PANEL DISCUSSION:
SCREENING FOR LUNG CANCER

Anthony D Weaver MD
Disclosures

Anthony Weaver has no relationships to disclose.

Thank God! A panel of experts!
Objectives

1. Analyze the current demographics of lung cancer in Kentucky.
2. Discuss current guidelines and recommendations for lung cancer screening
3. Review selected research on lung cancer screening
4. Suggest future directions
Objective 1

Analyze the current demographics of lung CA
Statistics: lung cancer

- leading cause of cancer deaths in the US
- In 2012, there were more than 225,000 new cases and more than 160,000 deaths
- Lung cancer deaths surpassed the total deaths from cancers of the breast, prostate, and colon combined.
Lung Cancer, 2004-2008

<table>
<thead>
<tr>
<th>Region</th>
<th>Incidence Rate</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>US*</td>
<td>62.0</td>
<td>52.5#</td>
</tr>
<tr>
<td>Kentucky**</td>
<td>100.8</td>
<td>75.1</td>
</tr>
</tbody>
</table>

The KY incidence is **62.6% HIGHER** than the US

The KY mortality is **43.0% HIGHER** than the US

*Source: SEER*Stat 7.0.4 SEER 17 Registries
**Source: Kentucky Cancer Registry
#: Based on 2003-2007 rate
### Kentucky Cancer Deaths per year 2006-2010

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung and Bronchus</td>
<td>3416</td>
</tr>
<tr>
<td>Colon</td>
<td>881</td>
</tr>
<tr>
<td>Breast</td>
<td>597</td>
</tr>
<tr>
<td>Pancreas</td>
<td>507</td>
</tr>
<tr>
<td>Prostate</td>
<td>392</td>
</tr>
<tr>
<td>Leukemia</td>
<td>332</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>320</td>
</tr>
<tr>
<td>Ovary</td>
<td>212</td>
</tr>
</tbody>
</table>
All 120 counties’ death rate above the US average.
The death rate varies from 59 in Larue and Cumberland counties to 124 in Gallatin County.
The highest rates are in eastern KY and Ohio, Butler, and Muhlenberg counties.
Incidence Rates† for Kentucky, 2003 - 2007
Breast
All Races (includes Hispanic), Female, All Ages

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

Quantile Interval

US (SEER + NPCR)
Rate (95% C.I.)
120.6 (120.4 - 120.9)

Kentucky
Rate (95% C.I.)
120.1 (118.2 - 122.1)
Incidence Rates† for Kentucky, 2003 - 2007
Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

Quantile Interval

- 116.8 to 157.0
- 109.6 to 116.7
- 101.6 to 109.5
- 96.1 to 101.5
- 89.1 to 96.0
- 68.8 to 89.0

- Suppressed * ***

US (SEER + NPCR)
Rate (95% C.I.)
68.0 (67.9 - 68.2)

Kentucky
Rate (95% C.I.)
100.6 (99.2 - 101.9)
Age-Adjusted Cancer Mortality Rates in Kentucky
All Sites, 2006-2010
By County
Age-Adjusted to the 2000 U.S. Standard Million Population

Kentucky Rate: 207.41
Rate per 100,000

- 156.89 - 198.83
- 198.91 - 212.07
- 212.55 - 230.33
- 230.69 - 283.64

Data accessed July 1, 2013.
Based on data released May 2, 2013.
Copyright (C) 2013 Kentucky Cancer Registry
Smoking

- 90% of lung cancer related to smoking.
- The strongest determinant of lung cancer in smokers is duration of cigarette smoking, and the risk also becomes larger with the number of cigarettes smoked.
- Smoking causes lung cancer in both men and women.
Prevalence of Current Smoking by Area Development District, 2010

Kentucky: 24.8
Lung Cancer Incidence by Area Development District, 2004-2008

Age-Adjusted Cancer Incidence Rates in Kentucky
Lung and Bronchus, 2004-2008
By Area Development District
Age-Adjusted to the 2000 U.S. Standard Million Population

Kentucky Rate: 100.84

Rate per 100,000

- 93.67 - 96.45
- 96.73 - 99.71
- 101.02 - 104.86
- 117.08 - 125.26

Data accessed October 4, 2011.
Based on data released November 1, 2010.
Copyright (C) 2011 Kentucky Cancer Registry
Lung Cancer Mortality by Area Development District, 2004-2008

Age-Adjusted Cancer Mortality Rates in Kentucky
Lung and Bronchus, 2004-2008
By Area Development District
Age-Adjusted to the 2000 U.S. Standard Million Population

Kentucky Rate: 75.06

Rate per 100,000
- 65.96 - 71.17
- 71.60 - 76.30
- 76.82 - 80.32
- 87.37 - 97.43

Data accessed October 4, 2011.
Based on data released April 21, 2011.
Copyright (C) 2011 Kentucky Cancer Registry
Other Risk Factors

- Radiation therapy in both Hodgkin lymphoma and breast cancer.
- Environmental toxins: second-hand smoke, asbestos, radon, metals (arsenic, chromium, and nickel), ionizing radiation, and polycyclic aromatic hydrocarbons.
- Pulmonary fibrosis — risk increased about 7X
- HIV infection
- Genetic factors — clearly established familial risk.
- Dietary factors — (antioxidants, cruciferous vegetables, phytoestrogens) may reduce the risk of lung cancer, but trials in high-risk patients have not been successful.
Radon?

Kentucky Radon Map
Average Radon Levels by County

Legend
Average Level (pCi/L)
- < 2.0
- 2.0 - 4.0
- > 4.0

Notes:
The amount of radon in the air is measured in "pico-curie per liter" or "pCi/L". The risk of contracting lung cancer from radon depends on how much radon is in your home, the amount of time you spend in your home, and whether you are a smoker or have ever smoked.
Incidence Rates† for Kentucky, 2003 - 2007
Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

Quantile Interval

116.8 to 157.0
109.6 to 116.7
101.6 to 109.5
96.1 to 101.5
89.1 to 96.0
68.8 to 89.0

Suppressed *///

US (SEER + NPCR)
Rate (95% C.I.)
68.0 (67.9 - 68.2)

Kentucky
Rate (95% C.I.)
100.6 (99.2 - 101.9)
Incidence Rates† for Kentucky, 2003 - 2007
Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

Quantile Interval

116.8 to 157.0
109.6 to 116.7
101.6 to 109.5
96.1 to 101.5
89.1 to 96.0
68.8 to 89.0
Suppressed**

US (SEER + NPCR)
Rate (95% C.I.)
68.0 (67.9 - 68.2)

Kentucky
Rate (95% C.I.)
100.6 (99.2 - 101.9)

Created by statecancerprofiles.cancer.gov on 09/21/2010 10:33 pm.
State Cancer Registries may provide more current or more local data.
Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the
State Cancer Registries (for more information).
† Incidence rates (cases per 100,000 population per year) are age-adjusted to the 2000 US standard population
(19 age groups: <1, 1-4, 5-9, ..., 80-84, 85+). Rates are for invasive cancer only (except for bladder which
is invasive and in situ) or unless otherwise specified. Rates calculated using SEER*Stat. Population counts for
denominators are based on Census populations as modified by NCI. The US populations included with the data
release have been adjusted for the population shifts due to hurricanes Katrina and Rita for 62 counties and parishes
in Alabama, Mississippi, Louisiana, and Texas. The 1969-2007 US Population Data File is used with SEER November 2009
* Data have been suppressed to ensure confidentiality and stability of rate estimates. Counts are suppressed
if fewer than 16 cases were reported in a specific area-sex-race category.
** Data have been suppressed for states with a population below 50,000 per sex for American Indian/Alaska Native
or Asian/Pacific Islanders because of concerns regarding the relatively small size of these populations in some states.
Incidence Rates† for West Virginia, 2003 - 2007
Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Created by statecancerprofiles.cancer.gov on 10/21/2010 2:15 pm.
State Cancer Registries may provide more current or more local data.
Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the State Cancer Registries (for more information).
† Incidence rates (cases per 100,000 population per year) are age-adjusted to the 2000 US standard population (19 age groups: <1, 1-4, 5-9, ... , 80-84, 85+). Rates are for invasive cancer only (except for bladder which is invasive and in situ) or unless otherwise specified. Rates calculated using SEER*Stat. Population counts for denominators are based on Census populations as modified by NCI. The US populations included with the data release have been adjusted for the population shifts due to hurricanes Katrina and Rita for 62 counties and parishes in Alabama, Mississippi, Louisiana, and Texas The 1969-2007 US Population Data File is used with SEER November 2009 data. The 1969-2006 US Population Data File is used with NPCR data November 2008/January 2009 data.
Incidence Rates\textsuperscript{\dagger} for Virginia, 2003 - 2007
Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted
Annual Incidence Rate
(Cases per 100,000)

Quantile Interval

- 89.3 to 117.6
- 79.5 to 89.2
- 73.3 to 79.4
- 68.1 to 73.2
- 58.2 to 68.0
- 37.3 to 58.1

Suppressed\textsuperscript{***}

US (SEER + NPCR)
Rate (95% C.I.)
68.0 (67.9 - 68.2)

Virginia
Rate (95% C.I.)
68.4 (67.5 - 69.2)

Created by statecancerprofiles.cancer.gov on 09/21/2010 11:52 pm.
State Cancer Registries may provide more current or more local data.
Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the
State Cancer Registries (for more information).
\textsuperscript{\dagger} Incidence rates (cases per 100,000 population per year) are age-adjusted to the 2000 US standard population
(19 age groups: <1, 1-4, 5-9, ..., 80-84, 85+). Rates are for invasive cancer only (except for bladder which is
invasive and in situ) or unless otherwise specified. Rates calculated using SEER*Stat. Population counts for
denominators are based on Census populations as modified by NCI. The US populations included with the data
release have been adjusted for the population shifts due to hurricanes Katrina and Rita for 62 counties and parishes
in Alabama, Mississippi, Louisiana, and Texas. The 1969-2007 US Population Data File is used with SEER November 2009

\textsuperscript{*} Data have been suppressed to ensure confidentiality and stability of rate estimates. Counts are suppressed
if fewer than 16 cases were reported in a specific area-sex-race category.
\textsuperscript{**} Data have been suppressed for states with a population below 50,000 per sex for American Indian/Alaska Native
or Asian/Pacific Islanders because of concerns regarding the relatively small size of these populations in some states.

Lung & Bronchus
All Races (includes Hispanic), Both Sexes, All Ages

Age-Adjusted Annual Death Rate
(Deaths per 100,000)

Quantile Interval

- 85.4 to 119.7
- 78.6 to 85.3
- 74.4 to 78.5
- 66.5 to 74.3
- 61.3 to 66.4
- 48.3 to 61.2

United States Rate (95% C.I.)
52.5 (52.4 - 52.6)

Tennessee Rate (95% C.I.)
67.7 (66.7 - 68.6)

Healthy People 2010 Goal 03-02
44.9

Created by statecancerprofiles.cancer.gov on 09/22/2010 12:06 am.
State Cancer Registries may provide more current or more local data.
Data presented on the State Cancer Profiles Web Site may differ from statistics reported by the State Cancer Registries (for more information).
Source: Death data provided by the National Vital Statistics System public use data file. Death rates calculated by the National Cancer Institute using SEER*Stat. Death rates (deaths per 100,000 population per year) are age-adjusted to the 2000 US standard population (19 age groups: <1, 1-4, 5-9, ..., 80-84, 85+). The Healthy People 2010 goals are based on rates adjusted using different methods but the differences should be minimal. Population counts for denominators are based on the Census 1969-2006 US Population Data File as modified by NCI. The US populations included with the data release have been adjusted for the population shifts due to hurricanes Katrina and Rita for 62 counties and parishes in Alabama, Mississippi, Louisiana, and Texas. Healthy People 2010 Goal 03-02: Reduce the lung cancer death rate to 44.9. Healthy People 2010 Objectives provided by the Centers for Disease Control and Prevention.
Lung Cancer in the Mountains
Objective 2

Discuss current guidelines and recommendations for lung cancer screening
The USPSTF recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 55 to 80 years who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery. (B recommendation)
U.S. Preventive Services Task Force

Draft Recommendation Statement

Note: This draft Recommendation Statement is not the final recommendation of the U.S. Preventive Services Task Force. This draft is distributed solely for the purpose of pre-release review. It has not been disseminated otherwise by the USPSTF. It does not represent and should not be interpreted to represent a USPSTF determination or policy.

This draft Recommendation Statement is based on an evidence review that was published on July 30, 2013 (available at http://www.uspreventiveservicestaskforce.org/uspstf13/ lungcanc/lungcanart.htm).

The USPSTF makes recommendations about the effectiveness of specific preventive care services for patients without related signs or symptoms.

It bases its recommendations on the evidence of both the benefits and harms of the service, and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decisionmaking to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.

This draft Recommendation Statement is available for comment from July 30 until August 26, 2013 at 5:00 PM ET. You may wish to read the entire Recommendation Statement before you comment. A fact sheet that explains the draft recommendations in plain language is available here.

Table 2: What the Grades Mean and Suggestions for Practice

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The USPSTF recommends the service. There is high certainty that the net benefit is substantial.</td>
</tr>
<tr>
<td>B</td>
<td>The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.</td>
</tr>
<tr>
<td>C</td>
<td>The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.</td>
</tr>
<tr>
<td>D</td>
<td>The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.</td>
</tr>
<tr>
<td>I</td>
<td>The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.</td>
</tr>
</tbody>
</table>
On April 30, 2014, the Centers for Medicare & Medicaid Services (CMS) will be convening a Medicare Evidence Development and Coverage Advisory Committee (MEDCAC) meeting to review all the available data, prior to making its final coverage decision.
### Table 3. Computed Tomography Screening Recommendations

<table>
<thead>
<tr>
<th>Organizations</th>
<th>Primary Population for Screening</th>
<th>Other Populations for Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommendations</td>
<td>Recommendations</td>
</tr>
<tr>
<td>American Association for Thoracic Surgery (AATS)</td>
<td>Aged 55-79 y</td>
<td>Aged ≥50 y</td>
</tr>
<tr>
<td></td>
<td>≥30 Pack-years of smoking</td>
<td>≥20 Pack-years of smoking</td>
</tr>
<tr>
<td></td>
<td>AHA Level of Evidence: B</td>
<td>Additional risk factor(s)</td>
</tr>
<tr>
<td>American College of Chest Physicians (ACCP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and American Society of Clinical Oncology (ASCO)</td>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lung cancer survivor ≥5 y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Cancer Society</td>
<td>Aged 55-74 y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥30 Pack-years of smoking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AHA Level of Evidence: B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Former smokers must have quit within past 15 y</td>
<td></td>
</tr>
<tr>
<td>National Comprehensive Cancer Network (NCCN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recommendations</td>
<td>Recommendations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aged 55-74 y</td>
<td>Aged ≥50 y</td>
</tr>
<tr>
<td></td>
<td>≥30 Pack-years of smoking</td>
<td>≥20 Pack-years of smoking</td>
</tr>
<tr>
<td></td>
<td>AHA Level of Evidence: B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Former smokers must have quit within past 15 y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbreviations: NA, not applicable; NR, not recommended for other populations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a American Hospital Association (AHA) level of evidence: A, multiple populations evaluated; data derived from multiple randomized trials or meta-analysis; B, limited populations evaluated; data derived from single randomized trial or nonrandomized studies; C, very limited populations evaluated; only consensus opinion of experts, case studies, or standard of care.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b Additional risk factors for lung cancer defined by AATS include chronic obstructive pulmonary disease, environmental and occupational exposures, any prior cancer or thoracic radiation, and genetic or family history.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c Although ACCP and ASCO evaluated more than 1 randomized trial, their recommendations are graded B because they were based on a single randomized trial (other studies were deemed “too small, too preliminary, or too poorly designed to support meaningful conclusions”).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d Additional risk factors for lung cancer defined by NCCN include cancer history, lung disease history, family history of lung cancer, radon exposure, and occupational exposure.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The evidence is insufficient to recommend for or against screening ... (Grade: I recommendation)

AAFP has significant concern with basing such a far reaching and costly recommendation on a single study.

The NLST, conducted in major medical centers..., has not been replicated in a community setting.

The long term harms of radiation exposure... unknown.
The USPSTF recommends annual CT screening even though the NLST trial was only 3 scans.

NNS to prevent one lung cancer death over 5 years and 3 screenings is 312.

NNS to prevent one death by any cause is 208 over 5 years in the NLST trial.

40% will have a positive result requiring follow-up. The harms of these follow-up interventions in ...the community is not known.

"The cost-effectiveness of low-dose CT screening must also be considered in the context of competing interventions, particularly smoking cessation."
Objective 3

Review selected research on lung cancer screening
Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

The National Lung Screening Trial Research Team*
Marty Driesler Lung Cancer Project: Results of Lung Cancer Screening in Rural Kentucky

Eric Benavides, Michael Brooks, Stacey Stone, Andrew Burrell, Bin Huang, David Mussa, Edward Hirschowitz, Anthony Weav, Ali Reza Khan, Jason Castles, J.D. Miller, Anna da Wiggins, Suzanne Arnold

University of Kentucky, Lexington, KY, UK.

ABSTRACT

Background: Southeastern Kentucky has one of the highest incidence rates of lung cancer in the United States. Computed tomography (CT) scan screening for lung cancer offers a promise of early diagnosis and improved outcomes; however, this remains unproven in the results of national randomized National Lung Screening Trial (NLST) studies.

Objective: The Marty Driesler Lung Cancer Project was developed to assess the feasibility of CT screening in rural Kentucky and high risk population selected on the basis of residence in a geographic region with a 30-year mean life in a lower socio-economic status and the presence of cigarette smoking history and/or current smoking habit. In addition, all participants were to be stationed at the community hospital centers.

Methods: From 2015 to 2019, patients were screened and referred for eligibility by physicians. Eligible subjects ranged in age from 55 to 75 years old and were either current or former smokers (>15 years of smoking) with >20 pack-years. All patients were invited to participate in a CT lung screening and were scheduled for a CT scan at the community hospital centers.

Results: A total of 951 subjects were screened for eligibility by physicians and 626 (66%) were eligible. Of these, 471 subjects (57%) had a previous family history and/or 54% of these subjects had an IELV (lung cancer risk) >74%. These 217 subjects were enrolled in the screening process and were invited for a CT scan annually for three years. The baseline (screening) CT images were obtained with 87 (40%) patients with new positive findings. Sixty-six (26%) non-small cell lung cancer (NSCLC) were screened identified, of which only 24 (21%) were confirmed as NSCLC. Of the 24 NSCLC, 16 were confirmed with a biopsy. The 24 confirmed NSCLC included 16 squamous cell carcinomas (67%), 2 adenocarcinomas (8%), and 6 NSCLC (25%).

Conclusions: Findings from the Marty Driesler Lung Cancer Project suggest that CT screening for lung cancer in rural communities is feasible and could be effective in identifying early-stage NSCLC. Further research is needed to determine the cost-effectiveness of CT screening for lung cancer and its impact on clinical outcomes.

METHODS

Subjects were screened for eligibility by physicians. Eligible subjects were invited to one of four participating rural centers for pulmonary function testing.

Subjects with an IELV (lung cancer risk) >74% underwent low-dose CT scans annually for three years as well as lung cancer screening.

All participants were screened for NSCLC at the community hospital centers.

All CT scans were performed with local radiologists with expertise in chest radiology.

Positive screening CT scans were characterized as NSCLC on the basis of tumor size, number, and location.

A panel of radiologists and pulmonologists in the community hospital centers reviewed the CT scans.

Newly identified NSCLC were confirmed with a biopsy.

Subjects with NSCLC were referred to the nearest cancer center for further evaluation.

RESULTS

24 NSCLC were confirmed with a biopsy.

Conclusions: Findings from the Marty Driesler Lung Cancer Project suggest that CT screening for lung cancer in rural communities is feasible and could be effective in identifying early-stage NSCLC. Further research is needed to determine the cost-effectiveness of CT screening for lung cancer and its impact on clinical outcomes.
Box 1. Entry Criteria for National Lung Screening Trial

Age 55-74 years
Smoking history
\[ \geq 30 \text{ Pack-years}^a \]
Former smokers must have quit within past 15 years
Exclusions

- Previous lung cancer
- Other prior cancer (except nonmelanoma skin cancer) in past 5 years
- Chest computed tomography within past 18 months
- Hemoptysis
- Unexplained weight loss >15 lb in past year
- Metallic implants or devices in chest or back
- Requirement for home oxygen supplementation
- Pneumonia or other acute respiratory tract infection treated with antibiotics in past 12 weeks

\(^a\) Pack-years refers to number of cigarette packs smoked per day (20 cigarettes per pack) multiplied by the number of years of smoking.
# MDLCP Entry Criteria

## Entry Criteria and Study Timeline

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 55-75</td>
<td>Patient requiring oxygen supplementation</td>
</tr>
<tr>
<td>Current or former smokers (quit &lt;15 years)</td>
<td>Life expectancy &lt; 5 years</td>
</tr>
<tr>
<td>with &gt; 30 pack-year smoking history</td>
<td>Current or prior history of lung cancer</td>
</tr>
<tr>
<td>FEV1/FVC &lt;70%</td>
<td>Prior history of any cancer within 5 years (excluding non-melanoma skin cancer)</td>
</tr>
<tr>
<td></td>
<td>Inability to lie flat with arms raised above the head</td>
</tr>
<tr>
<td></td>
<td>CT scan within 1 year of enrollment</td>
</tr>
</tbody>
</table>
Screening

- **LCST:** Three yearly screenings with either low dose CT or PA/Lat CXRs and followed for 3.5 years
- **MDLCP:** Three yearly screenings with low dose CT at community hospitals, with central review

**Figure 2.** Study timeline
**Table 2. Results of Three Rounds of Screening.***

<table>
<thead>
<tr>
<th>Screening Round</th>
<th>Low-Dose CT</th>
<th>Chest Radiography</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clinically Significant Abnormality Not Suspicious for Lung Cancer</td>
<td>No or Minor Abnormality</td>
</tr>
<tr>
<td>Total No. Screened</td>
<td>Positive Result</td>
<td>No. (% of screened)</td>
</tr>
<tr>
<td>T0</td>
<td>26,309</td>
<td>7191 (27.3)</td>
</tr>
<tr>
<td>T1</td>
<td>24,715</td>
<td>6901 (27.9)</td>
</tr>
<tr>
<td>T2</td>
<td>24,102</td>
<td>4054 (16.8)</td>
</tr>
</tbody>
</table>

* The screenings were performed at 1-year intervals, with the first screening (T0) performed soon after the time of randomization. Results of screening tests that were technically inadequate (7 in the low-dose CT group and 26 in the radiography group, across the three screening rounds) are not included in this table. A screening test with low-dose CT was considered to be positive if it revealed a nodule at least 4 mm in any diameter or other abnormalities that were suspicious for lung cancer. A screening test with chest radiography was considered to be positive if it revealed a nodule or mass of any size or other abnormalities suspicious for lung cancer.

<table>
<thead>
<tr>
<th>Subjects screened</th>
<th>Total subjects with nodules or lung abnormalities</th>
<th>Non-calcified nodule &gt; 4 mm No. (%)</th>
<th>Subjects with no lung findings</th>
<th>Lung cancer detected No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>227</td>
<td>140 (62%)</td>
<td>46 (20%)</td>
<td>87 (38%)</td>
<td>6 (2.6%)</td>
</tr>
</tbody>
</table>
Problems with Community-based screening

- Variability in the interpretation screening CT by local radiologists with the discrepancy rate of 9% and 3/6 cancers initially missed
- In patients with nodules:
  - Recommendations from local radiologist may vary from Fleischner guidelines
  - Inconsistency by referring physicians in following recommendations

<table>
<thead>
<tr>
<th></th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total scans</td>
<td>227</td>
<td>159</td>
<td>133</td>
<td>519</td>
</tr>
<tr>
<td>Percentage Clinically Significant Discrepancies</td>
<td>13.24%</td>
<td>3.44%</td>
<td>10.95%</td>
<td>9.21%</td>
</tr>
</tbody>
</table>

* Clinically significant discrepancies affecting follow-up recommendations

Fleischner Society Guidelines
Resource Use and Guideline Concordance in Evaluation of Pulmonary Nodules for Cancer: Too Much and Too Little Care

Renda Soylemez Wiener, MD, MPH; Michael K. Gould, MD, MS; Christopher G. Slatore, MD, MS; Benjamin G. Fincke, MD; Lisa M. Schwartz, MD, MS; Steven Woloshin, MD, MS

**IMPORTANCE** Pulmonary nodules are common, and more will be found with implementation of lung cancer screening. How potentially malignant pulmonary nodules are evaluated may affect patient outcomes, health care costs, and effectiveness of lung cancer screening programs. Guidelines for evaluating pulmonary nodules for cancer exist, but little is known about how nodules are evaluated in the usual care setting.

**OBJECTIVE** To characterize nodule evaluation and concordance with guidelines.
Reviewed records of 300 adults with pulmonary nodules from 15 VA’s

- 20% ≤ 4 mm
- 45% 5-8 mm
- 36% > 8 mm

- Median # of tests =2 (benign nodule), 8 (cancer)
- Median total F/U = 13 mo. (<1mo.-8.5 yrs)
- 4/13 nodules resected were benign
- 8/46 with invasive testing had complications
Conclusions

- 55.3% of patients received appropriate evaluation, 17.8% over-evaluated, and 26.9% under-evaluated.
- "It is important for clinicians to recognize that there is a real gap between care that is currently being delivered to patients with pulmonary nodules and what clinical practice guidelines considered optimal care"
Benefits and Harms of CT Screening for Lung Cancer
A Systematic Review

Peter B. Bach, MD, MAPP
Joshua N. Mirkin, BA
Thomas K. Oliver, BA
Christopher G. Azzoli, MD
Donald A. Berry, PhD
Otis W. Brawley, MD
Tim Byers, MD, MPH
Graham A. Colditz, MD, DrPH
Michael K. Gould, MD, MS
James R. Jett, MD
Anita L. Sabichi, MD
Rebecca Smith-Bindman, MD

Context  Lung cancer is the leading cause of cancer death. Most patients are diagnosed with advanced disease, resulting in a very low 5-year survival. Screening may reduce the risk of death from lung cancer.

Objective  To conduct a systematic review of the evidence regarding the benefits and harms of lung cancer screening using low-dose computed tomography (LDCT). A multisociety collaborative initiative (involving the American Cancer Society, American College of Chest Physicians, American Society of Clinical Oncology, and National Comprehensive Cancer Network) was undertaken to create the foundation for development of an evidence-based clinical guideline.

Data Sources  MEDLINE (Ovid: January 1996 to April 2012), EMBASE (Ovid: January 1996 to April 2012), and the Cochrane Library (April 2012).

Study Selection  Of 591 citations identified and reviewed, 8 randomized trials and 13 cohort studies of LDCT screening met criteria for inclusion. Primary outcomes were lung cancer mortality and all-cause mortality, and secondary outcomes included nodule detection, invasive procedures, follow-up tests, and smoking cessation.
Conclusion

“Screening a population of individuals at a substantially elevated risk of lung cancer most likely could be performed in a manner such that the benefits that accrue to a few individuals outweigh the harms that many will experience.

However, there are substantial uncertainties regarding how to translate that conclusion into clinical practice.”
Lung Cancer: Why the Guilt Trip?

- Memorial Sloan-Kettering survey
- 2000 lung cancer patients
- 84% current non-smokers
- “... people who start smoking are generally 12 or 13 years old... They were targeted.”
- “We are going to be faced with an epidemic of lung cancer for a decade or more if every single person stops smoking today.”
Objective 4

Suggest future directions
SUGGESTIONS

- We should be screening for lung cancer in Kentucky, particularly Eastern Kentucky.
- Scans should be done locally, with oversight.
- There should be at least a registry, preferably an organized network for managing positive screens.
- Talk to Whitney Jones about starting a statewide cancer screening program.
Weaver’s wish list

- Statewide smoking ban
- $.50 per pack increase in state cigarette tax
- Kentucky Medicaid pays for lung cancer screening, but demands accountability
- Lung cancer biospecimen bank with statewide specimen collection
- Research into the determinants of lung cancer in high risk counties (Mountain Top Removal?)