCT) continued...

**Recommendation:** For all other adults, regardless of age, smoking history, or other risk factors, **we recommend not screening for lung cancer with LDCT**

- *Strong recommendation; very low quality evidence*

# Low dose computed tomography (LDCT) continued...

## **Basis of the recommendation:**

- People who are not at high risk for lung cancer would be expected to have a lower absolute benefit of screening than high risk patients, but would still be susceptible to some of the harms association with screening (e.g., false positives, consequences from invasive follow-up tests, and overdiagnosis)

# Chest x-ray (CXR)

**Recommendation:** We recommend that chest x-ray not be used to screen for lung cancer, with or without sputum cytology

- *Strong recommendation; low quality evidence*

# Chest x-ray (CXR)

## **Basis of the recommendation:**

- Screening with CXR detected more early-stage and fewer late-stage lung cancers, compared to groups receiving usual care. However, such screening did not reduce lung cancer specific mortality or all-cause mortality
- This recommendation against screening is strong, since available evidence suggests no benefit of screening with CXR on lung cancer specific or all-cause mortality; but suggests that there are established harms of screening (e.g., overdiagnosis, false positives, and complications from follow-up testing)

# Performance Characteristics of LDCT

- Sensitivity is high (80-100%)
- Specificity varies widely (28-100%)
  - Contributing to a high frequency of false positives
- Including a multi-slice detector and/or computer assisted reading/diagnosis (CAR/D) and/or 1-2 independent radiologists may improve sensitivity and specificity
- Cut-off points for a positive LDCT result vary across studies (>3mm to >10mm)
- Currently no agreement on what cut-off point balances a reduction in mortality and minimizing harm

# Screening Intervals

- The CTFPHC is taking a more conservative approach in recommending three annual scans, rather than continuous annual or biennial scans
- It is possible that ongoing screening might yield additional benefits, but this is speculative, since there is no supporting RCT data. It is unclear whether it could lead to more false positives and invasive follow up testing, potentially disrupting the balance between the benefits and harms.

# Harms and Benefits for Screening

- Possible benefits of screening with LDCT include:
  - Early disease detection
  - Reduced lung cancer mortality
  - Reduced all-cause mortality
- Possible harms related to screening with LCDT/CXR include:
  - Death or major complications from invasive follow up testing
  - False Positives
  - Over-diagnosis

# Number Needed to Screen (NNS)

- 322 people would need to be screened with LDCT to prevent one death from lung cancer over 6.5 years.

# Overall Findings Summary – Benefits

## (Critical and Selected Important Outcomes)

Outcome	CXR vs Usual Care	CXR plus SC vs CXR	Annual LDCT vs Usual Care	LDCT vs CXR
Lung Cancer Mortality	RR 0.99 95% CI 0.92, 1.07 I <sup>2</sup> = 0%	RR 1.01 95% CI 0.74, 1.42 I <sup>2</sup> = na	RR 1.30 95% CI 0.80, 2.11 I <sup>2</sup> = na	RR 0.85 95% CI 0.75, 0.96, I <sup>2</sup> = na ARR 0.31% NNS 322 (95% CI 195, 1220)
All-Cause Mortality	RR 0.98 95% CI 0.96, 1.00 I <sup>2</sup> = 0%	–	RR 1.38 95% CI 0.86, 2.22 I <sup>2</sup> = 80%	RR 0.94 95% CI 0.88, 1.00, I <sup>2</sup> = na ARR 0.46% NNS 219 (95% CI 115, 5,556)
Stage at Diagnosis (Early Stage)	RR 1.14 95% CI 1.03, 1.25 I <sup>2</sup> = na	–	RR 1.74 95% CI 1.25, 2.42 I <sup>2</sup> = 0%	RR 1.46 95% CI 1.33, 1.61 I <sup>2</sup> = na
Stage at Diagnosis (Late Stage)	RR 0.93 95% CI 0.87, 0.98 I <sup>2</sup> = na	–	RR 0.62 95% CI 0.48, 0.79 I <sup>2</sup> = 0%	RR 0.71 95% CI 0.65, 0.77 I <sup>2</sup> = na

ARR = Absolute Risk Reduction; NNS = Number Needed to Screen

# Overall Findings Summary – Harms (Critical Outcomes)

Outcome	CXR	CXR plus SC	LDCT
Overdiagnosis	—	<p>TVDT &gt;400 days: 2.27% to 6.98% of all cases of lung cancer diagnosed in the screened population were overdiagnosed</p> <p>TVDT &gt;300 days: 4.55% to 16.28% of all cases of lung cancer diagnosed in the screened population were overdiagnosed</p>	10.99% to 25.83% of all cases of lung cancer diagnosed in the screened population were overdiagnosed
Death from Invasive Follow-up Testing	28.60 deaths (95% CI 16.02, 41.17) per 1,000 patients undergoing invasive follow-up testing	47.67 deaths (95% CI 23.86, 71.49) per 1,000 patients undergoing invasive follow-up testing	11.18 deaths (95% CI 5.07, 17.28) per 1,000 patients undergoing invasive follow-up testing
Major Complications from Invasive Follow-up Testing	63.32 major complications (95% CI 42.92, 92.49) per 1,000 patients undergoing invasive follow-up testing	—	52.03 major complications (95% CI 15.77, 88.28) per 1,000 patients undergoing invasive follow-up testing

TVDT = tumor volume doubling time

# Comparison: CTFPHC guideline vs. other recommendations

Organization (year)	Recommendations	Target Group	Screening Interval
CTFPHC (2016)	Recommend <u>for</u> screening for lung cancer using LDCT	Adults aged 55 to 74 years, who are current or former smokers (quit within the last 15 years) with at least a 30 pack-year smoking history	One annual screen for three consecutive years
USPSTF (2013)	Recommend <u>for</u> screening for lung cancer using LDCT	Asymptomatic adults aged 55 to 80 years, who are current or former smokers (quit within the last 15 years) with a minimum 30 pack-year smoking history	Annual screening
Cancer Care Ontario (2013)	Recommend <u>for</u> screening for lung cancer using LDCT	High-risk populations defined as persons 55 to 74 years of age with a minimum smoking history of 30 pack-years or more, who currently smoke or have quit within the past 15 years and are disease free at the time of screening	One annual scan for three consecutive years, followed by continuous biennial scans
CTFPHC (2003)	Recommended <u>against</u> using CXR to screen asymptomatic adults for lung cancer; <u>Insufficient</u> evidence for using LDCT as a screening test for asymptomatic adults		

## **Screening for Lung Cancer**

# **IMPLEMENTATION OF RECOMMENDATIONS**

# Values and Preferences

- Most participants in high risk group had willingness to participate in screening, motivated by:
  - Smoking history
  - Beliefs that early detection improves health outcomes
  - Family history of lung cancer
- Potential barriers to screening included:
  - Inconvenience of screening
  - Negative experiences with health care workers or settings
- Some concerns expressed about access to LDCT scans, and limiting eligibility to those between 55 and 74 years.

# Knowledge Translation Tools

- The CTFPHC creates KT tools to support the implementation of guidelines into clinical practice
- A patient harms and benefits poster and clinician FAQ have been developed for the lung cancer guideline
- After the public release, these tools will be freely available for download in both French and English on the website: [www.canadiantaskforce.ca](http://www.canadiantaskforce.ca)

## **Screening for Lung Cancer**

# **CONCLUSIONS**

# Conclusions: Key Points

- Adults between 55-74 years who are current or former smokers who quit within the past 15 years, and who have at least a 30 pack-year smoking history may benefit from screening for lung cancer with LDCT annually for three consecutive years
- Because of the potential for screening-related harms, LDCT and subsequent management should **ONLY** be carried out in health care setting with expertise in early diagnosis and treatment of lung cancer
- The weak recommendation implies that practitioners should have a discussion with their patients about the benefits and harms of screening for lung cancer with LDCT including false positives, side effects of invasive follow-up testing, and overdiagnosis

# Conclusions: Key Points

- There is no clear benefit of LDCT screening for lung cancer in adults younger than 55 years, older than 74 years, or who have a lower risk based on smoking history (i.e., smokers with less than a 30 pack-year smoking history, or former smokers who quit more than 15 years prior)
- There is no benefit of screening for lung cancer with chest x-rays (with or without sputum cytology), but there are known harms including false positives, side effects of invasive follow up testing, and overdiagnosis
- Since smoking is associated with 85% of incident lung cancer in Canada, tobacco control and smoking cessation are critical for reducing the morbidity and mortality due to lung cancer

# More Information

For more information on the details of this guideline please see:

- Canadian Task Force for Preventive Health Care website: <http://canadiantaskforce.ca>

# Questions & Answers

**Thank you**