


## Lung Cancer Screening

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## Question 1: Does lung cancer screening make sense?



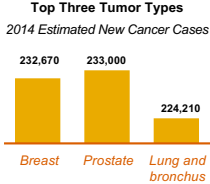
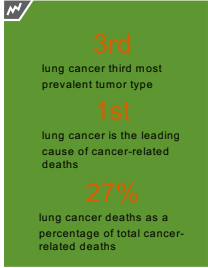
### Requirements for successful screening process

- Sufficiently high prevalence of disease?
- Significant morbidity and mortality?
- Pre-symptomatic stage is detectable?
- Effective and acceptable treatment available?
- Likely to be compliant with subsequent tests and Rx?
- Improved outcome for early treatment?
- Good sensitivity and specificity of the test?
- Lost cost and risk?
- Confirmatory tests available and practical?
- Evidence based patient selection criteria?




### Lung Cancer Leading Cause of Cancer Deaths

Third Most Prevalent Cancer Type Among Men and Women





Source: American Cancer Society, Cancer Facts and Figures 2014, accessed: <http://www.cancer.org/research/about-research-and-statistics/cancer-facts-figures-2014/index>

### 5-year survival for lung cancer for all stages is dismal



Based on data from SEER 18 2006-2012. Gray figures represent those who have died from lung and bronchus cancer. Green figures represent those who have survived 5 years or more.

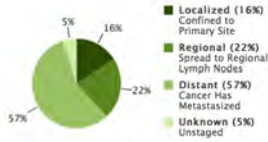
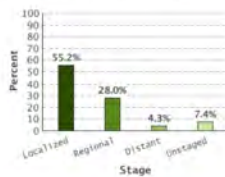


<http://seer.cancer.gov/statfacts/html/lungb.html>

### Typically Diagnosed at Late Stage

To be effective, treatment has to be directed at early stages

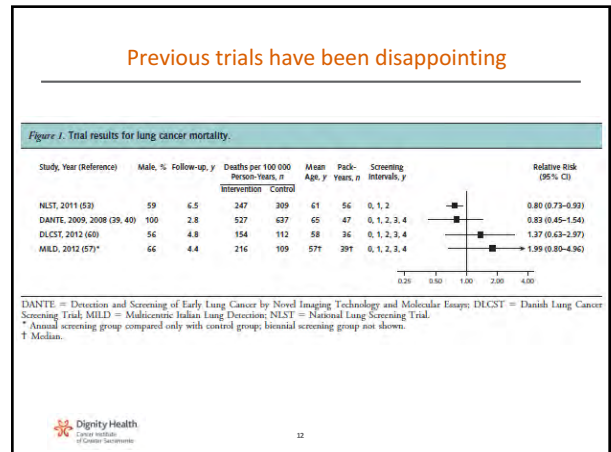
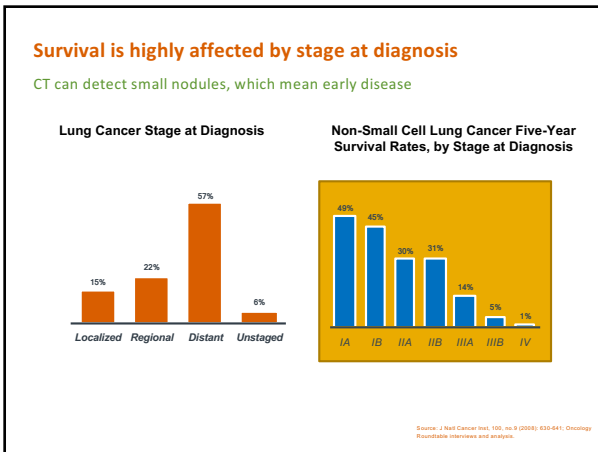
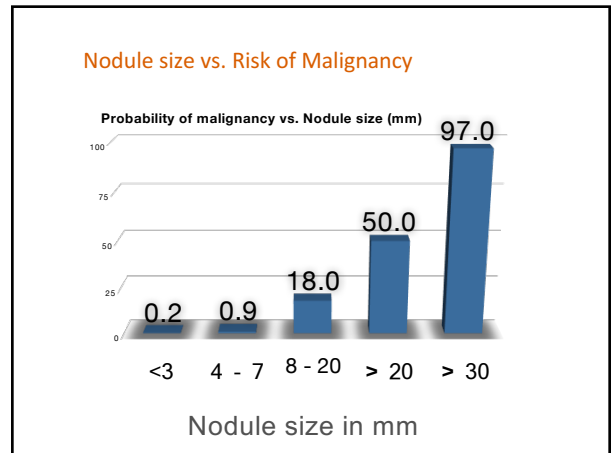
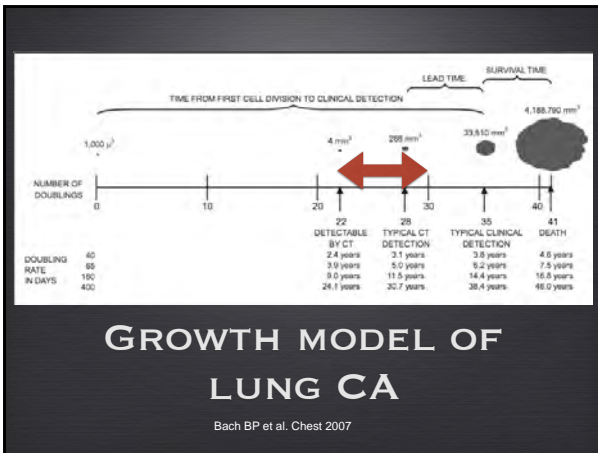
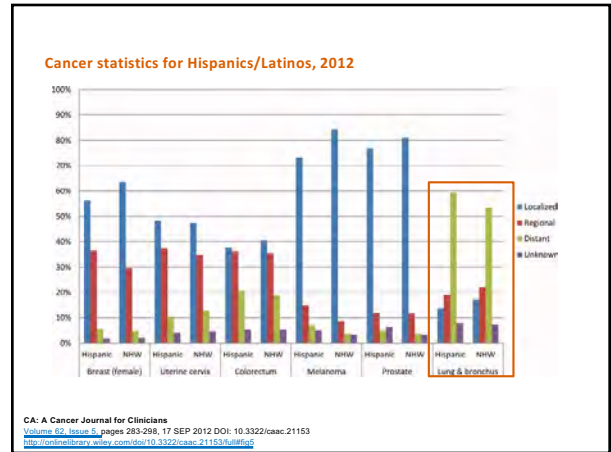
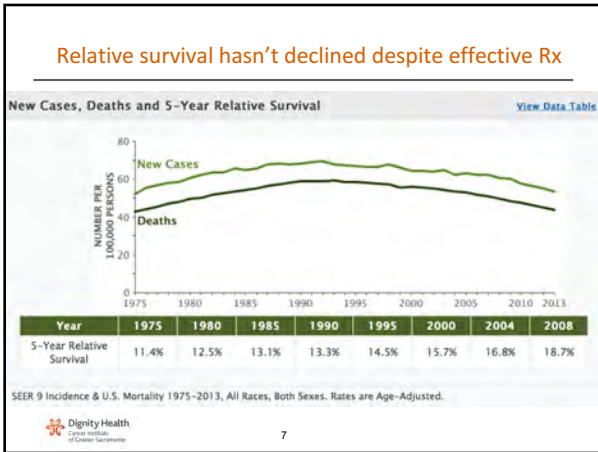
#### Percent of Cases & 5-Year Relative Survival by Stage at Diagnosis: Lung and Bronchus Cancer

SEER 18 2006-2012, All Races, Both Sexes by SEER Summary Stage 2000

<http://seer.cancer.gov/statfacts/html/lungb.html>

Source: J Natl Cancer Inst, 100, no 3 (2008): 635-641. Dignity Health. Available online and in print.



### Multiple trials of LDCT vs. CXR or UC

Trial Name	Study Design	Participants Recruited	Characteristics of Participants			Year Started	Report Date	LC Incidence Rate (LDCT)	Relative Mortality Reduction	
			Age	Sex	Prevalence (Prevalent)					
NLST	LDCT vs. CXR	26,854	55-74	MF	>20	<15	2002	2011	1%	67% / 20%
NELSON	LDCT vs. UC	16,822	50-75	MF	>15	<10	2003	2016	0.9%	63.8%
MALD	LDCT vs. UC	4,099	>40	MF	>20	<10	2005	2011	0.6%	63%
ORCA	LDCT vs. UC	2,811	65-74	M	>20	<10	2001	2007	2.2%	57%
EPISCAN	LDCT vs. CXR	765	50-75	MF	>15	<15	2002	2006	2.4%	0.9%
ITALUNG	LDCT vs. UC	3,206	55-69	MF	>20	<10	2004	N/A	1.5%	47.6%
VALDES	LDCT vs. UC	4,104	50-70	MF	>20	<10	2004	2016	0.8%	58.8%
LUSS	LDCT vs. CXR	4,052	50-69	MF	>15	<10	2007	2012	1.1%	78.2%
UKLS	LDCT vs. UC	52,000 (planned)	50-75	MF	N/A	N/A	2012	N/A	N/A	N/A

LDCT = Low-Dose Computer Tomography; CXR = Chest Radiograph; UC = Lung Cancer; UC = Usual Care  
Friedman, P et al. *RadioGraphics* 2015; 35:1893-1908

### NLST: National Lung Screening Trial 2011

- 53,000 current or former smokers
  - Age 55-74, quit less than 15 years ago
  - CXR arm – 26,700 subjects
  - Low dose CT arm – 26,722
- 20%** reduction in mortality from lung cancer in the Low Dose CT arm
- First real evidence that we can find lung cancers early, when they're potentially curable
  - And:** that we can do it with a low-radiation scan!

### NLST 2011 Results

- Lung cancer deaths
  - LDCT: 247/100,000
  - CXR: 309/100,000
- Relative reduction in mortality
  - 20% reduction (CI: 6.8-26.7%, p=0.004)
- Trial was terminated early based on these data

### How effective is it?

- More early cancers were found using CT screening
- Fewer people died from lung cancer in the CT group
  - But, some who were screened still died, just fewer than those who didn't get CT:

### Stage shift in stage diagnosis

Compares Favorably Compared to Other Screening Types

Shift in Stage of Diagnosis Due To CT Screening

Change in Number of Lung Cancer Patients Diagnosed by Stage<sup>1</sup>

<sup>1</sup> Analysis of lung cancer patient volumes at an academic medical center that sees 3,338 new patients per year; calculations based on 452 new diagnoses of lung cancer.

Source: Pritikin B et al. "An Actuarial Analysis Shows That Offering Lung Cancer Screening at An Insurance Benefit Would Save Lives at Relatively Low Cost." *Health Affairs* 31(4); Oncology Foundation interview and analysis.

### NLST Study Prompts USPSTF Approval

Commercial Reimbursement for Screening Expected 2015

Timeline for CT Lung Cancer Screening Approval

**What USPSTF "B" Recommendation Means for Lung Screening Programs**


- A grade "B" by the USPSTF means that the USPSTF recommends the service and that there is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial
- The Affordable Care Act requires that all new private health insurance plans cover all preventative services that are rated at a grade "B" or higher by the USPSTF

Source: "Screening for Lung Cancer, U.S. Preventive Services Task Force Practice Guideline Statement," USPSTF Final Recommendation Statement, Dec 2013; Oncology Foundation interview and analysis.

### Several Organizations In Support

Similar but not identical screening criteria available

**Societies  
Recommending  
CT Lung  
Cancer  
Screening**



- National Comprehensive Cancer Network
- American Lung Association
- American Thoracic Society
- American Society of Clinical Oncology
- American Association for Thoracic Surgery
- American Cancer Society
- American Association of Bronchology and Interventional Pulmonology
- Society of Thoracic Radiology
- Society of Thoracic Surgeons
- International Association for the Study of Lung Cancer
- Oncology Nursing Society
- European Society of Thoracic Surgeons
- American College of Radiology
- Cancer Care Ontario


Source: Mickel, A et al., "Rescue Lung, Rescue Life: Translating the NLST results into clinical practice," *Oncology (Semin Oncol)*, accessed.

### Comparison of cost-effectiveness studies

Study*	Year Published	Cost per life year saved	Cost per QALY saved
Mauchley et al, Thoracic Surg Clin	2015	\$28,000*	\$35,000
Black et al, NEJM	2014	\$52,000	\$81,000
Pyenson et al	2014	\$18,500	
Shmueli et al	2013		\$1,400
Vilanti et al	2013		\$28,000
Millman Group	2012	\$11,000 - \$26,000	
McMahon et al	2011		\$137,000 women \$149,000 men

\*Studies done after NLST

Cost-effectiveness of screening for lung cancer with low-dose computed tomography: a systematic literature review: Pugina, A. Eur J Public Health, 9/14/2015

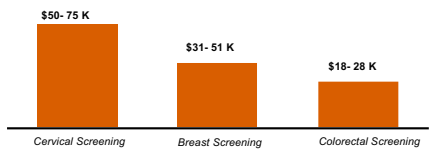

20

### Comparison of Cost-Effectiveness

Compares Favorably Compared to Other Screening Types

**Screening  
Cost Effectiveness**

**Cost Per Life-Year Saved**



<sup>1)</sup> Analysis of lung cancer patient outcomes at an academic medical center that uses 5,338 new patients per year; calculations based on 462 new diagnoses of lung.

Source: Pyenson B et al., "An Actuarial Analysis Shows That Offering Lung Cancer Screening at An Insurance Benefit Would Save Lives at Relatively Low Cost," *Health Affairs* 31(6), Oncology Roundtable interview and analysis.

Source: National Lung Screening Trial Research Team, "Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening," *N Engl J Med* 364: 219-226, 2011. doi:10.1056/NEJMoa1011976. URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3045494/>.


### Putting It Into Context

Comparing Mammography and Low-Dose Lung CT Screening

	Mammography	Low-dose CT Lung Cancer Screening
False positive rate	10-12%	20-25%
False discovery rate	96%	96%
False positive biopsy rate	7-15%	0.4-2.4%
Number of individuals need to be screened in order to save one life	~800-900	320

### Confirmatory tests

- Short-term follow-up CT
  - Some inflammatory nodules or infections just resolve
- PET-CT
  - Confirmation and improved staging
- CT-guided transthoracic biopsy
- Endobronchial ultrasound guided biopsy (EBUS)
- Super Dimension image-guided biopsy


23

### Screening: definition

- Screening is a process of identifying **apparently healthy** people who may be at increased risk of a disease or condition.
- We want to catch the lung cancers at a very early stage, before they can spread, i.e. **before** the patient has symptoms!
- But screening has limitations and even risks – it's imperative to target the population at risk as narrowly as possible.

### Ebola screening at the airport example

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- 100,000 travelers per day enter US
- Let's assume only 100/day have Ebola (0.01% prevalence)
- Ebola test is 95% sensitive and 99% specific
- We screen everyone entering US
- We quarantine people who turn up positive
- True positives: 95% of 100 = 95 – Good!
- False positives: 1% of 100K = 1,000 – Very bad!
- **We quarantine 10x more healthy people than sick!!!**

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### Ebola screening – smarter way to do it

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- 100,000 travelers per day enter US
- Let's assume only 100/day have Ebola (0.01% prevalence)
- Ebola test is 95% sensitive and 99% specific
- We screen **only people with fever: let's say 10,000/day**
- True positives: 95% of 100 = 95 – Good!
- False positives: 1% of 10K = 100 – Much better!
- **Without changing the test at all, test's positive predictive value went from 10% to 50% overnight!**
- We could do even better if we screen people with fever coming from known Ebola areas, etc.

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### Question 2: Who should be screened?

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### Comparing multiple eligibility criteria

Table 1: Eligibility Criteria for Lung Cancer Screening According to CMS, USPSTF, and Various Specialty Societies

Organization	Patient Age (y), Symptomatic	Smoking History (pack-years)	Other Factor(s)
CMS	55-77, asymptomatic	≥ 30	Less than 15 years since smoking cessation
USPSTF	55-80, asymptomatic	≥ 30	Less than 15 years since smoking cessation
ACCP, ASCO, ATS, ACS, and ALS*	55-74, asymptomatic	≥ 30	Less than 15 years since smoking cessation
National Comprehensive Cancer Network	55-74, asymptomatic; or ≥ 50, asymptomatic	≥ 30 or ≥ 20	Less than 15 years since smoking cessation or one or more additional risk factor(s): pulmonary disease, family history of lung cancer, personal cancer history, radon exposure, professional exposure
American Association for Thoracic Surgery	55-79, asymptomatic; or 55-79, or 55-79, long-term cancer survivor	≥ 30 or ≥ 20 or aged 55-79 years and long-term cancer survivor	One comorbid condition producing cumulative cancer risk ≥ 5% over 5 years or aged 55-79 years and long-term cancer survivor

\*ACCP = American College of Chest Physicians, ACS = American Cancer Society, ALS = American Lung Association, ASCO = American Society of Clinical Oncology, ATS = American Thoracic Society.

Freiborn, F et al. *RadiGraphics* 2015; 35:1893-1908

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### Screening eligibility criteria – CMS 2015

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- Age 55-77
- 30 or more pack-years of smoking tobacco
- Quit less than 15 years ago (or still smokes)
- Asymptomatic (no signs or symptoms of lung cancer)
- **Goal: to increase the prevalence of the disease in the screened population to improve performance of screening**
- Positive predictive value of lung cancer screening is 17.3%
- Note that this cohort contains ~30% of all lung cancers
  - But highest incidence: ~ 655/100k\*\*

\*J Am Coll Radiol. 2015 Mar;12(3):273-6. doi: 10.1016/j.jacr.2014.08.004. Epub 2014 Aug 28.  
\*\*http://msc.sagepub.com/content/19/3/154.full

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### Why can't all smokers get screened?


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- What about people who don't meet those criteria?
  - right now lung cancer screening hasn't been proven to help anyone except heavy smokers in the 55-77 year age group
  - most experts recommend against screening those patients who do not fall into the above criteria
- The potential harms of screening probably outweigh the benefits for most smokers who don't meet the criteria -- as far as we know today
- Those recommendations may change in the future as we learn more about screening.

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Shared decision making – CMS Requirement

- Ensure eligibility criteria are met
- Explain benefits & risks
  - Radiation exposure – more later
  - Need for follow-up testing: more CT, PET, etc
  - Potential need for invasive procedures: lung biopsy
  - False positives & over-diagnosis
- Counsel on need for adherence to annual screening from now till age 77
- Counsel on importance of quitting smoking
- All the above must be documented in the patient’s chart



Question 3: What do I do with the results?

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of Greater Sacramento

Lung-RADS is a refinement of original NLST criteria

- Language for systematic reporting of lung screen results
  - A la BI-RADS for mammography
  - Numbered system of increasing concern
- Positive screen defined as 6mm or greater solid nodule
  - (20mm ground-glass nodule)
- Initial data: Improves specificity:
  - 5.3% False Positive rate (vs. 21% for NLST!)
  - Positive predictive value: 17.3% (vs. 7% for NLST)
- At cost of decreased sensitivity
  - 79% vs. 94% with NLST

Lung-RADS Overview

Category Descriptor	Category Descriptor	Primary Category	Management
Incomplete	-	0	Additional lung cancer screening CT images and/or comparison to prior chest CT examinations is needed.
Negative	No nodules and definitely benign nodules	1	Continue annual screening with LDCT in 12 months
Benign Appearance or Behavior	Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	2	
Probably benign	Probably benign findings - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	3	6 month LDCT
Suspicious	Findings for which additional diagnostic testing and/or tissue sampling is recommended	4A	3 month LDCT; PET/CT may be used when there is a ≥ 8 mm solid component
		4B	
Significant other		5	
Prior Lung Cancer		C	

Lung-RADS 1 Overview

- Lung-RADS 1
  - “normal”
  - No nodules, or
  - Definitely benign nodules:
    - Granuloma
    - Hamartoma
- Management: next screening in 12 months

Lung-RADS 2 Overview

- Lung-RADS 2
  - Not normal, but “Benign appearance of behavior”, not growing
  - Management: LDCT in 12 months

**solid nodule(s):**

- < 6 mm
- new < 4 mm

**part solid nodule(s):**

- < 6 mm total diameter on baseline screening

**non solid nodule(s) (GGN):**

- < 20 mm OR
- ≥ 20 mm and unchanged or slowly growing

**category 3 or 4 nodules unchanged for ≥ 3 months**

### Lung-RADS 3 Overview

- Lung-RADS 3
  - Not normal, but "Probably benign", 1-2% malignancy
  - Management: LDCT in 6 months

<b>solid nodule(s):</b>
≥ 6 to < 8 mm at baseline OR new 4 mm to < 6 mm
<b>part solid nodule(s)</b>
≥ 6 mm total diameter with solid component < 6 mm OR new < 6 mm total diameter
<b>non solid nodule(s) (GGN) ≥ 20 mm on baseline CT or new</b>



### Lung-RADS 4A Overview

- Lung-RADS 4A
  - Suspicious, 5-15% malignancy
  - Management: LDCT in 3 months, or PET if solid > 8mm

<b>solid nodule(s):</b>
≥ 8 to < 15 mm at baseline OR growing < 8 mm OR new 6 to < 8 mm
<b>part solid nodule(s):</b>
≥ 6 mm with solid component ≥ 6 mm to < 8 mm OR with a new or growing < 4 mm solid component
<b>endobronchial nodule</b>



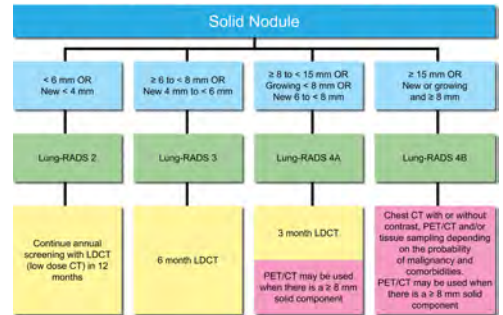
### Lung-RADS 4B/4X Overview

- Lung-RADS 4B and 4X
  - Suspicious, 15-100% malignancy
  - Management: CT +C, PET-CT, biopsy

<b>4B</b>	<b>solid nodule(s)</b>
	≥ 15 mm OR new or growing, and ≥ 8 mm
	<b>part solid nodule(s) with:</b>
	a solid component ≥ 8 mm OR a new or growing ≥ 4 mm solid component
<b>4X</b>	<b>Category 3 or 4 nodules with additional features or imaging findings that increases the suspicion of malignancy</b>

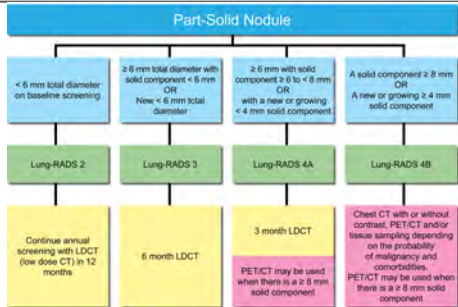


### Management of screen-detected nodules



Published in: Florian J. Fintelmann, Adam Benheim, Subba R. Diganthy, Inga T. Lennox, Mennudeep K. Kalra, Matthew D. Gilman, Anita Sharma, Ellen J. Flores, Victoria V. Muse, JoAnne O. Shepard. *Radiographics* 2015, 35, 1893-1908. DOI: 10.1148/rg.2015150079

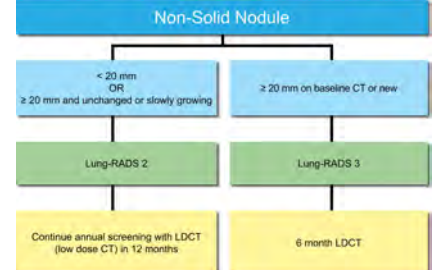
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### Management of screen-detected nodules

#### Management of Screen Detected Non-Solid Nodule

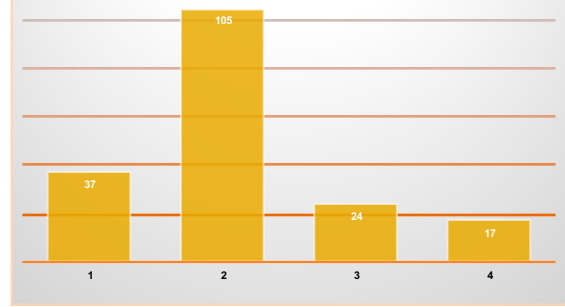


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**Lung-RADS category S – Needs more workup**

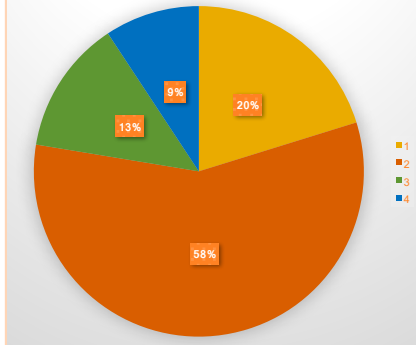
- Category S – added to the primary number
  - i.e. 1S, 2S etc
  - Signifies other “significant” finding not related to lung cancer that might affect management – may need further workup
  - Examples:
    - CV disease: Severe coronary artery calcifications, aneurysm
    - Lung: Effusion with pleural thickening or nodules, Asbestosis, Significant lung fibrosis, Acute pneumonia or edema
    - Other CA: mets, lymphoma, thymic CA,

**MRG Lung Screening results by Lung-RADS category**



Based on 186 recorded screenings to date

**MRG lung screening results by Lung-RADS category**



**NLST follow up**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• <b>Baseline scan</b> <ul style="list-style-type: none"> <li>– Repeat CT: ~20%</li> <li>– PET-CT: ~ 3%</li> <li>– Biopsy: ~2%</li> <li>– Surgery: ~1%</li> <li>– Benign diagnosis: 30%</li> <li>– Lung cancer diagnosis: 1%</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <b>Follow-up scans</b> <ul style="list-style-type: none"> <li>– Repeat CT: ~8%</li> <li>– PET-CT: ~ 1.5%</li> <li>– Biopsy: ~1%</li> <li>– Surgery: ~1%</li> <li>– Benign diagnosis: 26%</li> <li>– Lung cancer diagnosis: 0.8%</li> </ul> </li> </ul> |
|--|---|

**What if I test positive?**

- Again, the vast majority of small nodules are NOT going to become cancer
- 98 of 100 nodules found turned out NOT to be cancer
- More than half of all the participants in the study had at least one nodule
- For most people with a nodule, we can just watch it by doing a repeat scan in 3 or 6 months
- A few patients will need a different scan, called PET-CT
- Even fewer patients will need a needle biopsy of a nodule to determine if it is cancer
- 26-30% of patients who need biopsy will still have benign disease



**Other Frequently Asked Questions**



### Causes of death in NLST

**Table 7. Cause of Death on the Death Certificate, According to Screening Group.<sup>3</sup>**

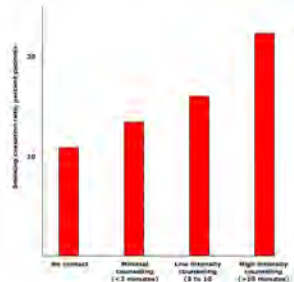
Cause of Death	Low-Dose CT Group	Radiography Group number/total number (percent)	Total
Neoplasm of bronchus and lung†	427/1865 (22.9)	503/1991 (25.3)	930/3856 (24.1)
Other neoplasm	416/1865 (22.3)	442/1991 (22.2)	858/3856 (22.3)
Cardiovascular illness	486/1865 (26.1)	470/1991 (23.6)	956/3856 (24.8)
Respiratory illness	175/1865 (9.4)	226/1991 (11.4)	401/3856 (10.4)
Complications of medical or surgical care	12/1865 (0.6)	7/1991 (0.4)	19/3856 (0.5)
Other	349/1865 (18.7)	343/1991 (17.2)	692/3856 (17.9)

N Engl J Med. 2011 Aug 4;365(5):395-409.

### Why is smoking cessation counseling important?

- Screening doesn't "prevent" lung cancer, it can only find it early
- Most smokers die from complications of heart disease caused by smoking, not from lung cancer!
  - 1 in 2 smokers will die from early heart disease
  - 1 in 16 life-long smokers will get lung cancer
- **The most effective way to reduce risk of dying from smoking is to stop smoking immediately!**
- Quitting is more likely to save your life than screening!
- Quitting smoking also will ensure you will have enough healthy lung tissue left to be able to tolerate lung surgery if a cancer is found!

### Smoking cessation rate vs. clinician effort



Original Source: Fiore, MC, Bailey, WC, Cohen, SJ, et al. Treating tobacco use and dependence: Clinical practice guideline. Rockville, MD: US Department of Health and Human Services, Public Health Service, June 2000. Reproduced with permission from: Falcher, BR, Falcher, SP. Prevention. In: Clinical Epidemiology - The Essentials, 4th ed. Lippincott Williams & Wilkins, Baltimore 2005; p. 147 - 147. Copyright © 2005 Lippincott Williams and Wilkins.

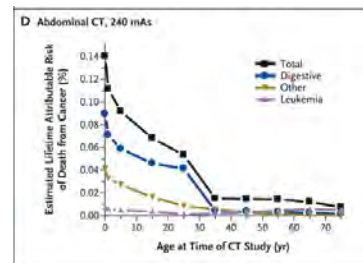
### Radiation doses from various exams

Exam	Effective dose	Equivalent background radiation
Dental xray	0.005 mSv	1 day
CXR	0.1 mSv	10 days
Low-Dose CT	1.5 mSv	6 months
Regular Chest CT	7-8 mSv	2 years
Annual dose for airline crews	~2-3 mSv/year	1 year
Annual exposure from smoking	2-3 mSv/y	1 year
Occupational limits (NRC)	50 mSv/year	25 years

### Why Low Dose Matters

- How many cancers are induced due to CT radiation?
- **Full-dose CT:** 1 in 500 (0.2%), depending on dose, patient size, protocol, etc
- **Low-dose screening CT:** 0.08% estimated risk of CA from single CT scan = 1 in 1250
  - if screen 100,000 patients with low dose CT:
    - induce ~80 cancers
    - find ~645 lung cancers
    - **save ~300\* lives!**

### Attributable lifetime risk of cancer from CT



NEJM,  
Volume  
357:2277-  
2284

### How can you tell the scan is low dose?

Total DLP: 62.3 mGy\*cm  
Est. Dose Savings: 26.38%

#	Description	Mode	CTDI [mGy]	DLP [mGy*cm]
1	SURVIEW	Surview	0.0	0.00
1	SURVIEW	Surview	0.0	0.00
2	CHEST NODULE	Helical	2.1	62.33

Exam Description: CT CHEST WO CONTRAST

Series	Type	Scan Range (mm)	CTDIvol (mGy)	DLP (mGy-cm)	Phantom cm
1	Scout	-	-	-	-
2	Helical	I19.250-I249.250	15.04	396.23	Body 32
Total Exam DLP:				396.23	

### Doc, is there harm from all the radiation?

- The Low Dose CT scan gives you radiation equivalent to normal background radiation from natural sources that we get in about 6 months
  - we are surrounded by natural radiation sources from space, rocks, and soil
- In other words, every 6 months we are exposed to the same amount of radiation as 1 screening CT scan
- There is a slight risk of causing another cancer due to the radiation, but it is much less than the risk of an undiscovered lung cancer

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### What are other potential harms of screening?

- Some of the cancers were "overdiagnosed"
  - i.e. cancers that would not have caused symptoms or shortened the patient's life
- Some people experienced complications from biopsy or surgery
  - but the complication rates were very small, 1-3%
  - biopsies or surgery are only done if cancers is strongly suspected based on the scans
  - vast majority of patients didn't need either one
- Some people needlessly experienced emotional distress because of a possible diagnosis of cancer
  - if screening study showed possible cancer but later tests ruled it out

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### Why is it done every year? Why not just a single scan?

- In the National Lung Screening Trial, patients were scanned every year for 3 years.
- Majority of small cancers were found in the first scan
- However, new cancers popped up in some patients between the scans
- This is why the current recommendations are to screen every year, like mammography, until age 77

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### I'm confused: Lung CA screening vs. incidental nodules

<ul style="list-style-type: none"> <li><b>Lung CA screening:</b> <ul style="list-style-type: none"> <li>Age 55-77 (eligibility criteria)</li> <li>Heavy smokers</li> <li>Yearly LDCT follow-up till age out or discover cancer</li> <li>LDCT only (except if positive)</li> <li><u>Lung-RADS</u> criteria</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Incidentally discovered nodules</b> <ul style="list-style-type: none"> <li>Any age (more or less)</li> <li>Smoker OR non-smokers</li> <li>Limited time of follow-up (1,2,3 years)</li> <li>Diagnostic or LDCT</li> <li><u>Fleischner Society</u> criteria</li> </ul> </li> </ul>
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### So, when do I order LDCT vs. regular CT?

<ul style="list-style-type: none"> <li><b>LDCT:</b> <ul style="list-style-type: none"> <li>Lung screening (must)</li> <li>Follow-up of known small nodules (if that's the only indication)</li> <li><u>Asymptomatic</u></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Regular dose CT:</b> <ul style="list-style-type: none"> <li>Cancer staging</li> <li>Large nodules/masses</li> <li>Follow up of nodules - maybe</li> <li>Initial workup of symptomatic patient for any cause</li> </ul> </li> <li>IV Contrast helps with:                     <ul style="list-style-type: none"> <li>Lung cancer staging</li> <li>Lymph nodes, vascular invasion</li> <li>Mediastinal masses</li> </ul> </li> </ul>
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Additional resources

- [www.shouldiscreen.com](http://www.shouldiscreen.com) -- more information about lung cancer screening and Shared Decision Making for patients and providers.
- <http://www.acr.org/Quality-Safety/Resources/Lung-Imaging-Resources> - Resources for lung screening from the American College of Radiology
- <http://www.cancer.org/healthy/stayawayfromtobacco/guide-toquittingsmoking/guide-to-quitting-smoking-toc> - Guide to Quitting Smoking from the American Cancer Society
- My slide deck for shared decision making:  
<https://1drv.ms/p/s!AuAwo4h9hkfr3Nn2hF2aA1Ab69I>



61

QR codes for useful links

Shared decision making  
Slide deck



ACR Lung-RADS



Should I screen?



62

How to schedule a Lung Screening CT scan

- As a provider, you can call the Dignity Health Lung Cancer Screening Clinic at 916-536-3665 to schedule a consultation to determine eligibility.
- If you would like to send a referral directly, please call 916-434-7600, or fax a referral to 916-408-8000.



63

Lung Cancer Screening Clinic  
Tel: (916) 536-3665  
Fax: (916) 379-3002

Thank you.  
Greg Rogalski  
916-538-4734

