



# Lung Cancer Screening

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# Disclosures

- I do not have any relevant financial relationships.

*This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.*

# Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

## **STATE LAW:**

The California legislature has passed Assembly Bill (AB) 1195, which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed AB 241, which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

*The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.*

## **EXEMPTION:**

Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

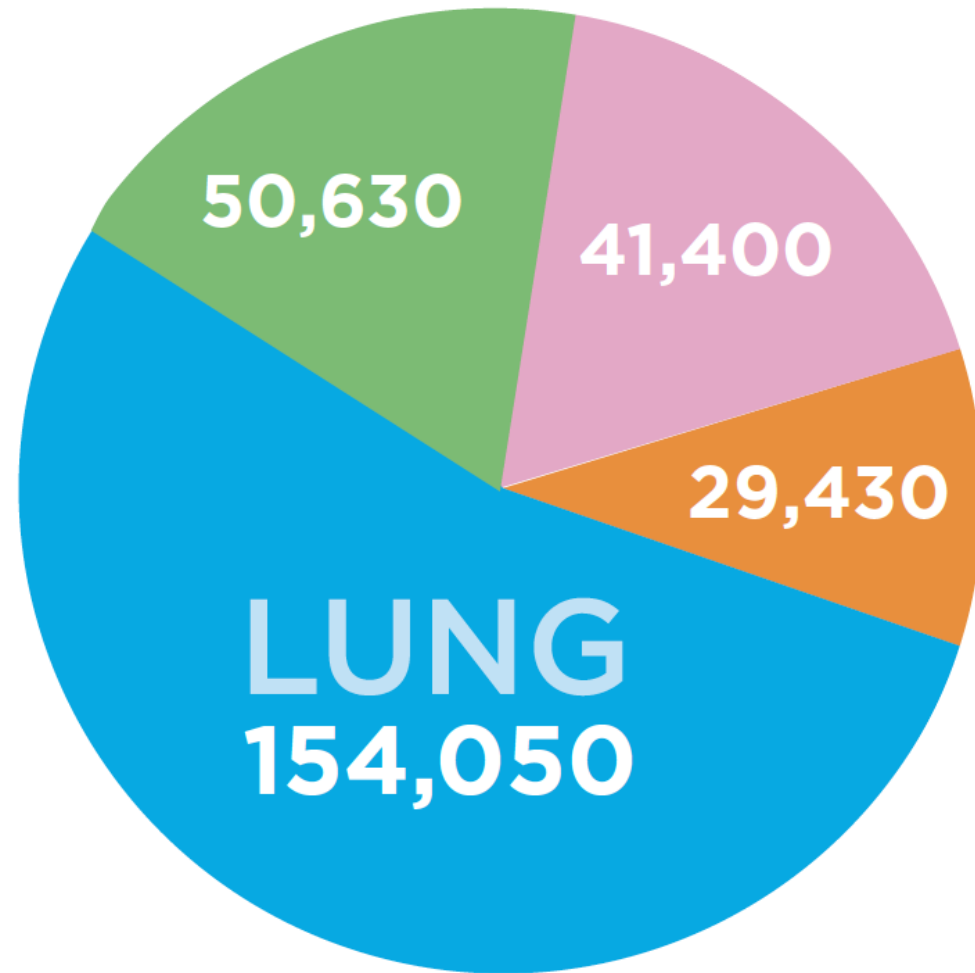
## ***The following CLC & IB components will be addressed in this presentation:***

- Differences in lung cancer risk by race/ethnicity
- Barriers to lung cancer screening

# Lung Cancer Screening with LDCT

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- Important recent updates
  - NELSON trial results
  - TALENT study
  - Changes in USPSTF recommendations
- Overcoming barriers to LDCT
- Liquid biopsy for early cancer detection



Colorectal



Breast



Prostate

# Lung Cancer Screening

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## Low Dose Radiation CT scan (LDCT) SAVES LIVES

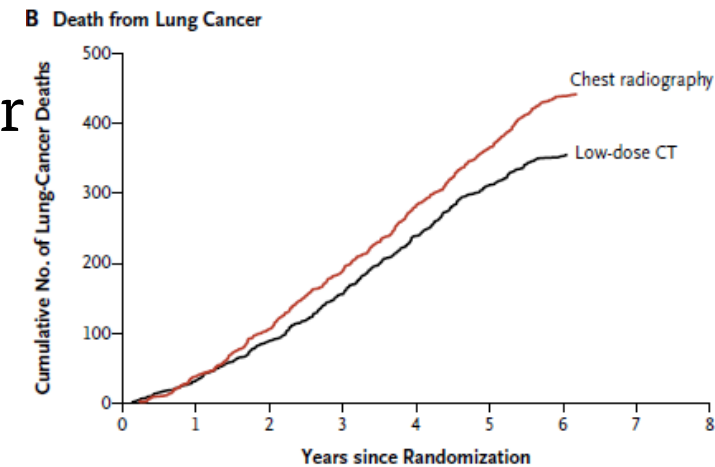
- CXR screening does not
- USPTF Recommended
- Covered by insurance
- Underutilized
  - National study estimated <5% of eligible patients are screened



# NLST: Lung cancer CT screening

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- Baseline + 2 yearly screens
- 20% relative reduction in lung cancer mortality
- 7% all cause mortality reduction
- 367/1060 lung cancers detected diagnosed after screening phase



## NELSON Trial

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- 13,195 men and 2594 women age 50-74,  $\geq 15$  pack-year, randomized 1:1 LDCT or observation (0,1,2,2.5 years)
- 24% mortality reduction at 10 years in men, 33% reduction at 10 years in women (59% reduction at 7 years)



## Recent USPSTF/CMS Changes

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- New USPSTF: Age 50-80,  $\geq 20$  pack-years, 15 year quit rule
- **CMS: Age 50-77,  $\geq 20$  pack-years, 15 year quit rule**
- NCCN: Age  $> 50$ ,  $\geq 20$  pack-years

# Lung-RADS structured reporting

Category Descriptor	Lung-RADS Score	Findings	Management	Risk of Malignancy	Est. Population Prevalence
<b>Incomplete</b>	0	Prior chest CT examination(s) being located for comparison Part or all of lungs cannot be evaluated	Additional lung cancer screening CT images and/or comparison to prior chest CT examinations is needed	n/a	1%
<b>Negative</b> No nodules and definitely benign nodules	1	No lung nodules Nodule(s) with specific calcifications: complete, central, popcorn, concentric rings and fat containing nodules			
<b>Benign Appearance or Behavior</b> Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	2	<b>Perifissural nodule(s)</b> (See Footnote 11) $< 10 \text{ mm}$ ( $524 \text{ mm}^3$ ) <b>Solid nodule(s):</b> $< 6 \text{ mm}$ ( $< 113 \text{ mm}^3$ ) new $< 4 \text{ mm}$ ( $< 34 \text{ mm}^3$ ) <b>Part solid nodule(s):</b> $< 6 \text{ mm}$ total diameter ( $< 113 \text{ mm}^3$ ) on baseline screening <b>Non solid nodule(s) (GGN):</b> $< 30 \text{ mm}$ ( $< 14137 \text{ mm}^3$ ) OR $\geq 30 \text{ mm}$ ( $\geq 14137 \text{ mm}^3$ ) and unchanged or slowly growing Category 3 or 4 nodules unchanged for $\geq 3$ months	Continue annual screening with LDCT in 12 months	$< 1\%$	90%
<b>Probably Benign</b> Probably benign finding(s) - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	3	<b>Solid nodule(s):</b> $\geq 6$ to $< 8 \text{ mm}$ ( $\geq 113$ to $< 268 \text{ mm}^3$ ) at baseline OR new $4 \text{ mm}$ to $< 6 \text{ mm}$ ( $34$ to $< 113 \text{ mm}^3$ ) <b>Part solid nodule(s)</b> $\geq 6 \text{ mm}$ total diameter ( $\geq 113 \text{ mm}^3$ ) with solid component $< 6 \text{ mm}$ ( $< 113 \text{ mm}^3$ ) OR new $< 6 \text{ mm}$ total diameter ( $< 113 \text{ mm}^3$ ) <b>Non solid nodule(s)</b> (GGN) $\geq 30 \text{ mm}$ ( $\geq 14137 \text{ mm}^3$ ) on baseline CT or new	6 month LDCT	1-2%	5%
<b>Suspicious</b> Findings for which additional diagnostic testing is recommended	4A	<b>Solid nodule(s):</b> $\geq 8$ to $< 15 \text{ mm}$ ( $\geq 268$ to $< 1767 \text{ mm}^3$ ) at baseline OR growing $< 8 \text{ mm}$ ( $< 268 \text{ mm}^3$ ) OR new $6$ to $< 8 \text{ mm}$ ( $113$ to $< 268 \text{ mm}^3$ ) <b>Part solid nodule(s):</b> $\geq 6 \text{ mm}$ ( $\geq 113 \text{ mm}^3$ ) with solid component $\geq 6 \text{ mm}$ to $< 8 \text{ mm}$ ( $\geq 113$ to $< 268 \text{ mm}^3$ ) OR with a new or growing $< 4 \text{ mm}$ ( $< 34 \text{ mm}^3$ ) solid component <b>Endobronchial nodule</b>	3 month LDCT; PET/CT may be used when there is a $\geq 8 \text{ mm}$ ( $\geq 268 \text{ mm}^3$ ) solid component	5-15%	2%
<b>Very Suspicious</b> Findings for which additional diagnostic testing and/or tissue sampling is recommended	4B	<b>Solid nodule(s)</b> $\geq 15 \text{ mm}$ ( $\geq 1767 \text{ mm}^3$ ) OR new or growing, and $\geq 8 \text{ mm}$ ( $\geq 268 \text{ mm}^3$ ) <b>Part solid nodule(s) with:</b> a solid component $\geq 8 \text{ mm}$ ( $\geq 268 \text{ mm}^3$ ) OR a new or growing $\geq 4 \text{ mm}$ ( $\geq 34 \text{ mm}^3$ ) solid component	Chest CT with or without contrast, PET/CT and/or tissue sampling depending on the "probability of malignancy and comorbidities. PET/CT may be used when there is a $\geq 8 \text{ mm}$ ( $\geq 268 \text{ mm}^3$ ) solid component. For new large nodules that develop on an annual repeat screening CT, a 1 month LDCT may be recommended to address potentially infectious or inflammatory conditions	$> 15\%$	2%
	4X	Category 3 or 4 nodules with additional features or imaging findings that increases the suspicion of malignancy			

- Radiologist classifies findings with recommendations on next follow-up imaging
- Invasive testing is very uncommon in people without cancer

# Advantages of a Lung Cancer Screening Program

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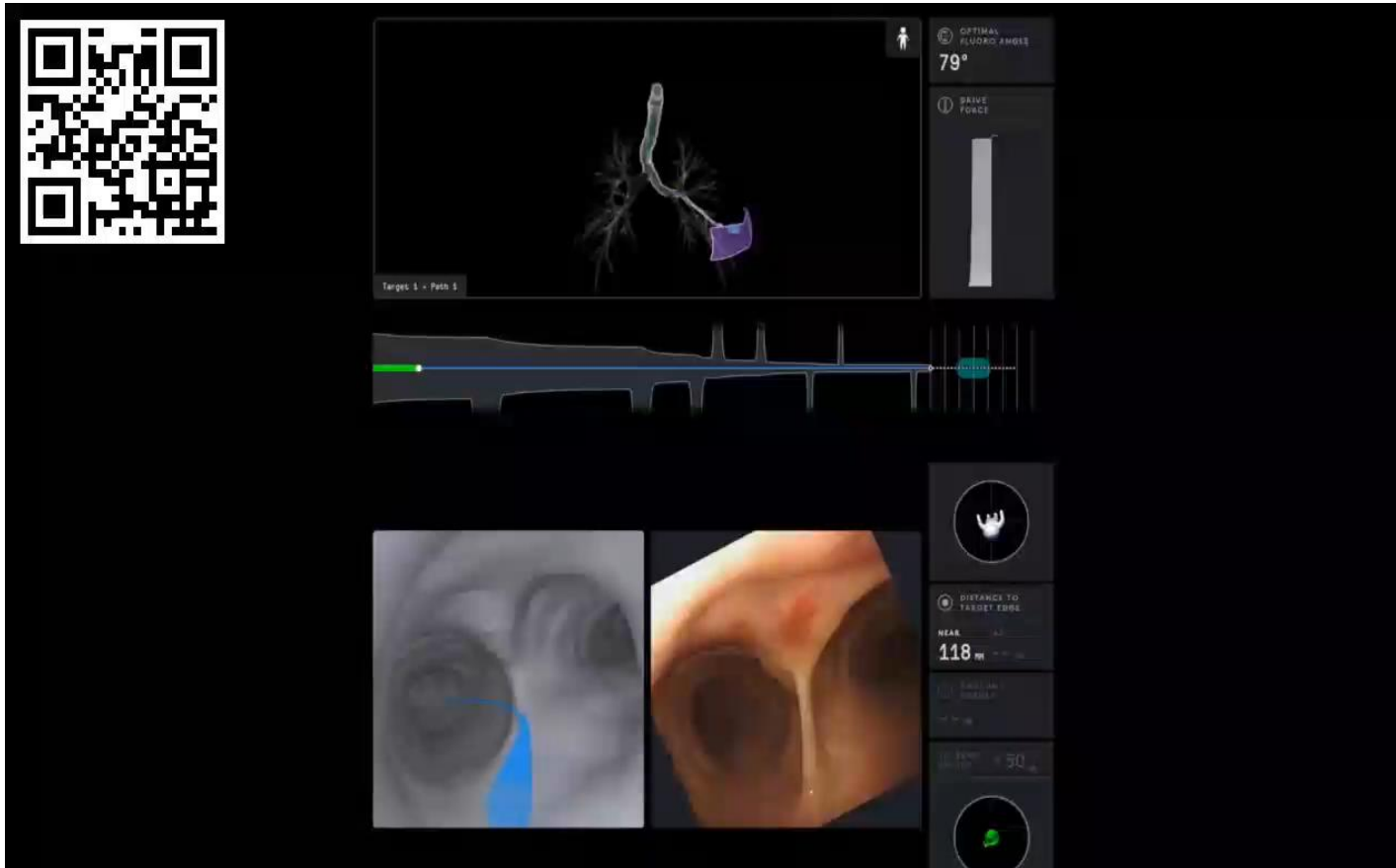
- Improved adherence to recommended follow-up
  - 55% national adherence
  - 90% City of Hope Program
- Reduces rates of invasive testing
- Multi-disciplinary review: Radiology+Pulmonary+Thoracic Surgery
- Logistics: Shared decision making, patient and PCP communication
- Integrated with smoking cessation

# How do we biopsy high risk nodules?

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- **Surgery** (VATS wedge resection with intraoperative frozen)- USUALLY NOT RECOMMENDED
  - Advantages: highest diagnostic yield, availability
  - Disadvantages: Cost, recovery, risks
- **CT guided Biopsy**
  - Advantages: high diagnostic yield (especially small nodules), availability
  - Disadvantages: High risk of pneumothorax, patient discomfort
- **Robotic navigational bronchoscopy**
  - Advantages: high diagnostic yield, low risks, can stage mediastinum at same time
  - Disadvantages: Operator dependent, availability

# Robotic Navigational Bronchoscopy



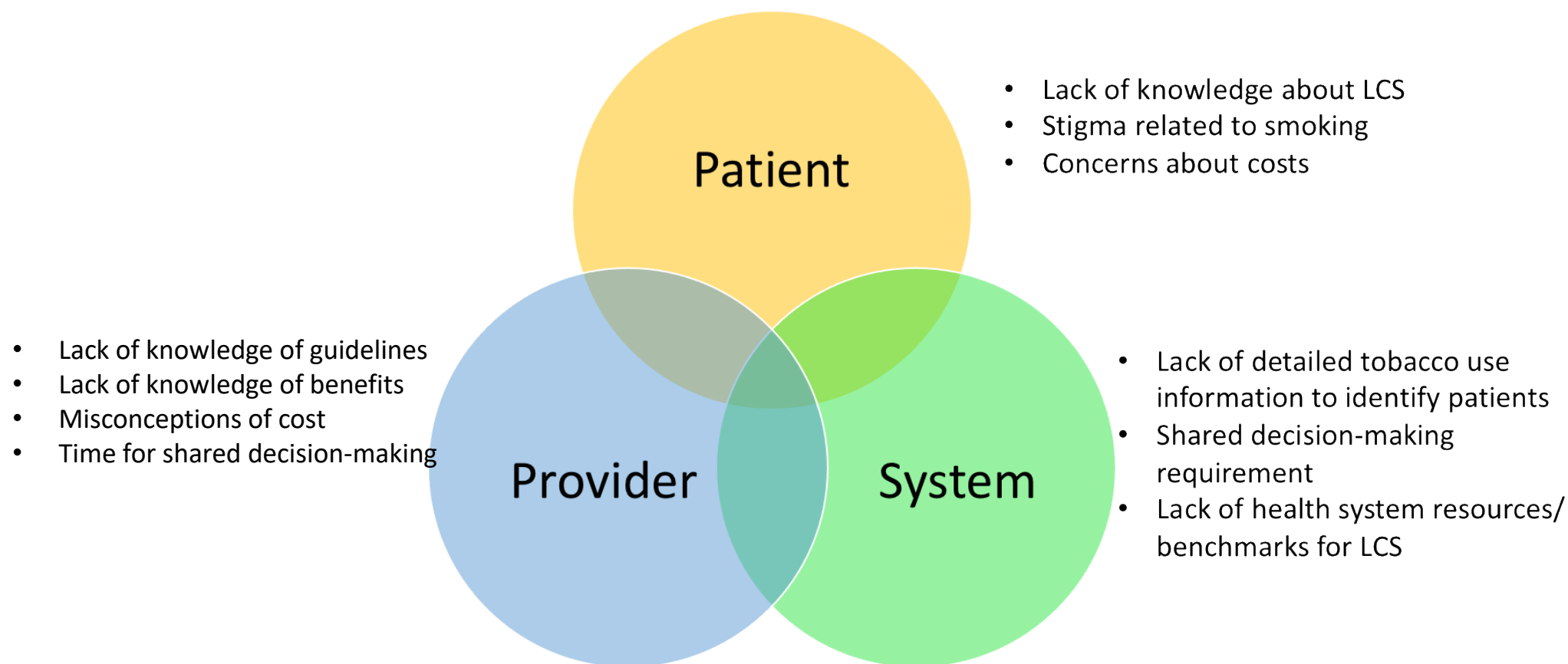
# Robotic Lobectomy

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# Barriers to Lung Cancer Screening

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Raz et al. J Thorac Oncol 2016  
Raz et al. Clin Lung Cancer 2018  
Raz et al. Clin Lung Cancer 2019

## Utilization of LDCT is low

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Physician practices (in past 12 months)	
Lung cancer screening tests ever ordered	
LDCT	129 (52%)
Chest radiograph	107 (43.1%)
Referred most or almost all high risk patients for	
LDCT for lung cancer screening	52 (21.1%)
Lung cancer screening program	20 (8.1%)
Ever initiated discussions about lung cancer screening with patients	177 (72%)
Primary care practice has a mechanism for reminders when a patient is due for lung cancer	79 (32.6%)

- Surveyed 250 PCPs in LA County



## Barriers to LCS among Primary Care Physicians

Perception	N	Median Physician Response (IQR)	% of Physicians who Strongly or Somewhat Agree
Lung cancer screening is not covered by insurance plans	248	2 (2-4)	54.4% (N=135)
I don't have time to discuss the risks and benefits of lung cancer screening**	250	5 (4-5)	9.2% (N=23)
The risks of lung cancer screening are too high	250	4 (3-5)	10% (N=25)
The benefits of lung cancer screening are not clear to me	248	4 (2-5)	29.8% (N=74)
Our affiliated imaging facilities don't offer LDCT	246	5 (3-5)	10.2% (N=25)
Lung cancer screening is too expensive for our health care system	249	3 (2-4)	25.3% (N=63)
Lung cancer screening may encourage smokers to continue to smoke	250	5 (3-5)	12.4% (N=31)

- Surveyed 250 PCPs in LA County

# PCP Knowledge of LCS Guidelines is Variable

Measure		Family Practice N=107 N (%)	Internal Medicine N=135 N (%)	p-value
National Comprehensive Cancer Network (NCCN)	Yes	34 (32)	54 (41)	0.2871
	No	7 (7)	10 (8)	
	Not Sure	65 (61)	67 (51)	
United States Preventive Services Task Force (USPSTF)	Yes	53 (50)	61 (46)	0.8443
	No	21 (20)	28 (21)	
	Not Sure	32 (30)	43 (33)	
American Cancer Society (ACS)	Yes	48 (45)	72 (55)	0.2277
	No	10 (9)	14 (11)	
	Not Sure	48 (45)	45 (34)	

## Smokers enrolled in smoking cessation counseling have little knowledge about LCS

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- Surveyed 185 current smokers in group smoking cessation at Kaiser
- Top barriers (agree/strongly agree):
  - Lack of knowledge about the test (56%)
  - Worry about results (56%)
  - No family history of lung cancer (49%)
  - No symptoms of lung disease (45%)
  - Worry about feeling like social outcast for smoking (39%)
  - High cost (38%)
  - Worry about being blamed for having smoked (37%)

## Patient follow-up with LDCT recommendations is low

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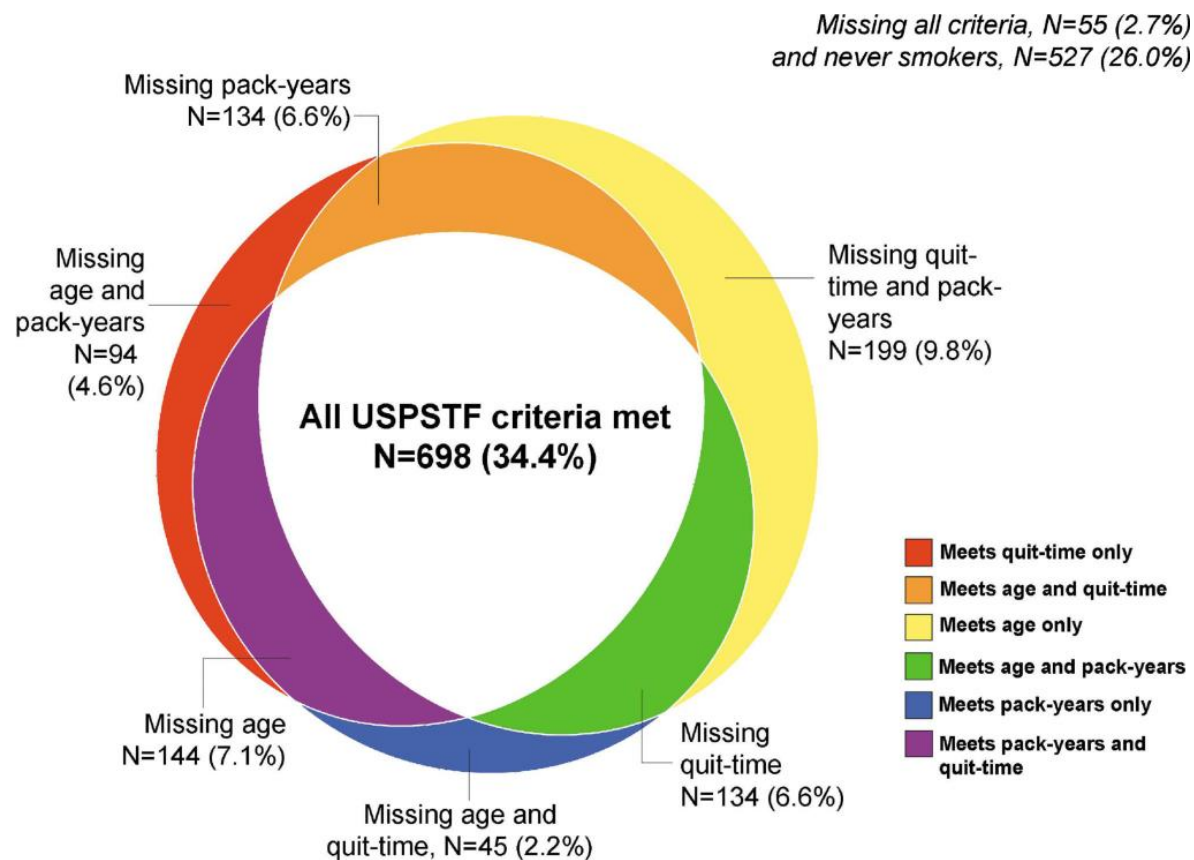
- National Average for Follow-up with LDCT recommendations: ~55%
- Variability in adherence
- City of Hope program: 90% adherence
- One of the advantages of a LCS program vs standalone imaging center

## Overcoming Barriers to LCS

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- Educate/empower patients and family members
- PCP education
- EMR notifications
- Utilization of LCS programs
- Educate smoking cessation personnel
- Liquid biopsy (experimental)

# Most who develop lung cancer are not eligible for LCS



- >65% of lung cancer patients not eligible for screening
- Disproportionately affects women, Asians, Latinx, African Americans

# Risk Factors for Lung Cancer in Never and Light Smokers

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<u>Category</u>	<u>Examples</u>
<b>Environment</b>	Secondhand smoke, radon, asbestos, pollution
<b>Occupational</b>	Rubber, painting, roofing
<b>Disease</b>	Infections, COPD
<b>Genetic</b>	Family history, germline mutations
<b>Iatrogenic</b>	Radiation
<b>Sex</b>	Female
<b>Ethnicity</b>	Asian, Latinx

## TALENT study

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- 12,011 never-smoking East Asians with other risk factors (family history, ETS, TB/COPD) underwent LDCT
- Baseline scans: Lung cancer in 3.2% of those with family history, 2.0% without
- 96.5% stage 0/1



## Liquid Biopsy for Early Detection

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- Detects minute amounts of tumor DNA in blood
- Risk Factors +/- LB → LDCT
- Several in development
  - GRAIL (Galleri)
  - Thrive (CancerSEEK)
  - Quantgene (DEEPGEN)

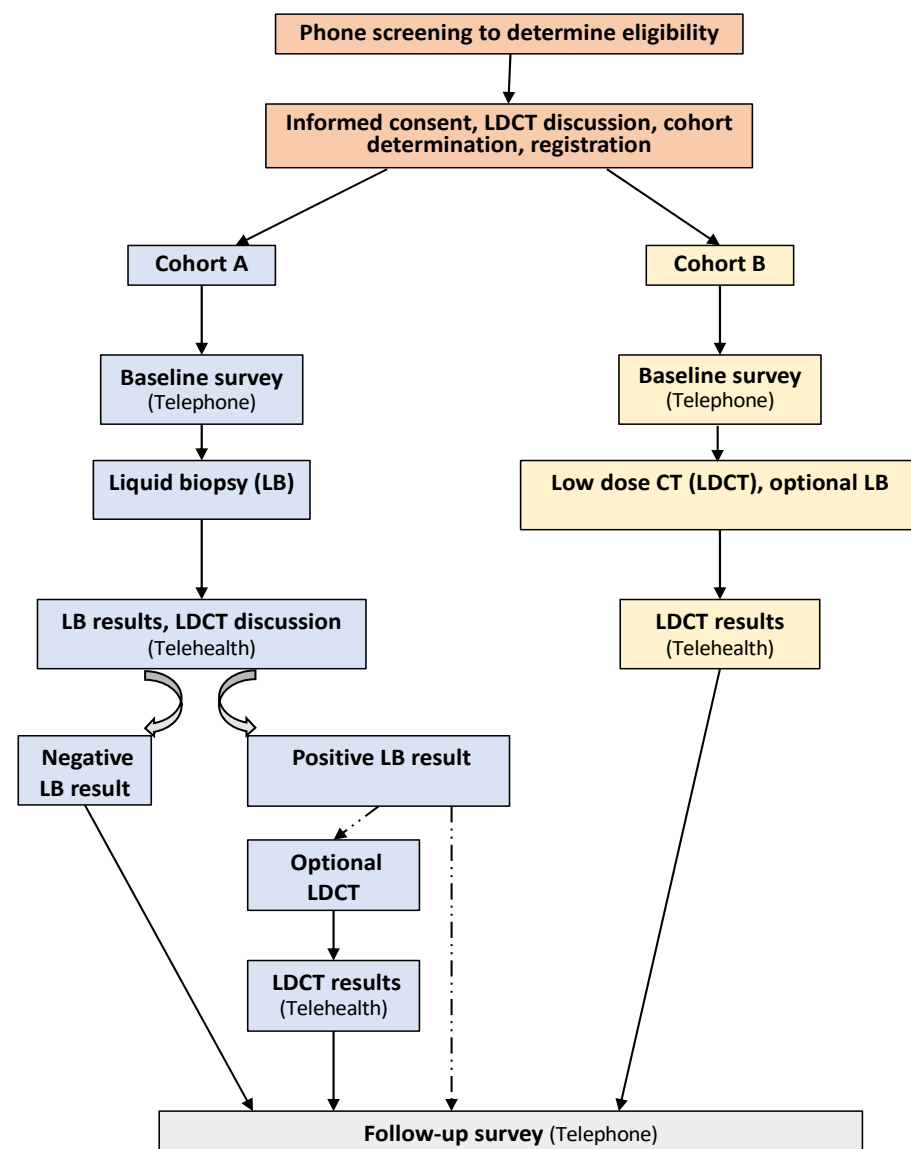
## Sensitivity and Specificity of Liquid Biopsy for Early Lung Cancer Detection

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- GRAIL: Sensitivity 99%, Specificity (early stage lung cancer): 21%
- Thrive: Sensitivity 99%, Specificity (early stage lung cancer): 22%
- Quantgene: Sensitivity 99%, Specificity (early stage lung cancer): 52%

Note: Studies performed in predominantly non-Hispanic White participants (82% of participants overall, ~5% Blacks, ~5% Asian)

## Liquid Biopsy at Home: An option to increase utilization of LDCT?



## Summary

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- Lung Cancer Screening with LDCT saves lives
- LDCT is severely underutilized due to a number of barriers
- Patient and PCP education needed about benefit of LCS
- Strategies for LCS in people outside of USPSTF criteria needed

## Contact information and resources

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Dan Raz, MD: [draz@coh.org](mailto:draz@coh.org)

Sophia Yeung (Lung cancer screening coordinator): [syeung@coh.org](mailto:syeung@coh.org)

### **COH Lung Cancer Screening Sites:**

City of Hope, Duarte

Newport Beach (Newport Diagnostic Center)

Lancaster/Antelope Valley (AVOIC)

City of Hope Corona

### **Other Lung Cancer Screening Centers of Excellence:**

<https://go2foundation.org/risk-early-detection/screening-centers/>