Current State of Lung Cancer Screening

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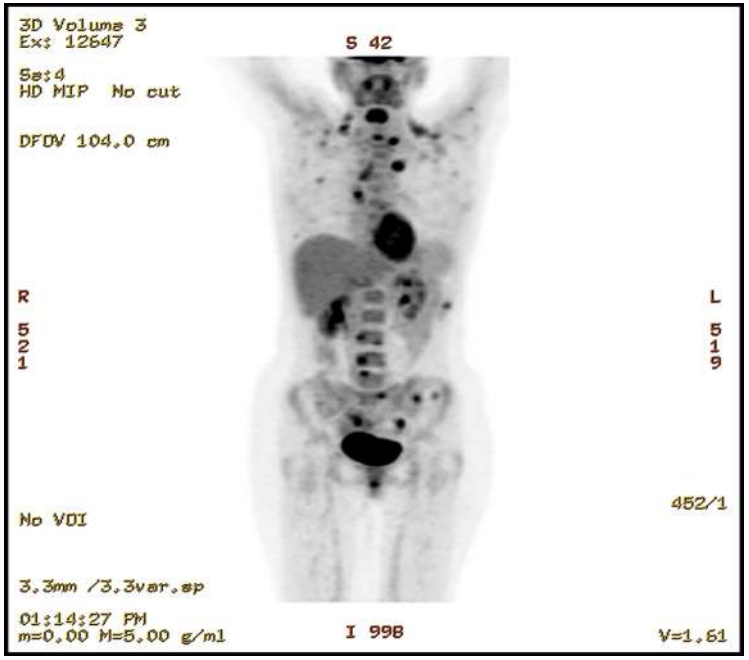
Disclosures

- **None**

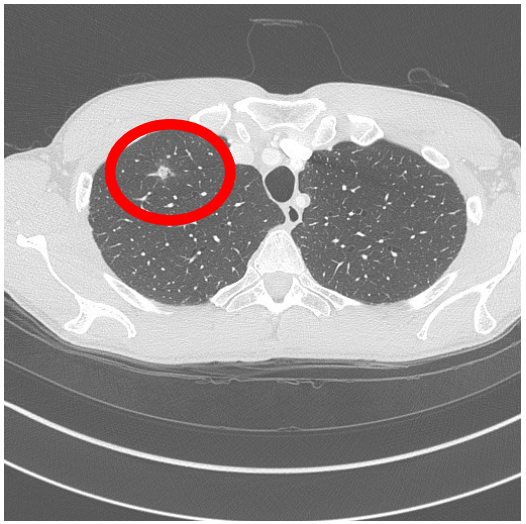
Stage IV NSCLC



<5%

5 year Survival with Best Medical Management

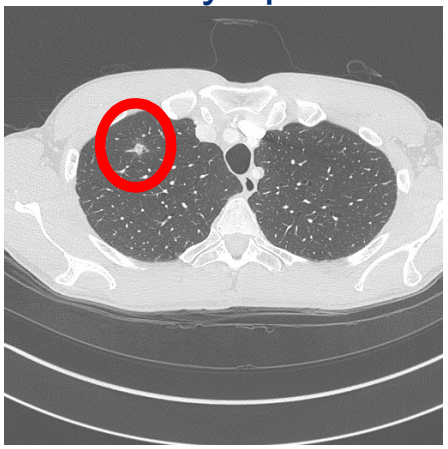
Stage I NSCLC



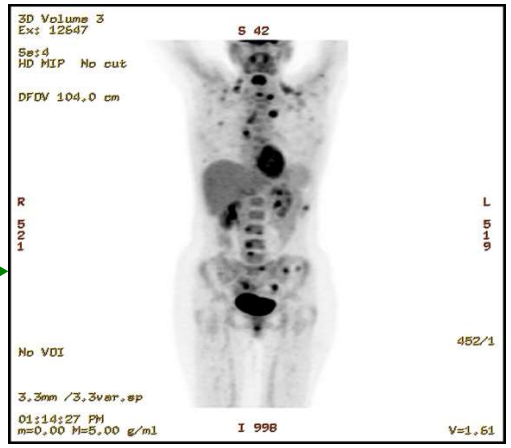
>80%
5 year Survival After Surgery

Goal of Lung Cancer Screening

No Symptoms



Symptoms



Screening

Stage I
>80% 5 year Survival

Stage IV
<5% 5 year Survival

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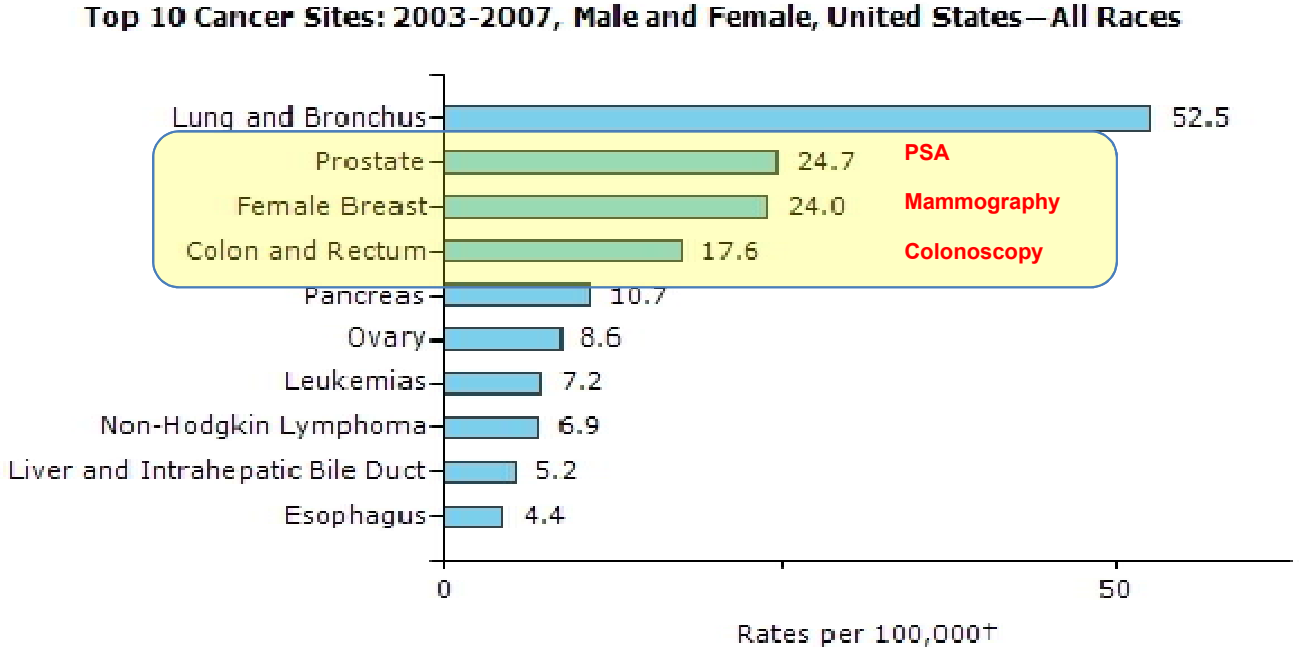
US Cancer Mortality Rates
Secondary Prevention



U.S. Cancer Statistics Working Group. *United States Cancer Statistics: 1999–2007 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2010. Available at: www.cdc.gov/uscs.*

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National Lung Screening Trial

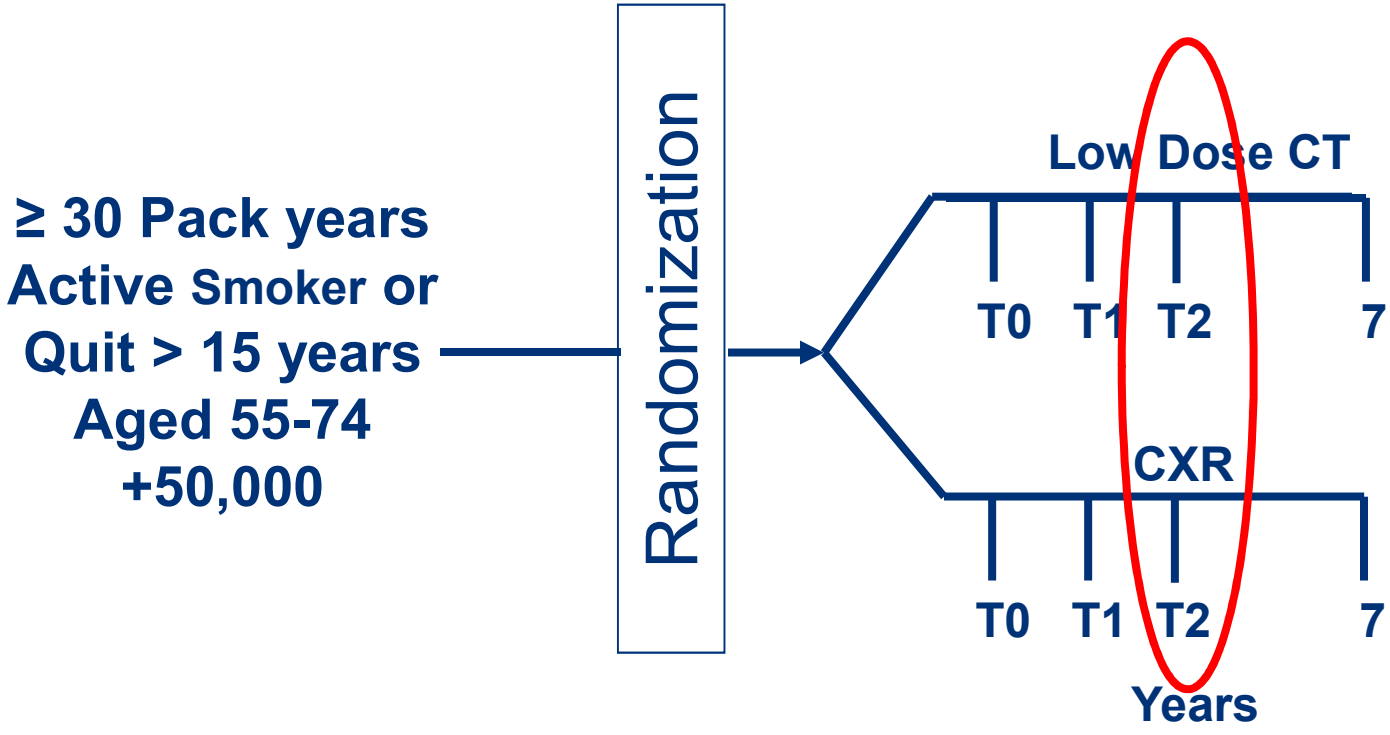
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 4, 2011 VOL. 365 NO. 5

Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

- **To determine whether screening with low-dose computed tomography (LDCT), as compared with chest radiography (CXR), reduces mortality from lung cancer among high-risk persons**
  - **Eligible participants**
    - 55-74 years old
    - History of cigarette smoking of at least 30 pack-years
      - If former smoker, had quit within the previous 15 years

National Lung Screening Trial: NLST



Cancers Found at Each Year of Screening

	LDCT	CXR
T0	292	190
T1	186	133
T2	237	144

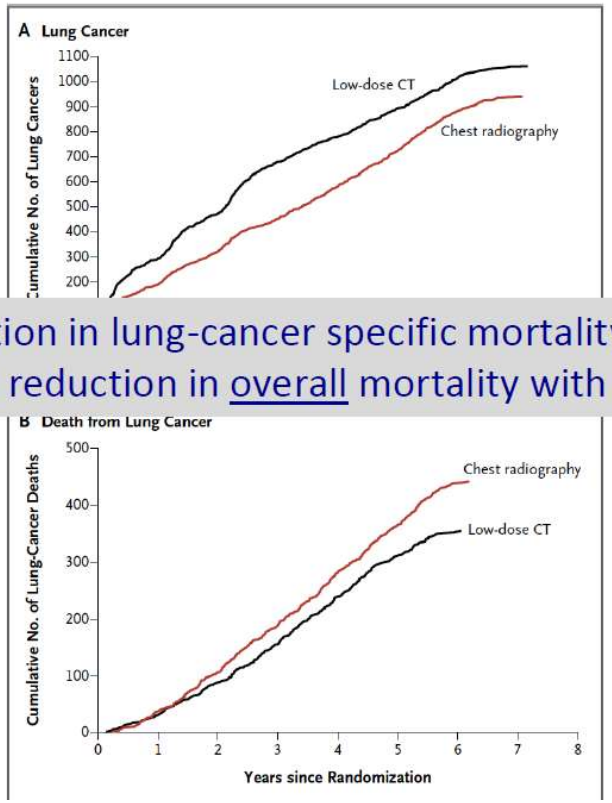
NEJM 2011, 365: 395-409

Positive Results

	Low Dose CT		
Screen Results	T0	T1	T2
Total Positive	7,193	6,902	4,052
Lung Cancer	270 (4%)	168 (2%)	211 (5%)
No Lung Cancer	96%	98%	95%

Any nodule > 4mm considered positive

NEJM 2011, 365: 395-409



20% reduction in lung-cancer specific mortality with LDCT
6.7% reduction in overall mortality with LDCT

National Lung Screening Trial Results: Stage Shift

Stage	Positive Screen	AJCC - NSCLC
I	63%	24%
II	7%	6%
IIIA	9%	23%
IIIB	8%	
IV	13%	44%
Early (Stages I – II)	70% *	30%
Late (Stages III- IV)	30%	70%

* = for years T0-T3

NLST
Results: False Positive Workup Events

- False Positive Rate:
  - 20-25%: Chance you will end up with a false positive
  - ~10-12% for Mammography ("Call back")
- False Discovery Rate (1-PPV):
  - 96%: Chance if you are positive you do not have cancer
  - Same as mammography
- False Positive Biopsy Rate
  - 0.4-2.4%: Chance if screened you will have an unnecessary invasive procedure (LDCT)
  - 7-15%: Chance if you end up having a biopsy it will be negative (mammography).

Lung-RADS for nodules at baseline	Findings	Management
Category 1	Nodules with benign calcification pattern	LDCT 12 mo
Category 2	Solid nodule <6mm	
	Part-solid nodule <6mm total diameter	
	Non-solid nodule <20mm	
Category 3	Solid nodule ≥6mm to <8mm	LDCT 6 mo
	Part-solid nodule ≥6mm total with solid core <6mm	
	Non-solid nodule ≥20mm	
Category 4A	Solid nodule ≥8mm to <15mm	LDCT 3 mo / PET-CT
	Part-solid nodule ≥6mm with solid core ≥6mm to <8mm	
Category 4B	Solid nodule ≥15mm	Contrast CT / PET-CT / biopsy
	Part-solid nodule with solid core ≥8mm	

Lung Cancer Screening

To hope, or to screen?

"Screen Carefully"

"Very few of my patients will develop lung cancer.
I'm worried about screening too many of them.
Especially since someone might get hurt"

Primary Care Physicians

"Screen All People at Risk"

"All of my lung cancer patients have cancer.
It's tragic when they aren't screened, and die prematurely.
Especially since I have a treatment that can cure."

Thoracic Surgeons and Radiation Oncologists

@BrendonStilesMD UC DAVIS HEALTH

Number of Persons Screened to Prevent One Death

- Mammogram
  - Age 40-49: 1,904
  - Age 50-59: 1,339
  - Age 60-79: 337
- Fecal Occult Blood (5 years): 1,374
- Flex Sigmoidoscopy: 871
  (PLCO: NEJM 2012; 336:2345)
- PSA: 1,410
  - Treat 48 to Prevent One Death

NLST: 320 Persons screened to prevent one death

Annual Number of Lung Cancer Deaths Avoided if NLST Protocol Adopted

- **Ma et al. Cancer 2013; 119: 1381-1385**
  - In 2010 8.6 million Americans fit NLST criteria
  - 12,000 lung cancer deaths would be avoided each year
- **Pinsky et al. J Med Screen. 2012; 19: 154-156**
  - NLST covers 6.2% of US population age > 40
  - NLST protocol would detect 26.7% of all lung cancer

- LCS Cost per life-year saved is below $19,000
- Below Cervical, Colorectal and Breast Cancer in 2012 dollars

EXHIBIT 4

Cost Of Cervical, Colorectal, Breast, And Lung Cancer Screening Per Life-Year Saved

Type of cancer	Screening technique	Cost per life-year saved (dollars, year of original study)	Date of original study	Cost per life-year saved (2012 dollars)
Cervical[a]	Pap smear	33,000	2000	50,162[b]–75,181[c]
Colorectal[d]	Colonoscopy	11,900	1999	18,705[b]–28,958[c]
Breast[e]	Mammography	18,800	1997	31,309[b]–51,274[c]
Lung[f]	LDCT (baseline scenario[g])	18,862	2012	18,862
	LDCT (lowest-cost scenario[h])	11,708	2012	11,708
	LDCT (highest-cost scenario[i])	26,016	2012	26,016

Pyenson et al, Health Affairs 31, No.4 770-779: April 2012

Cost-Effectiveness of Lung Cancer Screening

- **US Preventive Services Task Force**
  - Grade B recommendation for LDCT screening
    - Private insurance to cover the cost
- **Compared 3 strategies**
  - LDCT versus chest radiograph versus no screening

Strategy	Cost	Life Expectancy	QALE	Incremental Costs†	Incremental Life Expectancy	Incremental QALE	Cost per Life-Yr	Cost per QALY
	U.S. $	*life-yr*	*QALY*	*U.S. $*	*life-yr*	*QALY*	*U.S. $ (95% CI)*	
CT screening	3,074	14.7386	10.9692	1,631	0.0316	0.0201	52,000 (34,000–106,000)	81,000 (52,000–186,000)
Radiographic screening	1,911	14.7071	10.9491	469	0	0	NA	NA
No screening‡	1,443	14.7071	10.9491	—	—	—	—	—

Black, WC et al. N Engl J Med 2014;371:1793-802

Surgical Results of NLST

- **Only 29.6% (n = 305) of the cohort had a thoracoscopic resection.**
- **Overall 30-day mortality in patients undergoing resection was 1.7% (n = 18).**

Kamel MK, et al. J Thorac Cardiovasc Surg. 2019 May;157(5):2038-2046.e1.

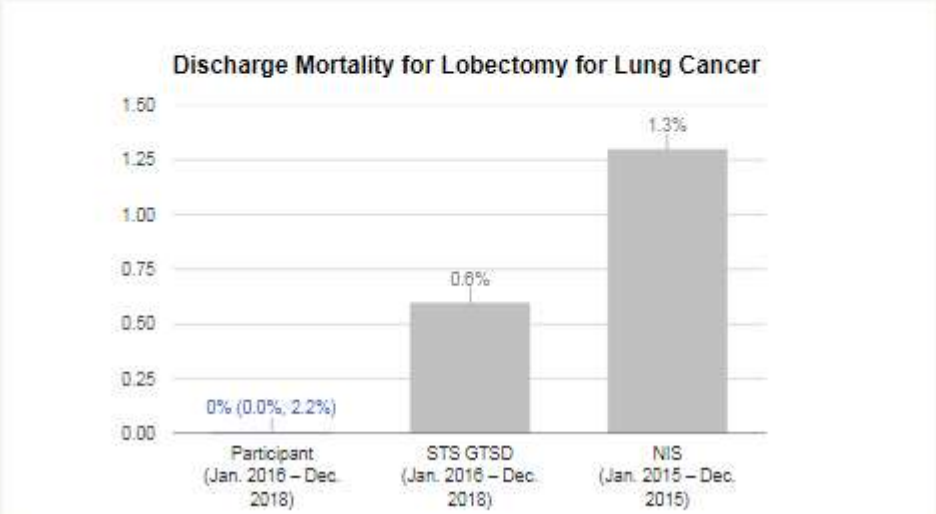
Surgical Mortality (Publically Reported)

UC Davis Health - General Thoracic Surgery

Hospital associated with this Participant

UC Davis Medical Center Sacramento, CA

Performance for Lobectomy Compared to STS and National Outcomes*




Brendon Stiles
@BrendonStilesMD
Following
Can I talk about NELSON ???
Incredible results which will hopefully help increase screening rates!
#lcsm
IASLC 19th World Conf
September 23-26, 2018
Lung Cancer Stage (males NL) 7th TNM
Cancer Registry NL - Control Arm - Screen Arm
up to December 2011
Stage
IASLC 19th World Conferen
September 23-26, 2018
Year 8
Year 9
Year 10
0.75
0.76
0.74
0.39
0.47
0.61
5:21 PM - 4 Oct 2018
12 Retweets 33 Likes
6
12
33

NELSON - trial ISRCTN 63545820

- **Randomized Controlled Trial**
- **Recruitment through population-based registries**
- **CT screening vs. no screening**
- **Different screening intervals**
- **Volume & Volume Doubling Time of nodules**
- **Central reading of CT images**
- **Expert causes of death committee &**
- **Follow up through national registries**

Trial, initially powered (80%) for high risk **males**, to detect a lung cancer mortality reduction of ≥ 25% at 10 years after randomization (individual FU)

And includes a small subgroup of women (16%)

Harry J. de Koning, Erasmus MC, Public Health Rotterdam

Presented at the 2018 WCLC

USPSTF

- The United States Preventive Services Task Force (USPSTF) announced they recommend annual screening for lung cancer with low-dose computed tomography (LDCT) in adults with a grade B recommendation.

Lung Cancer Screening by LDCT is considered an essential health benefit by the Affordable Care Act and is covered, often with no co-pay by private insurance and Medicare and medical.

CMS Guidelines

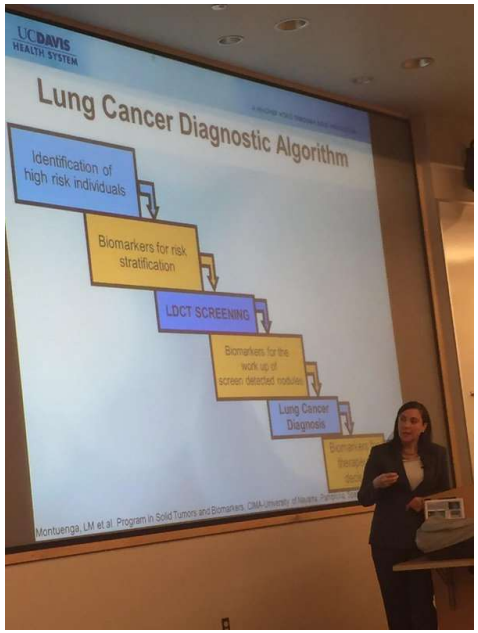
- **February 5, 2015 – The Centers for Medicare & Medicaid Services (CMS) announced**
- **That Medicare coverage would be provided for Screening for Lung Cancer with**
- **Low Dose Computed Tomography (LDCT)**
  - One LDCT per year
  - Criteria
    - Age 55-77 years and either
      - Current smokers OR
      - Quit smoking within the last 15 years
    - Tobacco smoking history
      - At least 30 pack year
    - Written order form a physician or qualified non-physician practitioner that
    - meets certain requirements
  - Visit for counseling and shared decision-making on the benefits and risks of

– lung cancer screening

CMS : DAVIS HEALTH
CENTERS FOR MEDICARE & MEDICAID SERVICES

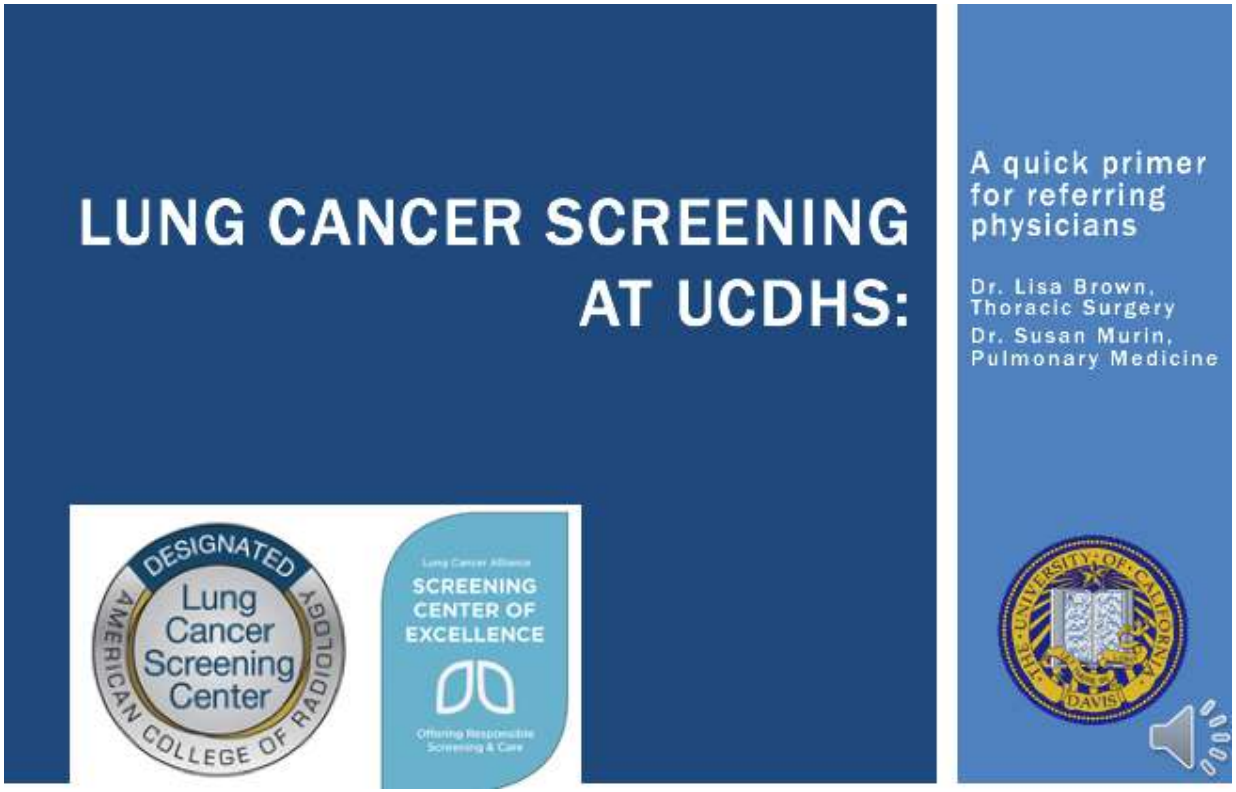
UC Davis Comprehensive Lung Cancer Screening Program

- **Lisa Brown, MD, MAS Clinical Director**
- **CMS Compliance**
  - Optimization of the EPIC EMR order for Lung Cancer Screening
  - UC Davis Shared Decision Making Toolkit
    - Provider assistance when counseling candidates
  - EMR Dot phrase for Lung Cancer Screening



UC Davis Comprehensive Lung Cancer Screening Program

- **Provider Education**
  - CME Webinar
    - 0.25 credit



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AMERICAN LUNG ASSOCIATION.
Fighting for Air

ASCO®

IASLC
International Association for the Study of Lung Cancer

American Cancer Society®

American Association for Thoracic Surgery
Google™ Custom Search
Promoting Scholarship in Thoracic and Cardiovascular Surgery

NCCN National Comprehensive Cancer Network®

Lung Cancer Screening

EUROPEAN LUNG FOUNDATION

AMERICAN COLLEGE OF CHEST PHYSICIANS

But There's a Big Problem!

Of the more than 7.6 million Americans who are eligible for screening, only 2% have been screened.

National Failure

- **The American Lung Association performed a recent survey of over 1,000 men and women and found that only 15% of people surveyed were aware that Lung Cancer Screening is an essential health benefit and covered by most healthcare plans with no or minimal costs.**
- **The top reason why high-risk patients aren't screened is that their doctors never recommended it.**
- **And only 3% of women cited lung cancer as a relevant health issue, even though lung cancer kills more women than breast and colon cancer combined.**

https://www.lung.org/our-initiatives/lung-force/lung-health-barometer

Disparities Exist

- **African-Americans are more likely to die from Lung Cancer than White Americans. But African-Americans are screened less.**
- **However, African-Americans may have a higher incidence of positive screening exams.**
- **When detected by screening, AA exhibit the same survival advantage and lower stage detection as their white counterparts.**

Pasquinelli MM, et al. JAMA Oncol. 2018;4(9):1291-1293.

National Failure

- Rates of Physician-Patient Discussions About Lung Cancer Screening Very Low and Declining (American Association for Cancer Research)
  - Prevalence of physician-patient discussions about lung cancer screening
  - **In 2017**
    - 4.3% in the general population
    - 8.7% among current smokers
- **In 2012**
  - 6.7% in the general population
  - 12% among current smokers

Conclusions

- **Lung Cancer Screening is effective**
- **Lung Cancer Screening is underutilized**
- **Medical providers play a role in its underutilization**
- **Health disparities exist when it is utilized**

Thank You

@DavidCookeMD