It's 2022 –
Let's Get Back to Cancer Screening

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What COVID did to Cancer Screening

- 2020 **COVID** Pandemic –

  Dramatic drop in screening for all cancers

  Facilities closed, staffing shortages

  Fear of getting exposed to COVID and getting sick

- Estimated 9.4M screening cases did not happen
- National Cancer Institute data model estimates an additional one percent increase in breast and colorectal cancer-related deaths by 2030 -> equivalent to ***10,000 extra deaths***.
- Large scale efforts now to bring screening rates back up to pre-pandemic levels

We fight cancer like girls!

"'You fight like a girl, mom.'"

Identification and Management of the Patient at High Risk for Breast Cancer

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Breast Surgical Oncologist

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Disclosures:

NO significant disclosures

Objectives

1. Learn how to identify a patient who is at high-risk for breast cancer
2. Understand when to use a risk model for determining risk and which are preferred
3. Recognize the risk factors for developing breast cancer
4. Learn techniques for decreasing the risk of developing breast cancer
5. Identify who benefits from chemoprevention and who benefits from risk-reduction surgery

Identification of the High-Risk Patient

- Depends on where you are:
  - US
    - 5-year risk: >1.67%
    - Lifetime risk: >20%
  - UK:
    - Chances of developing breast cancer between 40-50 years old: 8%
    - Moderate Risk: >17% to <30%
    - High Risk: >30%

How to assess risk?

- Hereditary Risk Assessment
  - Look for "Red Flags for Hereditary Breast and Ovarian Cancer Syndromes"
    - Ovarian or fallopian tube cancer at any age
    - Breast cancer <50 years old
    - Bilateral breast cancers
    - Both breast and ovarian cancers
    - Male breast cancer
    - Ashkenazi Jewish heritage and breast cancer at any age
    - More that 1 relative with: breast, ovarian/fallopian tube, prostate, pancreatic or melanoma
- Genetic Testing
  - Typically follow NCCN guidelines for genetic testing
- Breast Cancer Risk Calculation

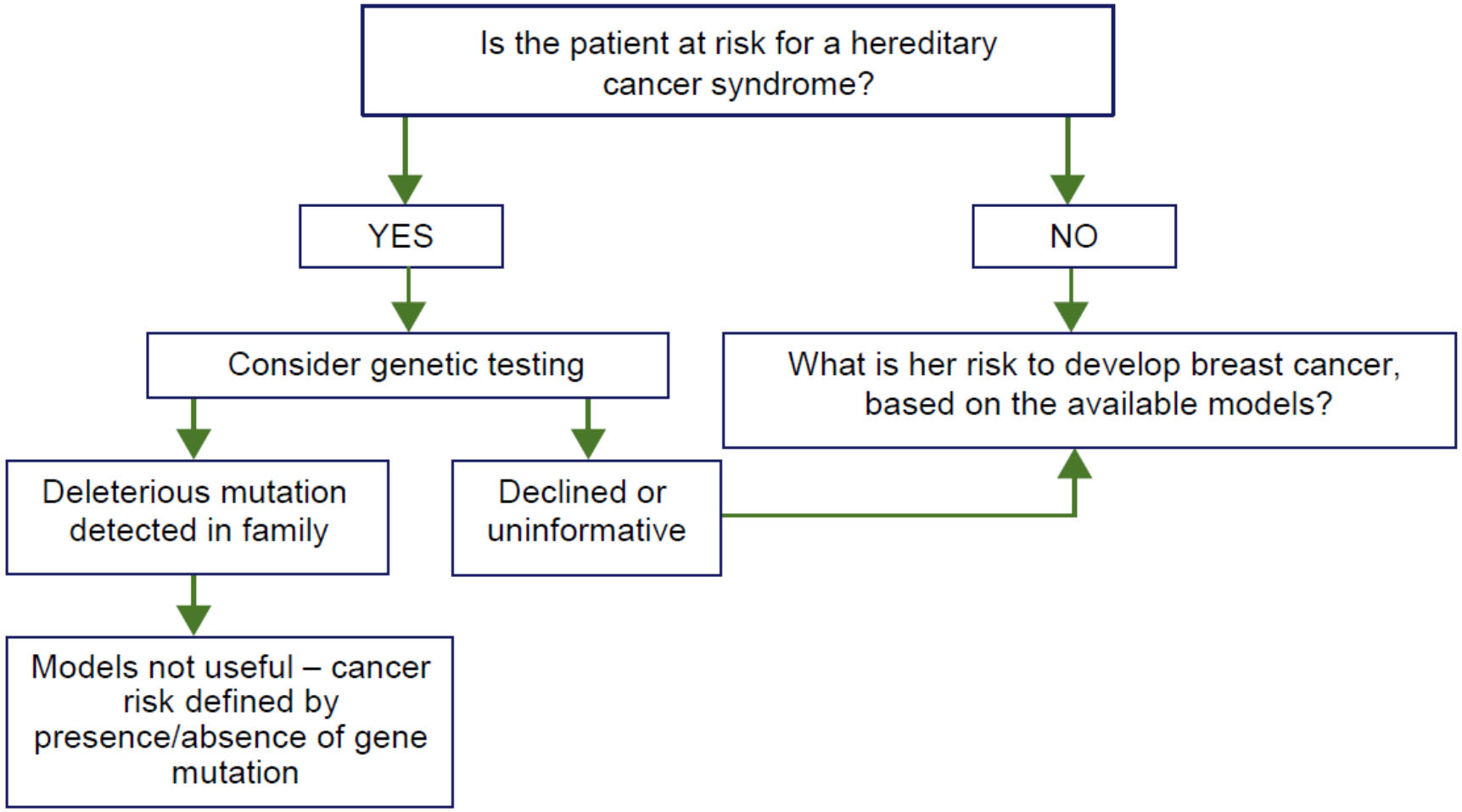

Fig. 1. Algorithm for breast cancer risk assessment.

Not all genetic mutations are created equal…

Table 2
Genes associated with hereditary breast cancer syndromes

	Gene Name	Breast Imaging Recommendations (as per NCCN)[4,a]	Estimated Breast Cancer Risk	References
High familial penetrance	*BRCA1*	Begin annual breast MR imaging @ 25 y	Up to 87%	Ashton-Prolla et al,[15] 2009, Ford et al,[46] 1994
	BRCA2	Begin annual mammogram @ 30 y	Up to 84%	Antoniou et al,[47] 2003
	TP53	Begin annual breast MR imaging @ 20 y Begin annual mammogram @ 30 y	Up to 79%	Ford et al,[48] 1998, Chompret et al,[49] 2000
	PTEN	Begin annual mammogram and breast MR imaging @ 30–35 y	Up to 85%	Bougeard et al,[50] 2015
	PALB2	Begin annual mammogram and consider breast MR imaging @ 30 y	Up to 58%	Tan et al,[51] 2012
	STK11	Begin annual mammogram and consider breast MR imaging @ 25 y	45%–50%	Antoniou et al,[52] 2014
	CDH1	Begin annual mammogram and consider breast MR imaging @ 30 y	39%–52% (lobular)	van Lier et al,[53] 2010; Pharoah et al,[54] 2001; Kaurah et al,[55] 2007
Moderate familial penetrance	*CHEK2*	Begin annual mammogram and consider breast MR imaging @ 40 y	25%–39%	van der Post et al,[56] 2015; Weischer et al,[57] 2008
	ATM		17%–52%	Cybulski et al,[58] 2011; Ahmed & Rahman,[59] 2006; Swift et al,[60] 1991
Moderate familial penetrance, not as well characterized	*NBN*	Begin annual mammogram and consider breast MR imaging @ 40 y	Up to 30%	Thompson et al,[61] 2005; Zhang et al,[62] 2011
	NF1	Begin annual mammogram @ 30 y; consider breast MR imaging @ 30–50 y	Elevated	Steffen et al,[63] 2006; Seminog et al,[64] 2013
	BRIP1	No specific recommendations, follow average risk screening	Unknown	Madanikia et al,[65] 2012; Rafnar et al,[66] 2011; Seal et al,[67] 2006
	RAD51C		Unknown	Easton et al,[68] 2016; Le Calvez-Kelm et al,[69] 2012
	RAD51D		Unknown	Coulet et al,[70] 2013
Other novel genes, not well characterized	*MUTYH*	No specific recommendations, follow average risk screening	Unknown	Loveday et al,[71] 2011; Vogt et al,[72] 2009
	MRE11A		Unknown	Rennert et al,[73] 2012
	RAD50		Up to 30%; unknown	Rennert et al,[73] 2012; Damiola et al,[74] 2014

[a] Breast cancer screening plans may be individualized and begin earlier based on the earlier known breast cancer in the family; tomosynthesis should be considered: see NCCN's guidelines for details.

Risk Factors for Breast Cancer

- Non-modifiable
  - Age
  - Gender at birth (Female)
  - Age at menarche
  - Age at menopause
  - Dense breast tissue
  - Previous breast cancer or high-risk lesions
  - Family History
  - Your genes
  - Tall Height
  - Radiation therapy to breast/chest <30 years old
- Modifiable
  - Obesity
  - Hormone Replacement Therapy (combined)
  - Activity Level
  - Alcohol intake
  - Not having children/having children late in life
  - Not breastfeeding

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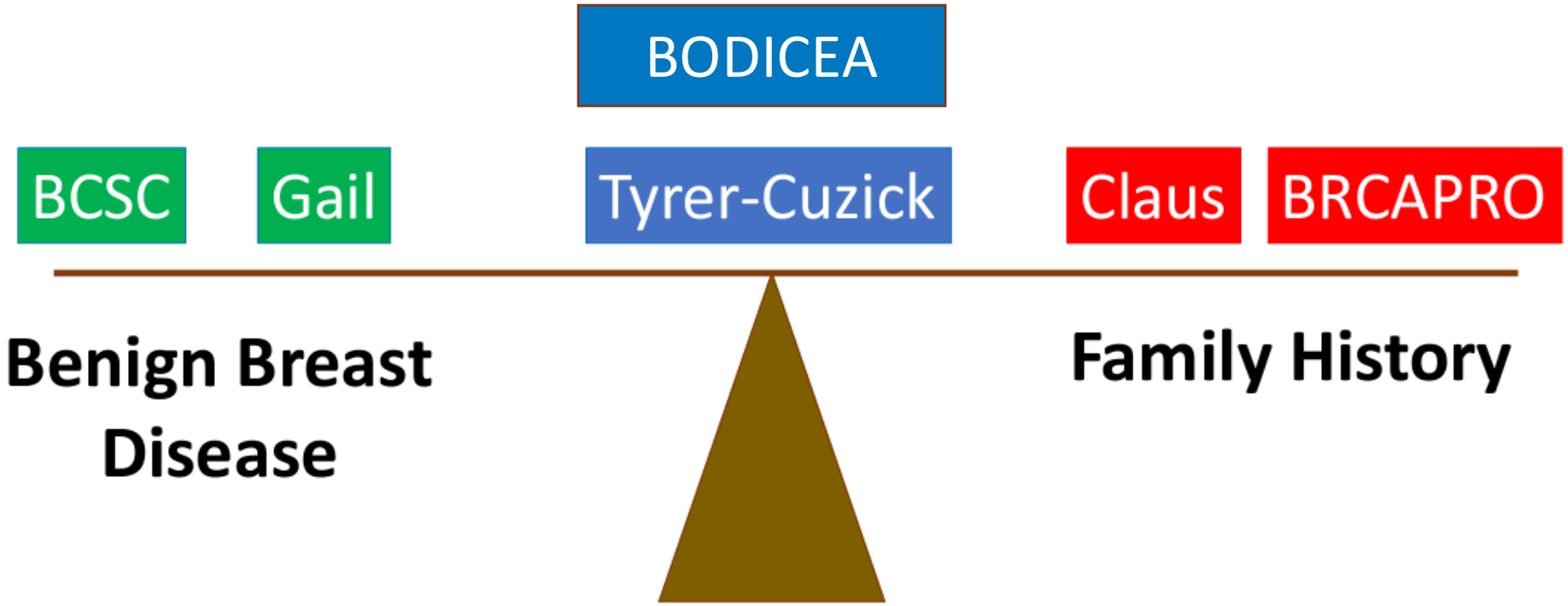
Risk Models for Calculating Breast Cancer Risk



Tyrer-Cuzik vs BOADICEA

(Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm)

Similarities in accounting for risk factors:

- Age
- Age at Menarche/menopause/First birth
- BMI
- Breast Density
- BRCA gene mutation
- Ovarian Cancer
- Ashkenazi Jewish Origin
- Family history of breast cancer (including bilateral) with ages
- Family history of ovarian cancer with ages
- Family history of BRCA mutation

DIFFERENCES

In Tyrer-Cuzik only:

- Previous biopsy results including Hyperplasia, Atypia and LCIS
- Competing mortality

In BOADICEA (CanRisk Tool) only:

- Alcohol intake
- Use of OCPs
- Previous Invasive Breast Cancer
- Previous Pancreatic Cancer
- Polygenic Risk Score
- Family history pancreatic cancer
- Family history genetic mutations beyond BRCA (PALB2, CHEK2, ATM, BARD1, RAD51C, RAD51D, BRIP1)

Take home points/ Controversy

- If pathogenic variant is found in a highly penetrant gene, risk models not as pertinent
  - Interesting work by Myriad with CHEK2 carrier modification polygenic risk score
- Integrating breast density with classic risk factors is a superior mode of calculating risk of developing breast cancer
- Both BOADICEA and Tyrer-Cuzik developed initially for the White/European population
- Likely BOADICEA is better but very complex and most do not have polygenic risk scores
- Tyrer-Cuzik is known to:
  - OVERESTIMATE lifetime risk in LCIS and Hispanic women
  - UNDERESTIMATE lifetime risk in Black women

Screening based on breast density and risk

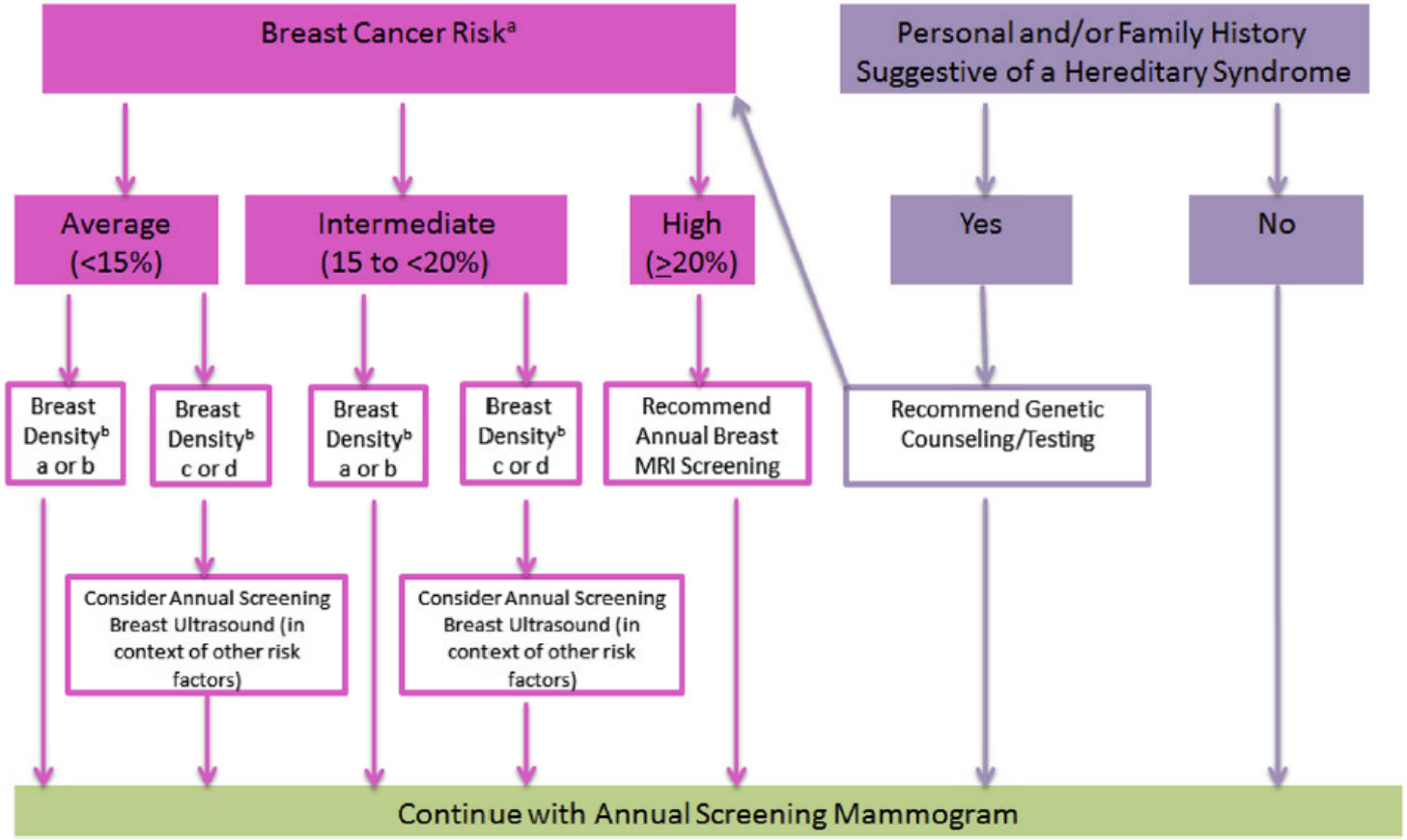


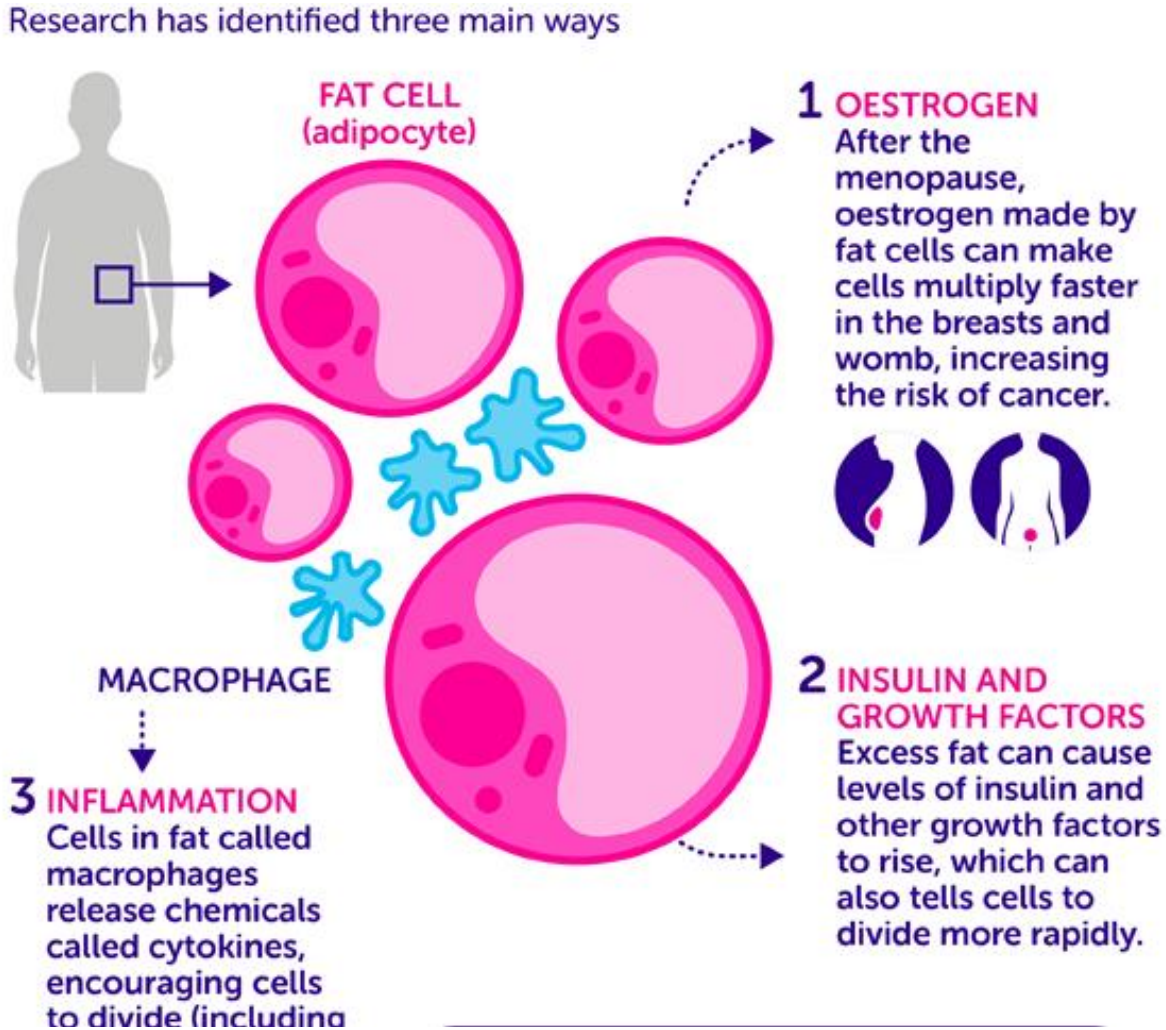
Fig. 2. Personalized Breast Cancer Screening Algorithm. [a]calculated by the Tyrer-Cuzick model. [b]breast composition is classified by the ACR BI-RADS® classification system.

RISK-REDUCTION in the High-Risk Patient

- Maintain a healthy body weight and BMI and avoid weight gain
- Stay active and exercise
- Limit alcohol consumption to ≤ 1 drink/day
- Encourage breastfeeding
- Smoking cessation

OBESITY and Breast Cancer

- Associated with a higher risk of of ER- and Triple Negative PREmenopausal breast cancers
- Associated with a higher risk of ER+ POSTmenopausal breast cancers (30% increased risk)
- Weight gain after 18 years old associated with increased risk
  - Every 5kg of weight gain above the lowest adult weight→ 4-8% increase in postmenopausal breast cancer risk
- Linked with shorter all-cause and breast cancer survival

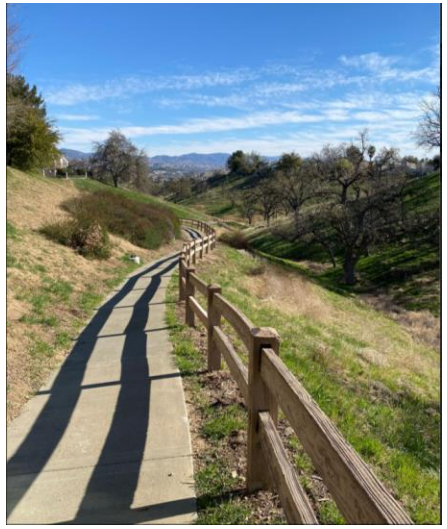


Some Weight Changes Matter

- Decreased body weight in adulthood associated with decreased risk of breast cancer by 20%
  - Weight loss whose highest adult weight was <45 years old reduces postmenopausal breast cancer risk most
- Weight cycling NOT an increased risk
- Hispanic women: weight gain in early adulthood has more of an effect on increasing risk
- Asian American women: high BMI combined with recent weight gain (>4.5kg) is the greatest risk

Physical Activity and Risk Reduction

- American Cancer Society recommends that adults get at least 150-300 minutes of moderate intensity exercise or 75-150 minutes of vigorous intensity activity each week.

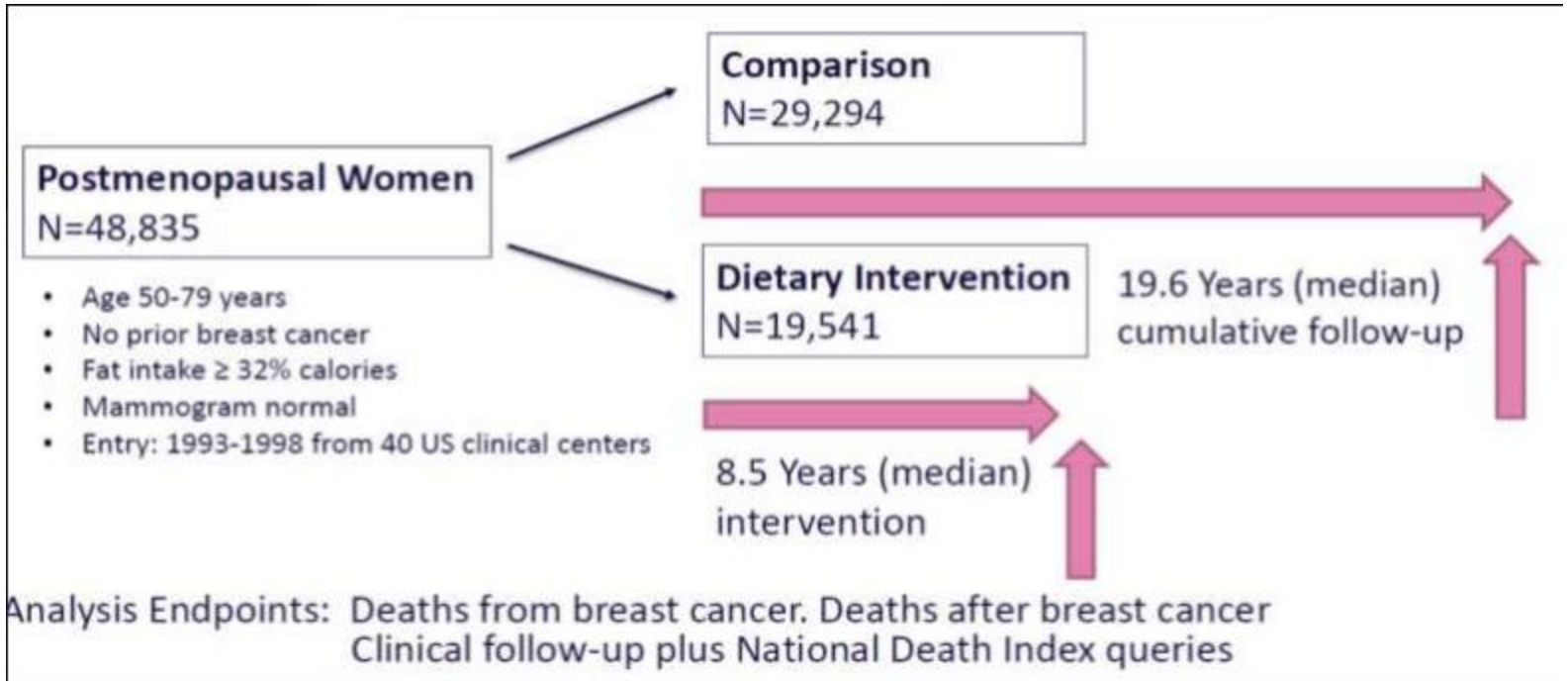


Moderate activity is anything that makes you breathe as hard as you do during a brisk walk. It causes a slight increase in heart rate and breathing. You should be able to talk, but not sing during the activity.

Vigorous activities are performed at a higher intensity. They cause an increased heart rate, sweating, and a faster breathing rate.

Dietary Changes for Risk Reduction

- Women's Health Initiative (WHI) Dietary Modification Clinical Trial



Dietary Changes for Risk Reduction

- Women's Health Initiative (WHI) Dietary Modification Clinical Trial
  - 48,835 postmenopausal women (50-79 years old), with no prior breast cancer and a dietary fat intake of >32% of energy
    - Assigned to usual diet (60%) vs dietary intervention group (40%)
    - 8.5 years of dietary intervention (low fat with 24.7% of energy consumption with increased vegetable, fruit and grain intake)
    - 19.6-year median follow up
      - No reduction in developing breast cancer
      - Statistically significant DECREASE IN DEATH from breast cancer

Dietary Changes for Risk Reduction

- 24% risk reduction in large multicentric study from Italy
- Adherence to a DRRD is associated with a modestly lower breast cancer risk, especially among lean women, in Nurses' Health Study (22,739 women over 26 years) and NHSII study (93,915 women over 16 years)

Adherence to a Diabetes Risk Reduction Diet:

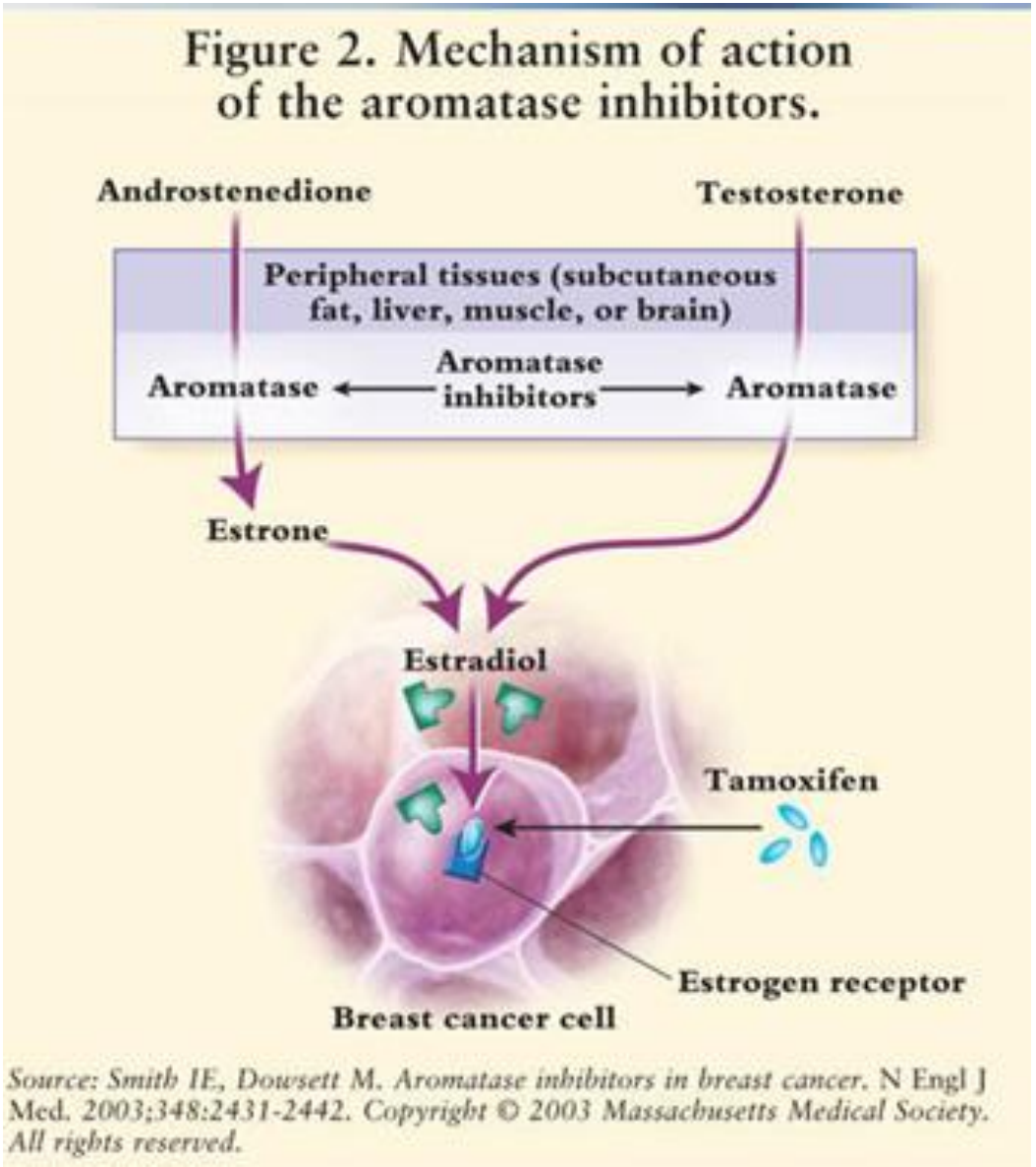
- high intakes of cereal fibers, coffee, fruit and nuts, a ratio of polyunsaturated fats to saturated fats
- low dietary glycemic index, low intakes of red/processed meat, sugar sweetened beverages/fruit juices and trans fats

Dietary Changes for Risk Reduction: Overall recommendations:

- Lots of fruits/vegetables
- Limit Red and Processed Meats
- Limit sugar-sweetened beverages
- Limit highly processed foods and refined grains
- Jury is out on soy

Chemoprevention

AKA: “Anti-hormone Therapy”



Tamoxifen and the Reduction of Breast Cancer (NSABP P1)

- 13,388 women assigned to placebo vs Tamoxifen x 5 years
- Through 7 yrs follow up: cumulative risk of breast cancer reduced from 42.5/1000 in placebo vs 24.8/1000 in Tamoxifen group
  - In yrs 2-5 when the women were on Tamoxifen, the rates of tumors were decreased by 50% compared to placebo.
  - In year 6, the reduction was 29%
  - In year 7, the reduction was 14%
  - Rate of decline because decreased cancers in placebo group

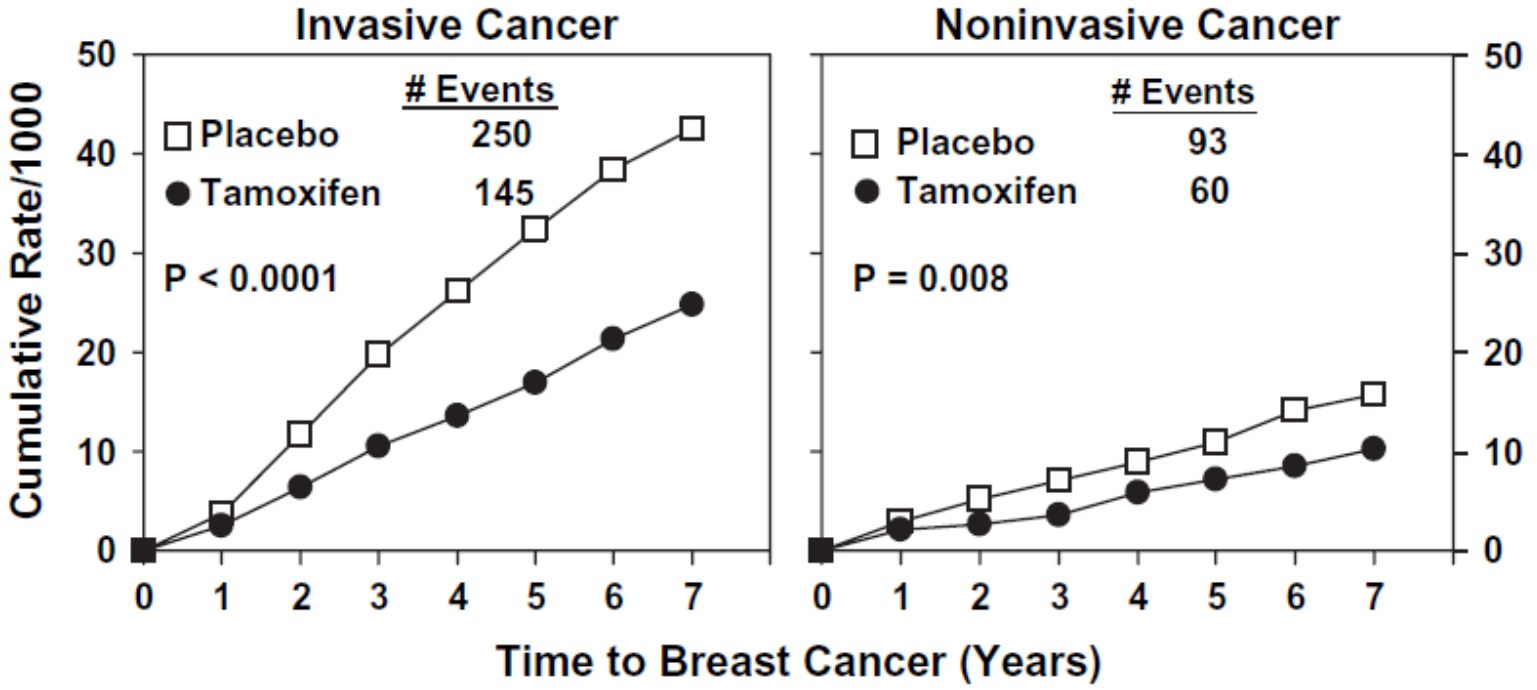


Fig. 2. Cumulative rates per 1000 women of invasive and noninvasive breast cancers in NSABP P-1 participants by treatment group.

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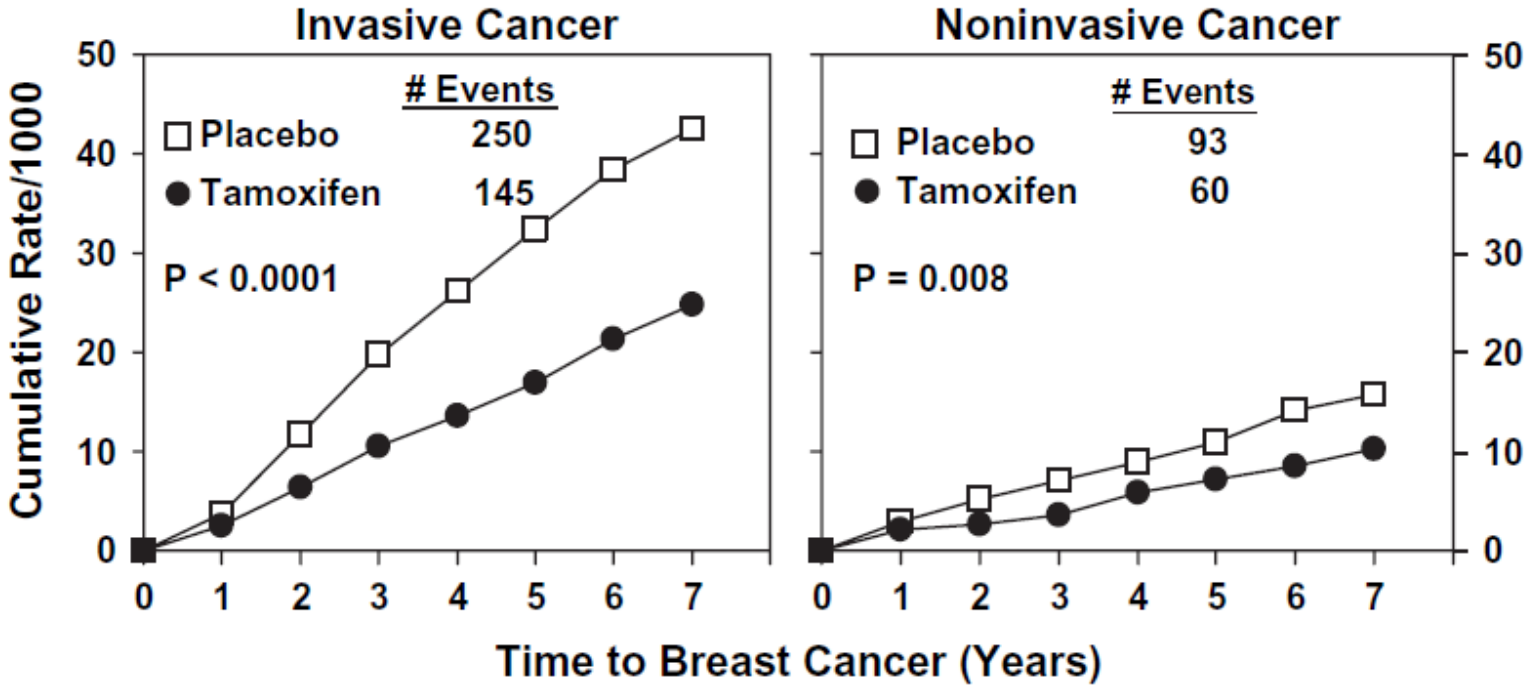

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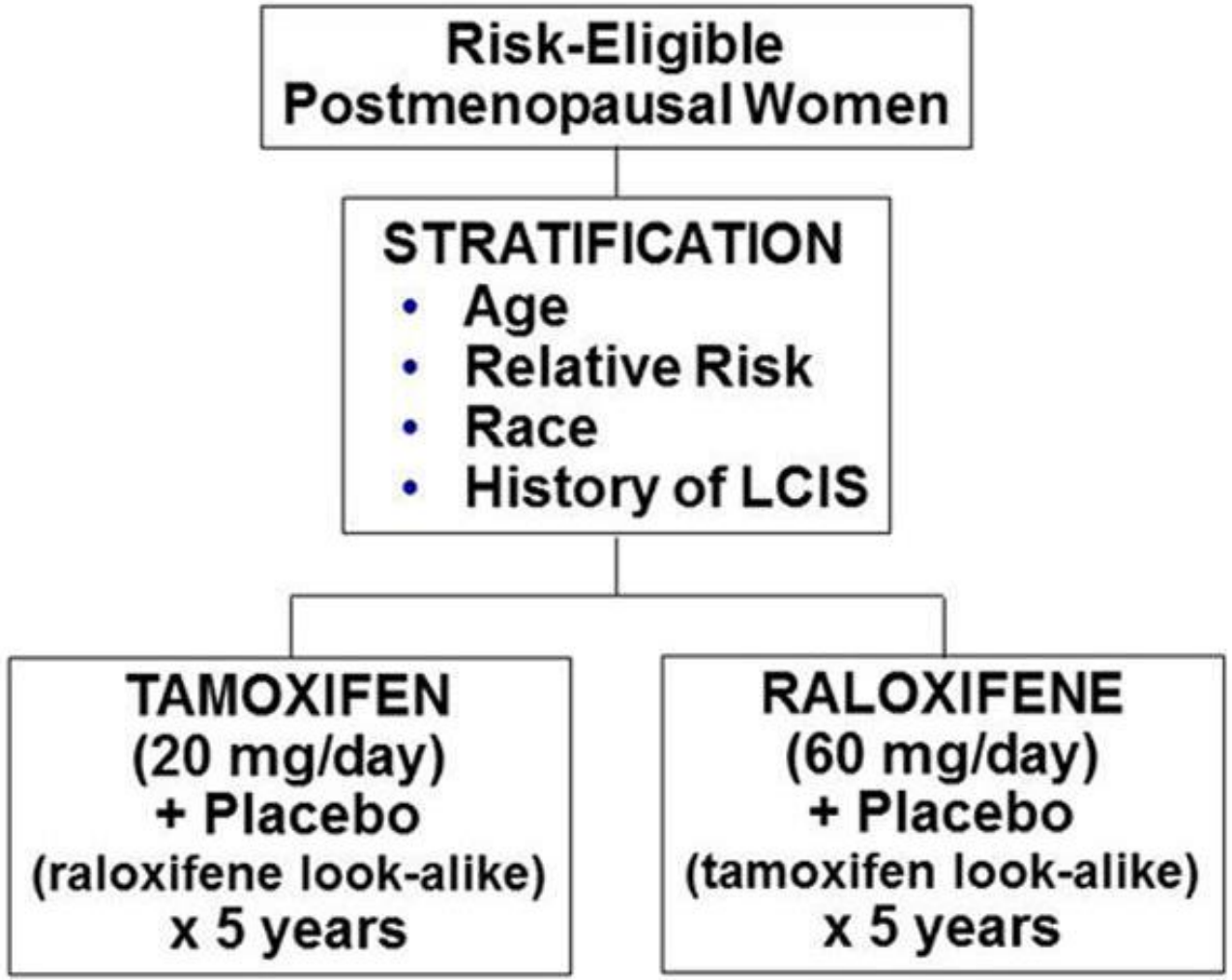
- Side effects
  - DECREASE in osteoporotic fractures
  - Increase in endometrial cancers in >50 yo
  - Increase in thromboembolic evenst
  - Increase in cataracts
  - No difference in ischemic heart disease
  - No difference in cancers other than those of breast or endometrium

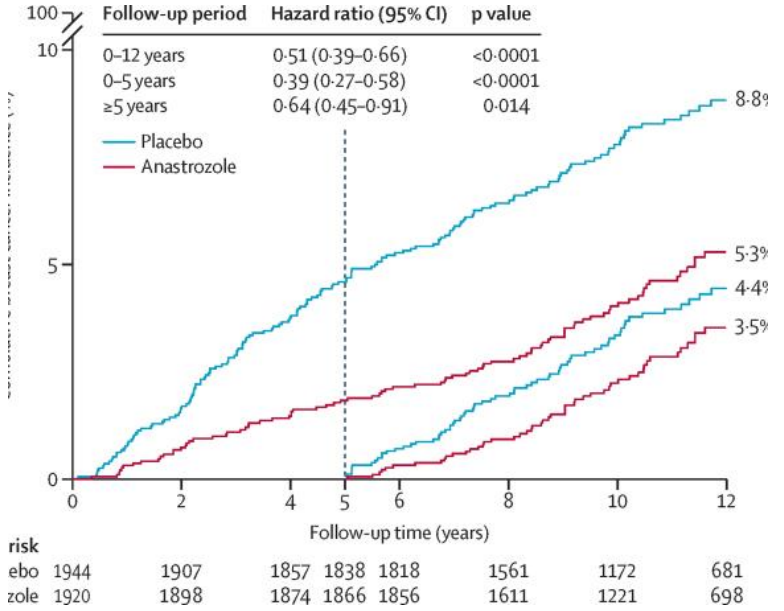
Study of Tamoxifen and Raloxifene for prevention of breast cancer (STAR TRIAL)

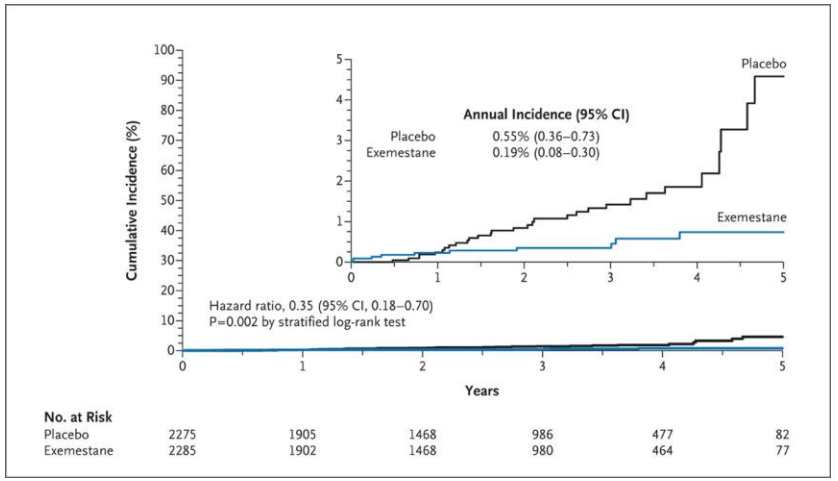
- 19,747 post-menopausal women with increased 5-year breast cancer risk (mean risk of 4.03%)
- Raloxifene is AS EFFECTIVE as Tamoxifen for reducing the risk of invasive breast cancer
- Raloxifene has a lower risk of thromboembolic events and cataract but a non-statistically higher risk of noninvasive breast cancer
- Risk of other cancers, fractures, ischemic heart disease and stroke is similar for both



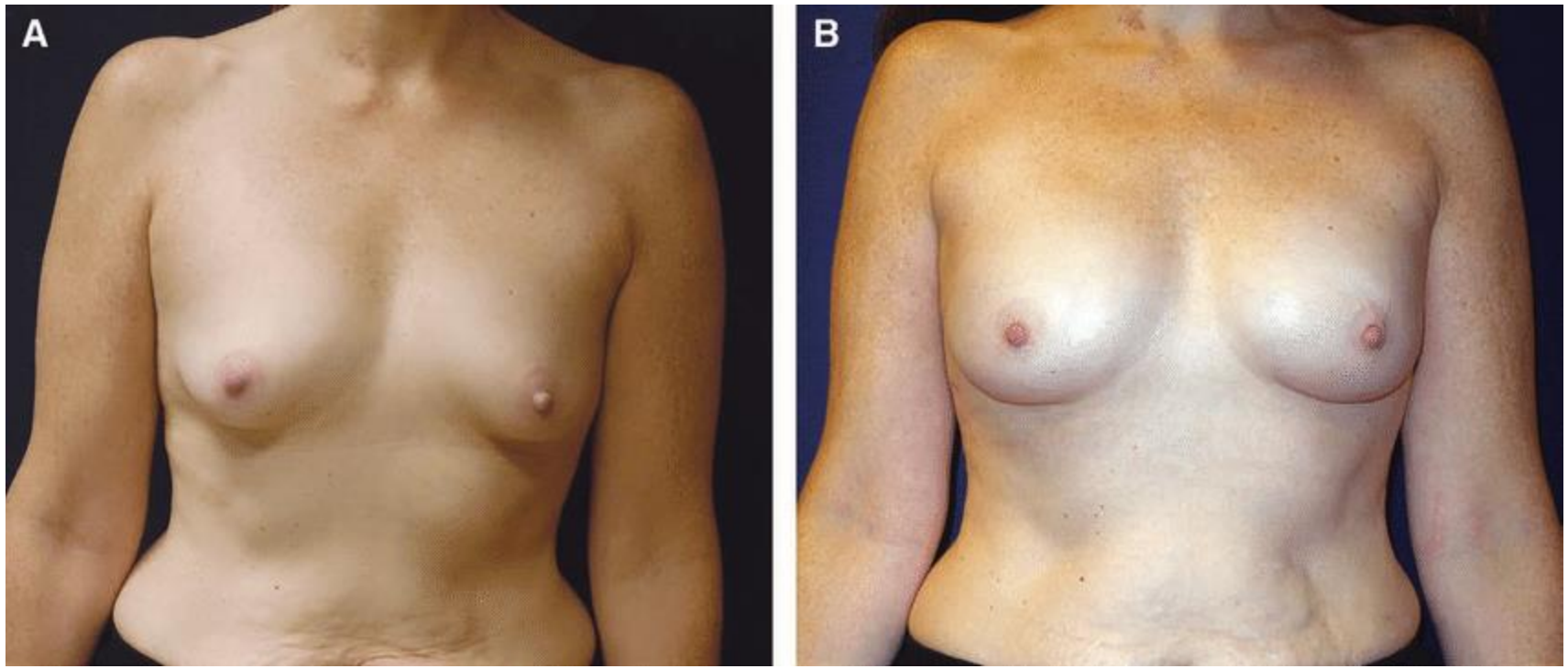
Aromatase Inhibitors in the prevention of breast cancer

- IBIS-II: 1,920 women received Anastrazole x 5 years vs 1,944 placebo
  - 53% reduction in all breast cancer in 1st 5 years
  - 49% reduction after nearly 11 years
  - Adverse side effects: fractures, joint-related effects and menopausal symptoms
- MAP.3: 2,285 women received Exemestane vs 2,275 placebo
  - Reduction of invasive breast cancer by 65%
  - Same adverse side effects





Risk-Reducing Surgery



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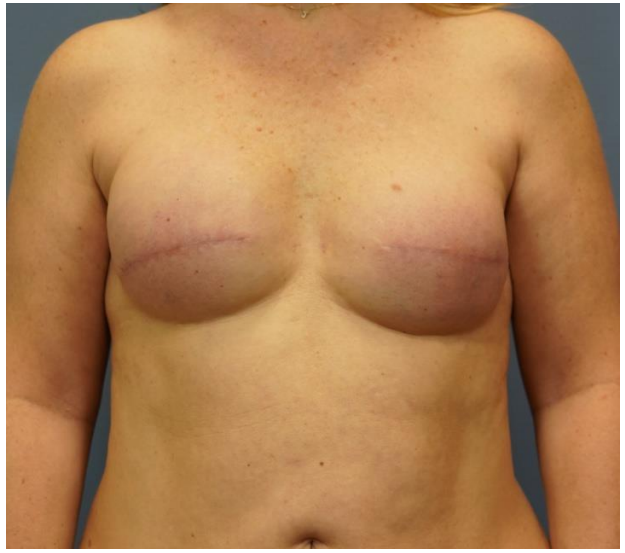

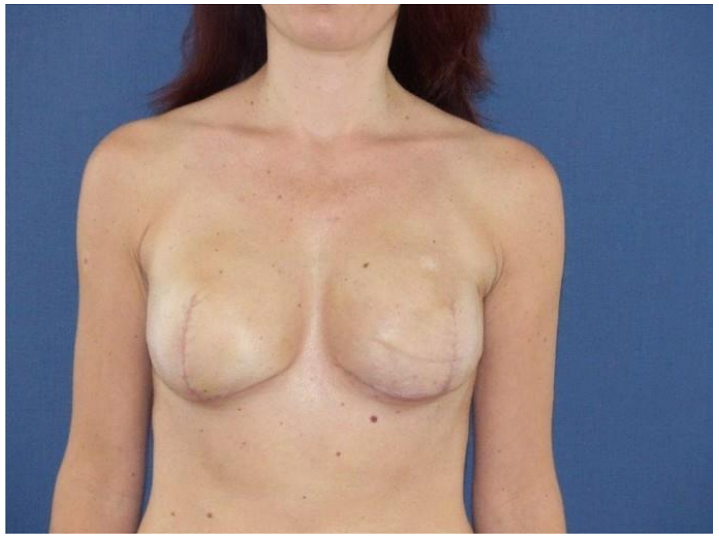

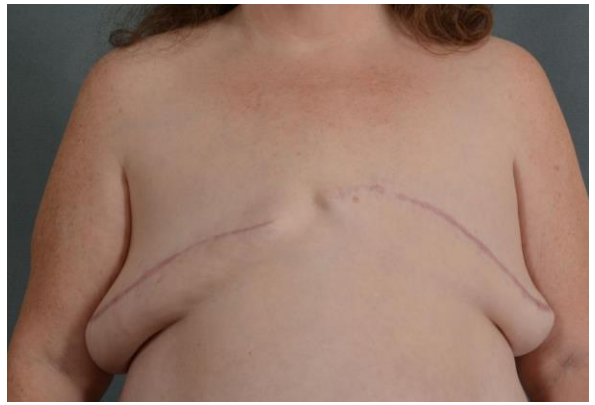

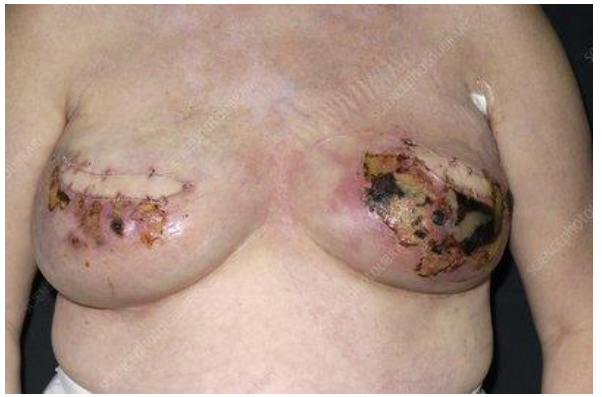

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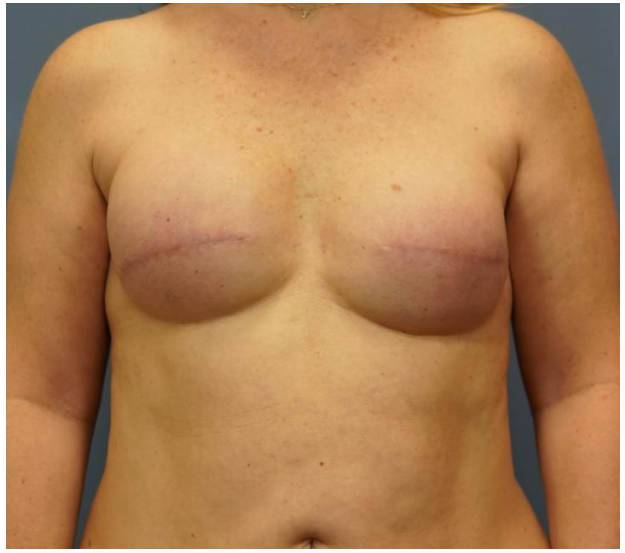

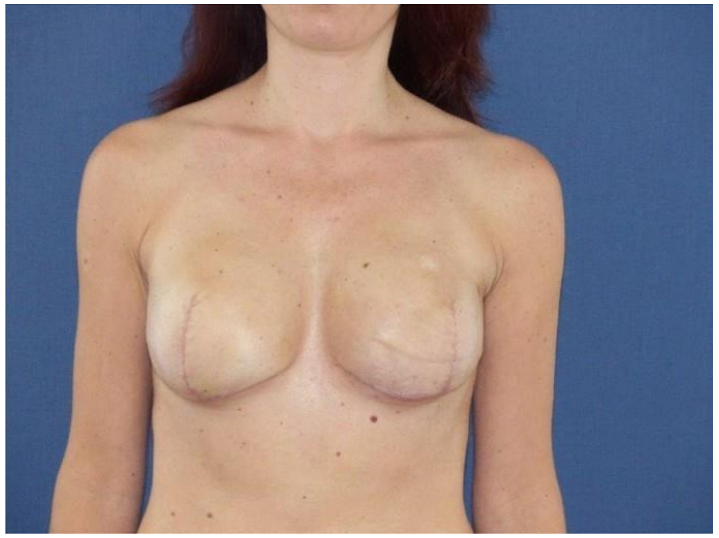

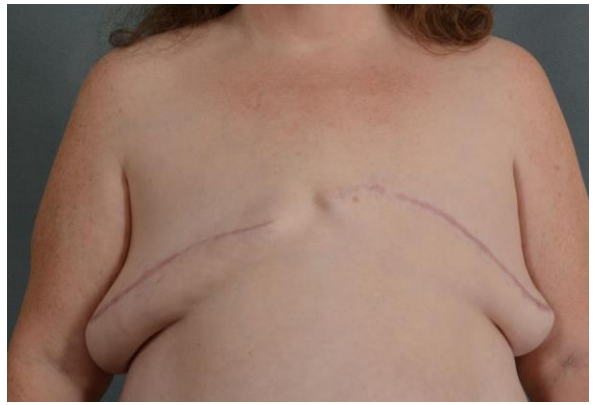

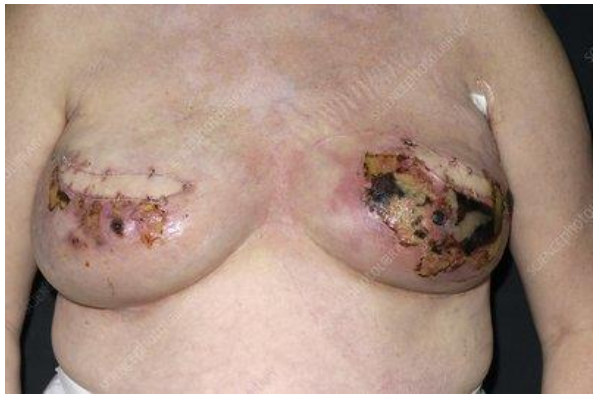

DOES NOT DECREASE MORTALITY!

How I manage the high-risk patient

ALL PATIENTS

- Understand their goals of care
- Learn what their breast mean to them
- Educate about their particular risk
- Discuss risk-reduction lifestyle changes

INTERMEDIATE HIGH-RISK (30-50%)

- All the above AND:
- Determine best timing to offer risk reduction with Tamoxifen and/or Aromatase inhibitor
- Will begin to consider risk reduction mastectomy but only in select patients with adequate expectations
- Work toward ideal body weight, non-smoking status

LOW HIGH-RISK (20-30%)

- See “ALL PATIENTS” AND:
- Obtain an annual mammogram and annual MRI staggered so the breasts are imaged every 6 months
- Annual breast exam and education staggering my visits with PCP or GYN breast exam

HIGH HIGH-RISK (>50%)

- Offer all other treatments
- Offer risk reduction mastectomy but not an absolute.
- Get patient ready for RRM
  - working towards ideal body weight
  - Smoking cessation
  - Possible breast reduction if too large for a nipple-sparing mastectomy
  - determining best timing based on mutation and family history

THANK YOU!

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END

Breast Cancer Screening: Imaging Guidelines and Updates

Anjali Date, M.D.
Lead Interpreting Physician
Sheila R. Veloz Breast Imaging Center
Senior Partner, Tower Imaging Medical Group

September 25, 2022

Disclosures: None

Breast Cancer Screening: Goals

- Our goal as Breast Imagers is to reduce breast cancer deaths through early detection
- Early detection allows for more effective, less harmful treatment
- Reduces incidence of advanced disease
- Imaging allows for early detection by identifying cancers that are too small to palpate

5 Year Relative survival rates for breast cancer

These numbers are based on women diagnosed with breast cancer between 2011 and 2017.

Screening w/imaging allows us to capture the largest percentage of women in this category

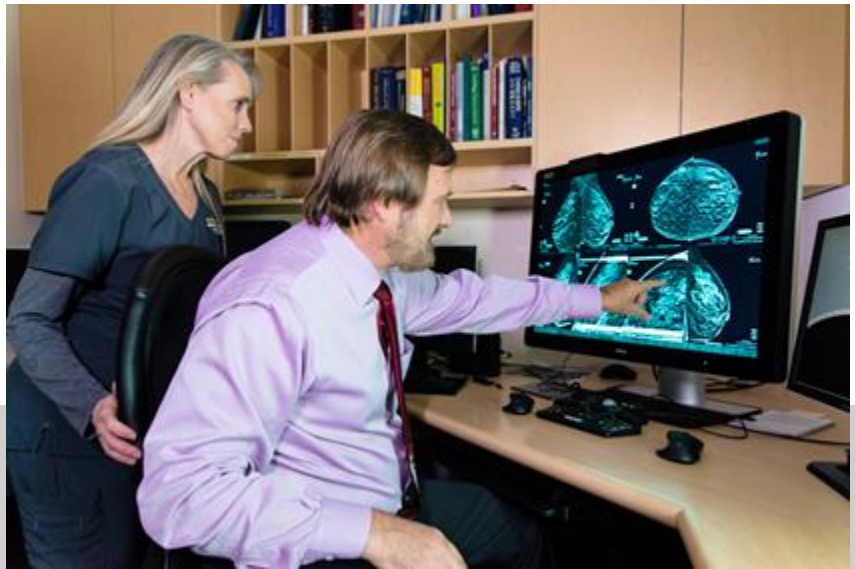
SEER Stage	5-year Relative Survival Rate
Localized*	99%
Regional	86%
Distant	29%
All SEER stages combined	90%

*Localized stage only includes invasive cancer. It does not include ductal carcinoma in situ (DCIS).

https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/breast-cancer-survival-rates.html

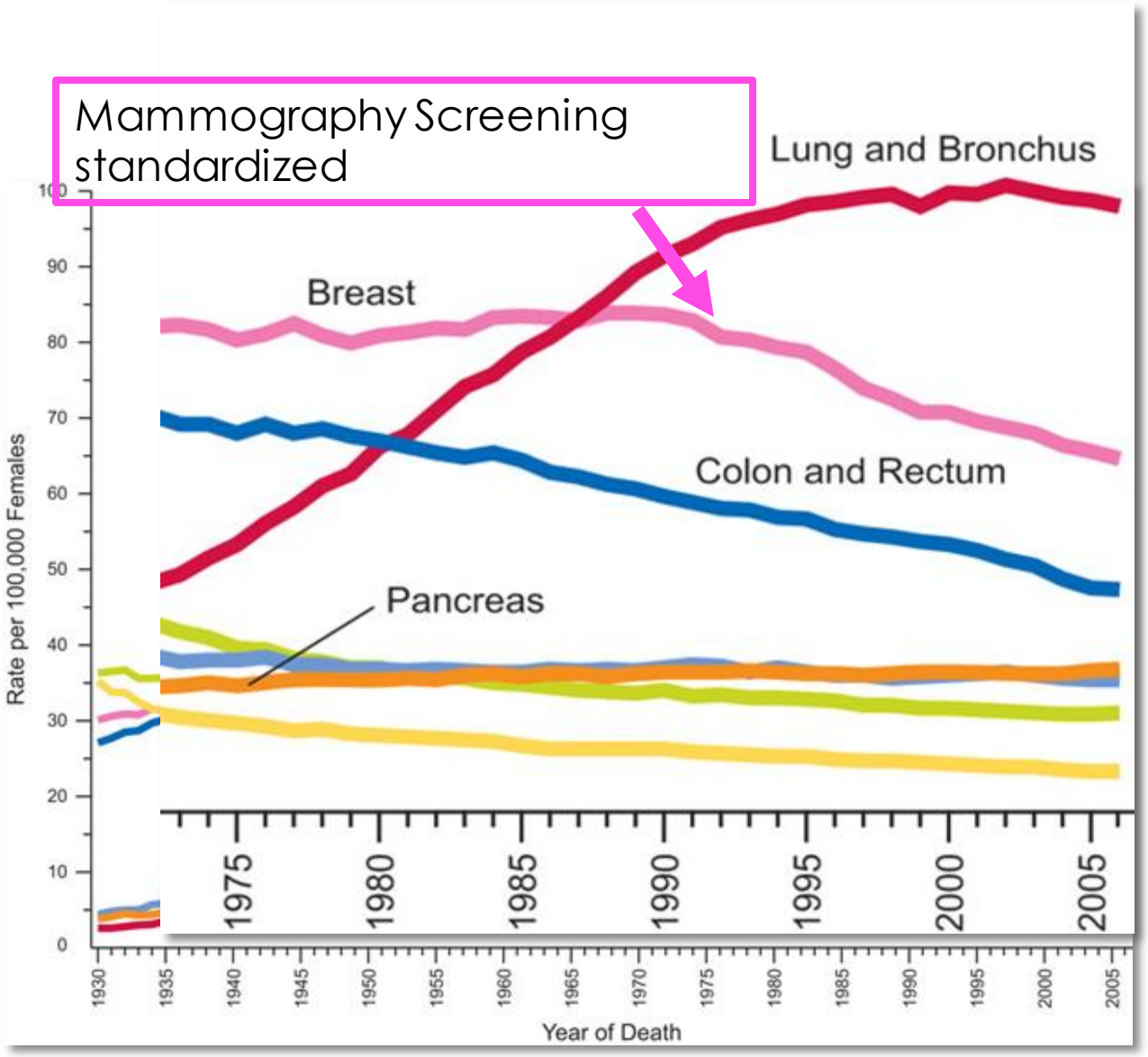
Breast Cancer Screening: Our Imaging Tools

- Mammogram
- Ultrasound
- MRI
- (Thermogram)



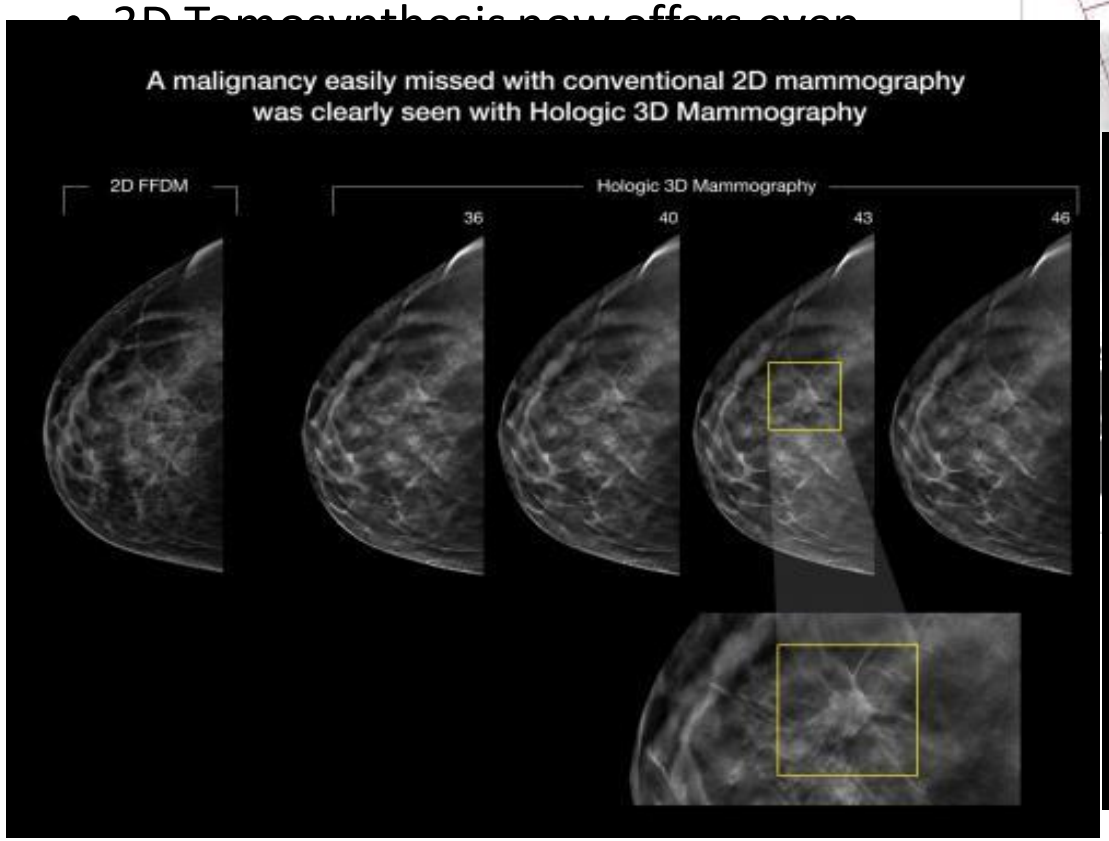
Mammogram

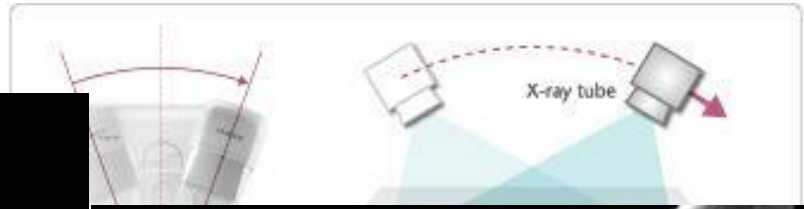
- Since the standardization of screening mammography programs started here and throughout the world, the breast cancer death rate has significantly decreased
- Risk of death from breast cancer is decreased by 30-48%
- Only modality proven with long term RCT and observational studies to have a PROVEN MORTALITY BENEFIT

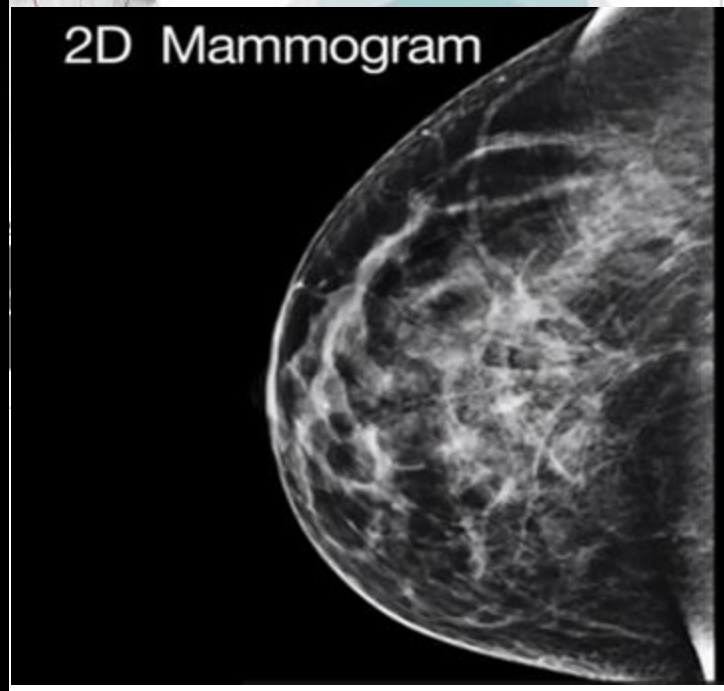


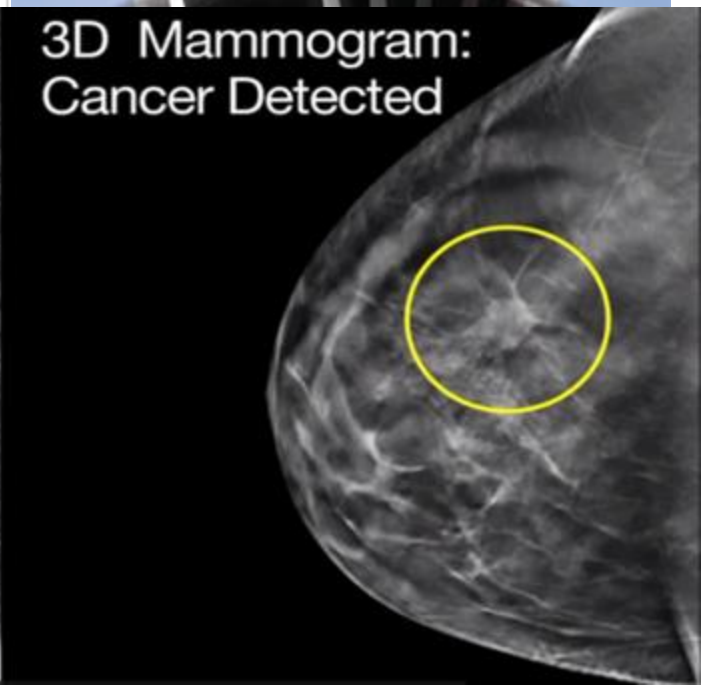
3D Mammogram: Tomosynthesis

- 3D Tomosynthesis now offers even



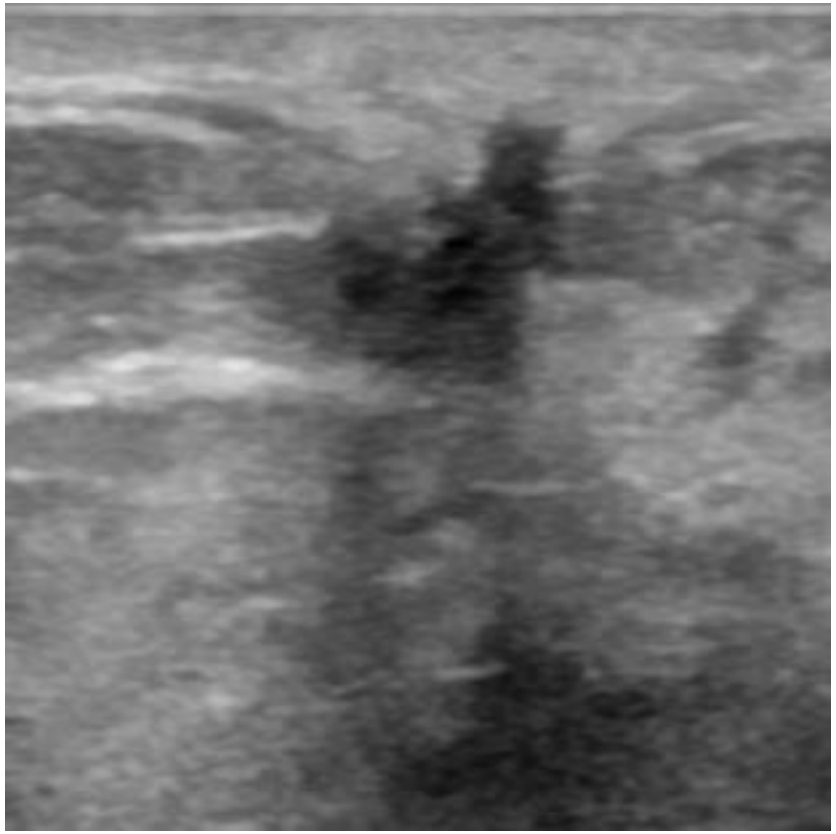




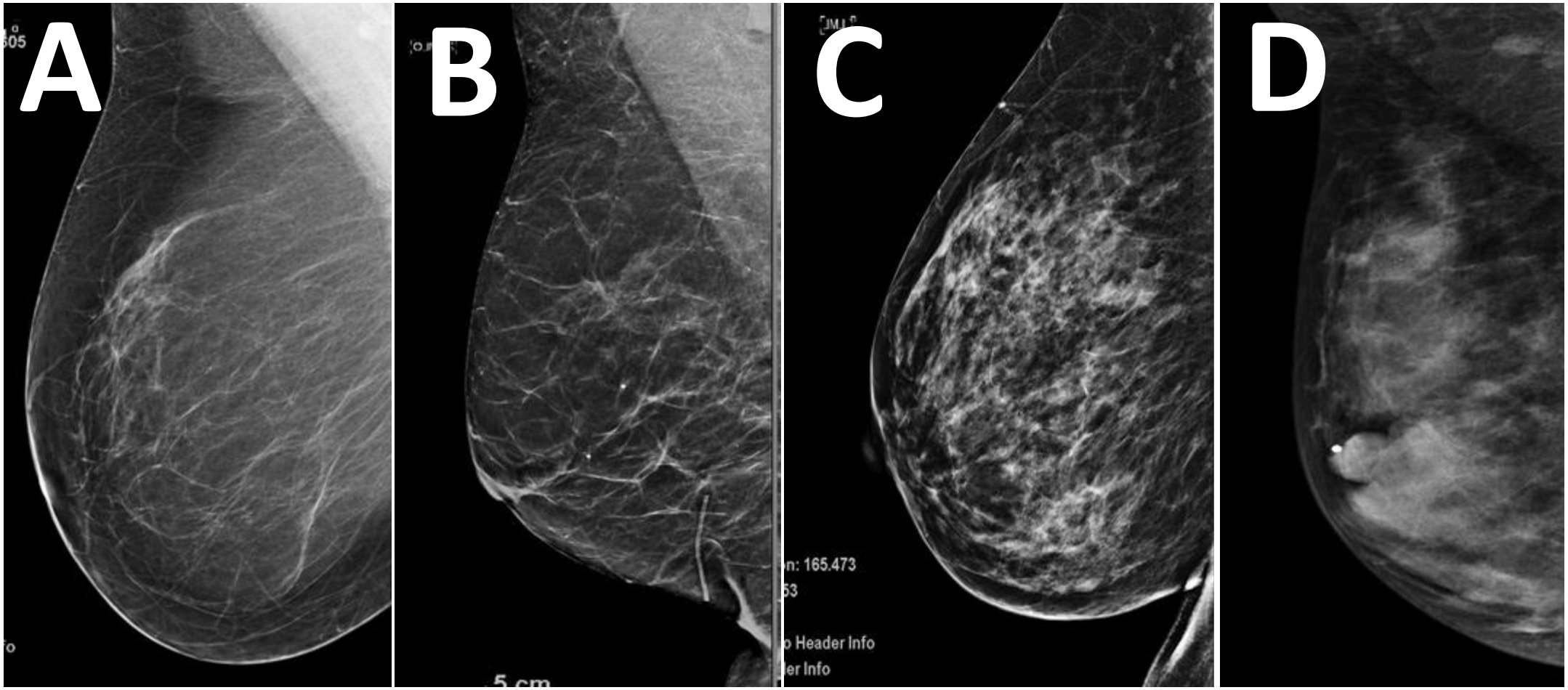


Ultrasound

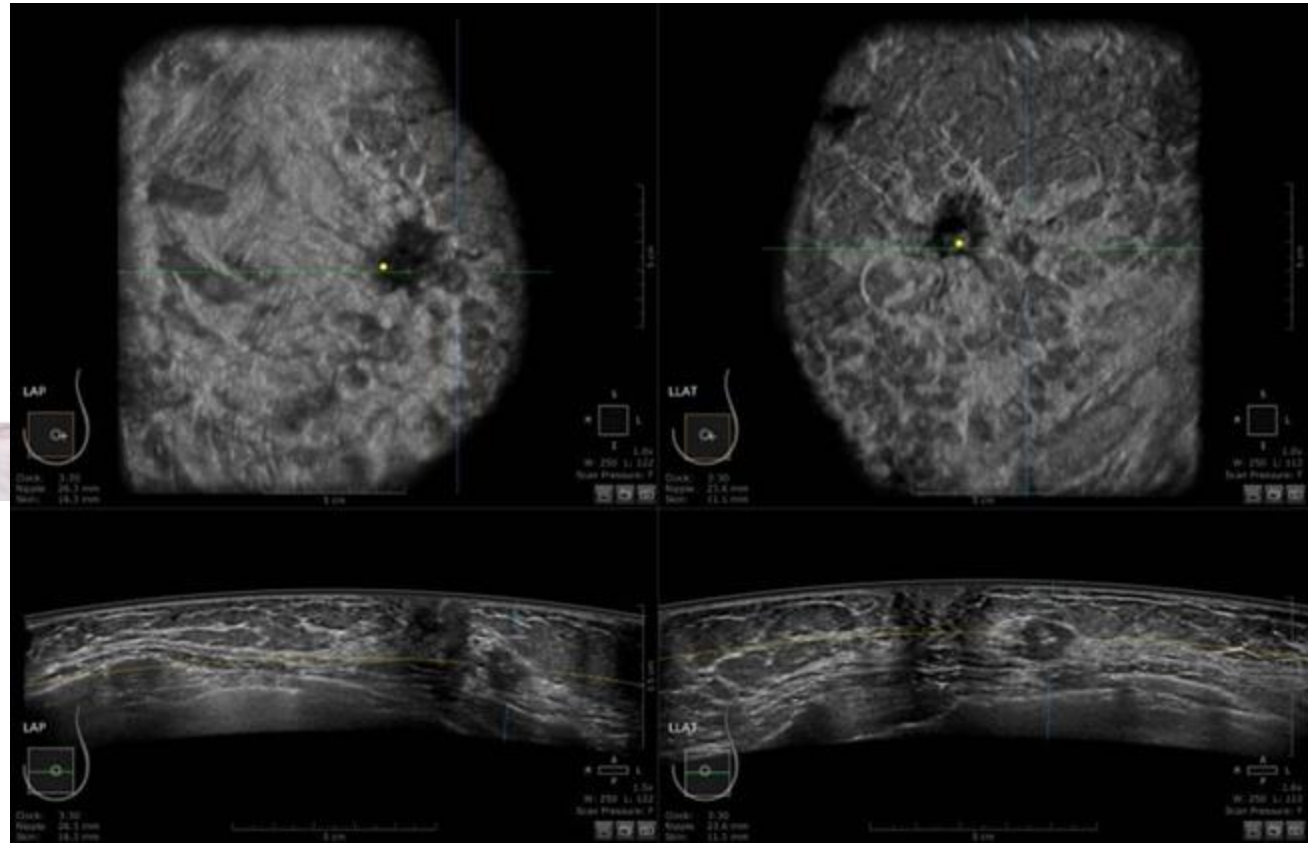
- No radiation, uses sound waves to create the images
- Handheld versus Automated Images acquired
- Provides further characterization of mammogram detected findings
- Added screening benefit in women with dense breast tissue



Mammogram: Breast Density

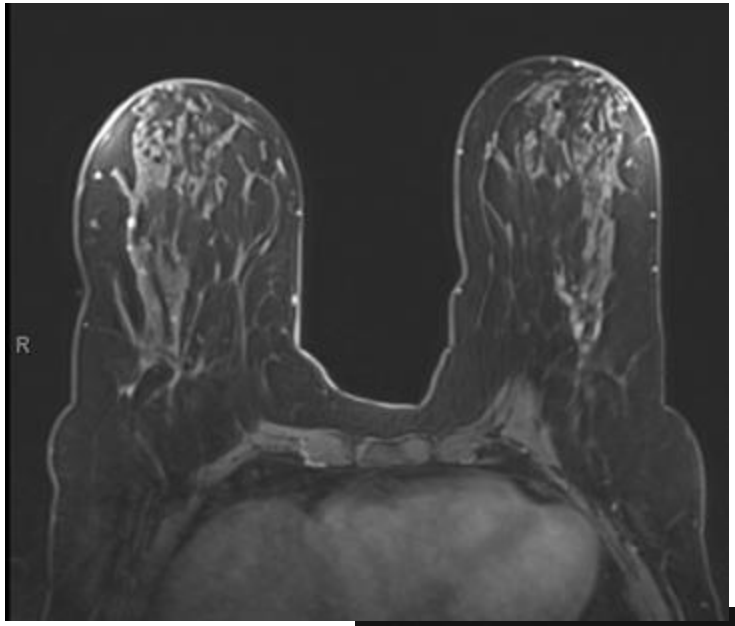


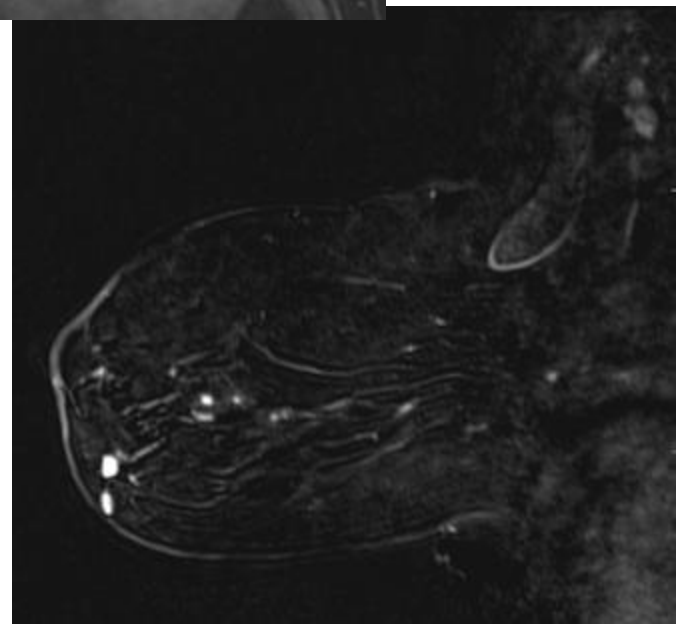
ABUS: Automated Breast Ultrasound



Breast MRI

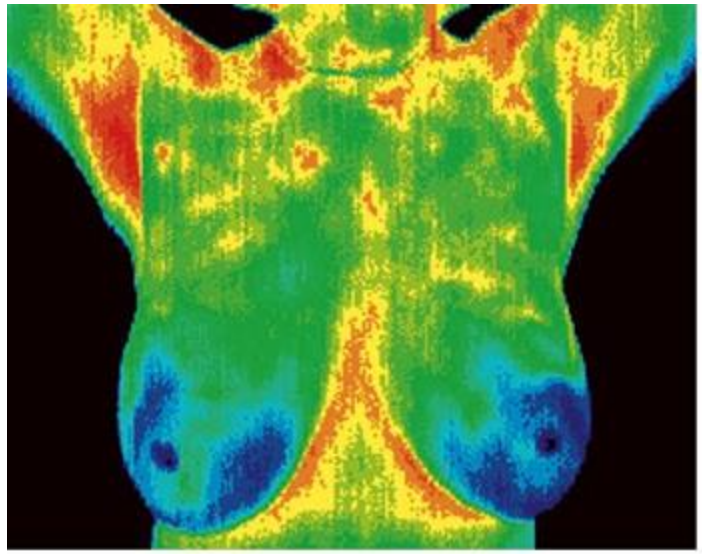
- Indications
  - High risk (>20% lifetime risk according to assessment, factors include family history of premenopausal breast cancer, BRCA or other genetic predisposition)
  - Implant evaluation (silicone implants every 3 years, FDA approved)
  - Extent of disease for known malignancy
- No radiation
- Cons:
  - Contrast needed
  - Long exam time
  - High number of false positive findings when compared with MG and US



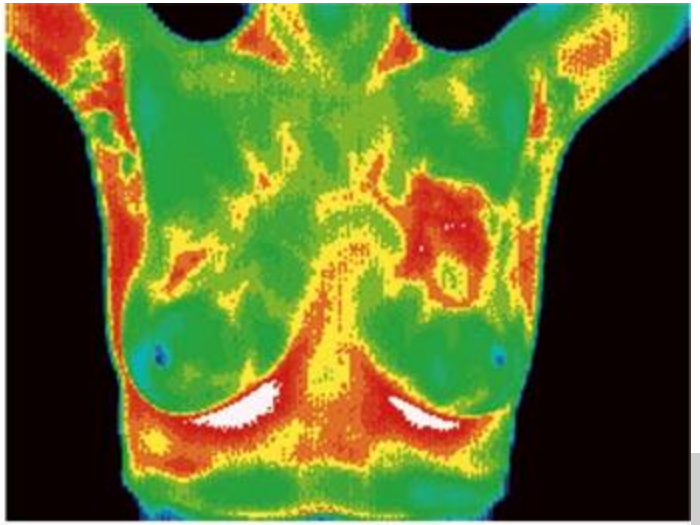


Thermography or Thermal Imaging

- From the FDA “Thermography has not been shown to be effective as a standalone test for either breast cancer screening or diagnosis of early stage breast cancer”
- Uses a special camera to measure the temperature of the skin on the breast surface
- Non invasive, no radiation
- Postulated increased blood flow and metabolism in the tumor bed increased skin temperature



Normal – No Issues



Cancer in Left Breast

Additional Imaging Tools

- AI software and Deep Learning algorithms improving efficiency and accuracy of interpretation
  - computer assisted detection improves reader efficiency, accuracy and inter-reader variability
- Contrast Enhanced Mammography
- US Sheer Wave Elastography

Review of Screening Guidelines: Alphabet Soup

USPSTF

ACS

ACR/SBI

ACR/SBI Guidelines

- Risk Assessment at age 30
- Annual Screening mammogram beginning at age 40
- Annual Screening Whole Breast Ultrasound for women with dense breast tissue
- Annual Screening MRI for women with >20% lifetime risk of breast cancer

USPSTF Screening Guidelines (ACS similar)

- Every 2 years starting at 50
- Discussion between patient and primary MD for screening early at 40
- Reasoning:
  - Psychological harm (anxiety)
  - Healthcare cost of additional imaging and biopsies (false positives)
  - Radiation Exposure
  - NNS too high for age 40-49

FLAWS:

- Meta Analysis of 9 RCTs: older, outdated studies
- Increased healthcare cost for cancer treatment
- Anxiety can be address with education
- Underestimates mortality benefit
  - Invited to screen versus control
  - 15% mortality benefit from age 39-49
  - No observational studies

ACR/SBI Guidelines

- Risk Assessment at age 30
- **Annual** Screenir mammogram be 40
- **Annual** Screenir Breast Ultrasour with dense brea
- **Annual** Screenir women with >2(risk of breast ca

WHY?

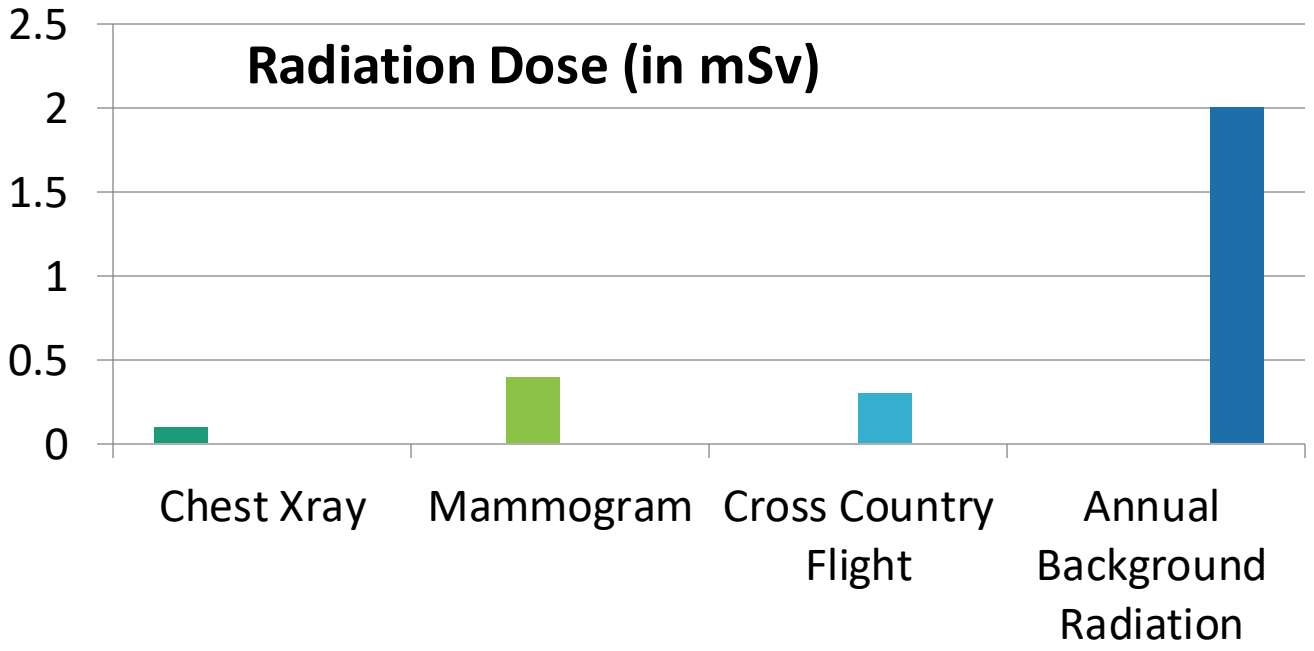
- About 15% more lives are saved by screening

are at risk for more
rs

at the patient and clinician
on life expectancy

Radiation Dose and Imaging

- Radiation dose is strictly monitored by the FDA and limited to 3mGy per breast (however in most centers actual dose is lower)
- Benefits of cancer detection far outweigh the (theoretical) risks
  - 1 in 10,000 women has a risk of developing a breast cancer caused by lifetime cumulative radiation
  - 1 in 8 women has a risk of developing naturally occurring breast cancer



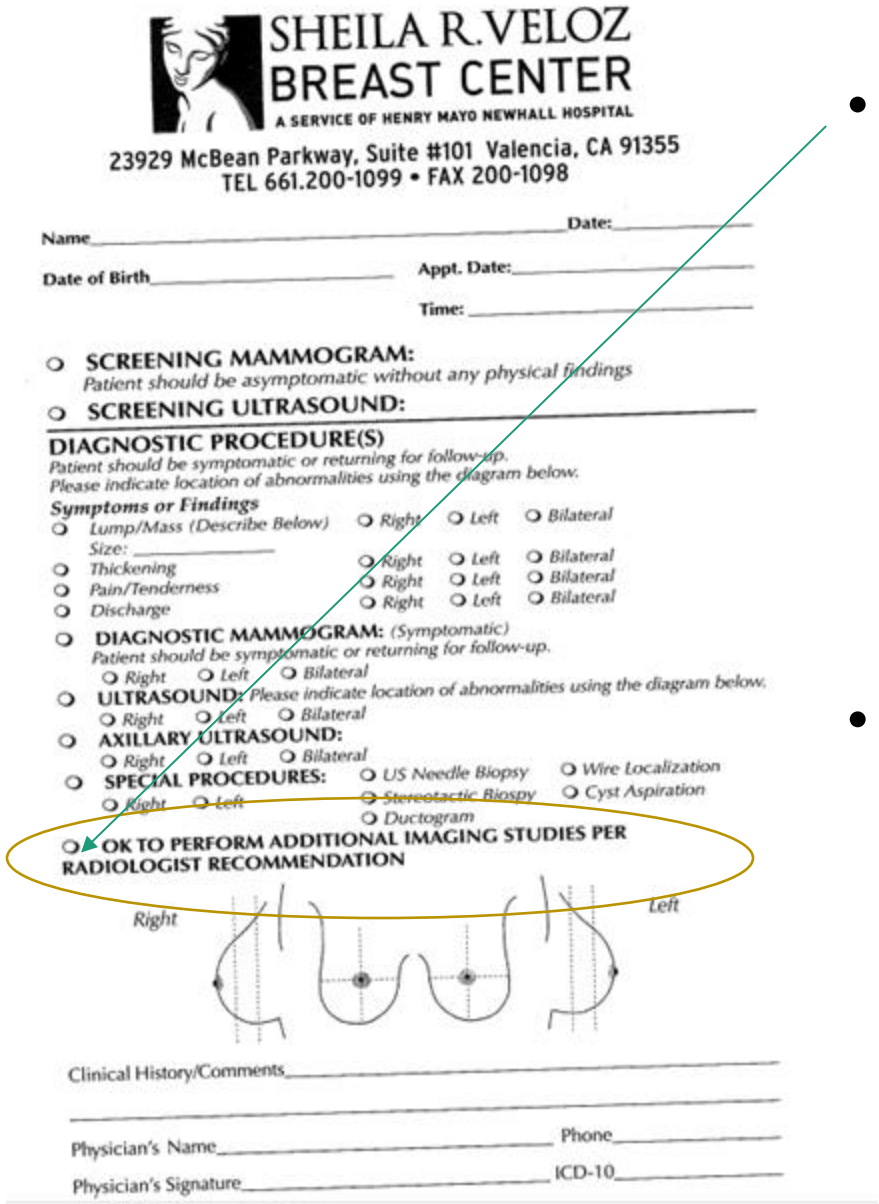
Reporting Terminology: BI-RADS Lexicon

SCREENING EXAM	DIAGNOSTIC EXAM
No physical exam symptoms or complaints	Physical exam finding by physician or patient
Mammogram or ABUS	Spot Compression, Magnification views and Targeted Ultrasound
Interpretation not given upon completion of exam	Findings reviewed and discussed with patient by radiologist upon completion of exam
BI-RADS 0, 1 or 2 assessments ONLY	BI-RADS 1-5 assessments
Does not require order from physician	Requires order from physician

Final Assessment Categories

Category		Management	Likelihood of cancer
0	Need additional imaging or prior examinations	Recall for additional imaging and/or await prior examinations	n/a
1	Negative	Routine screening	Essentially 0%
2	Benign	Routine screening	Essentially 0%
3	Probably Benign	Short interval-follow-up (6 month) or continued	>0 % but ≤ 2%
4	Suspicious	Tissue diagnosis	4a. low suspicion for malignancy (>2% to ≤ 10%) 4b. moderate suspicion for malignancy (>10% to ≤ 50%) 4c. high suspicion for malignancy (>50% to <95%)
5	Highly suggestive of malignancy	Tissue diagnosis	≥95%
6	Known biopsy-proven	Surgical excision when clinical appropriate	n/a

https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Bi-Rads



SHEILA R. VELOZ BREAST CENTER
A SERVICE OF HENRY MAYO NEWHALL HOSPITAL
23929 McBean Parkway, Suite #101 Valencia, CA 91355
TEL 661.200-1099 • FAX 200-1098

Name _____ Date: _____
Date of Birth _____ Appt. Date: _____
Time: _____

○ **SCREENING MAMMOGRAM:**
Patient should be asymptomatic without any physical findings
○ **SCREENING ULTRASOUND:**

DIAGNOSTIC PROCEDURE(S)
Patient should be symptomatic or returning for follow-up.
Please indicate location of abnormalities using the diagram below.

Symptoms or Findings
○ *Lump/Mass (Describe Below)* ○ *Right* ○ *Left* ○ *Bilateral*
Size: _____
○ *Thickening* ○ *Right* ○ *Left* ○ *Bilateral*
○ *Pain/Tenderness* ○ *Right* ○ *Left* ○ *Bilateral*
○ *Discharge* ○ *Right* ○ *Left* ○ *Bilateral*

○ **DIAGNOSTIC MAMMOGRAM:** *(Symptomatic)*
Patient should be symptomatic or returning for follow-up.
○ *Right* ○ *Left* ○ *Bilateral*
○ **ULTRASOUND:** *Please indicate location of abnormalities using the diagram below.*
○ *Right* ○ *Left* ○ *Bilateral*
○ **AXILLARY ULTRASOUND:**
○ *Right* ○ *Left* ○ *Bilateral*
○ **SPECIAL PROCEDURES:** ○ *US Needle Biopsy* ○ *Wire Localization*
○ *Right* ○ *Left* ○ *Stereotactic Biopsy* ○ *Cyst Aspiration*
○ *Ductogram*

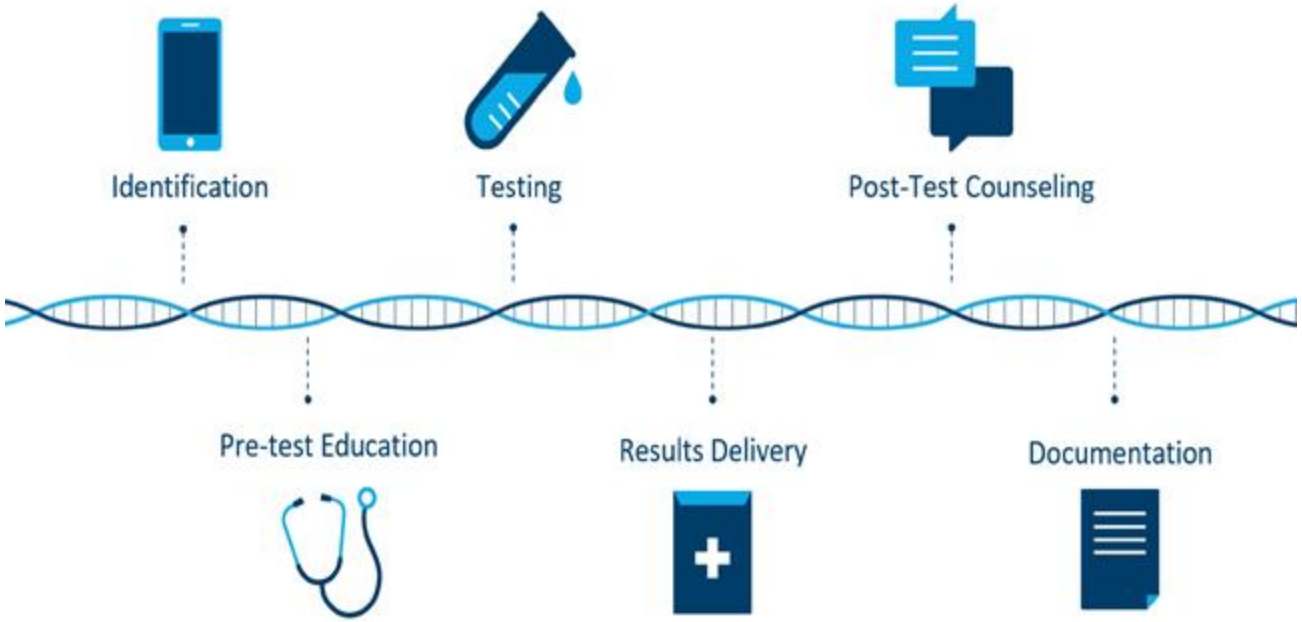
○ **OK TO PERFORM ADDITIONAL IMAGING STUDIES PER RADIOLOGIST RECOMMENDATION**

Right *Left*

Clinical History/Comments _____
_____
Physician's Name _____ Phone _____
Physician's Signature _____ ICD-10 _____

- For diagnostic imaging, this allows the Radiologist to add any additional studies that may be necessary to workup each patient on an individual basis.
- Also allows for same day add on biopsies.

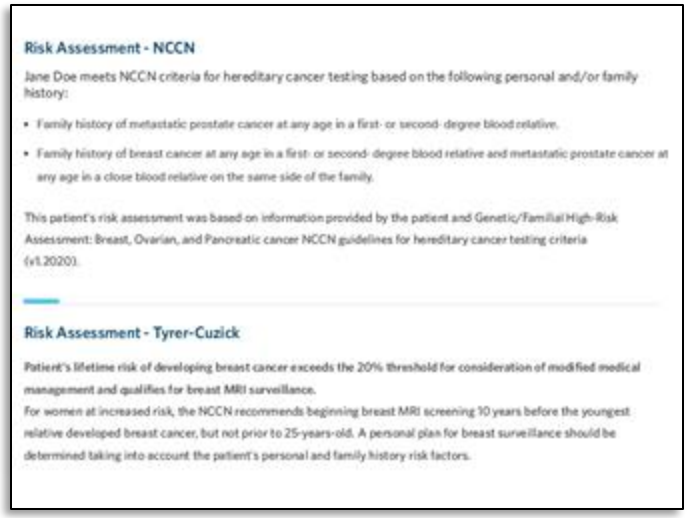
AMBRY Genetics CARE Program



- Identifies patients who qualify for genetic testing based on NCCN Criteria
- Allows us to test them SAME DAY as screening mammogram
- Identifies patients with HIGH TC Score >20%
- Tailors our approach to Breast Cancer Screening to the INDIVIDUAL

Results:

Clinical Summary Report



Risk Assessment - NCCN

Jane Doe meets NCCN criteria for hereditary cancer testing based on the following personal and/or family history:

- Family history of metastatic prostate cancer at any age in a first- or second- degree blood relative.
- Family history of breast cancer at any age in a first- or second- degree blood relative and metastatic prostate cancer at any age in a close blood relative on the same side of the family.

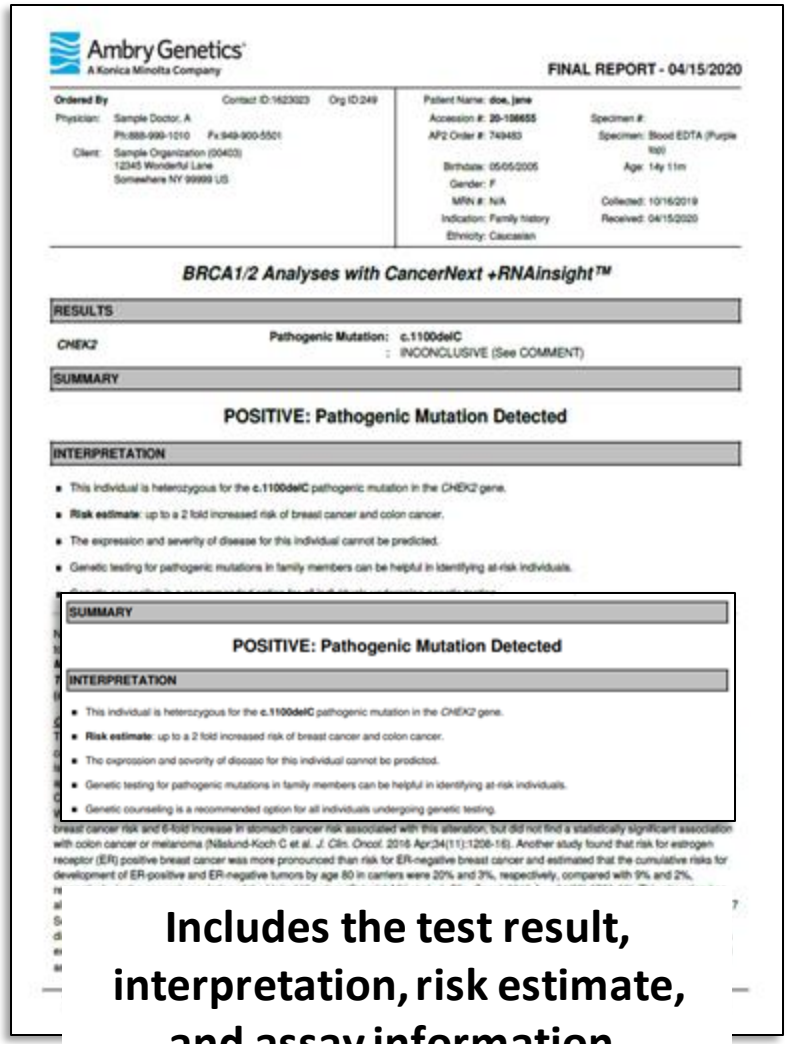
This patient's risk assessment was based on information provided by the patient and Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic cancer NCCN guidelines for hereditary cancer testing criteria (v1.2020).

Risk Assessment - Tyrer-Cuzick

Patient's lifetime risk of developing breast cancer exceeds the 20% threshold for consideration of modified medical management and qualifies for breast MRI surveillance.
For women at increased risk, the NCCN recommends beginning breast MRI screening 10 years before the youngest relative developed breast cancer, but not prior to 25-years-old. A personal plan for breast surveillance should be determined taking into account the patient's personal and family history risk factors.

Explains why the patient meets NCCN criteria or is at high-risk for developing breast cancer.

Genetic Testing Result



Ambry Genetics
A Konica Minolta Company

FINAL REPORT - 04/15/2020

Ordered By
Physician: Sample Doctor, A
Ph:888-999-1010 Fx:949-900-5501
Client: Sample Organization (00403)
12345 Wonderful Lane
Somewhere NY 99999 US

Patient Name: doe, jane
Accession #: 20-108655
AP2 Order #: 749483
Birthdate: 05/05/2005
Gender: F
MRN #: N/A
Indication: Family history
Ethnicity: Caucasian
Specimen:
Specimen: Blood EDTA (Purple top)
Age: 14y 11m
Collected: 10/16/2019
Received: 04/15/2020

BRCA1/2 Analyses with CancerNext +RNAinsight™

RESULTS

CHEK2 — **Pathogenic Mutation:** c.1100delC
: INCONCLUSIVE (See COMMENT)

SUMMARY

POSITIVE: Pathogenic Mutation Detected

INTERPRETATION

- This individual is heterozygous for the **c.1100delC** pathogenic mutation in the *CHEK2* gene.
- **Risk estimate**: up to a 2 fold increased risk of breast cancer and colon cancer.
- The expression and severity of disease for this individual cannot be predicted.
- Genetic testing for pathogenic mutations in family members can be helpful in identifying at-risk individuals.

SUMMARY

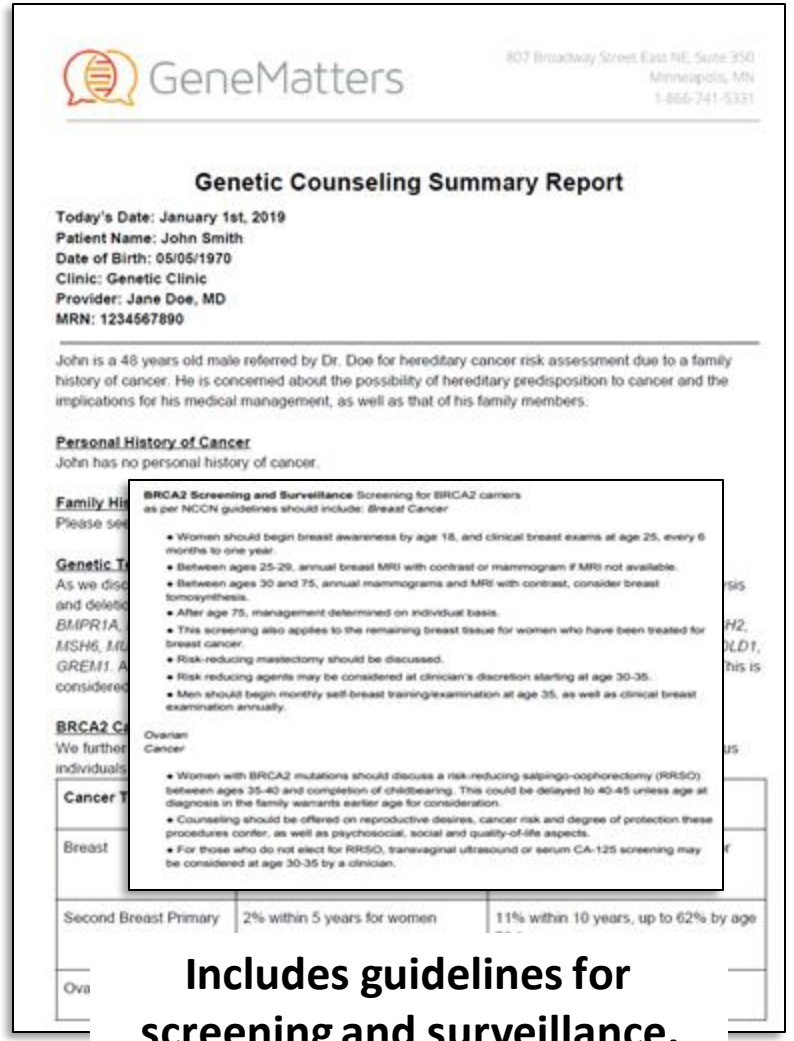
POSITIVE: Pathogenic Mutation Detected

INTERPRETATION

- This individual is heterozygous for the **c.1100delC** pathogenic mutation in the *CHEK2* gene.
- **Risk estimate**: up to a 2 fold increased risk of breast cancer and colon cancer.
- The expression and severity of disease for this individual cannot be predicted.
- Genetic testing for pathogenic mutations in family members can be helpful in identifying at-risk individuals.
- Genetic counseling is a recommended option for all individuals undergoing genetic testing.

Includes the test result, interpretation, risk estimate, and assay information.

GeneMatters - Post Test Counseling Report



GeneMatters

Genetic Counseling Summary Report

Today's Date: January 1st, 2019
Patient Name: John Smith
Date of Birth: 05/05/1970
Clinic: Genetic Clinic
Provider: Jane Doe, MD
MRN: 1234567890

John is a 48 years old male referred by Dr. Doe for hereditary cancer risk assessment due to a family history of cancer. He is concerned about the possibility of hereditary predisposition to cancer and the implications for his medical management, as well as that of his family members.

Personal History of Cancer
John has no personal history of cancer.

BRCA2 Screening and Surveillance Screening for BRCA2 carriers as per NCCN guidelines should include: *Breast Cancer*

- Women should begin breast awareness by age 18, and clinical breast exams at age 25, every 6 months to one year.
- Between ages 25-29, annual breast MRI with contrast or mammogram if MRI not available.
- Between ages 30 and 75, annual mammograms and MRI with contrast, consider breast tomosynthesis.
- After age 75, management determined on individual basis.
- This screening also applies to the remaining breast tissue for women who have been treated for breast cancer.
- Risk-reducing mastectomy should be discussed.
- Risk reducing agents may be considered at clinician's discretion starting at age 30-35.
- Men should begin monthly self-breast training/examination at age 35, as well as clinical breast examination annually.

Ovarian Cancer

- Women with BRCA2 mutations should discuss a risk-reducing salpingo-oophorectomy (RRSO) between ages 35-40 and completion of childbearing. This could be delayed to 40-45 unless age at diagnosis in the family warrants earlier age for consideration.
- Counseling should be offered on reproductive desires, cancer risk and degree of protection these procedures confer, as well as psychosocial, social and quality-of-life aspects.
- For those who do not elect for RRSO, transvaginal ultrasound or serum CA-125 screening may be considered at age 30-35 by a clinician.

Cancer T		
Breast		
Second Breast Primary	2% within 5 years for women	11% within 10 years, up to 62% by age
Ova		

Includes guidelines for screening and surveillance.

Keck Medicine of USC and Henry Mayo Newhall Hospital

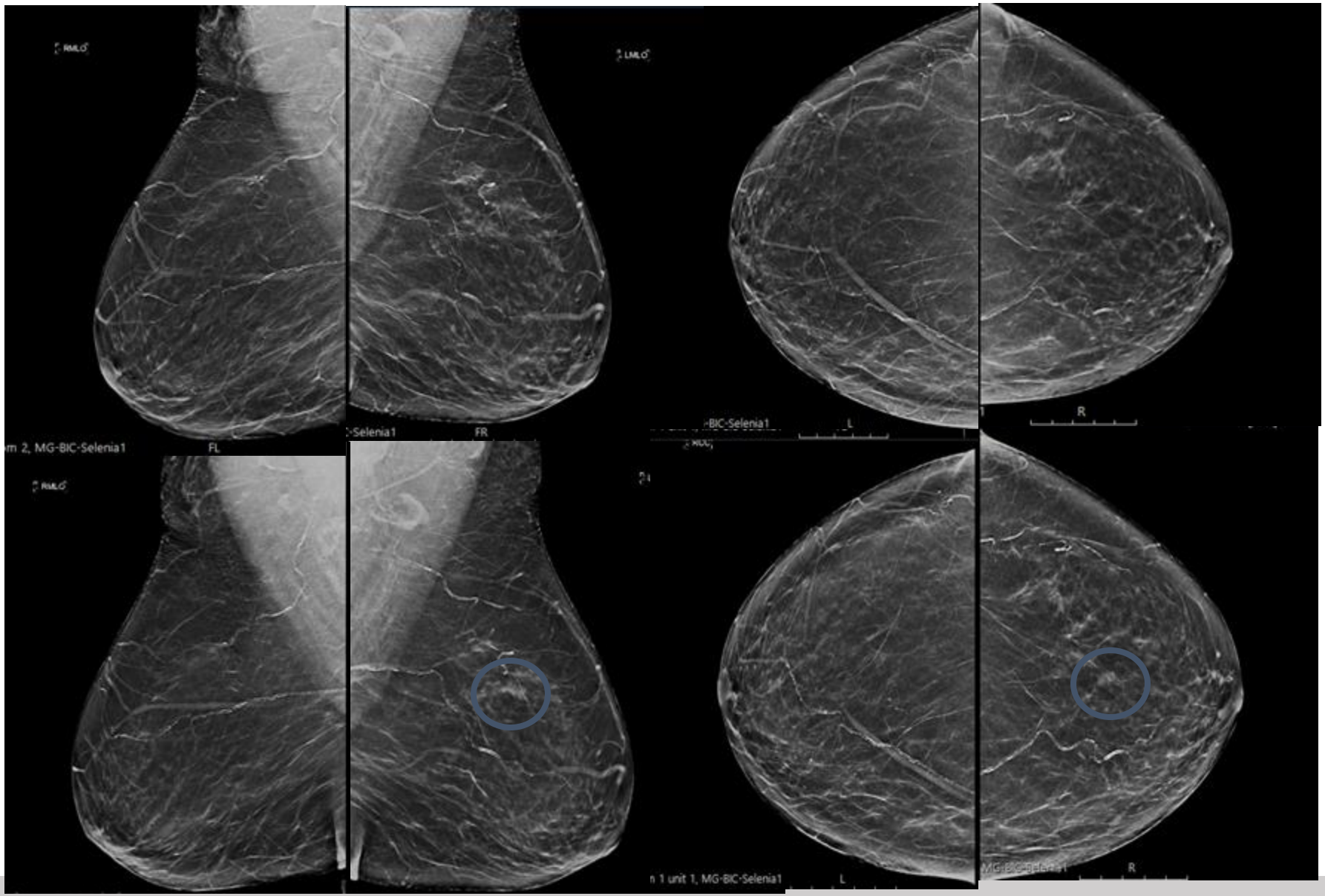
May 29, 2020 - August 25, 2022

	Sheila R. Veloz	Breast & Imagine Centers	All CARE Sites
# Of unique patients	12,833	607,991	789,996
# Of assessments sent	12,780	419,831	638,642
# Of assessments completed	11,256 (88%)	270,234 (64.37%)	408,260 (63.93%)
Patients meeting NCCN guidelines for GT	30%	31.9%	30%
# Of patients with TC score over 20%	1,549 (12%)	~30 K	~44 K
# of tests reported	1,385	~20 K	~31 K

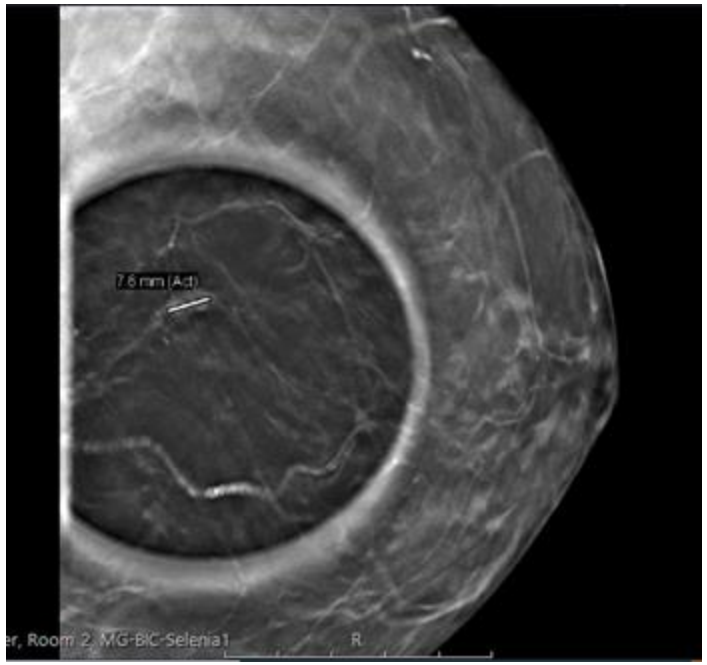
Result Details

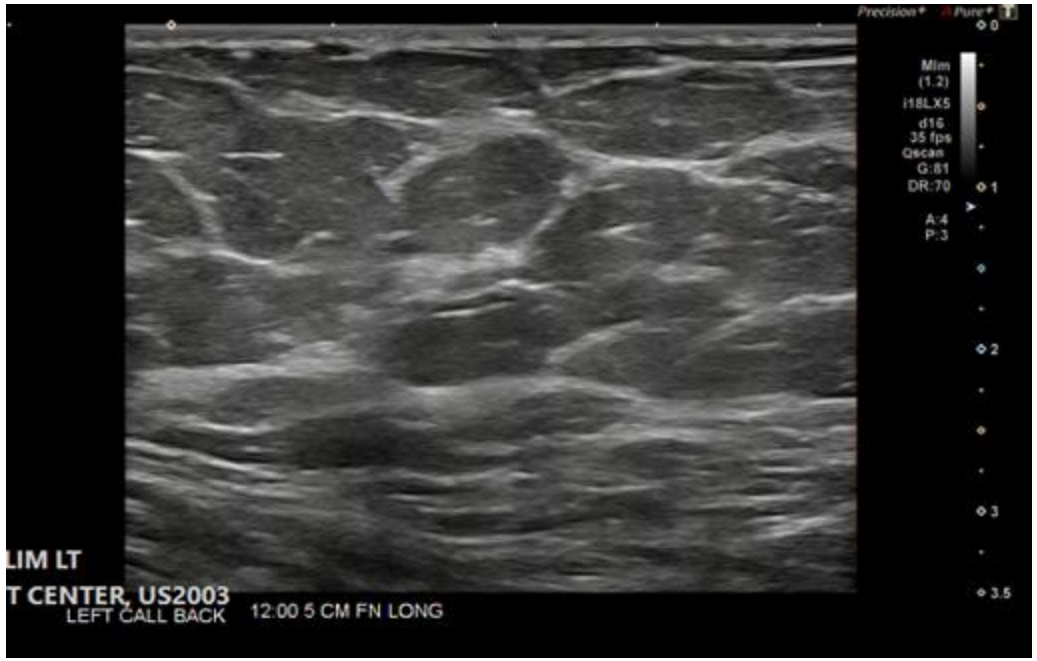
	Sheila R. Veloz	Breast & Imagine Centers	All CARE Sites
Positive	7.94%	8.22%	8.82%
Variant of Uncertain Significance (VUS)	22.94%	24.88%	24.86%
Negative	69.12%	66.90%	66.33%

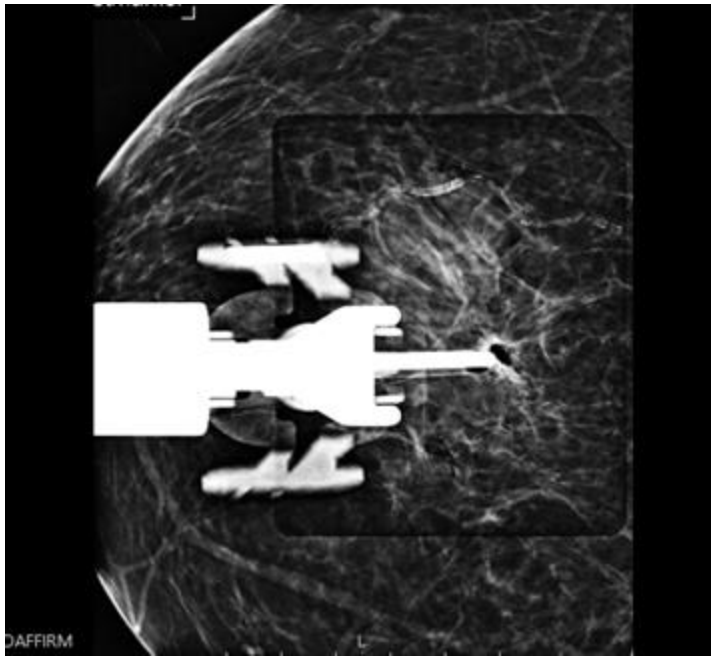
69 yo woman, screening mammogram, BI-RADS 0



Diagnostic Imaging: BI-RADS 4, suspicious for malignancy. Stereotactic biopsy recommended.

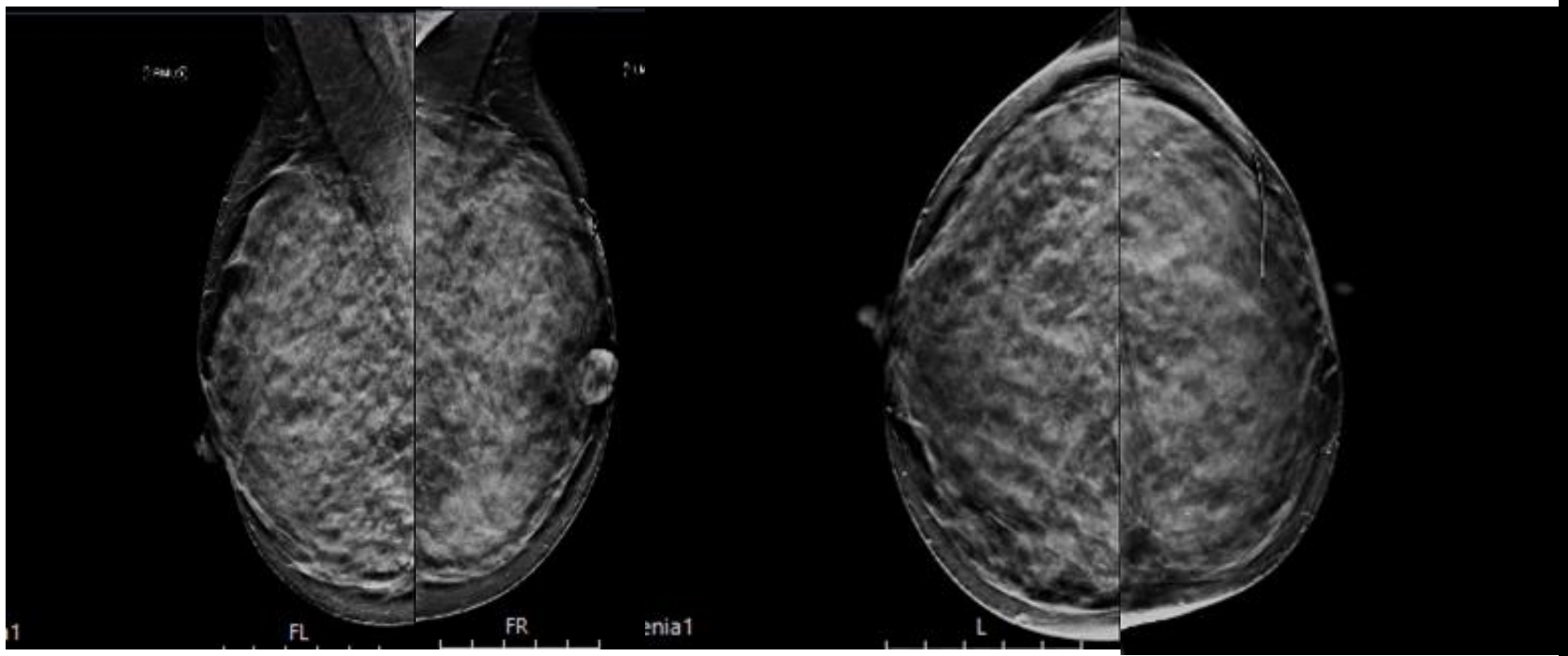


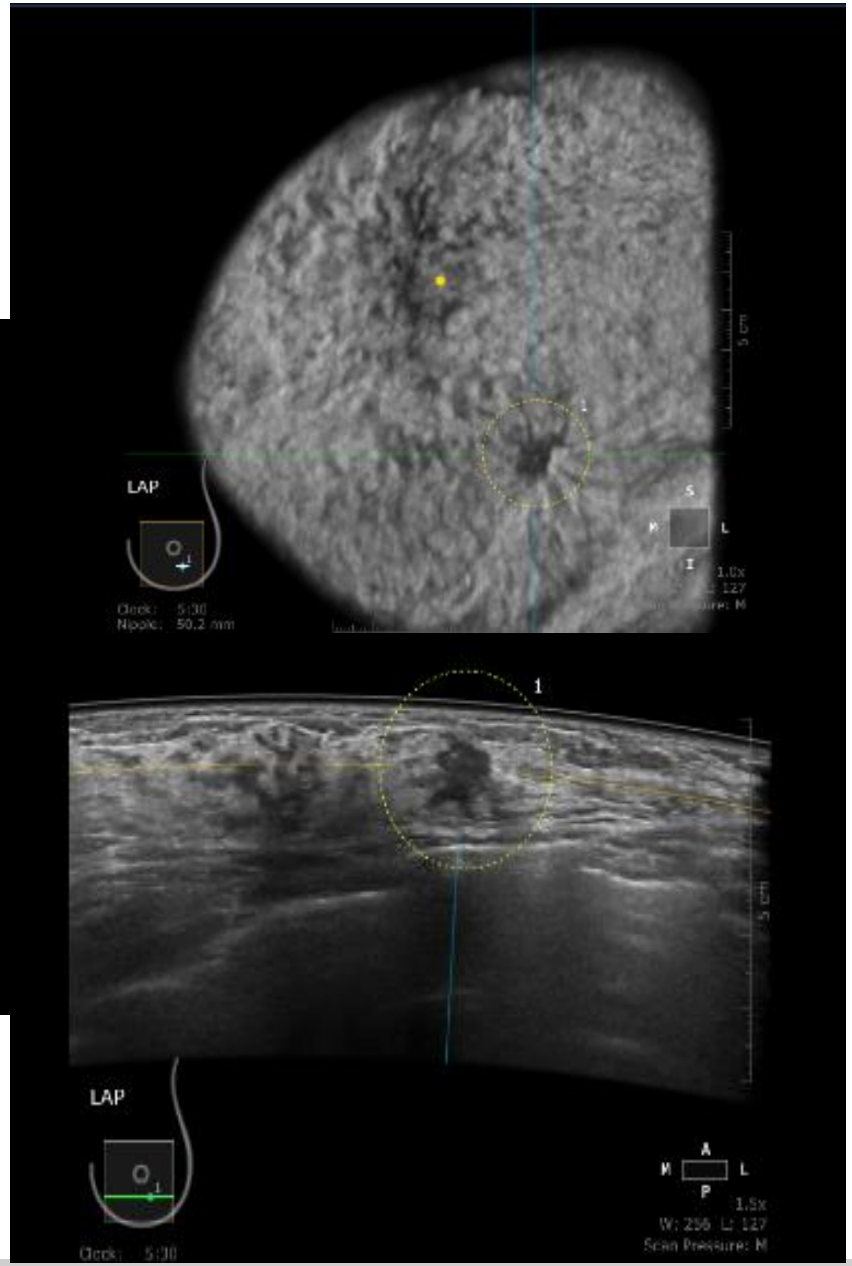




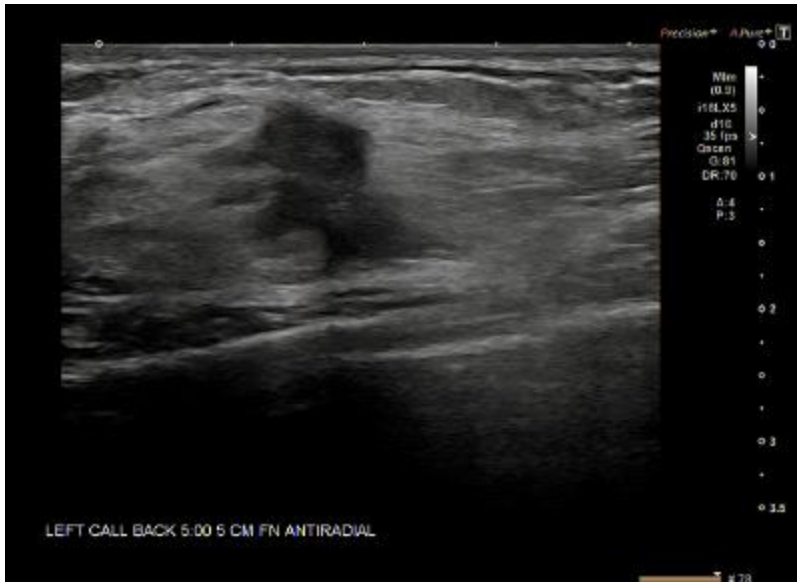
Tomo Guided Stereotactic Biopsy yielded: Invasive ductal carcinoma and DCIS

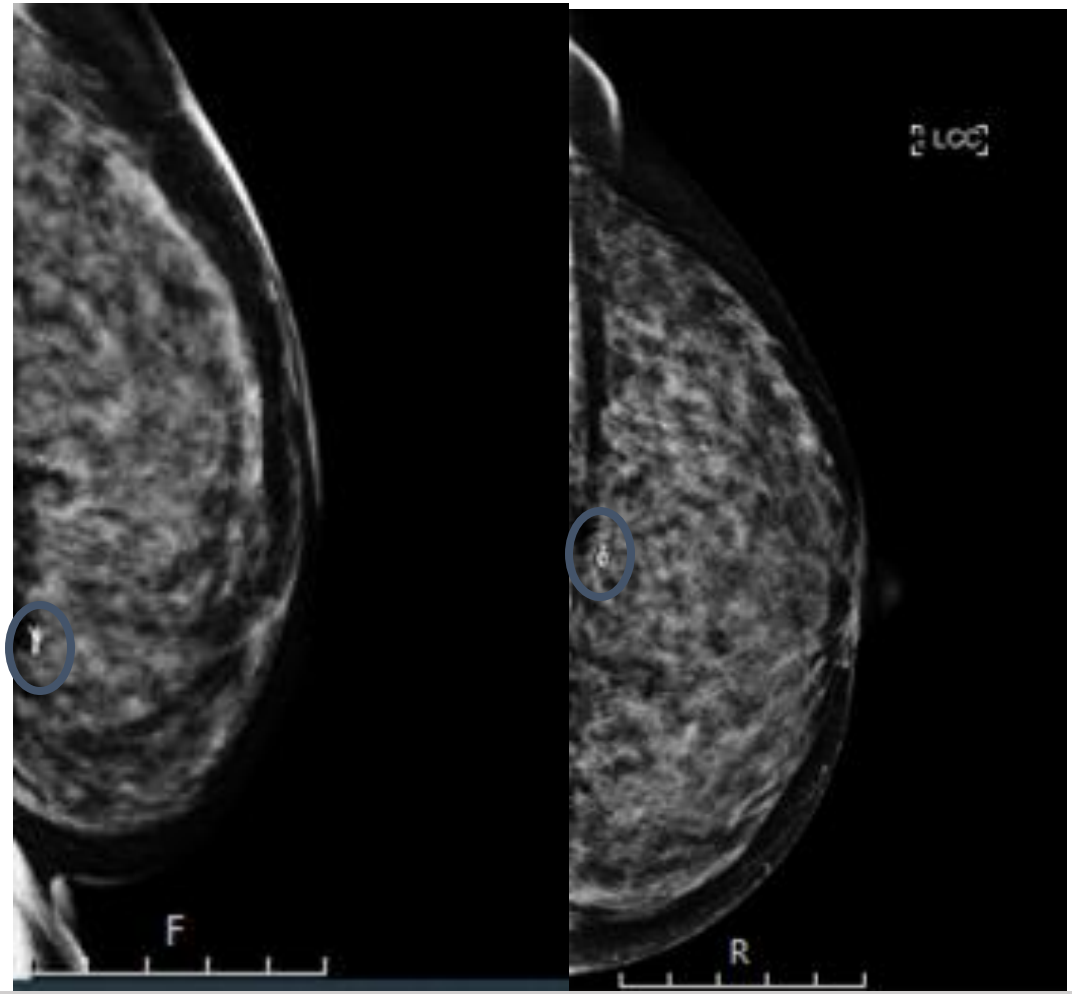
55 yo woman, screening mammogram and ABUS, BI-RADS 0





Diagnostic Imaging: BI-RADS 4, suspicious for malignancy. Ultrasound guided biopsy recommended.





Ultrasound guided core biopsy yielded: Invasive ductal carcinoma

ACR/SBI Guidelines

- Risk Assessment at age 30
- **Annual** Screening mammogram beginning at age **40**
- **Annual** Screening Whole Breast Ultrasound for women with dense breast tissue
- **Annual** Screening MRI for women with >20% lifetime risk of breast cancer

Works Cited

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https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Bi-Rads

Coldman A, Phillips N, Warren L, Kan L. Breast cancer mortality after screening mammography in British Columbia women. Int J Cancer 2007;120:1076-1080 16. Tabar L, Yen MF, Vitak B, Chen HH,

Smith RA, Duffy SW. Mammography service screening and mortality in breast cancer patients: 20-year followup before and after introduction of screening. Lancet 2003;361:1405-1410

https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/breast-cancer-survival-rates.html

END

Reminders

- Stop at our Patient and Provider Educational Materials Station.
- For instructions on CME credit hours, please see the reference sheet in the red folder in your bags.
- Pick up your laminated Let's Get Back to Screening Poster on your way out.

BREAK

It's 2022 –
Let's Get Back to Cancer Screening

May Lin Tao, MD, MSHS

Director of USC/**Henry Mayo Cancer Program**, Santa Clarita Valley
Clinical Associate Professor of Radiation Oncology, Keck Medicine of USC

Coming up:

Lung Cancer Screening

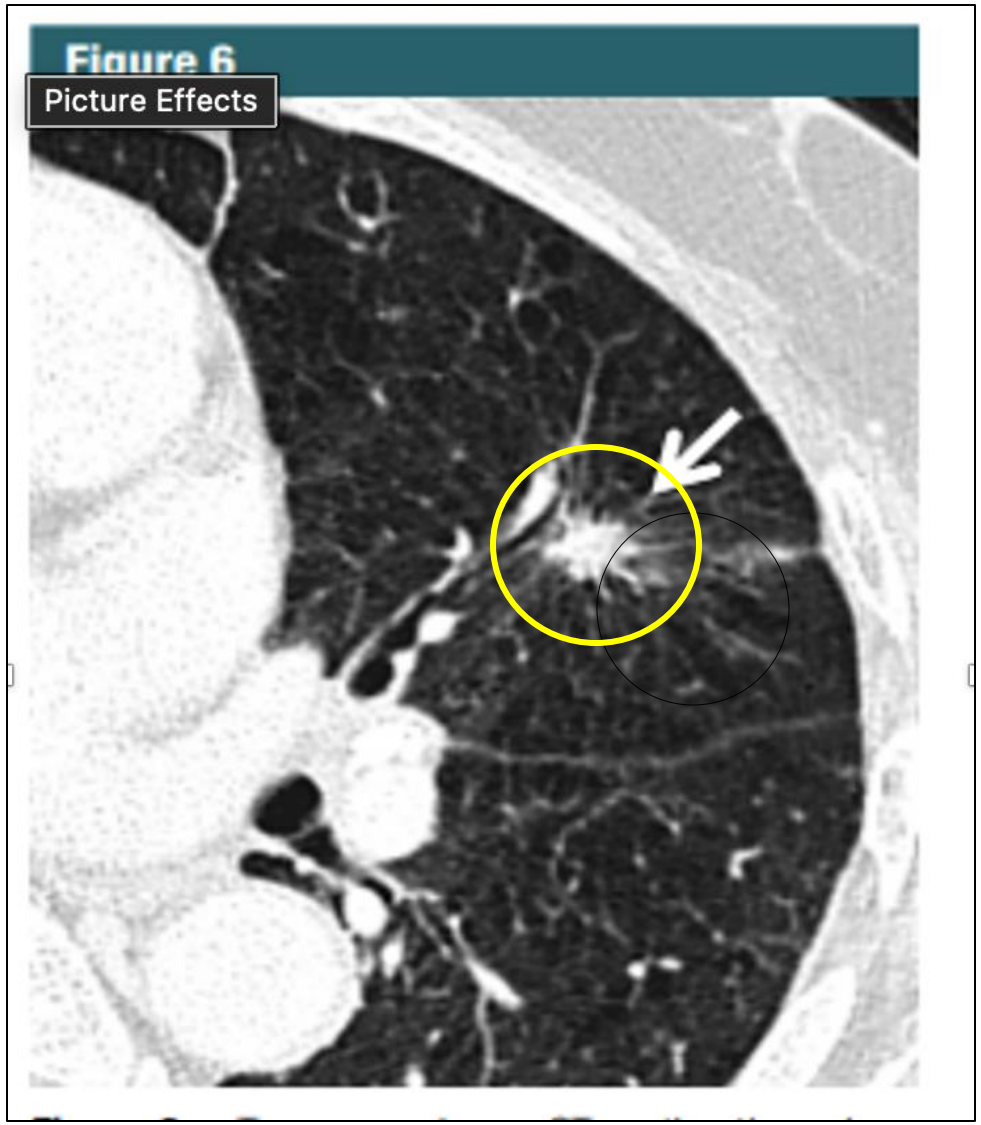
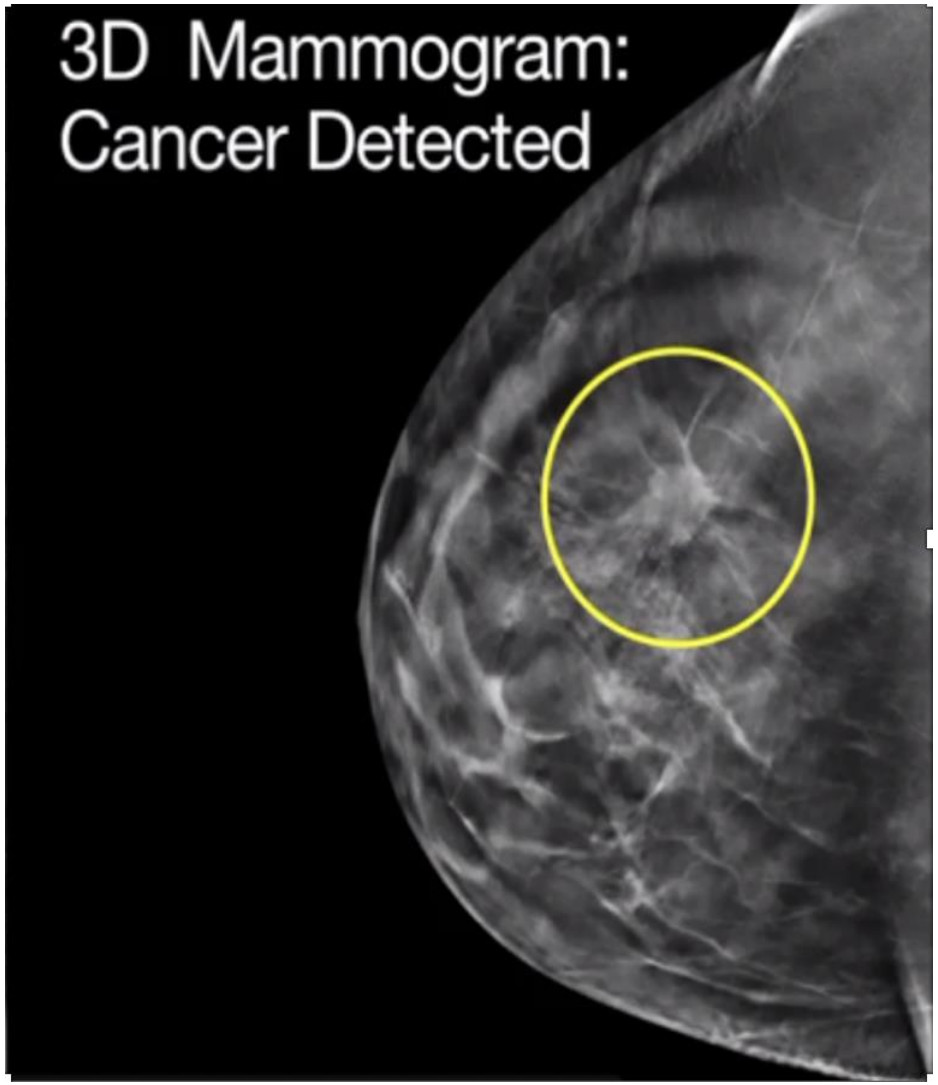


Figure 6
Picture Effects


3D Mammogram:
Cancer Detected

Lung Cancer Screening
Advanced diagnostic Intervention

Mostafa Tabassomi MD
Interventional Pulmonologist
Pulmonary & Critical Care Medicine

Date: 9/10/2022

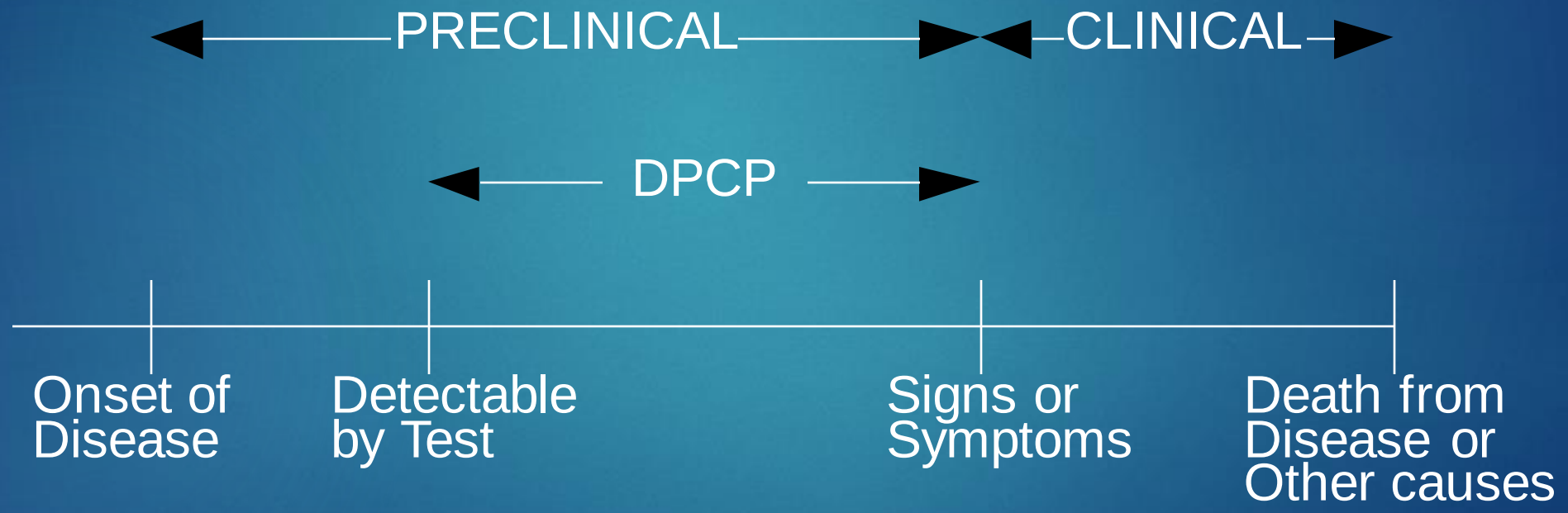
Screening vs Diagnosis

Non-patients	Patients
Asymptomatic	Symptomatic
Test non-diagnostic	Test diagnostic
Low prevalence	High prevalence

Screening vs Diagnosis

Non-patients	Patients
Asymptomatic	Symptomatic
Test non-diagnostic	Test diagnostic
Low prevalence	High prevalence

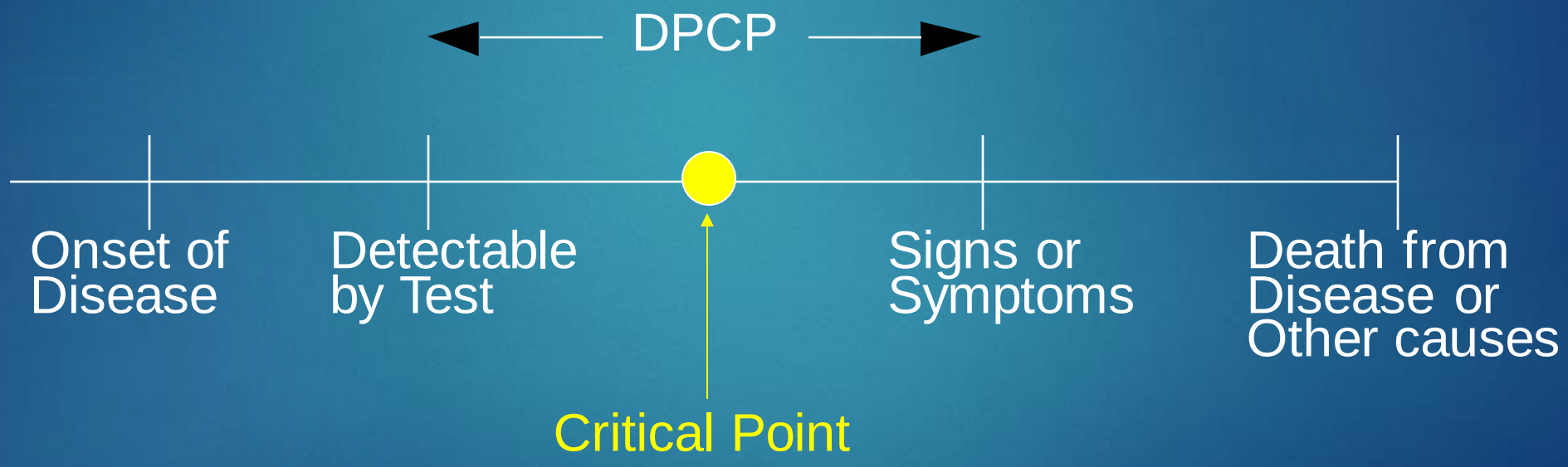
Timeline of Disease



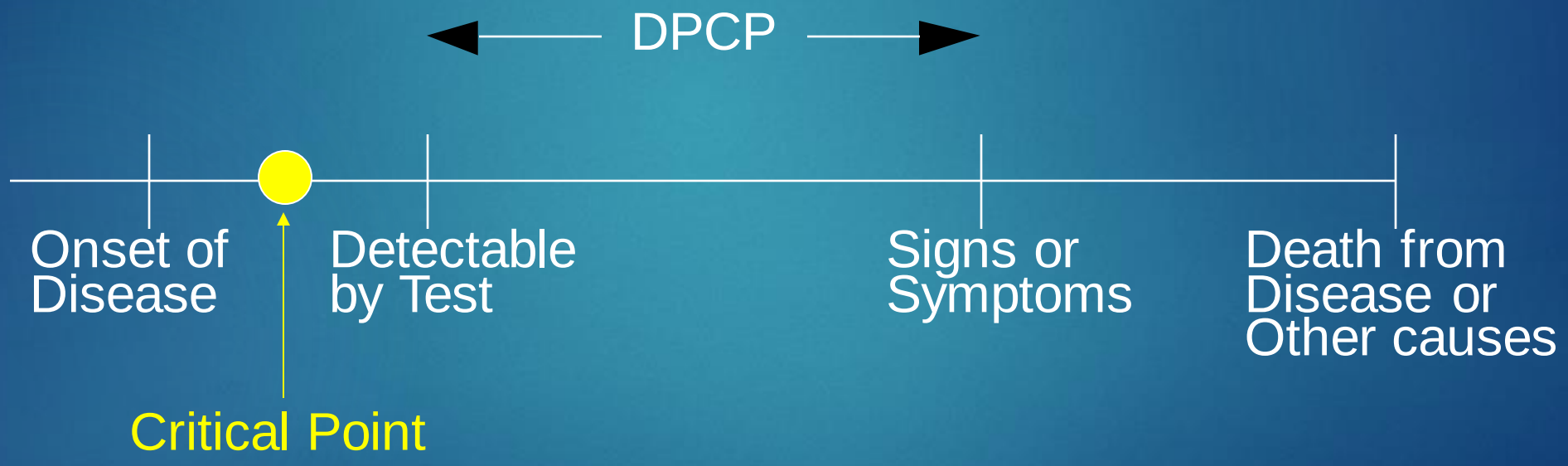
Critical Point

The point in the natural history of disease before which therapy is more effective.

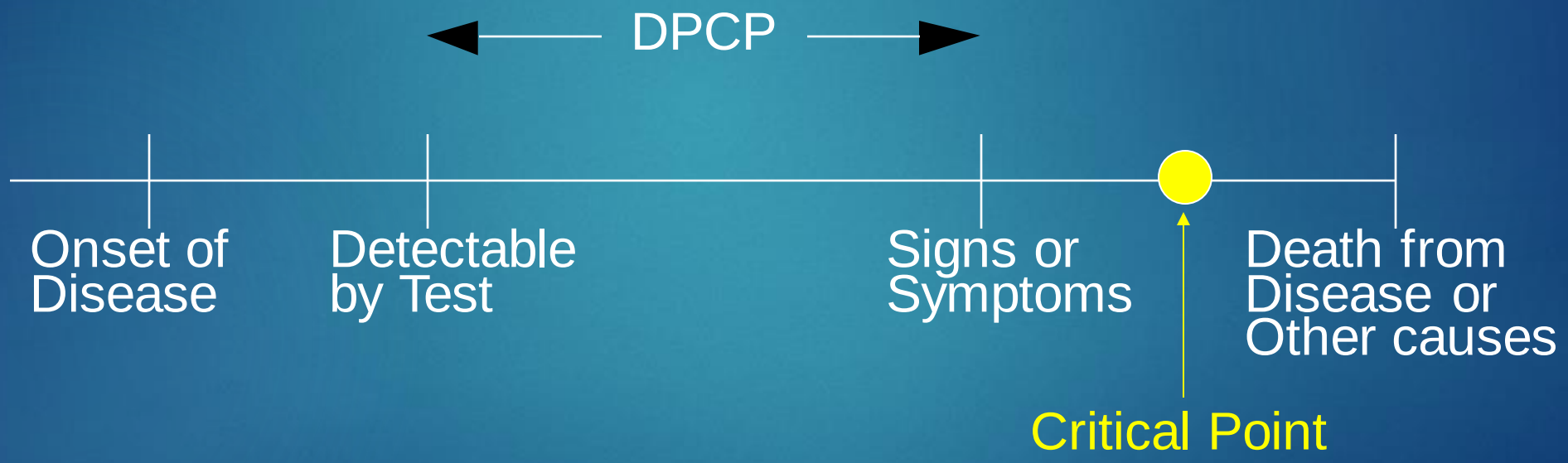
Screening Effective



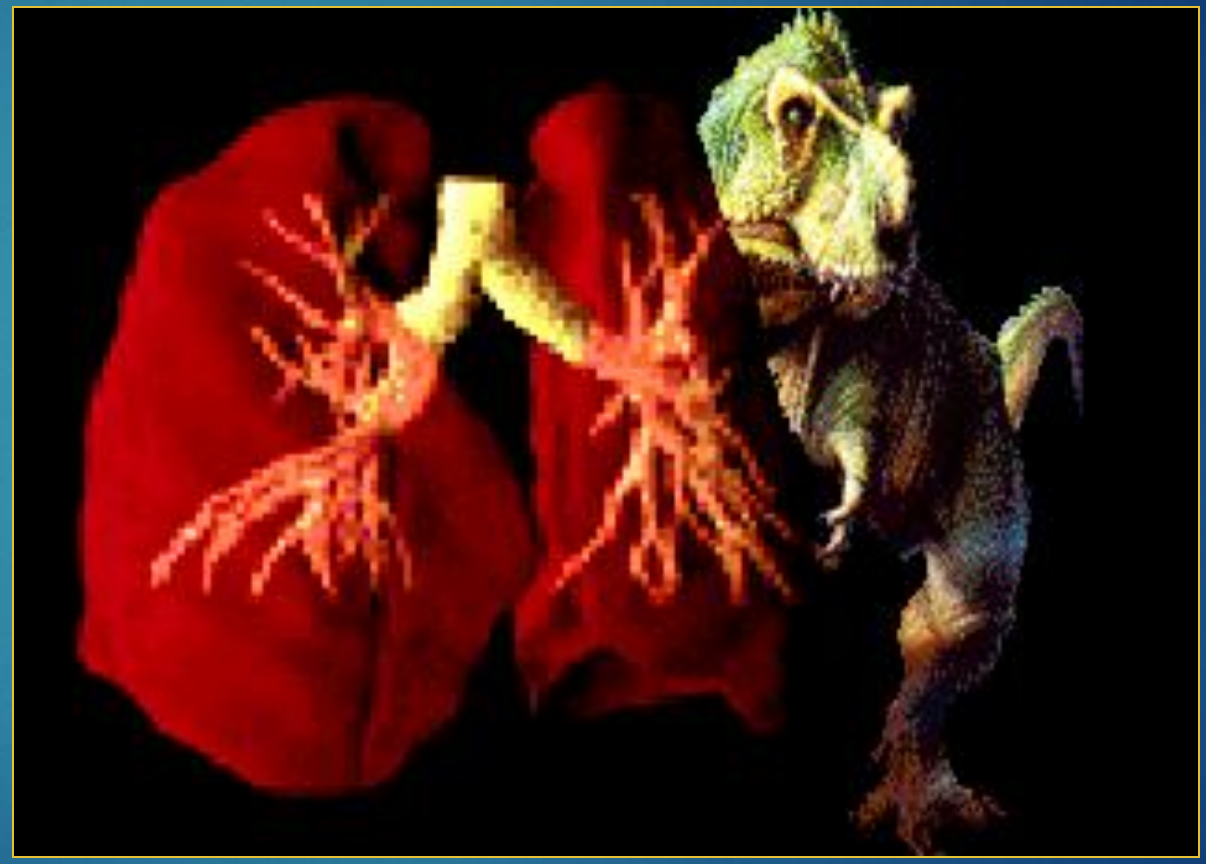
Screening Ineffective



Screening Unnecessary



Lung Cancer



Only 7% cured in 1971: only 15% cured today.

Keck Medicine of USC and Henry Mayo Newhall Hospital

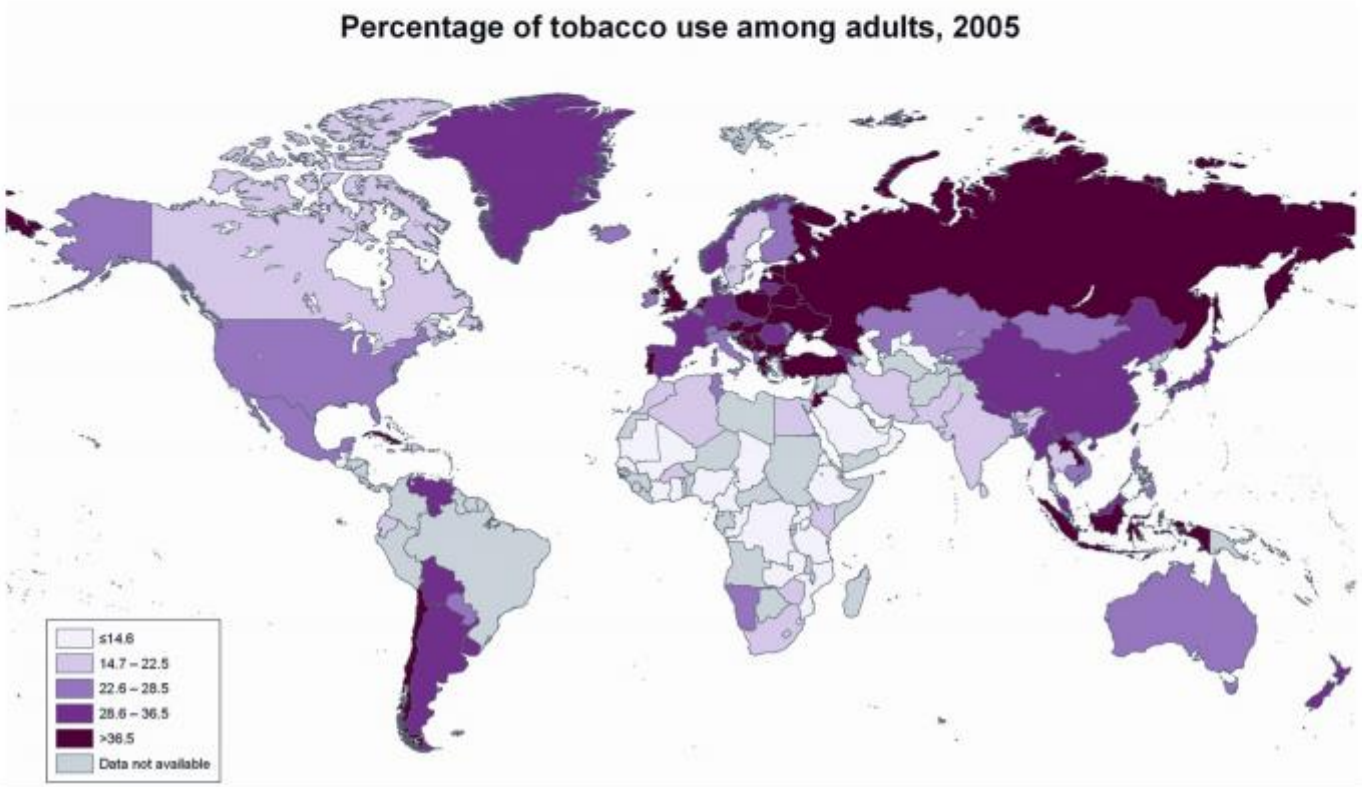
Lung cancer

- The US numbers are staggering:
  - 228,000 new cases yearly
  - 142,670 will die of the disease

American Cancer Society 2019

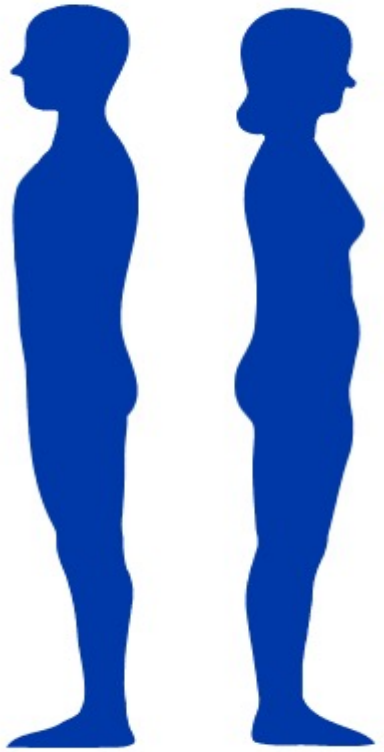
Lung Cancer: Global Impact

- Most common cause of cancer death
- 1.8 million new lung cancer cases per year
- 1.6 million deaths per year (more than TB, malaria, HIV)



Estimated New Cancer Cases* in the US in 2018

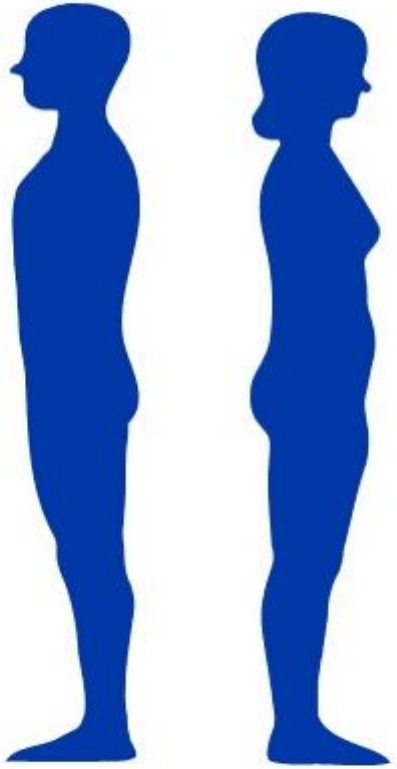
Males 856,370		Females 878,980	
Prostate	19%	30%	Breast
Lung & bronchus	14%	13%	Lung & bronchus
Colon & rectum	9%	7%	Colon & rectum
Urinary bladder	7%	7%	Uterine corpus
Melanoma of skin	6%	5%	Thyroid
Kidney & renal pelvis	5%	4%	Melanoma of skin
Non-Hodgkin lymphoma	5%	4%	Non-Hodgkin lymphoma
Oral cavity & pharynx	4%	3%	Pancreas
Leukemia	4%	3%	Leukemia
Liver & intrahepatic bile duct	4%	3%	Kidney & renal pelvis
All other sites	22%	21%	All other sites



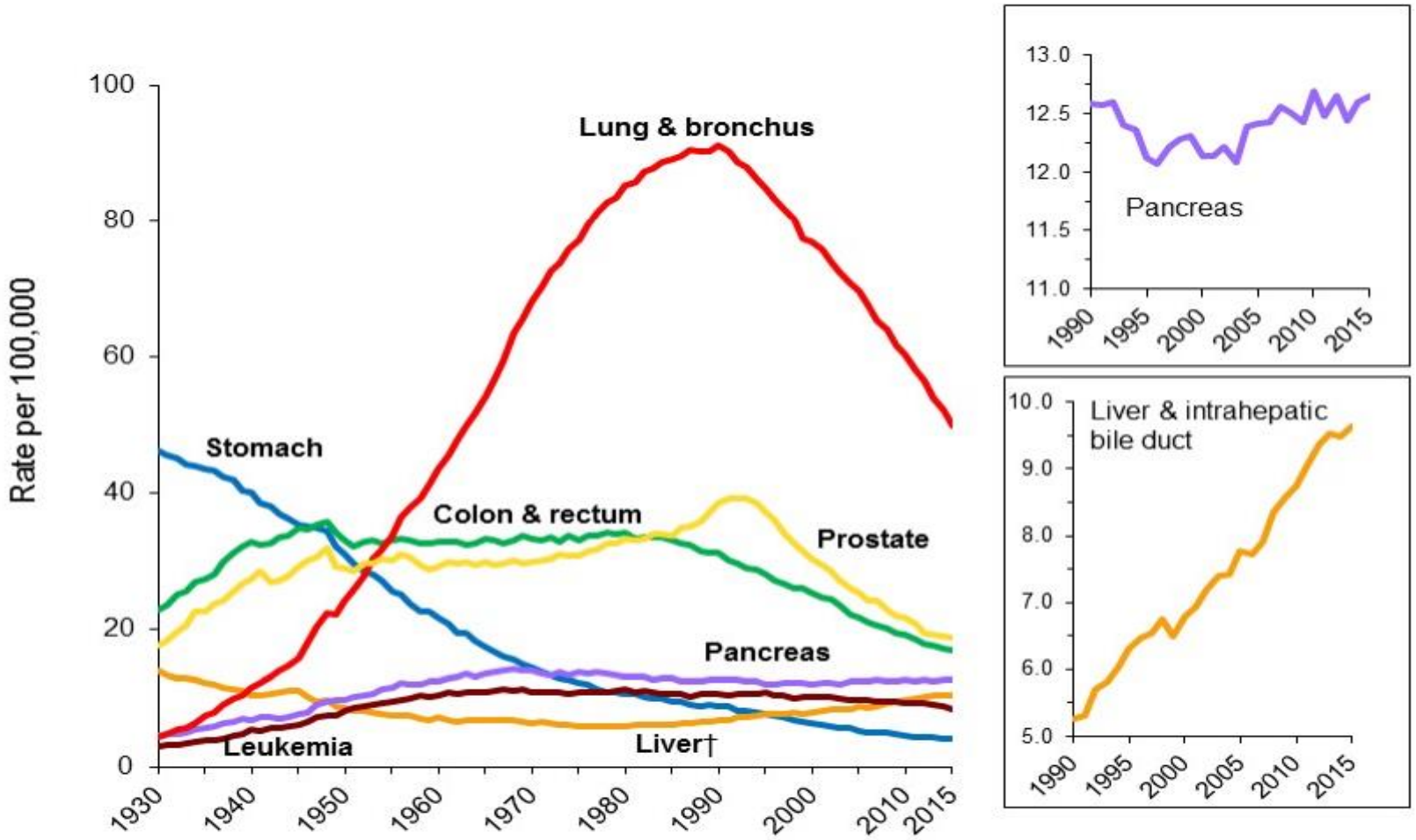
*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Estimated Cancer Deaths in the US in 2018

Males 323,630		Females 286,010	
Lung & bronchus	26%	25%	Lung & bronchus
Prostate	9%	14%	Breast
Colon & rectum	8%	8%	Colon & rectum
Pancreas	7%	7%	Pancreas
Liver & intrahepatic bile duct	6%	5%	Ovary
Leukemia	4%	4%	Uterine corpus
Esophagus	4%	4%	Leukemia
Urinary bladder	4%	3%	Liver & intrahepatic bile duct
Non-Hodgkin lymphoma	4%	3%	Non-Hodgkin lymphoma
Kidney & renal pelvis	3%	3%	Brain & other nervous system
All other sites	24%	24%	All other sites

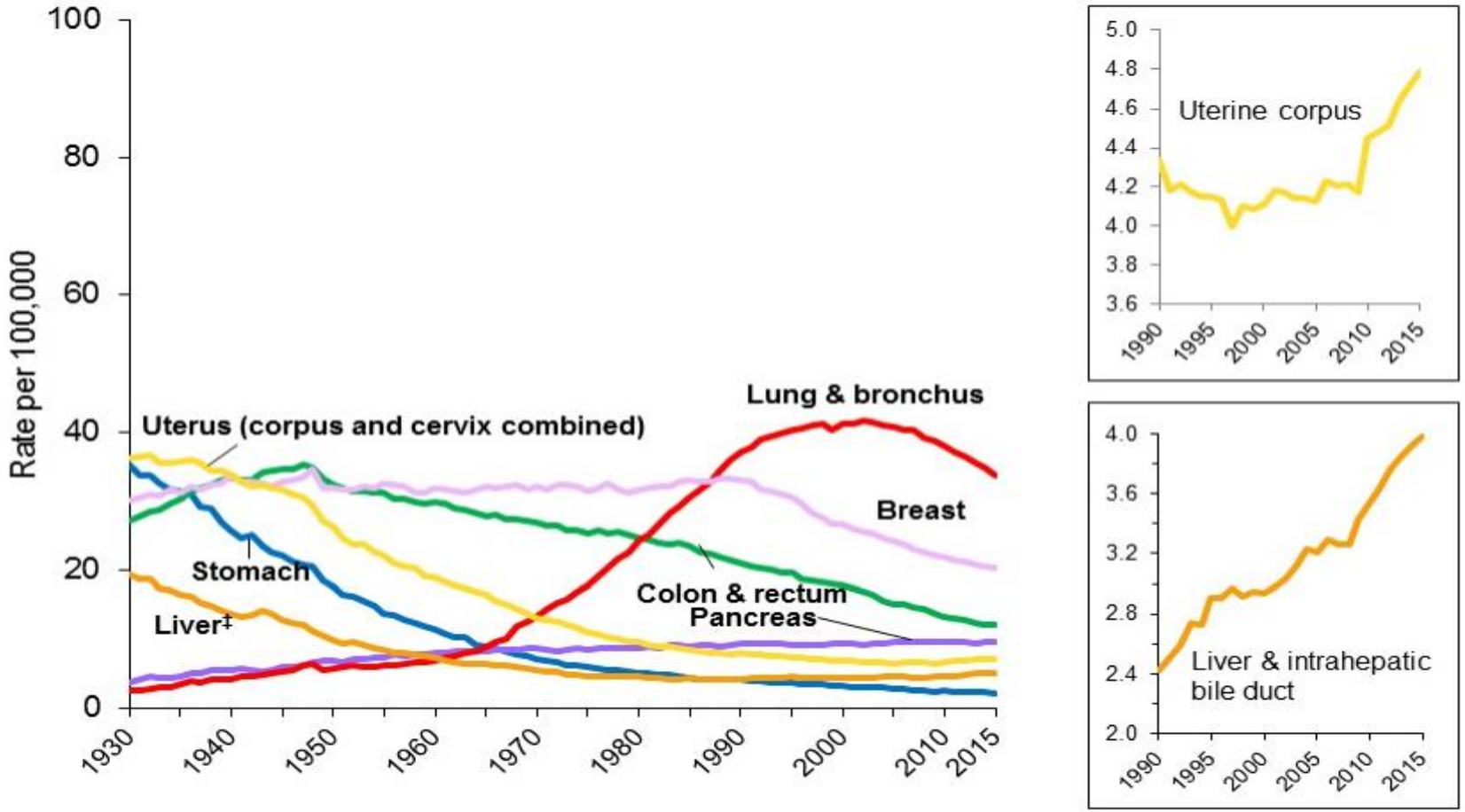


Trends in Cancer Death Rates* Among Males, US,1930-2015



*Age-adjusted to the 2000 US standard population. †Includes intrahepatic bile duct, gallbladder, and other biliary.
NOTE: Due to International Classification of Diseases coding changes, numerator information for colorectal, liver, and lung cancers has changed over time
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2017.

Trends in Cancer Death Rates* Among Females, US,1930-2015



*Age-adjusted to the 2000 US standard population. †Uterus includes uterine corpus and uterine cervix combined. ‡Includes intrahepatic bile duct, gallbladder, and other biliary.
NOTE: Due to International Classification of Diseases coding changes, numerator information for colorectal, liver, lung, and uterine cancers has changed over time.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2017.

Etiology of Lung Cancer

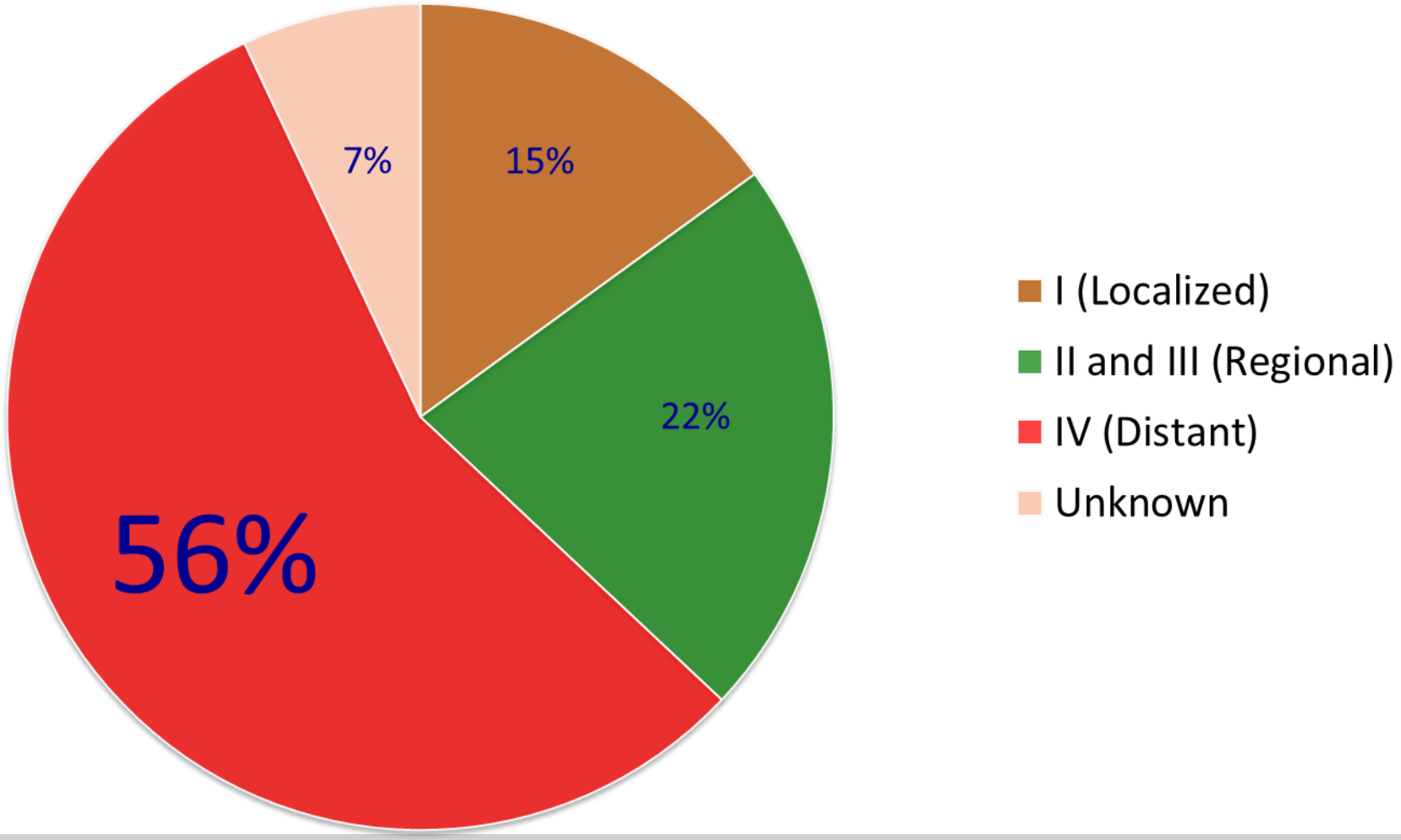
- Tobacco causes 80 – 90%
  - Clear dose response relationship
- Individual (genetic) susceptibility
  - 10 – 15% of active smokers will develop lung cancer
- Other causes include asbestos, radon, polycyclic hydrocarbons, cadmium, chloromethyl ether, chromium, nickel, arsenic may cause lung cancer
- Age is a risk factor: Average age at dx is 70
- COPD is a risk factor
  - (3-6x more likely than smoking alone)

Screening: The Two Largest Screening Trials

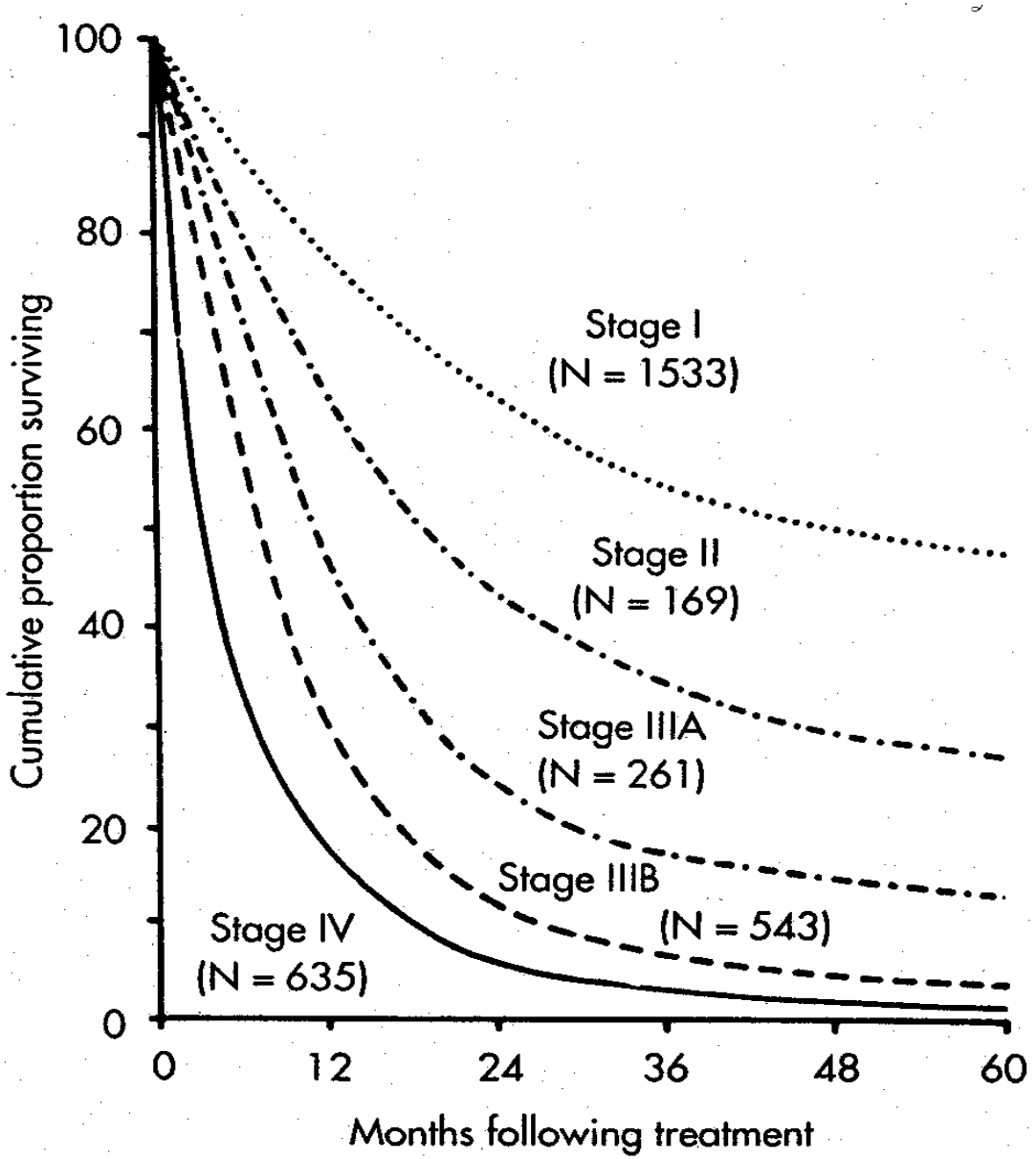
	NLST (53,454)	NELSON (15,792)
Inclusion	55-74 years, 30+ pack-years, smoked in past 15 years; 33 sites	**50**-74 years, ½ ppd x >30 years or ¾ ppd x > 25 years, smoked in past **10** years; 4 sites central read
Screens and Follow-up	Baseline, years 1 and 2; 6-7 yrs	Baseline, years 1, 3, and **5.5**; 10 yrs
Control Arm	Chest radiograph	No screening
Nodule ID and Evaluation	≥ 4 mm, site discretion	Volumetric, 50-500 mm^3 repeat CT in 3 months, VDT < 400 days
Lung Cancer Mortality Reduction	20% (16%); 8% men, **27%** women	27%; 26% men, **39%** women
Overall Survival	Improved	No difference

Screening Recommendation		
	USPTF-2013	Expanded USPTF-2020
Age	55-80	50-80
Smoking	>30 pack year	>20 pack year
Quit	<15 years ago	<15 years ago
Comments	Over 8 million eligible for screening	Estimated additional 6.5 million

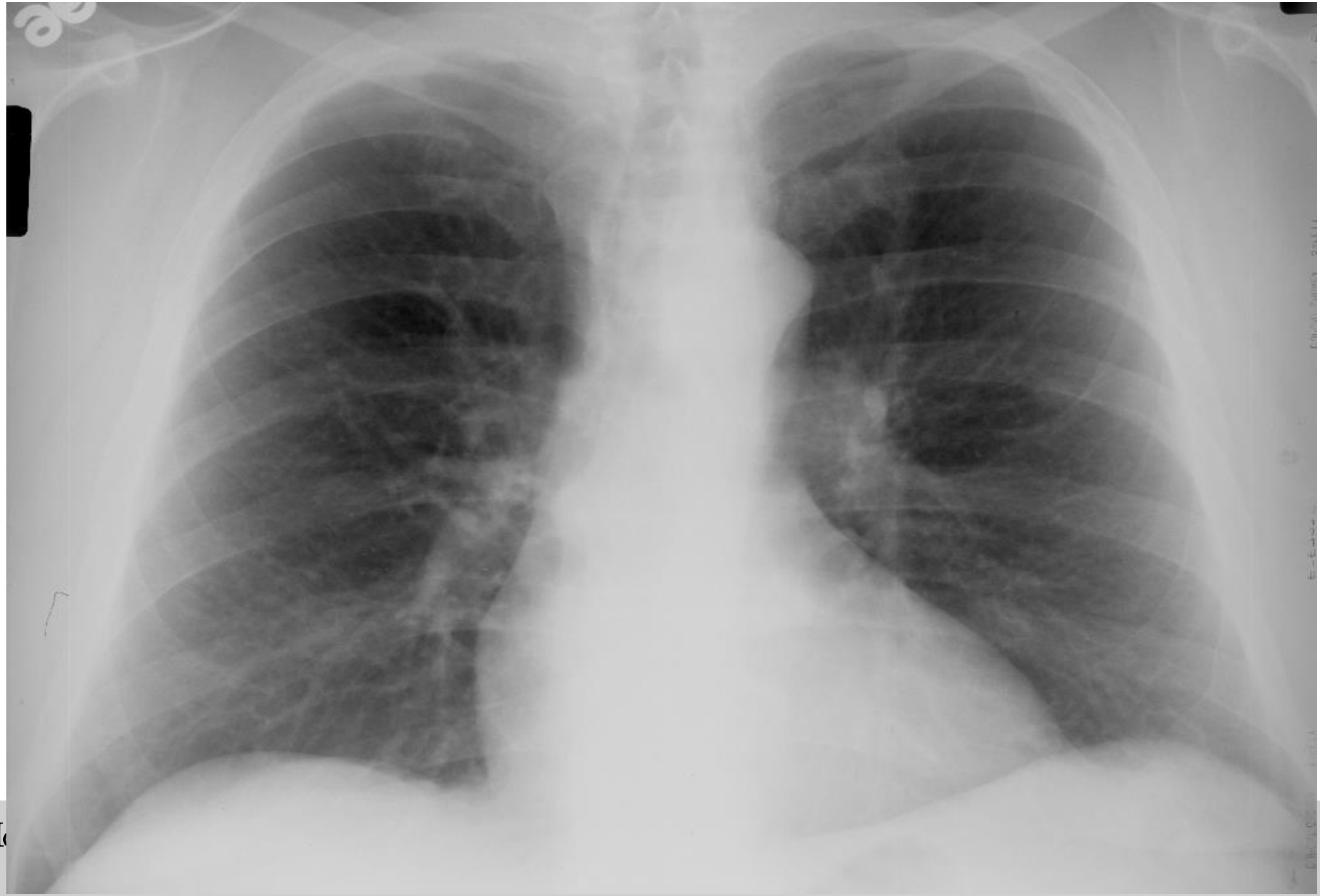
Lung Cancer Stage at Diagnosis

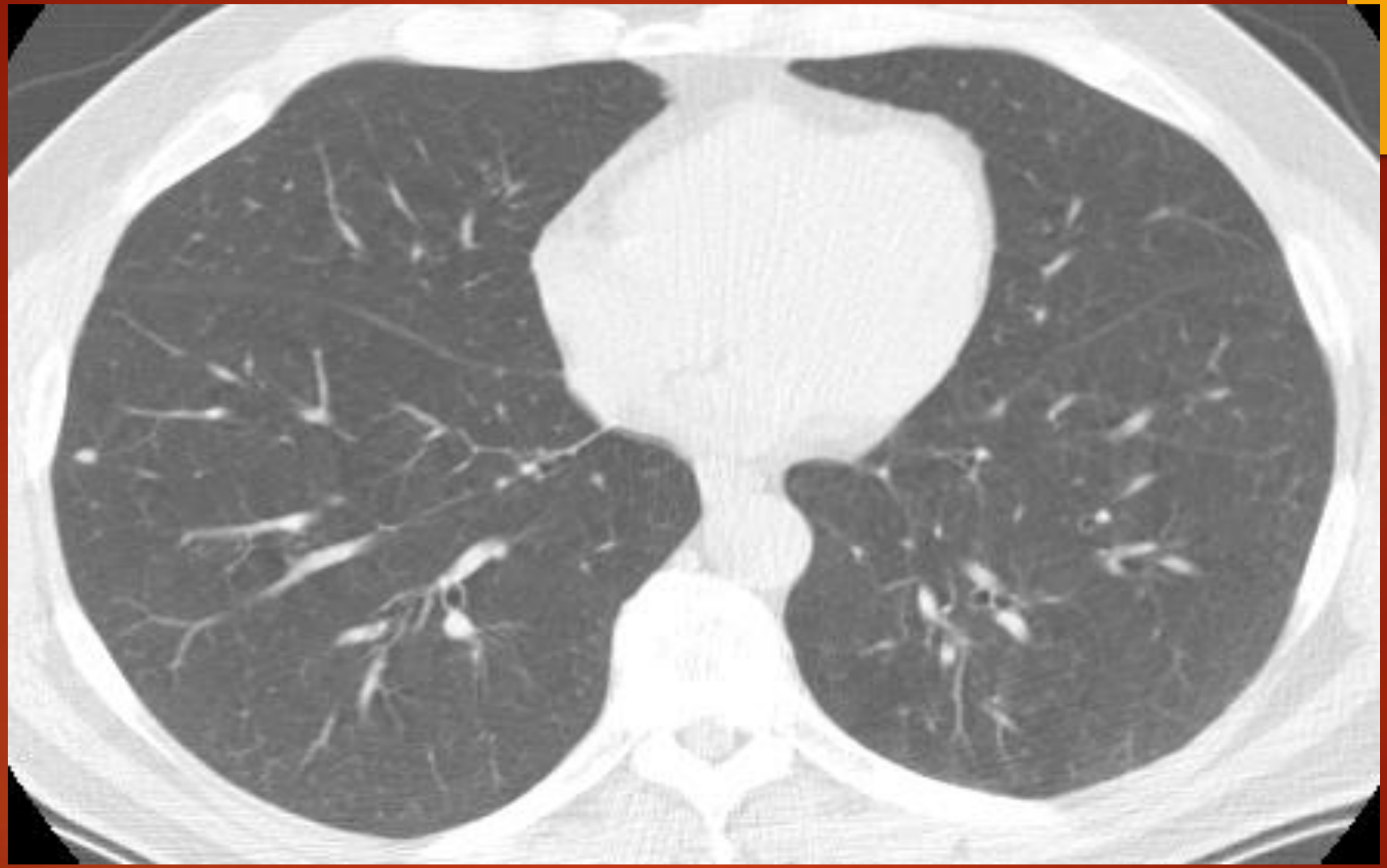


http://seer.cancer.gov/statfacts/html/lungb.html



Mountain CF. Chest 1986;89(suppl):225-233.





National Lung Screening Trial

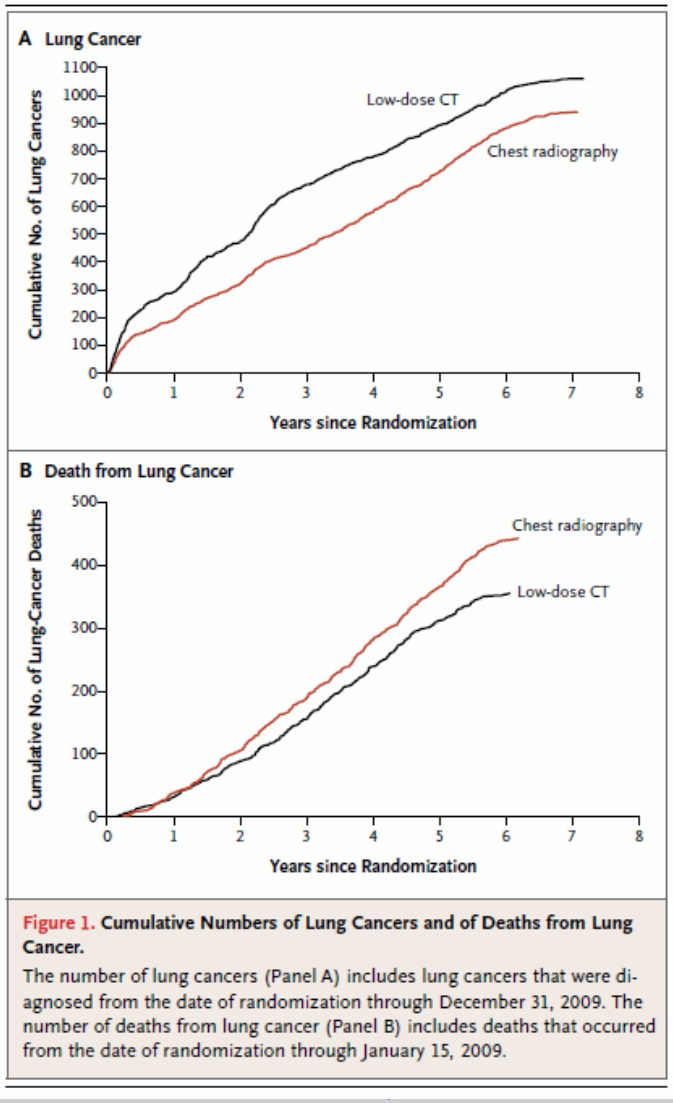


Figure 1. Cumulative Numbers of Lung Cancers and of Deaths from Lung Cancer.

The number of lung cancers (Panel A) includes lung cancers that were diagnosed from the date of randomization through December 31, 2009. The number of deaths from lung cancer (Panel B) includes deaths that occurred from the date of randomization through January 15, 2009.

- Primary Results
  - 20% relative reduction in lung cancer mortality with LDCT
  - 6.7% reduction in all-cause mortality with LDCT
- Additional Results
  - Positive/False Positive Screens
    - LDCT: 39% had 1+ pos. screen
    - CXR: 16% had 1+ pos. screen

NLST (2011) *NEJM*, 365, 395-409.

Population Impact of NLST (LDCT)

- Data from NLST was applied to the population to estimate the number of lung cancer deaths that could be averted by LDCT screening

- 8.6 million Americans eligible for LDCT per NLST
  - 5.2m American men/3.4m American women

- Results
  - **12,250** lung cancer deaths averted each year
  - 8,990 American men/3,260 American women
  - **7.6%** of all American lung cancer deaths each year

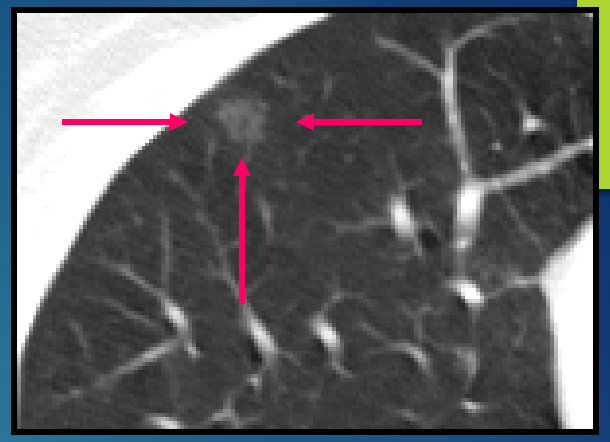
(Ma et al., 2013, *Cancer*)

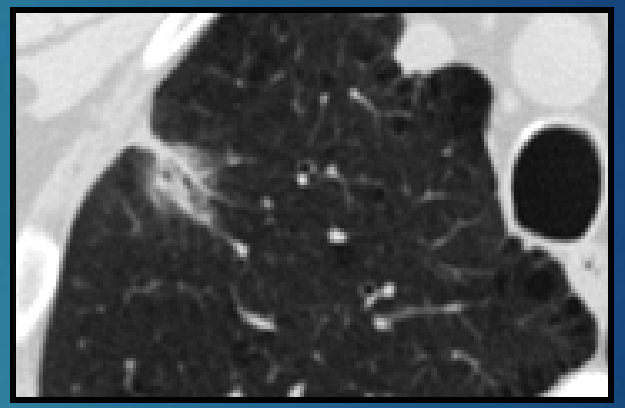
Low-Dose Helical CT

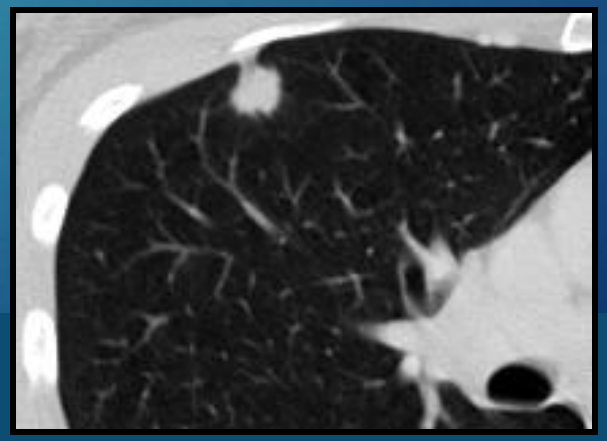
- Allows entire chest to be surveyed in a single breathhold
  - Time: approximately 7 - 15 seconds
  - Reduces motion artifact
  - Eliminates respiratory misregistration
- Narrower slice thickness
- Hourly throughput - 4 patients per hour
- Radiation dose one tenth of diagnostic CT

What do we see on CT? Definition of terms

- GGO (non-solid): Nodule with hazy increased lung attenuation which does not obscure underlying bronchovascular markings.
- Mixed (part-solid): Nodules containing both ground glass and solid components
- Solid (soft tissue): Nodules with attenuation obscuring the bronchovascular structures

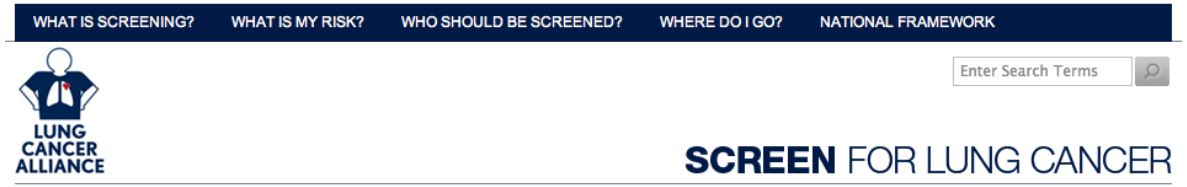






Downstream Effects of CT Screening

- Radiation carcinogenesis
  - screening & consequent diagnostic tests: CT, PET
- Additional minimally invasive procedures
  - Percutaneous Lung FNA
  - Bronchoscopy
  - VATS
- Thoracotomy for benign disease
  - Is there an acceptable percentage?
  - Potential post-operative morbidity & mortality
  - Treatment for disease without biopsy?
- Evaluation for other observations: cardiac, renal, liver, adrenal disease



ASCO®

AMERICAN LUNG ASSOCIATION®
Fighting for Air

American Cancer Society®

IASLC
International Association for the Study of Lung Cancer

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

NCCN National Comprehensive Cancer Network®

EUROPEAN LUNG FOUNDATION

AMERICAN COLLEGE OF CHEST PHYSICIANS

Keck Medicine of USC and Henry Mayo Newhall Hospital

U.S. Preventive Services Task Force

Guidelines for lung cancer screening

Organization	Recommendation	Year
American Association of Thoracic Surgery	Recommends annual low-dose CT scan screening for high-risk individuals (ages 55 to 79 years with ≥30 pack-year history of smoking and current smoker or quit within past 15 years; ages 50 to 79 years with ≥20 pack-year history and cumulative risk >5% over next 5 years; or lung cancer survivors with no incidence of disease for ≥4 years).	2012
American Cancer Society	Recommends annual low-dose CT scan screening for high-risk individuals (ages 55 to 74 years with ≥30 pack-year history of smoking and current smoker or quit within past 15 years).	2013
American College of Chest Physicians	Recommends annual low-dose CT scan screening for high-risk individuals (ages 55 to 77 years with ≥30 pack-year history of smoking and current smoker or quit within past 15 years).	2018
American Society of Clinical Oncology	Recommends annual low-dose CT scan screening for high-risk individuals (ages 55 to 74 years with ≥30 pack-year history of smoking and current smoker or quit within past 15 years).	2019
Canadian Task Force on the Periodic Health Examination	Recommends screening asymptomatic adults aged 55 to 74 years with at least a 30 pack-year smoking history who smoke or quit smoking <15 years ago with low-dose CT every year for 3 consecutive years.	2016
National Comprehensive Cancer Network	Recommends annual low-dose CT scan screening for high-risk individuals (age 50 years or greater with ≥20 pack-year history of smoking). Screening is not recommended for individuals with functional status or comorbidity that would prohibit curative-intent therapy.	2022
US Preventive Services Task Force	Recommends annual low-dose CT scan screening for high-risk individuals (ages 50 to 80 years with a 20 pack-year history of smoking and current smoker or quit within past 15 years). Discontinue when person has not smoked for 15 years or if limited life expectancy.	2021
Centers for Medicare and Medicaid Services	Recommends annual low-dose CT scan screening after completion of a shared decision-making visit for high-risk individuals (ages 50 to 77 years with ≥20 pack-year history of smoking and current smoker or quit within the past 15 years).	2022
American Academy of Family Physicians	Supports the United States Preventive Services Task Force recommendation for annual screening for lung cancer with low-dose CT in adults (ages 50 to 80 years who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years).	2021

This table covers some of the more common societies and governmental agencies. It is not meant to be comprehensive.

Risk of developing cancer can be calculated by the Tammemägi 2012 PLCO(m2012) lung cancer risk prediction model.[1]

CT: computed tomography.

Reference:

1. *Tammemägi MC, Church TR, Hocking WG, et al. Evaluation of the lung cancer risks at which to screen ever- and never-smokers: screening rules applied to the PLCO and NLST cohorts. PLoS Med 2014; 11:e1001764.*

Centers for Medicare and Medicaid Services

"The Centers for Medicare & Medicaid Services (CMS) has determined that the ***evidence is sufficient*** *to add a lung cancer* ***screening counseling and shared decision making visit****, and for appropriate beneficiaries, annual screening for lung cancer with low dose computed tomography (LDCT), as an additional preventive service benefit under the Medicare program only if the following conditions are met…"*

https://www.cms.gov/medicare-coverage-database/view/ncacal-decision-memo.aspx?proposed=N&ncaid=304

Centers for Medicare and Medicaid Services

- *Age 50 – 77 years;*
- *Asymptomatic (no signs or symptoms of lung cancer);*
- *Tobacco smoking history of at least 20 pack-years (one pack-year = smoking one pack per day for one year; 1 pack = 20 cigarettes);*
- *Current smoker or one who has quit smoking within the last 15 years; and*
- *Written order for LDCT-based lung cancer screening with…*
  - *Determination of eligibility*
  - *Documentation of an SDM consultation*
  - *Documentation of adherence/screening counseling*
  - *Tobacco cessation intervention*

https://www.cms.gov/medicare-coverage-database/view/ncacal-decision-memo.aspx?proposed=N&ncaid=304

CMS: Additional Requirements

Initial LDCT must be ordered during a lung cancer screening counseling and shared decision making visit

Documentation

1. Eligibility Criteria are all met and documented
2. One or more decision aids to discuss benefits, harms, follow-up diagnostic testing, over-diagnosis, false positive rate, total radiation exposure
3. Counseling on importance of adherence to annual LDCT screening, impact of comorbidities, willingness to undergo diagnosis and/or treatment
4. Counseling on smoking cessation (or continued abstinence), including offering additional tobacco cessation counseling services if appropriate

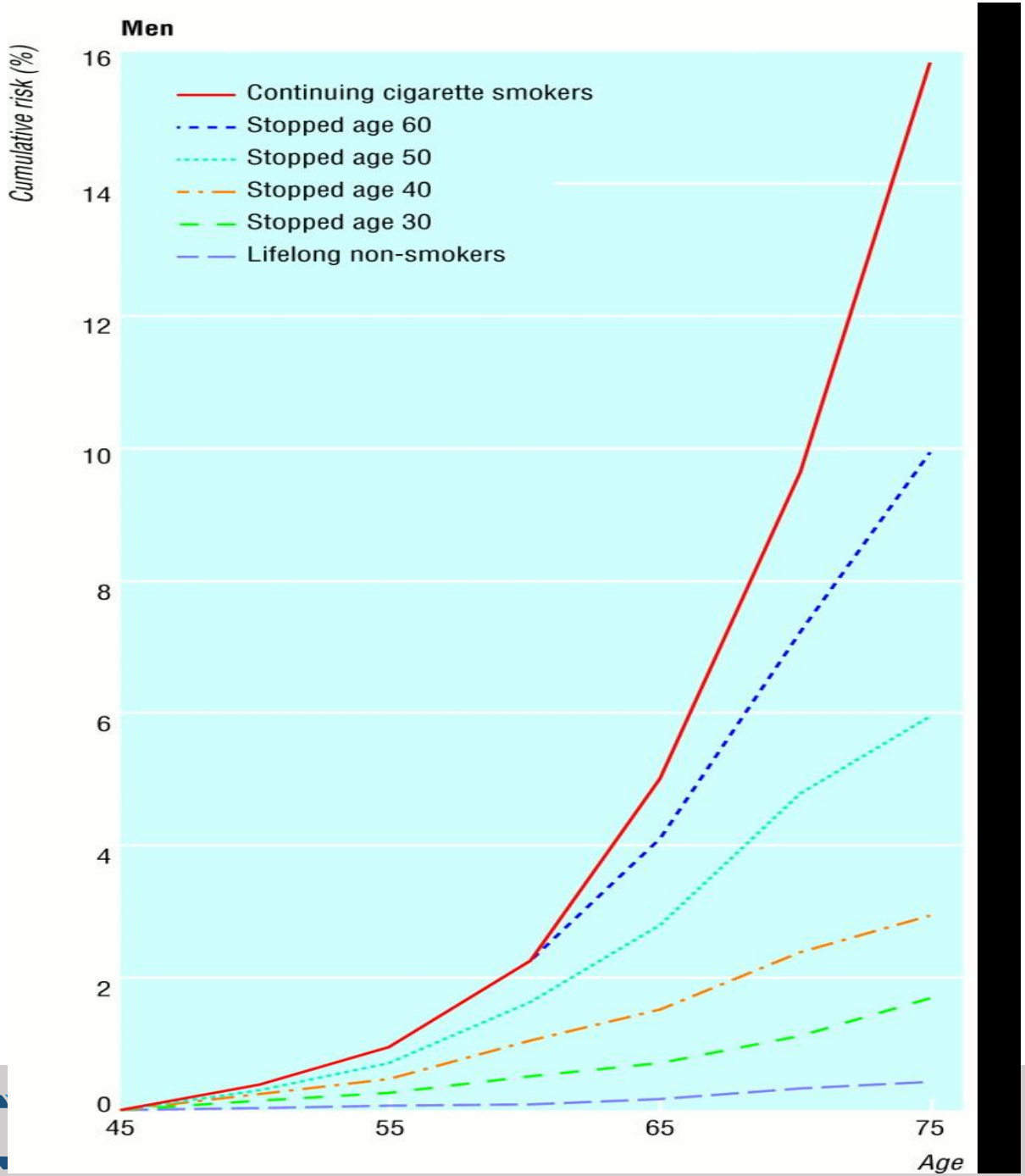
What would help most for lung cancer?

SMOKING CESSATION

U.S. population with direct smoking exposure:

- 46.5 million former smokers
- 45.1 million current smokers

CDC MMWR 10/27/06


Men
Cumulative risk (%)
16
14
12
10
8
6
4
2
0
Continuing cigarette smokers
Stopped age 60
Stopped age 50
Stopped age 40
Stopped age 30
Lifelong non-smokers
45
55
65
75
Age

Smoking Cessation

Rationale for Including Tobacco Cessation Counseling with LCS

- Decreases risk of lung cancer and other smoking-related conditions
- Increases cost effectiveness of lung cancer screening
- It is the right thing to do
- Required by CMS for reimbursement

Lung Cancer Screening & Tobacco Cessation

- Integrating evidence-based tobacco cessation into lung cancer screening programs could broaden utility by adding a primary prevention strategy to an evidence-based secondary prevention strategy.
- Current data is mixed with regard to the impact of screening on tobacco use, some studies reporting higher rates of cessation and others demonstrating no impact of screening on tobacco use.
- Fairly consistent results indicate that abnormal/suspicious scans are associated with tobacco cessation/lower rates of tobacco use.
- Regrettably, there are no intervention studies examining the impact of tobacco cessation in the lung cancer screening setting (although pilot studies are underway). The NCI has recently announced an RFA to address this important question.

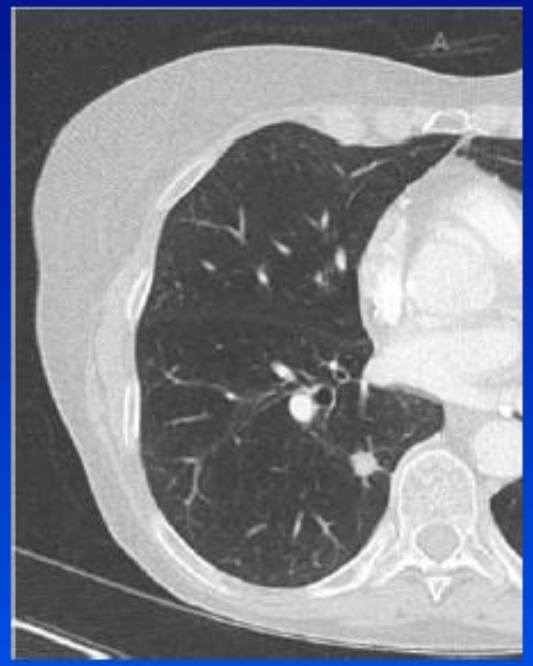
Interventional pulmonology

Rigid bronchoscopy
Navigational bronchoscopy
Endobronchial Ultra Sound
Whole lung lavage
Trans-tracheal Oxygen Therapy
Tunnel pleural catheters
Pleuroscopy
Bronchoplasty
Brachytherapy
Radiopaque and dye marker placement

Endotracheal/bronchial Laser, electrocautery, cryotherapy
Photo Dynamic Therapy
Autofluorescence
Narrow band Imaging
Bronchial thermoplasty
Endobronchial valves
Stents
Per cutaneous Tracheostomy

Question 1

- 60 yo female found to have a 1.2cm RLL nodule as an incidental finding. She has a 25 pack year smoking history and the remainder of her clinical history is unremarkable



Question

- Which of the following is true regarding this patient?

A. This patient has a low likelihood for malignancy

B. PET imaging is recommended

C. Referral for surgical excision is recommended

D. A follow-up CT scan should be performed in 6 months

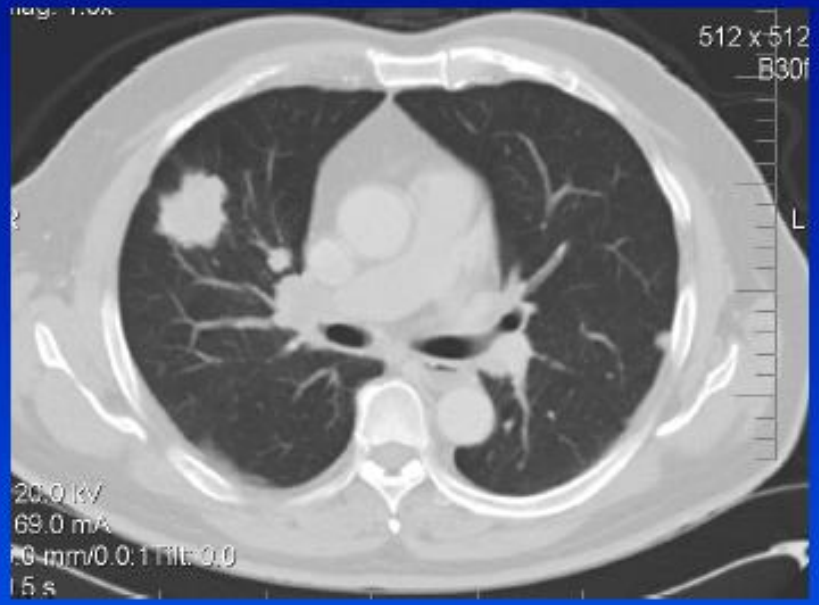
Correct Answer: B

- *PET imaging is recommended*
- Nodules >8 mm with low to moderate probability of malignancy should have functional imaging to characterize the nodule (2C)

Gould ACCP guidelines 2013

Risk Factors for Malignancy

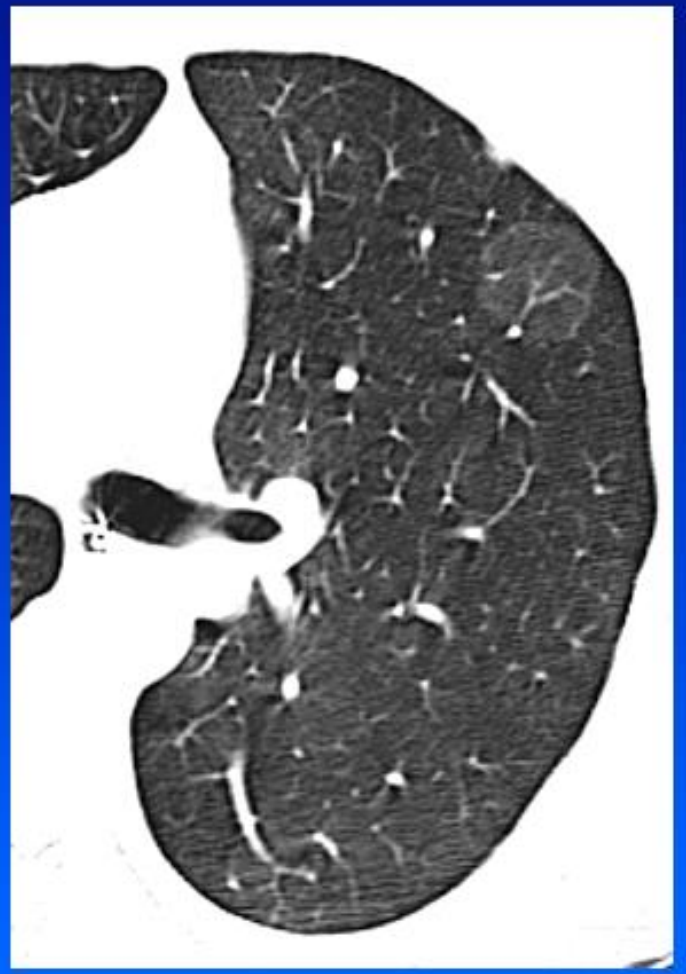
- Appearance
- Lesion Size
  - Growth
- Advancing age
- Smoker
- Location*
- Prior history of extrathoracic malignancy*



Gould MK et al. Chest 2007;131:383-388
Swensen SJ et al. Arch Intern Med 1997;157:849-855

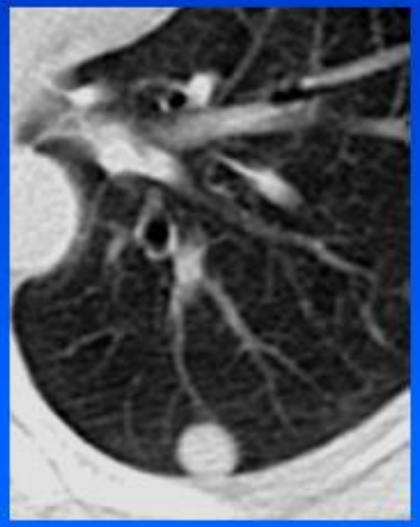
Appearance

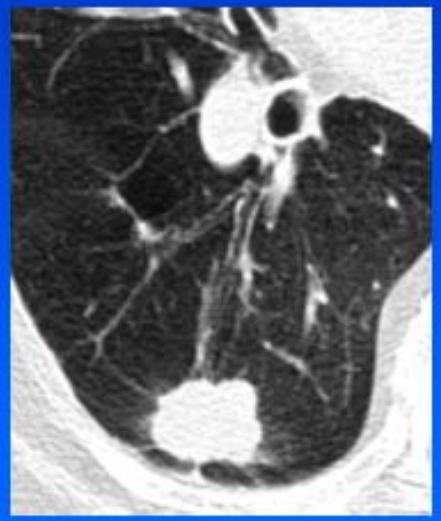
- Solid vs ground-glass
  - Ground glass lesions are more likely malignant
  - Longer volume doubling time
  - Better prognosis

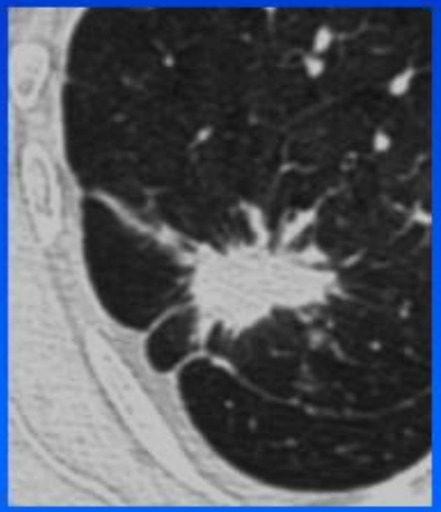


Appearance

- Risk of malignancy is 20-30% with smooth borders
- Risk of malignancy is 33-100% with irregular, lobulated or spiculated borders



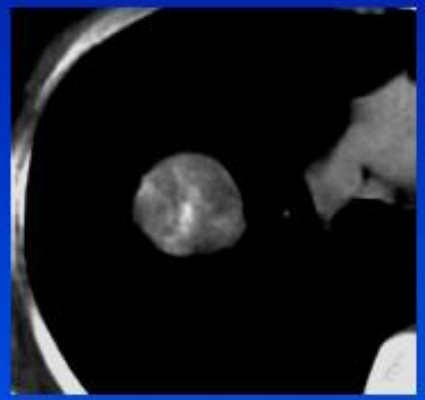




Calcification

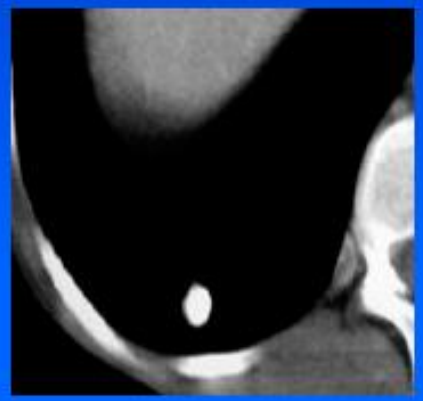
- Some patterns may help differentiate malignant from benign processes

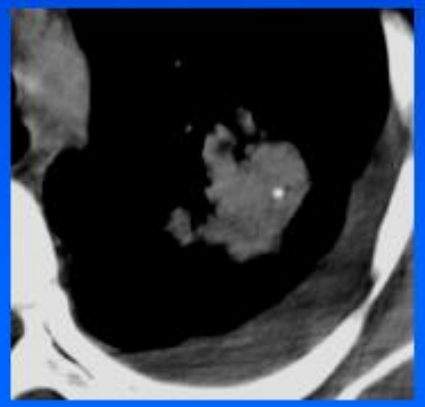
Laminated



Speckled

Diffuse





Eccentric

Size

- The smaller the lesion is, the less likely it is to be malignant
- Follow-up is size and risk factor dependent, but is almost always indicated

Size	Risk of Malignancy
< 4mm	0%
4-7mm	1%
8-20mm	15%
> 20mm	75%

Swensen SJ et al.Radiology 2005;235:259-265

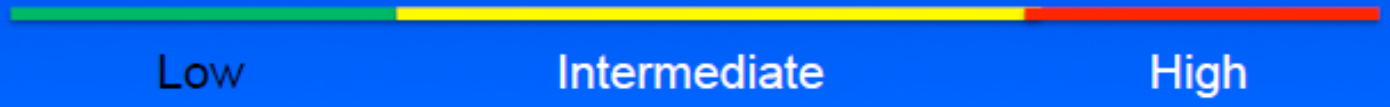
Estimating the Probability of Cancer

- Estimating probability of cancer is the critical first step in the evaluation algorithm
  - Influences diagnostic/therapeutic choices
  - Assists in interpretation of diagnostic tests
    - Probability of malignancy is < 2% when PET imaging is negative and pCA is low
    - Probability of malignancy is > 10% when PET imaging is negative and pCA is high

Gould MK et al. Chest 2007;131:383-388

Calculating Risk

- Most do this clinically
- "Risk calculators" can help
- Expert clinicians are good at estimating the likelihood of malignancy
  - Low risk: pCA < 0.05
  - Intermediate risk: pCA 0.05-0.65
  - High risk: pCA > 0.65



Gould MK et al. Chest 2013;143:93S-120S

A: Solid Nodules*

Nodule Type	Size: <6 mm (<100 mm³)	Size: 6–8 mm (100–250 mm³)	Size: >8 mm (>250 mm³)	Comments
Single				
Low risk†	No routine follow-up	CT at 6–12 months, then consider CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Nodules <6 mm do not require routine follow-up in low-risk patients (recommendation 1A).
High risk†	Optional CT at 12 months	CT at 6–12 months, then CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up (recommendation 1A).
Multiple				
Low risk†	No routine follow-up	CT at 3–6 months, then consider CT at 18–24 months	CT at 3–6 months, then consider CT at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).
High risk†	Optional CT at 12 months	CT at 3–6 months, then at 18–24 months	CT at 3–6 months, then at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).

B: Subsolid Nodules*

Nodule Type	Size: <6 mm (<100 mm³)	Size: ≥6 mm (>100 mm³)	Comments
Single			
Ground glass	No routine follow-up	CT at 6–12 months to confirm persistence, then CT every 2 years until 5 years	In certain suspicious nodules < 6 mm, consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection. (Recommendations 3A and 4A).
Part solid	No routine follow-up	CT at 3–6 months to confirm persistence. If unchanged and solid component remains <6 mm, annual CT should be performed for 5 years.	In practice, part-solid nodules cannot be defined as such until ≥6 mm, and nodules <6 mm do not usually require follow-up. Persistent part-solid nodules with solid components ≥6 mm should be considered highly suspicious (recommendations 4A-4C)
Multiple	CT at 3–6 months. If stable, consider CT at 2 and 4 years.	CT at 3–6 months. Subsequent management based on the most suspicious nodule(s).	Multiple <6 mm pure ground-glass nodules are usually benign, but consider follow-up in selected patients at high risk at 2 and 4 years (recommendation 5A).

Question 2

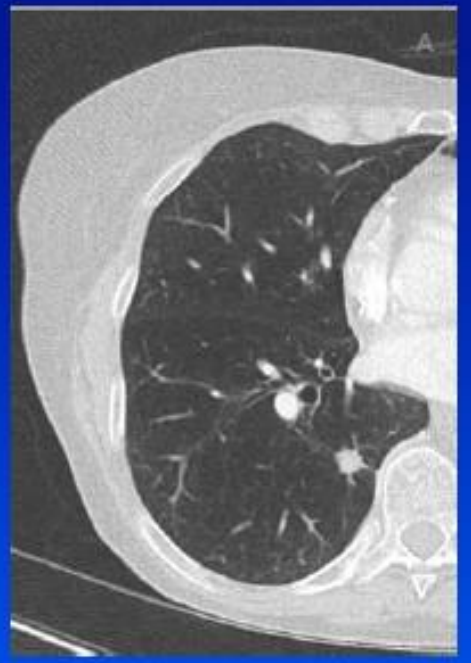
- PET imaging is performed, showing no significant uptake in the RLL nodule. What is the next step?

A. Repeat CT scan in 12 months

B. Surgical excision

C. CT guided needle aspiration

D. Bronchoscopic lung biopsy



Correct Answer: D

- *Bronchoscopic lung biopsy*
- Guideline recommendations
  - Nonsurgical biopsy may be performed when pretest probability for malignancy and findings on imaging tests are discordant (2C)
- Trust your clinical pretest probability
  - Probability of malignancy is < 2% when PET imaging is negative and pCA is low
  - Probability of malignancy is > 10% when PET imaging is negative and pCA is high

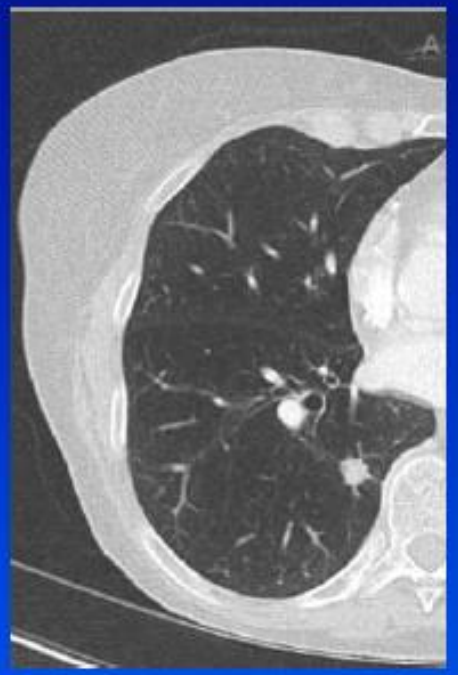
Rivera ACCP guidelines Chest 2013

Incorrect Answer: B

- *Surgical excision*
- Nonsurgical biopsy recommended at this point given intermediate risk for malignancy
- Surgical excision is recommended for those with high clinical suspicion for malignancy based on risk factors and imaging (pCA >0.65) under the appropriate circumstances

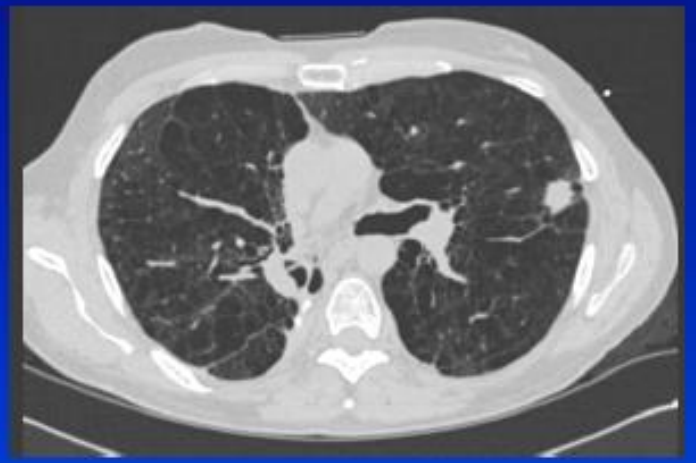
Incorrect Answer: C

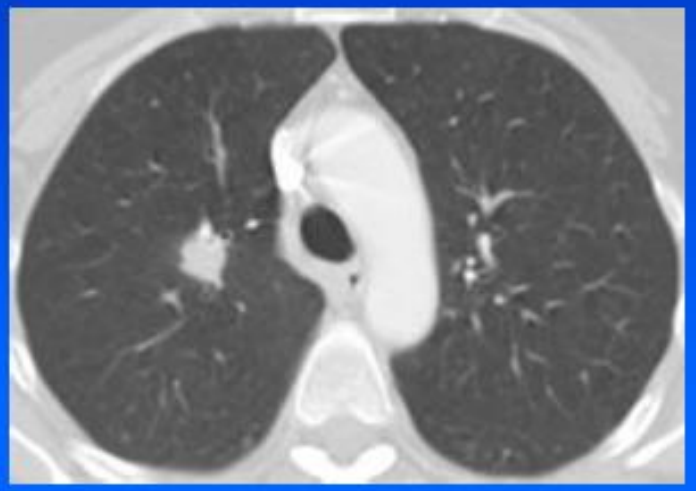
- *CT guided needle aspiration*
- Technically, is a nonsurgical biopsy technique
- Risk of pneumothorax not insignificant



CT Guided Needle Aspiration

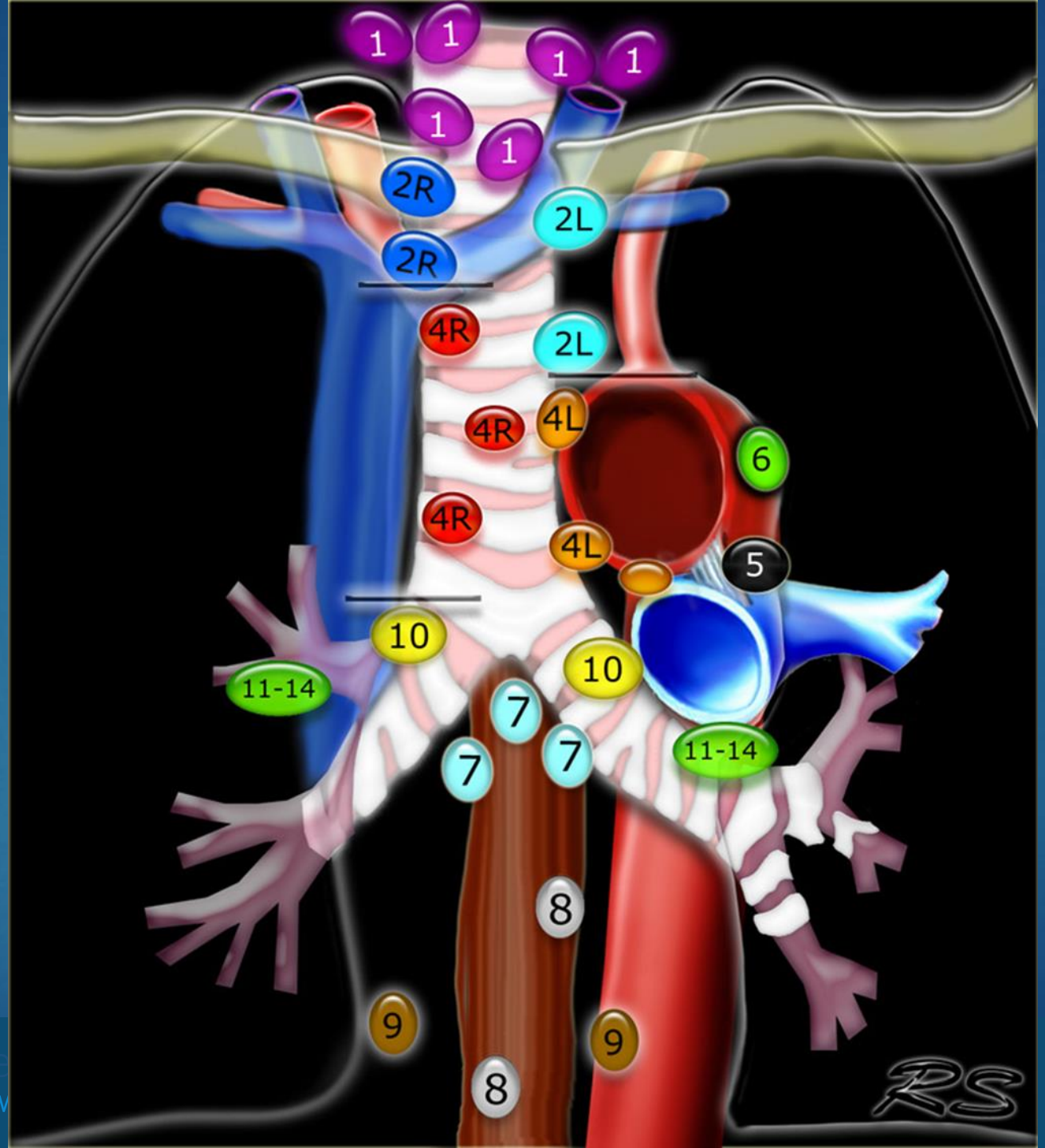
- Diagnostic yield 80-90%
- Rate of pneumothorax 8-64%
  - Chest tube
  - Hospitalizations
  - Prolonged air leak





Geraghty P, et al. *Radiology* 2003; 229(2):475-481
Baaklini WA, et al. *Chest* 2000; 117:1049–1054

T/M	Label	N0	N1	N2	N3
T1	T1a *≤1*	IA1	IIB	IIIA	IIIB
	T1b *>1-2*	IA2	IIB	IIIA	IIIB
	T1c *>2-3*	IA3	IIB	IIIA	IIIB
T2	T2a *Cent, Visc Pl*	IB	IIB	IIIA	IIIB
	T2a *>3-4*	IB	IIB	IIIA	IIIB
	T2b *>4-5*	IIA	IIB	IIIA	IIIB
T3	T3 *>5-7*	IIB	IIIA	IIIB	IIIC
	T3 *Inv*	IIB	IIIA	IIIB	IIIC
	T3 *Satell*	IIB	IIIA	IIIB	IIIC
T4	T4 *>7*	IIIA	IIIA	IIIB	IIIC
	T4 *Inv*	IIIA	IIIA	IIIB	IIIC
	T4 *Ipsi Nod*	IIIA	IIIA	IIIB	IIIC
M1	M1a *Contr Nod*	IVA	IVA	IVA	IVA
	M1a *Pl Dissem*	IVA	IVA	IVA	IVA
	M1b *Single*	IVA	IVA	IVA	IVA
	M1c *Multi*	IVB	IVB	IVB	IVB



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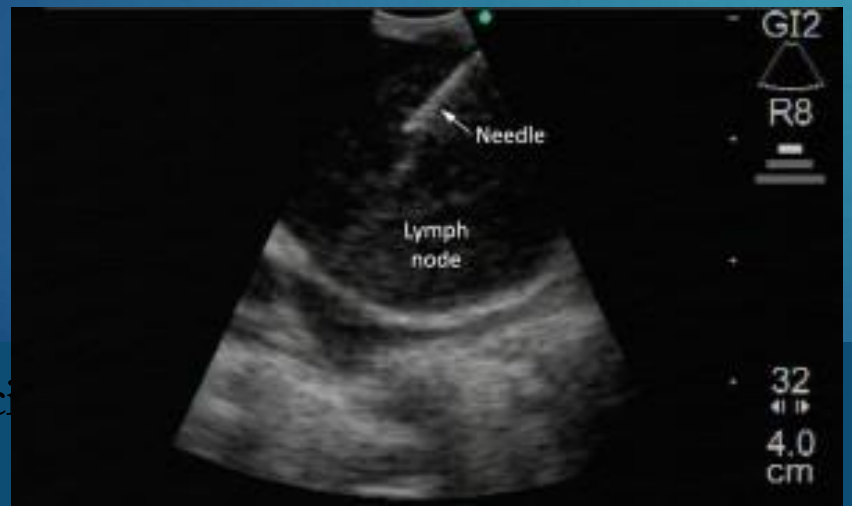

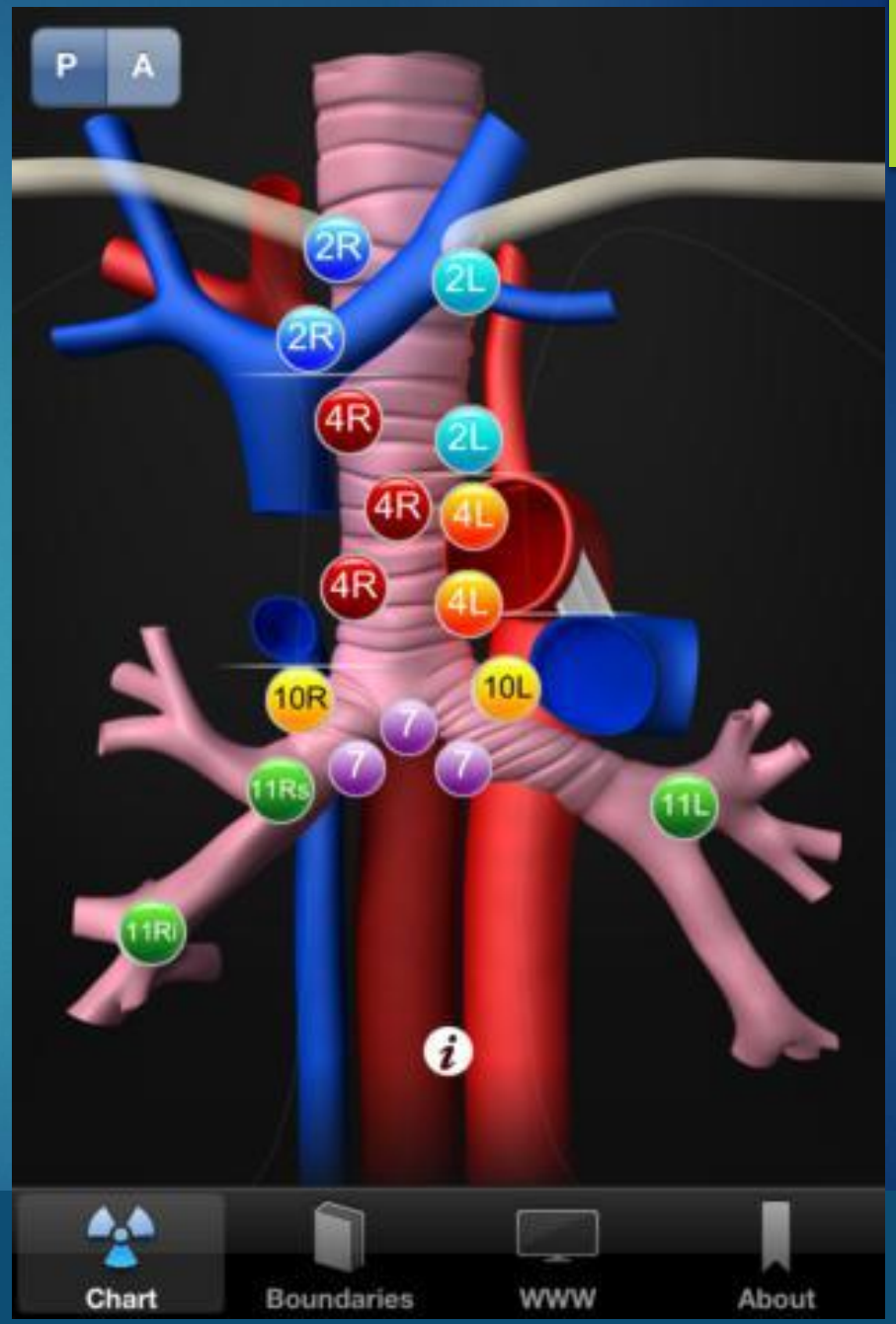

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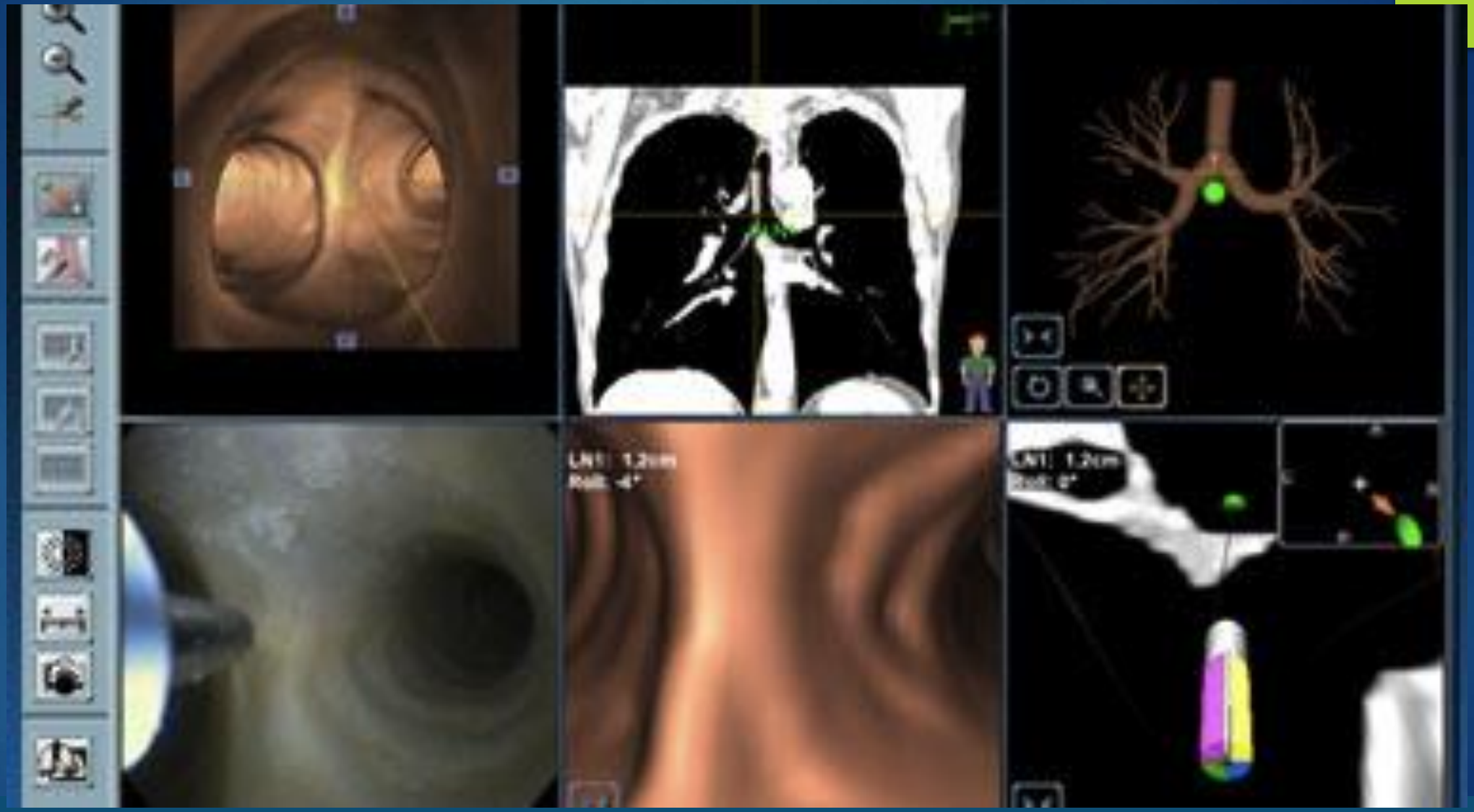

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END

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Lung Cancer Screening: Imaging

Anjali Date, M.D.
Tower Imaging Medical Group
September 10, 2022

Keck Medicine of USC and Henry Mayo Newhall Hospital

Low Dose Lung Cancer Screening CT

- Average Radiation dose of 1.4 mSv compared with 8 mSv for routine Chest CT
- Useful tool for Lung Cancer Screening: imaging can detect early stage cancers leading to decreased mortality
- Annual Screening LDCT recommended
- National Lung Screening Trial
  - 20% reduction in lung cancer mortality
  - NNS was 320
- NELSON trial
  - RCT 15,789 patients 50-75 years old
  - Screening at increasing intervals VS. no screening
  - 46.8% Stage IA lung cancers detected with screening (7.1% without) versus 51.8% Stage IV without screening

Guidelines

- USPSTF: 2012, recommends annual low dose dose CT
  - the USPSTF has changed the age range and pack-year eligibility criteria and recommends annual screening for lung cancer with LDCT for adults aged 50 to 80 years who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years
- CMS: Covers LDCT under preventative services
  - LCS is covered as a preventive service in patients aged 50–77 years
  - ≥20 pack-year smoking history
  - current smokers or quit within last 15 years
  - no signs or symptoms of lung cancer

https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening

Lung-RADS® Version 1.1

Assessment Categories Release date: 2019

Category Descriptor	Lung-RADS Score	Findings	Management	Risk of Malignancy	Est. Population Prevalence
Incomplete	**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%
Negative No nodules and definitely benign nodules	**1**	No lung nodules Nodule(s) with specific calcifications: complete, central, popcorn, concentric rings and fat containing nodules	Continue annual screening with LDCT in 12 months	< 1%	90%
Benign Appearance or Behavior Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	**2**	**Perifissural nodule(s)** *(See Footnote 11)* < 10 mm (524 mm^3) **Solid nodule(s):** < 6 mm (< 113 mm^3) new < 4 mm (< 34 mm^3) **Part solid nodule(s):** < 6 mm total diameter (< 113 mm^3) on baseline screening **Non solid nodule(s) (GGN):** <30 mm (<14137 mm^3) **OR** ≥ 30 mm (≥ 14137 mm^3) and unchanged or slowly growing **Category 3 or 4 nodules unchanged for ≥ 3 months**			
Probably Benign Probably benign finding(s) - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	**3**	**Solid nodule(s):** ≥ 6 to < 8 mm (≥ 113 to < 268 mm^3) at baseline **OR** new 4 mm to < 6 mm (34 to < 113 mm^3) **Part solid nodule(s)** ≥ 6 mm total diameter (≥ 113 mm^3) with solid component < 6 mm (< 113 mm^3) **OR** new < 6 mm total diameter (< 113 mm^3) **Non solid nodule(s)** (GGN) ≥ 30 mm (≥ 14137 mm^3) on baseline CT or new	6 month LDCT	1-2%	5%
Suspicious Findings for which additional diagnostic testing is recommended	**4A**	**Solid nodule(s):** ≥ 8 to < 15 mm (≥ 268 to < 1767 mm^3) at baseline **OR** growing < 8 mm (< 268 mm^3) **OR** new 6 to < 8 mm (113 to < 268 mm^3) **Part solid nodule(s):** ≥ 6 mm (≥ 113 mm^3) with solid component ≥ 6 mm to < 8 mm (≥ 113 to < 268 mm^3) **OR** with a new or growing < 4 mm (< 34 mm^3) solid component **Endobronchial nodule**	3 month LDCT; PET/CT may be used when there is a ≥ 8 mm (≥ 268 mm^3) solid component	5-15%	2%
Very Suspicious Findings for which additional diagnostic testing and/or tissue sampling is recommended	**4B**	**Solid nodule(s)** ≥ 15 mm (≥ 1767 mm^3) **OR** new or growing, and ≥ 8 mm (≥ 268 mm^3) **Part solid nodule(s) with:** a solid component ≥ 8 mm (≥ 268 mm^3) **OR** a new or growing ≥ 4 mm (≥ 34 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 ≥ 8 mm (≥ 268 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			
Other Clinically Significant or Potentially Clinically Significant Findings (non lung cancer)	**S**	**Modifier - may add on to category 0-4 coding**	As appropriate to the specific finding	n/a	10%

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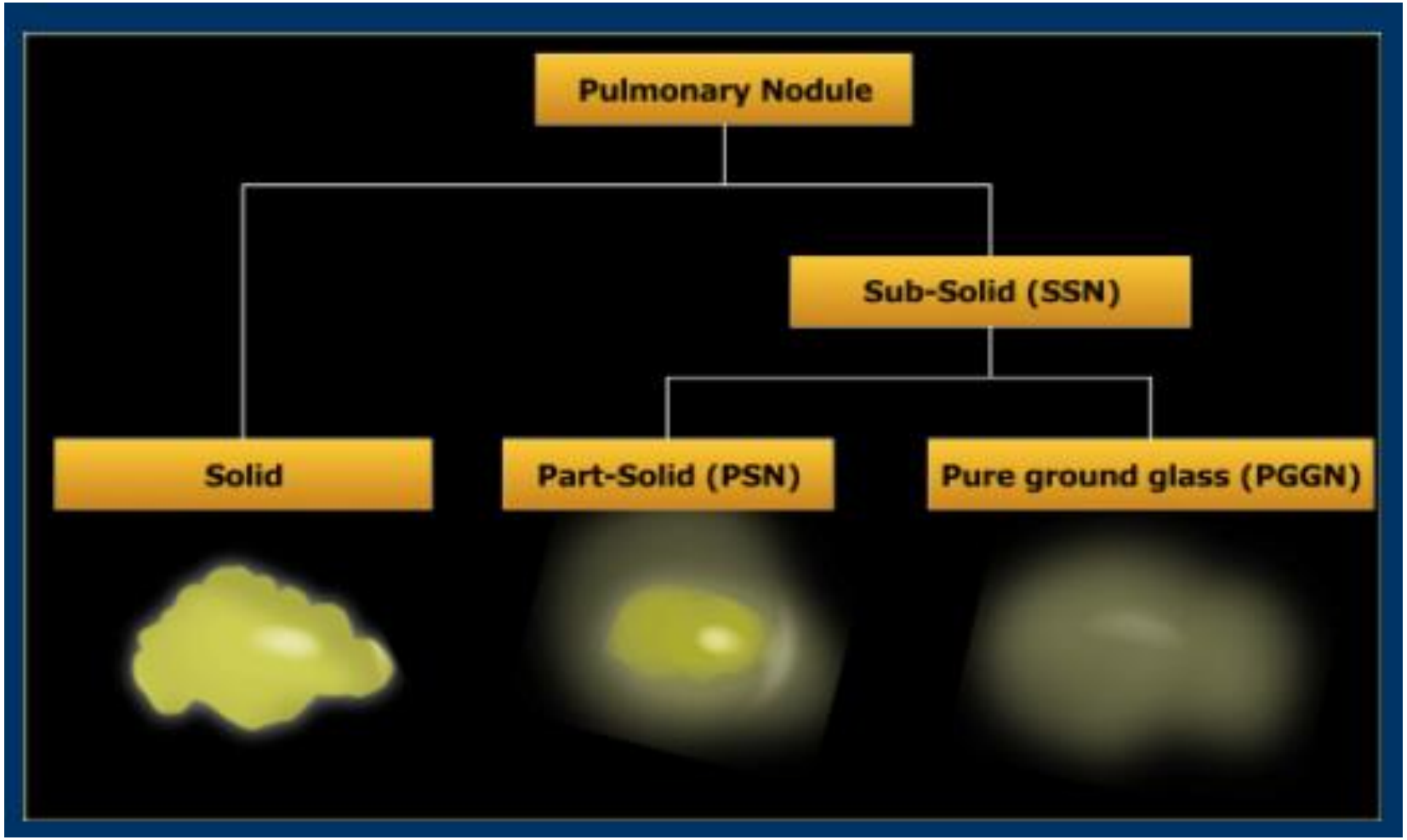
Lung Rads VS Fleischner Society Guidelines

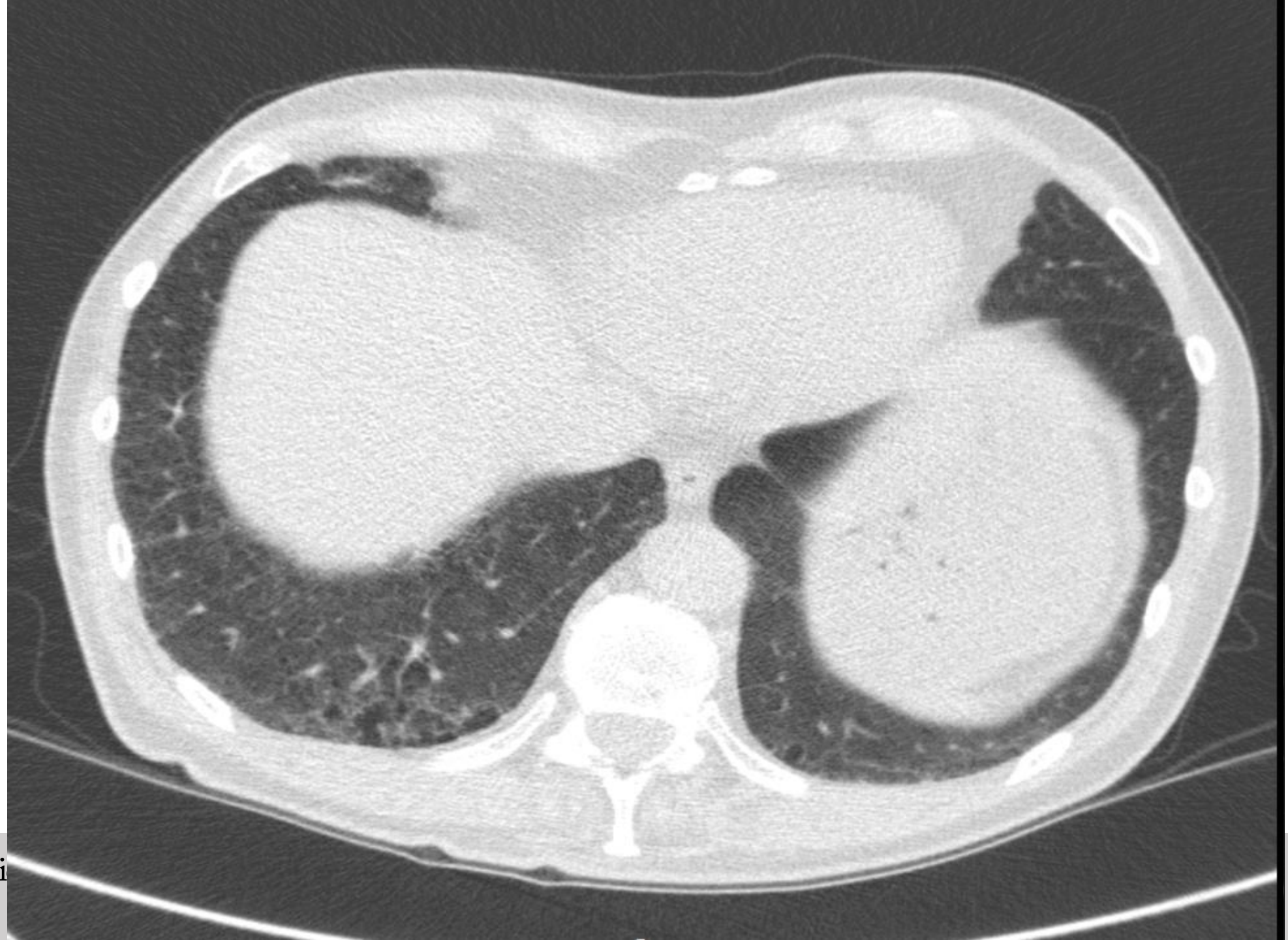
Table 3: Comparison between Lung-RADS Guidelines and Fleischner Society Guidelines for the Management of Pulmonary Nodules

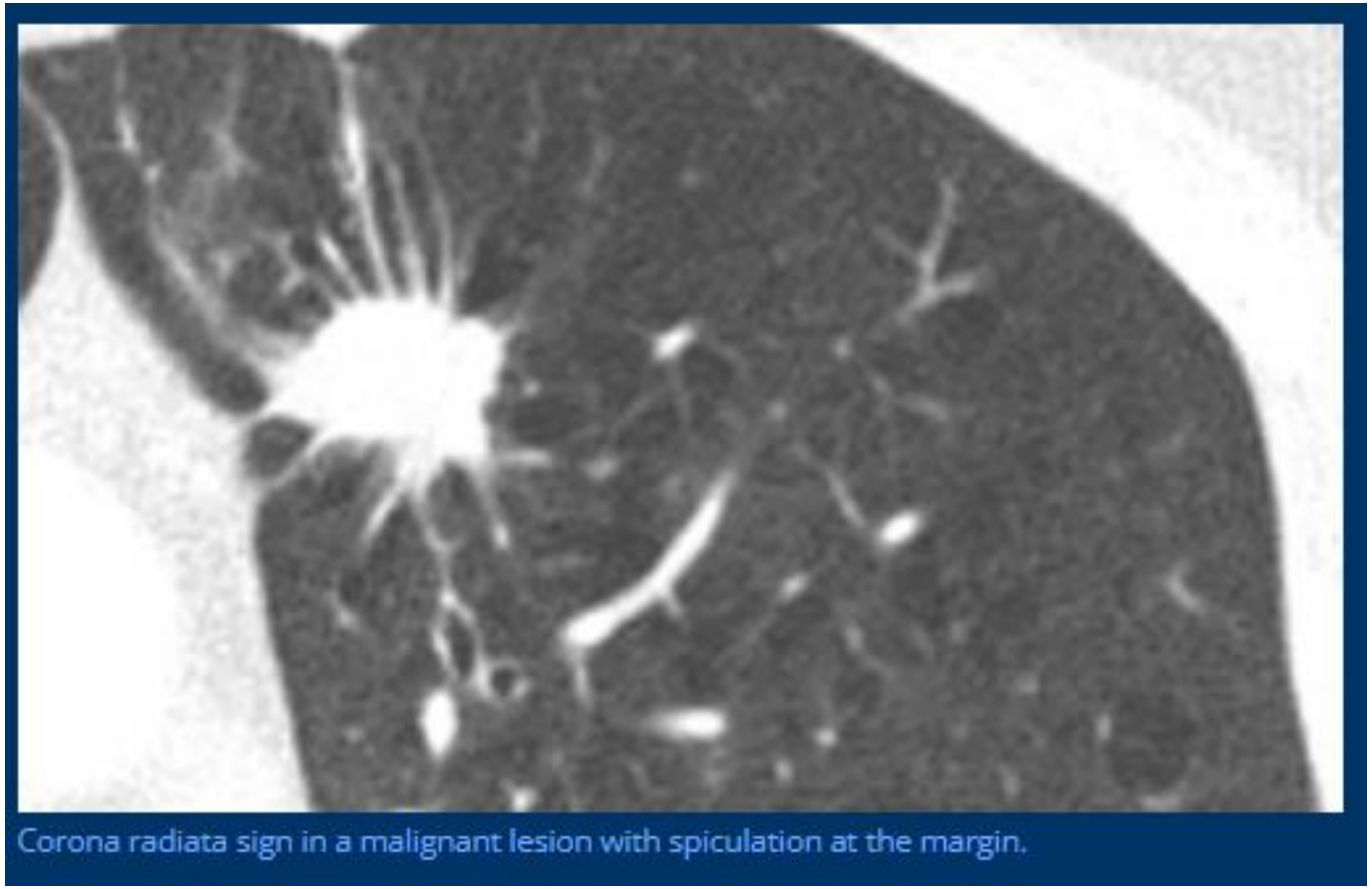
Lung-RADS Guidelines	Fleischner Society Guidelines
Single version published in 2014 (2) (addresses solid and subsolid nodules)	Updated version published in 2017 (6) (addresses solid and subsolid nodules) Older versions published in 2005 for solid nodules (7) and in 2013 for subsolid nodules (8)
Developed for the management of nodules in the setting of LCS CT	Developed for the management of incidentally detected nodules
Includes management of nodules that are new or growing	Does not address how to manage nodules that are new or growing
Applies to patients older than 55 years of age (current lower limit for LCS) and up to 80 years of age (upper age limit according to the U.S. Preventive Services Task Force)	Applies to patients older than 35 years of age, with no upper age limit
Applies to all patients undergoing LCS CT	Does not apply to immunosuppressed patients or those with a history of malignancy

Note.—Numbers in parentheses are reference citations.

Martin M, Kanne J et al. Lung-RADS: Pushing the Limits. Radiographics 2017:37:1975-1993.


Pulmonary Nodule
Sub-Solid (SSN)
Solid
Part-Solid (PSN)
Pure ground glass (PGGN)





Corona radiata sign in a malignant lesion with spiculation at the margin.

https://radiologyassistant.nl/chest/solitary-pulmonary-nodule/benign-versus-malignant

Figure 6

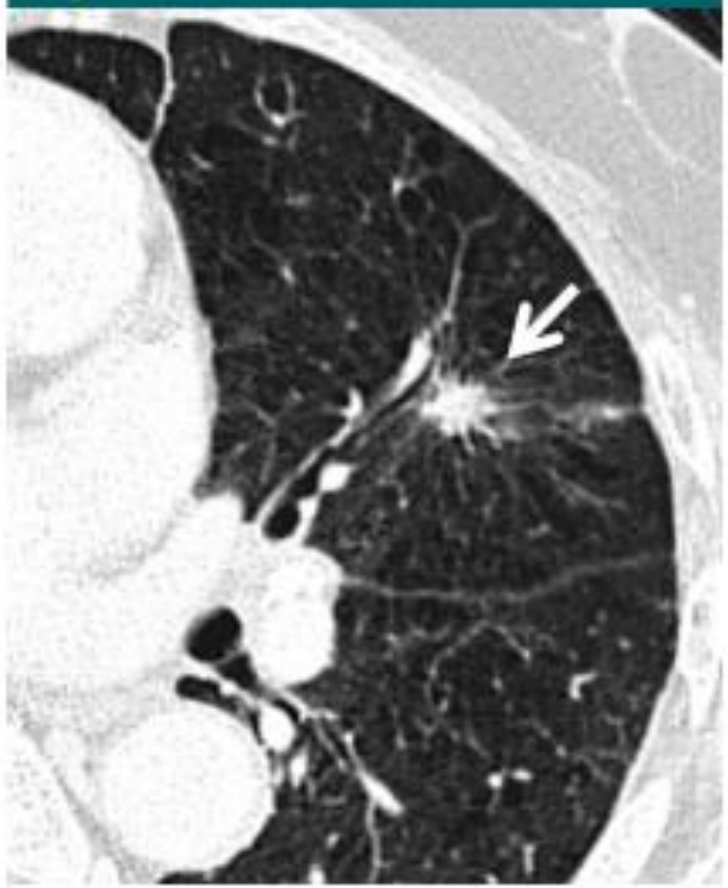


Figure 6: Transverse 1-mm CT section through the left upper lobe shows a suspicious solid spiculated nodule (arrow). Surgery revealed invasive adenocarcinoma.

MacMahon H, Naidich D. Guidelines for management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleichner Society. 2017. Radiology. July2017. 284.1:228-243.

Ground Glass/Subsolid Nodules: AAH→AIS→MIA→Invasive Adenocarcinoma

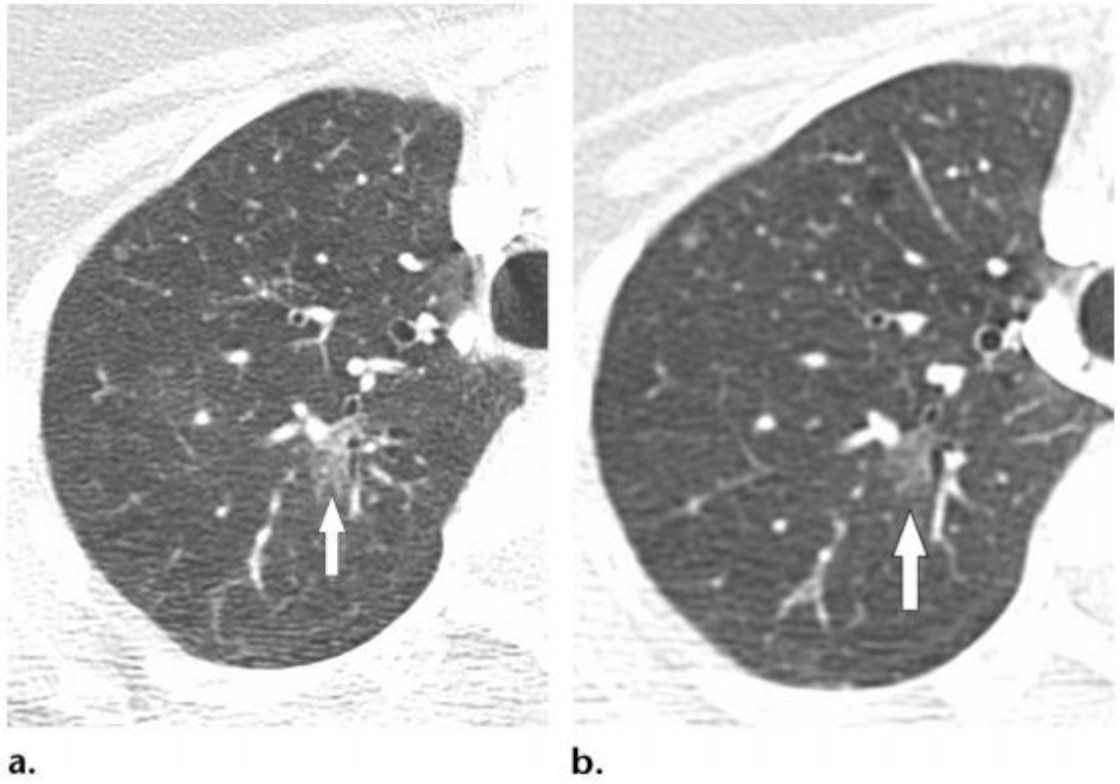


Figure 5. Invasive adenocarcinoma in a 66-year-old woman. **(a)** Axial contrast material–enhanced chest CT image (lung window settings) of the right upper lobe shows a ground-glass nodule (arrow). **(b)** Comparison axial CT image obtained 3 years earlier than **a** shows that the nodule had increased in attenuation centrally with time, without an overall change in size.

Martin MY, Kanne JP et al. Lung-RADS: Pushing the Limits. Radiographics 2017:37:1975-1993.

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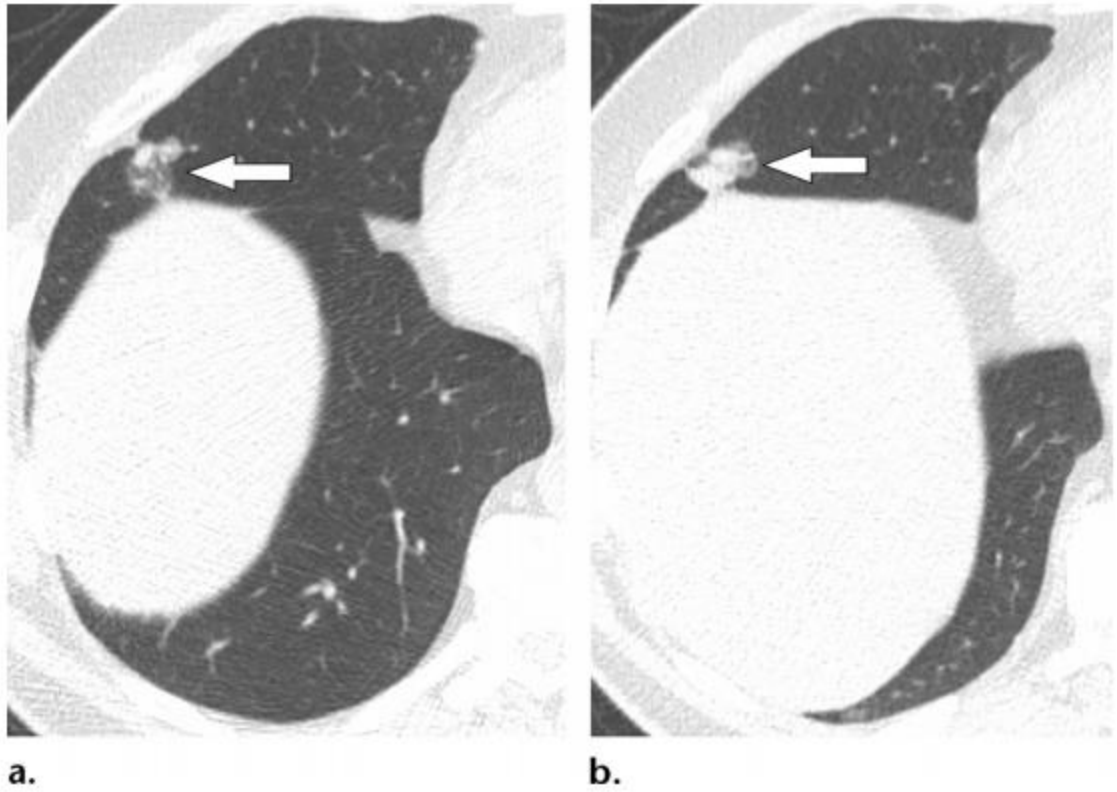

Figure 13. Invasive lung adenocarcinoma in a 68-year-old man. **(a)** Initial LCS CT: Axial unenhanced chest CT image (lung window settings) of the right lung shows a part-solid nodule (arrow) in the inferior right middle lobe. **(b)** Follow-up axial CT image obtained 3 months later than **a** shows slight contraction of the nodule, although the solid component (arrow) has enlarged.

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Mirian M, Jaime J et al. Lung-RADS: Pushing the Limits. Radiographics 2017:37:1975-1993.

THANK YOU!

Low Dose CT Lung Cancer Screening

Tear off the attached card for eligibility.
Ask your physician for a referral:

Patient Name:_____

Date of Birth: _____ /_____ /_____

Criteria *(all must be met)*:

- ☐ Age: 55–77
- ☐ Active Smoker or quit within 15 yrs:
  - a. How many years smoked? _____
  - b. How many packs/day? _____

    Multiply A x
    (must be at
- ☐ Received couns
  annual screenir
  active smoker
- ☐ *No General He*

Low Dose CT Lung

CPT

- ☐ G0297 *(Cou*
- ☐ 71271 *(CT S*

HCPCS

- ☐ Z87.891 for
  history of ni
- ☐ F17.21 for c
  dependence
  use)
- ☐ F17.21 for c

_____

(Healthcare Provide

Date: _____ /____

**General Health/ C*
(please discuss thes

- Recent histor
  unexpected s
  shortness of
- No severe he
  ability to get

Henry Mayo Newhall Hospital

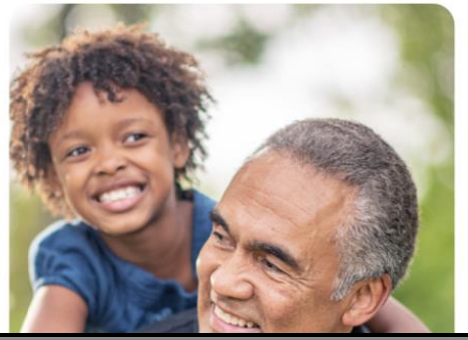
Low Dose CT Lung Cancer Screening Program

Medical Director: Mostafa Tabassomi, MD

Call our Let's Get Back to Screening number:
661.200.1332

Additional Programs:

Henry Mayo Smoking Cessation Program:
661.200.1343



Early Detection is Key.

Most lung cancer patients are diagnosed in the late stages of the disease, according to the American Cancer Society, and most of them are past or current smokers. Through its new Low Dose Computed Tomography (CT) Lung Cancer Screening Program, Henry Mayo Newhall Hospital's goal is to screen patients at risk and diagnose lung cancer in the early stages. Early stage detection improves lung cancer treatment options and survival.

What is Lung Cancer?

Lung cancer is cancer that can arise from several different kinds of cells in the lung. As with other cancers, lung cancer happens when abnormal cells grow out of control - it can cause problems by forming a tumor mass or spreading to other parts of the body. Studies have shown that 9 out of 10 lung cancers can be detected by screening before symptoms appear.

Know Your Risk Factors.

Smoking is the biggest risk factor for lung cancer. About 85 percent of lung cancers are caused by smoking. The risk of developing lung cancer increases with the amount a person smokes and the length of time a person smokes. The risk of lung cancer also increases as people get older. Most lung cancers occur in people 55 and older. African Americans also have higher rates of lung cancer.

Eligibility for Low Dose CT Lung Cancer Screening:

- Current or former smoker who quit within last 15 yrs
- Ages 50 – 77 *(Medicare)* // 50 – 80 *(Commercial payers)*
- 20 pack years or more smoking history *(see tear off page for details)*
- Other health factors *(see tear off page for details)*

Benefits of Screening:

Reduction in the risk of dying from lung cancer —

Data shows that annual Low Dose CT scans can detect lung cancer EARLY and this has shown to provide a significant reduction in lung cancer deaths among patients at risk.

Better treatment options —

Early lung cancer may be more easily removed by surgery. The most common type, non-small cell lung cancer, can often be cured by surgery alone if found early enough. Advanced lung cancers may be inoperable, result in cancer spreading beyond the lungs, require more intensive treatment and have lower cure rates.

Cons of Screening:

False Positives (false alarms) may occur and lead to additional scans or invasive procedures which may not be needed. Screening and follow up testing exposes patients to low doses of radiation.

How Do I Schedule a Screening?

Make an appointment with your primary care physician to have an informed discussion on the potential benefits and possible risks of having a lung cancer screening scan. After reviewing and discussing the criteria, your physician will determine if you are a candidate for a lung cancer screening. Your physician's office may schedule the exam.

OR — Call 661.200.1332 for more information on low dose CT lung cancer screening and to be counseled by our low dose CT lung cancer screening program nurse.

Is the Screening Covered by Insurance?

The CT scan for lung cancer is considered part of a normal yearly screening for patients that are reasonably healthy and meet age and smoking history criteria. This screening exam, if eligible, is covered through Medicare and most commercial insurances. Check with your insurance company for coverage.

What Can I Expect During an Exam?

Our highly trained radiologists use a Low Dose Computed Tomography (CT) scan of the chest to screen for lung cancer. The level of radiation is low but provides excellent clarity to detect an early lung mass. The test takes just minutes to perform and involves lying on a table which moves in and out of a donut hole in the CT scanner. If you need follow-up testing, our program radiologists and pulmonologists can help.

What if Something Abnormal Shows up on My Scan?

If an abnormality is detected through screening, Henry Mayo's multi-disciplinary team of cancer specialists may determine if there is a lung cancer by utilizing non-invasive, accurate diagnostic biopsy techniques including: endobronchial ultrasound (EBUS) and electromagnetic navigation.

END

It's 2022 –
Let's Get Back to Cancer Screening

May Lin Tao, MD, MSHS

Director of USC/**Henry Mayo Cancer Program**, Santa Clarita Valley
Clinical Associate Professor of Radiation Oncology, Keck Medicine of USC

Coming up:

Colorectal Cancer Screening

These days seem like we are in the Land of Oz…

Informing Your Patients About The Importance of Colonoscopy

Presented By: M. Philip Duldulao MD

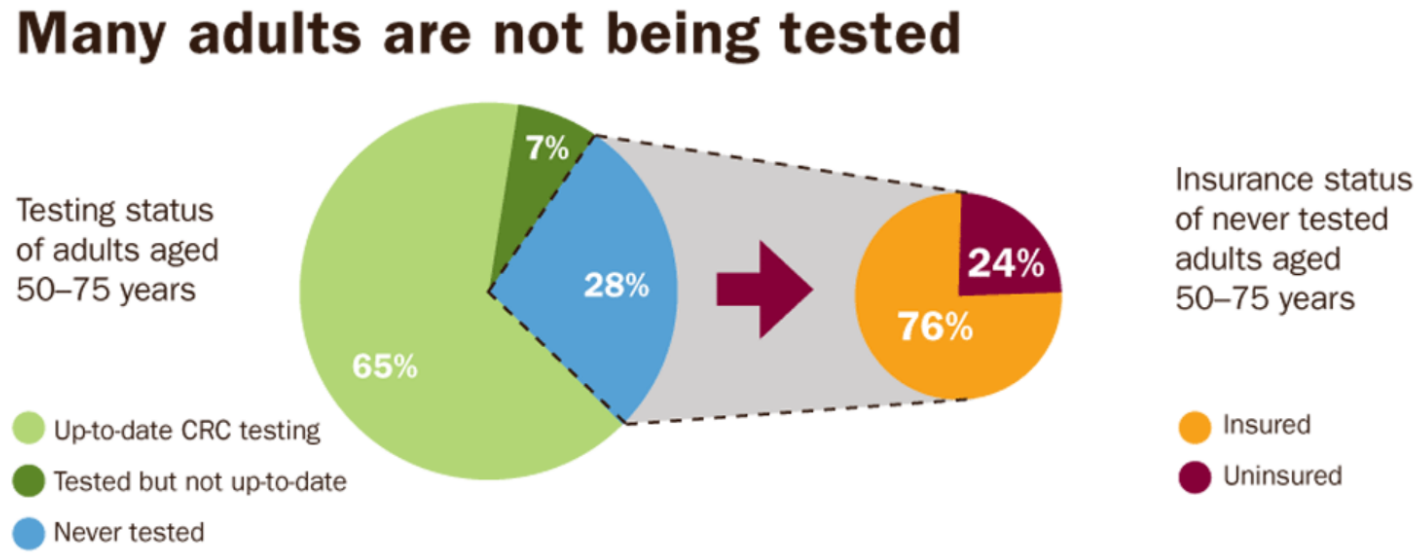
Date: 09/10/22

Disclosures

Olympus – Consultant

So You NEED a Colonoscopy!!!

Who Is / IS NOT Getting Screened for CRC



SOURCE: Behavioral Risk Factor Surveillance System, 2012

Graphic illustrating the colorectal cancer testing status of adults aged 50 to 75 years. 65 percent of adults are up to date on colorectal cancer testing, 28 percent have never been tested, and 7 percent have been tested but are not up to date. Of the 28 percent of adults who have never been tested, 76 percent are insured and 24 percent are uninsured.

- 28% have not undergone ANY screening test
  - FIT/FOBT/Colonoscopy

Why Do Patients Refuse Colonoscopies

- Survey of 1100 participants 50 and older
- 45% M; 55% W
  - 28% - Not necessary
  - 20.1% - Too expensive
  - 20.1% - Dislike colonoscopies
  - 15.8% - Rely on “Other” methods to avoid colon cancer
  - 6.5% - Didn’t know they needed one
  - 6.5% - Just too busy

Why Do Patients Refuse Colonoscopies (Continued)

- 15.7% of 50-65 year olds will not get a screening colonoscopy
- 18.5% say that their doctor DID discuss the need to have a colonoscopy

- Additional factors
  - Increasing mistrust of medical professionals
  - Practitioner's poor understanding/education of the current data, recommendations and guidelines

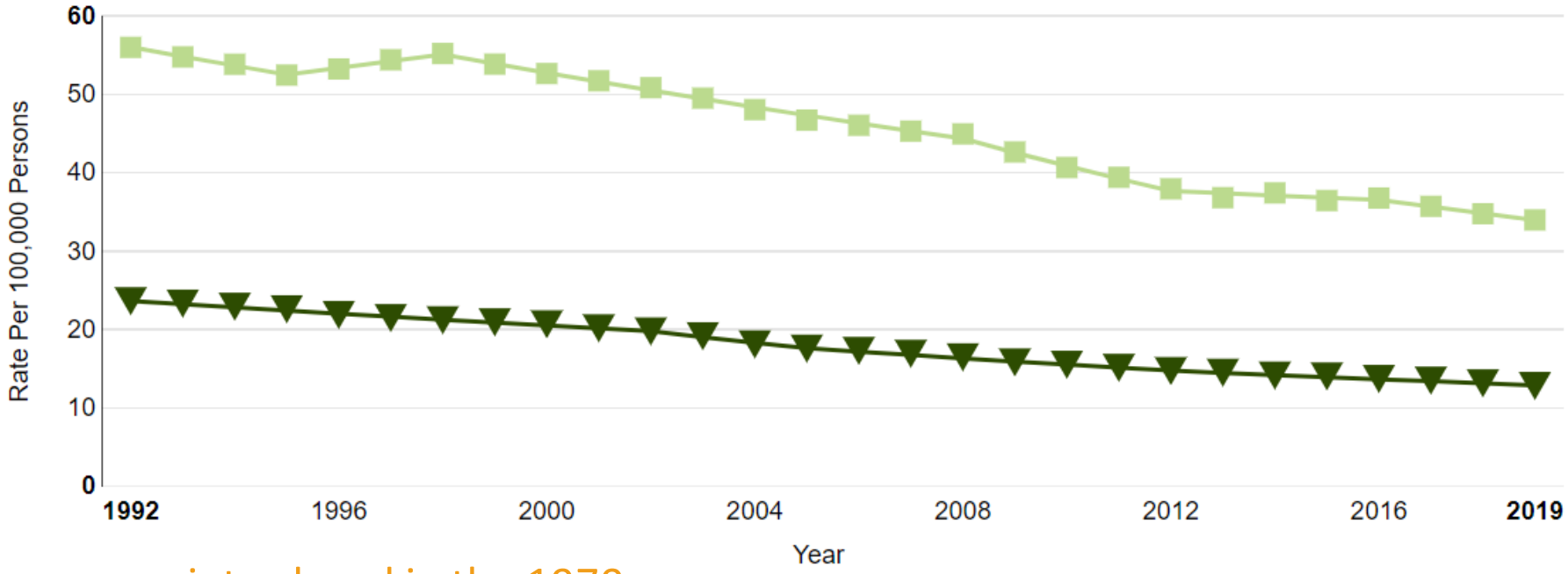
How To Dispel The Myths…

- 15.7% of 50-65 year olds will not get a screening colonoscopy
- 18.5% say that their doctor DID discuss the need to have a colonoscopy
- Additional factors
  - Increasing mistrust of medical professionals
  - Practitioner's poor understanding/education of the current data, recommendations and guidelines

MYTH #1

COLONOSCOPIES DON'T PREVENT CANCER

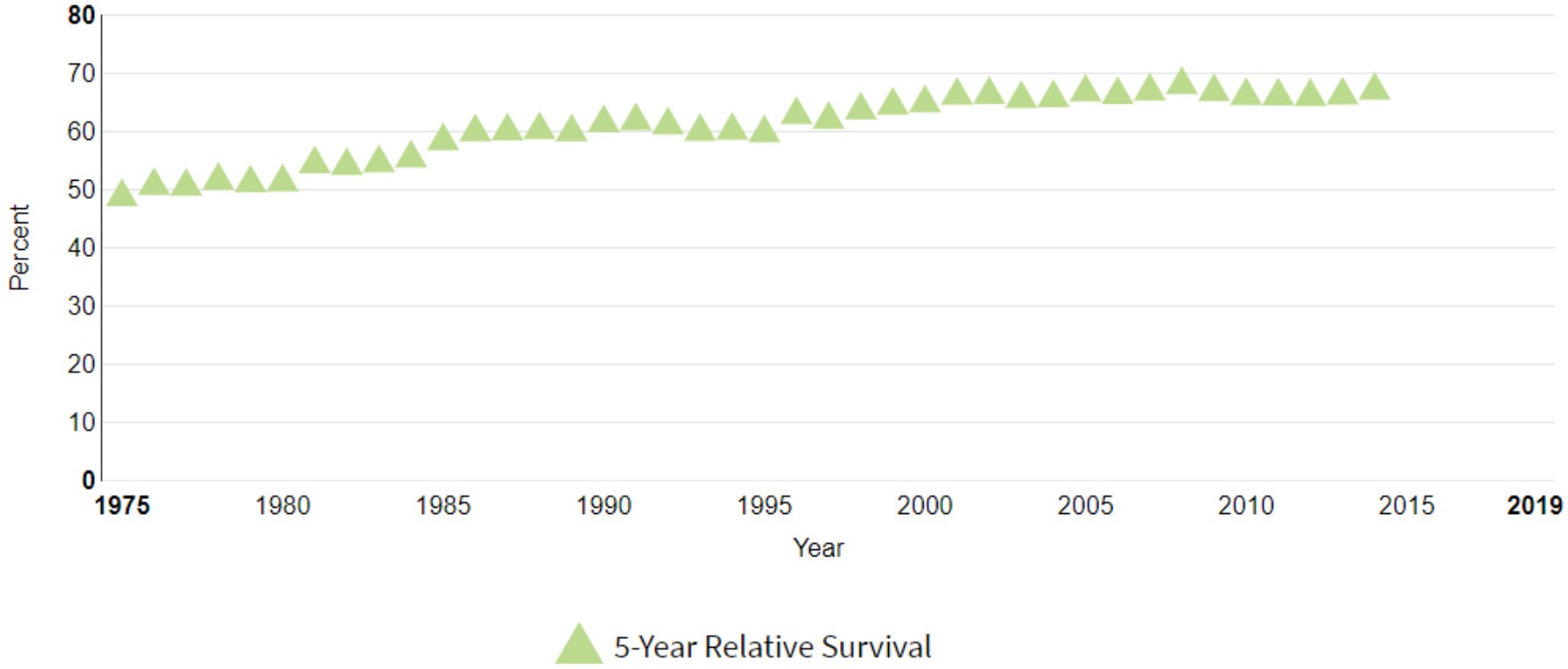
What Practitioners Need to Know



Colonoscopy introduced in the 1970s

New cases come from SEER 12. Deaths come from U.S. Mortality.
All Races, Both Sexes. Rates are Age-Adjusted.
Modeled trend lines were calculated from the underlying rates using the Joinpoint Trend Analysis Software.

Overall Survival for CRC

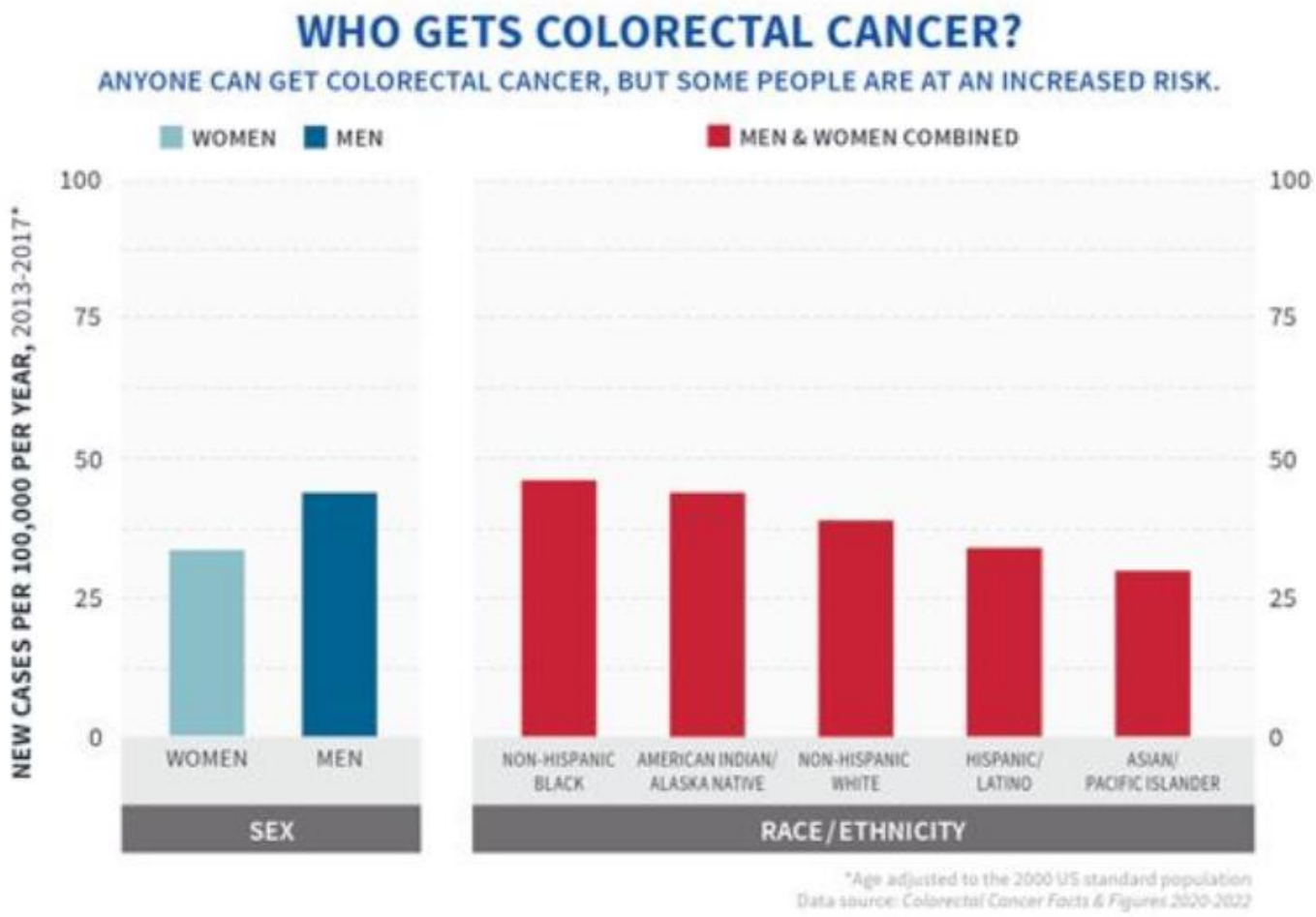


SEER 8 5-Year Relative Survival Percent from 1975–2014, All Races, Both Sexes.

MYTH #2

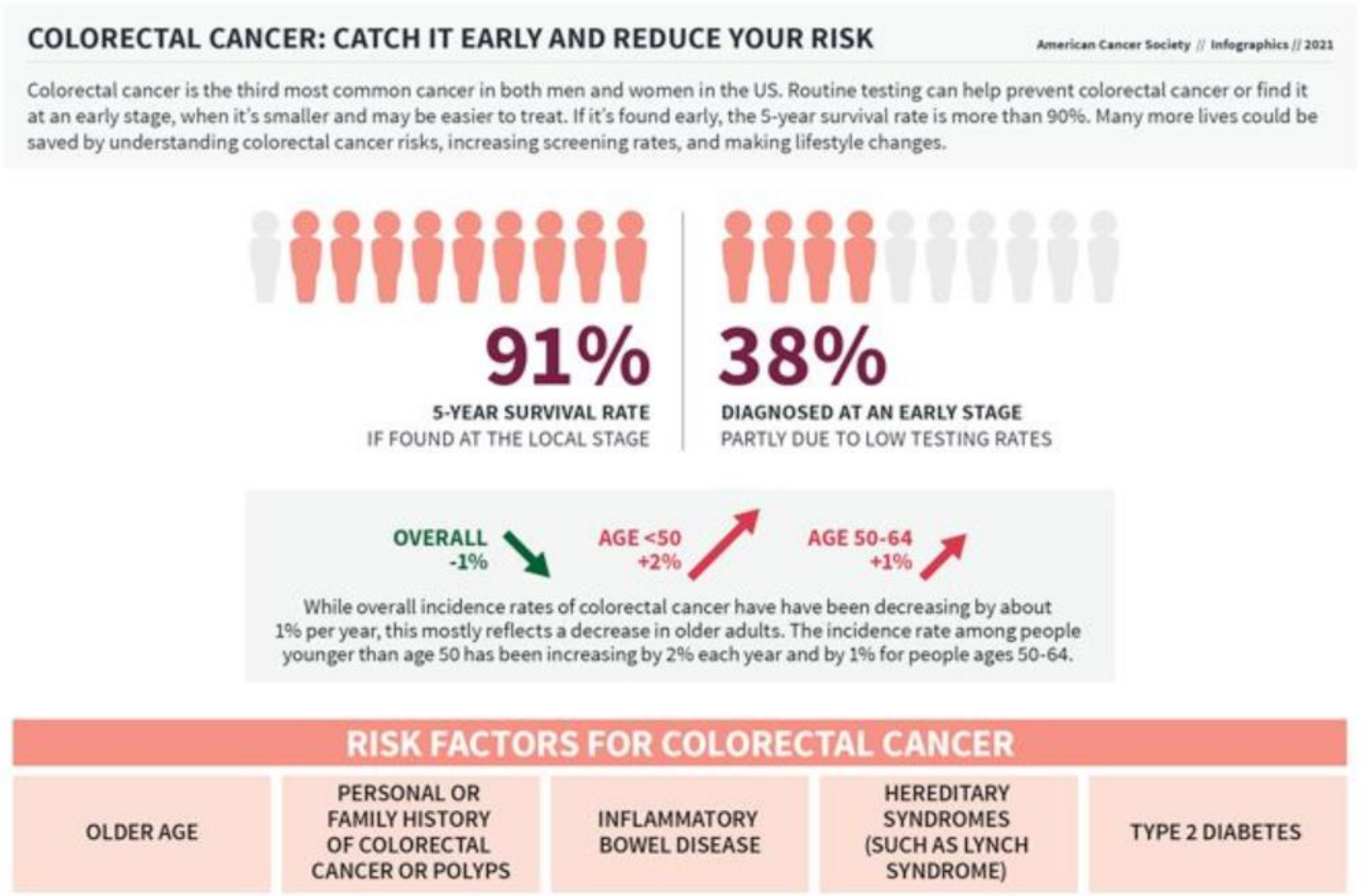
ONLY PATIENTS WITH FAMILY HISTORY OF CANCER GET COLORECTAL CANCER

Who Gets CRC?

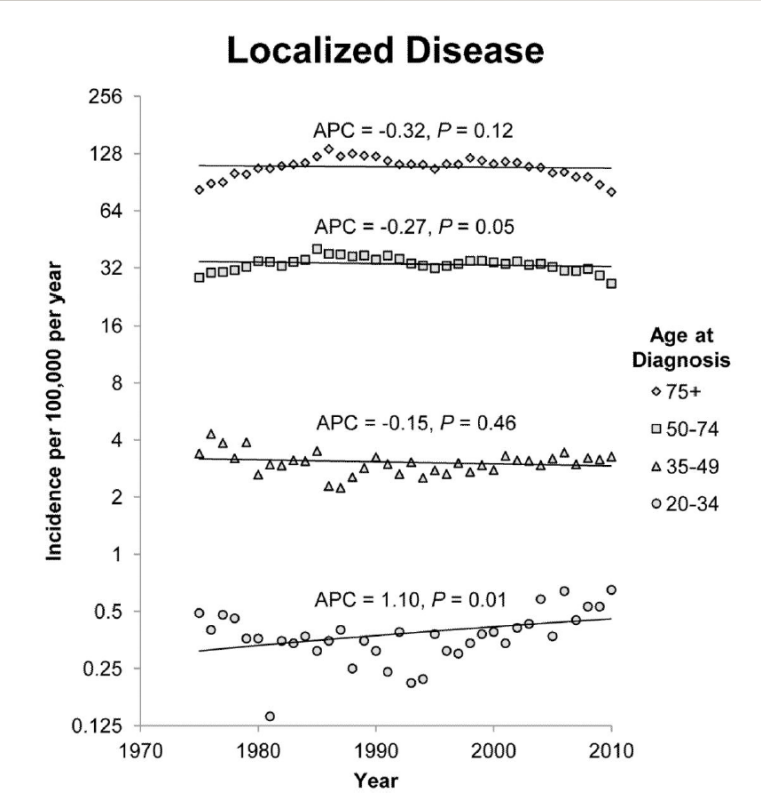

WHO GETS COLORECTAL CANCER?
ANYONE CAN GET COLORECTAL CANCER, BUT SOME PEOPLE ARE AT AN INCREASED RISK.
WOMEN
MEN
MEN & WOMEN COMBINED
NEW CASES PER 100,000 PER YEAR, 2013-2017*
100
75
50
25
0
WOMEN
MEN
SEX
NON-HISPANIC BLACK
AMERICAN INDIAN/ ALASKA NATIVE
NON-HISPANIC WHITE
HISPANIC/ LATINO
ASIAN/ PACIFIC ISLANDER
RACE/ETHNICITY
*Age adjusted to the 2000 US standard population
Data source: Colorectal Cancer Facts & Figures 2020-2022

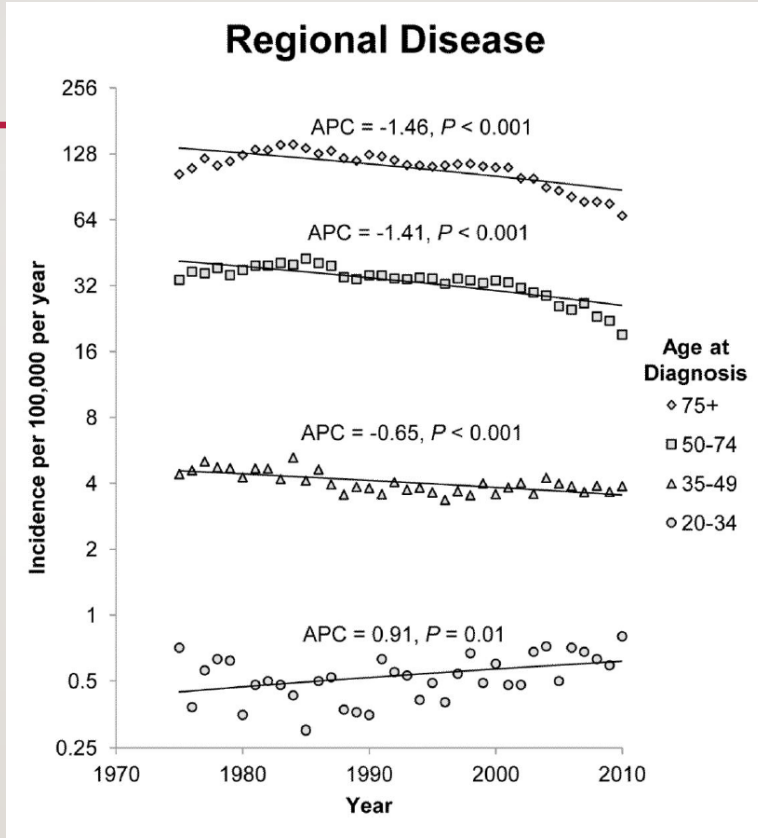
Factors for CRC

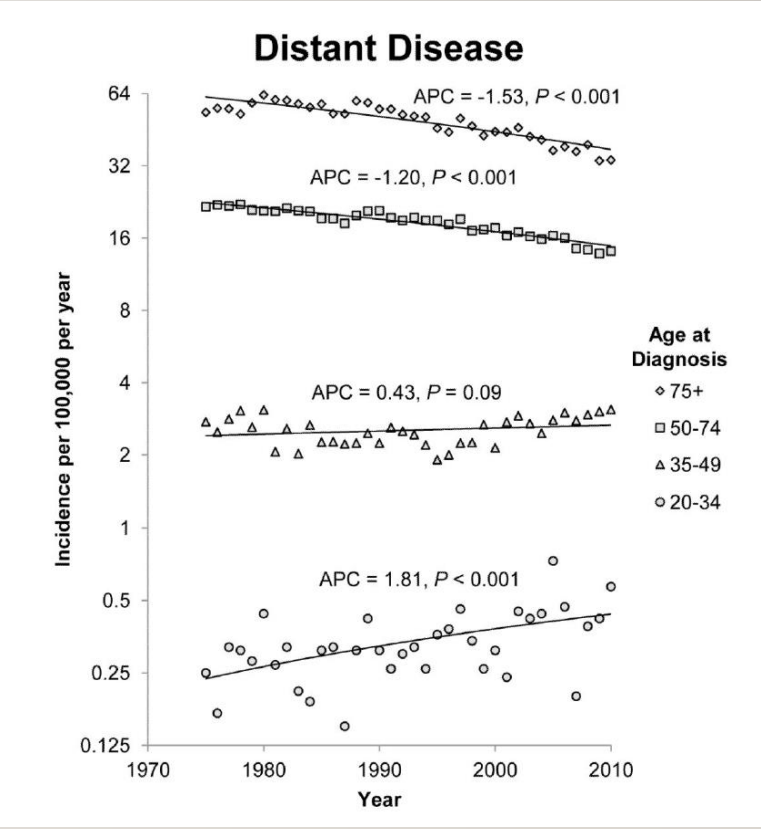
- Other risk factors: Obesity, smoking
- Early detection = Increase survival



THE DISTURBING TREND IN CRC







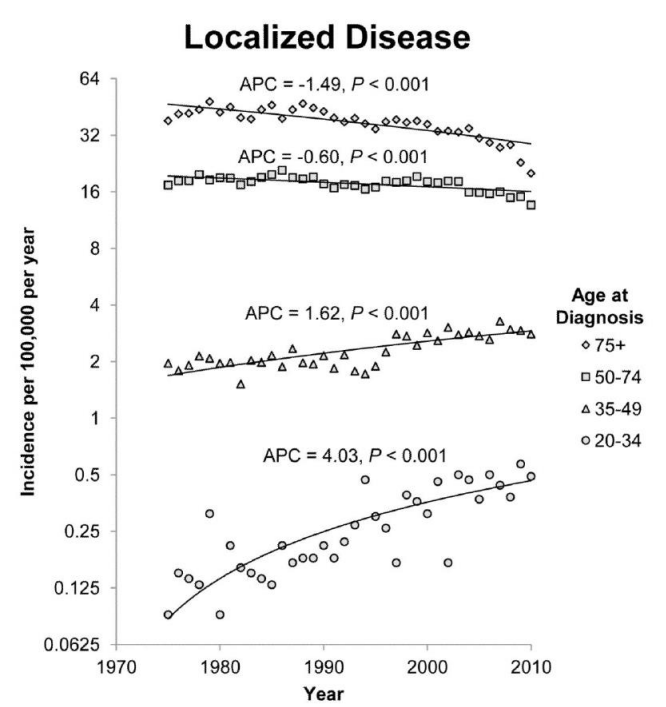
- Incidence of colon cancer rising in young patients

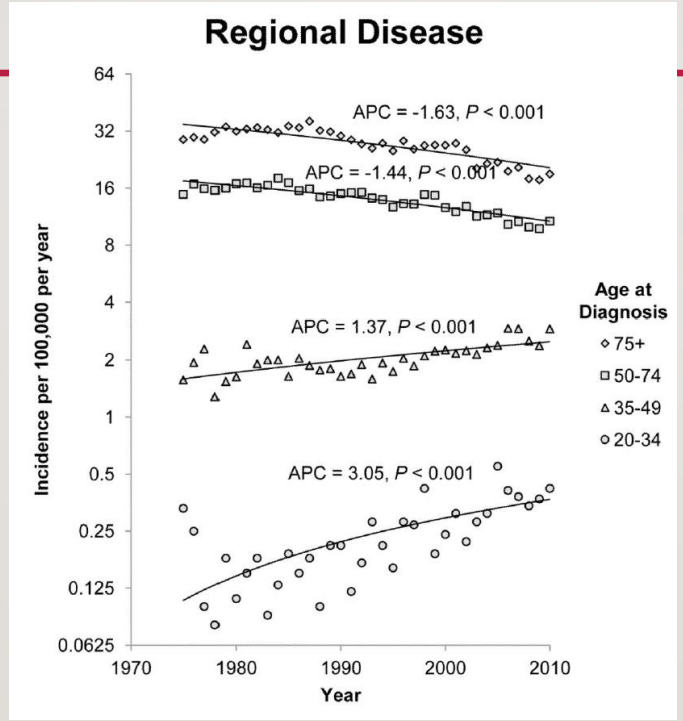
Keck Medicine of USC and Henry Mayo Newhall Hospital

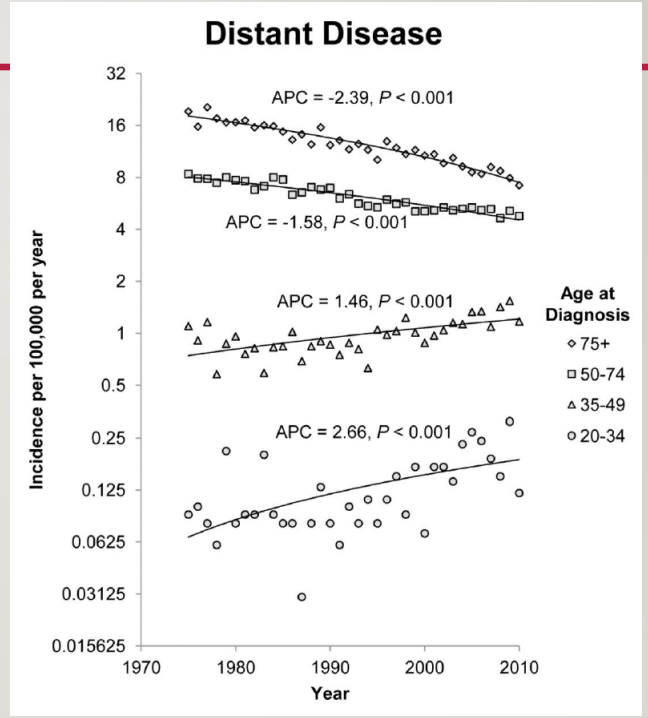
Increasing Disparities in Age-Related Incidence of Colon and Rectal Cancer in the United States, 1975-2010

Christina E Bailey, MD[1], Chung-Yuan Hu, PhD[1], Y Nancy You, MD[1], Brian K Bednarski, MD[1], Miguel A Rodriguez-Bigas, MD[1], John M Skibber, MD[1], Scott B Cantor, MD[2], and George J Chang, MD[1]

RISE IN RECTAL CANCER IN YOUNG PATIENTS







- Almost 125% projected rise in rectal cancer in patients 20-34 yo by 2030

Keck Medicine of USC and Henry Mayo Newhall Hospital

Increasing Disparities in Age-Related Incidence of Colon and Rectal Cancer in the United States, 1975-2010

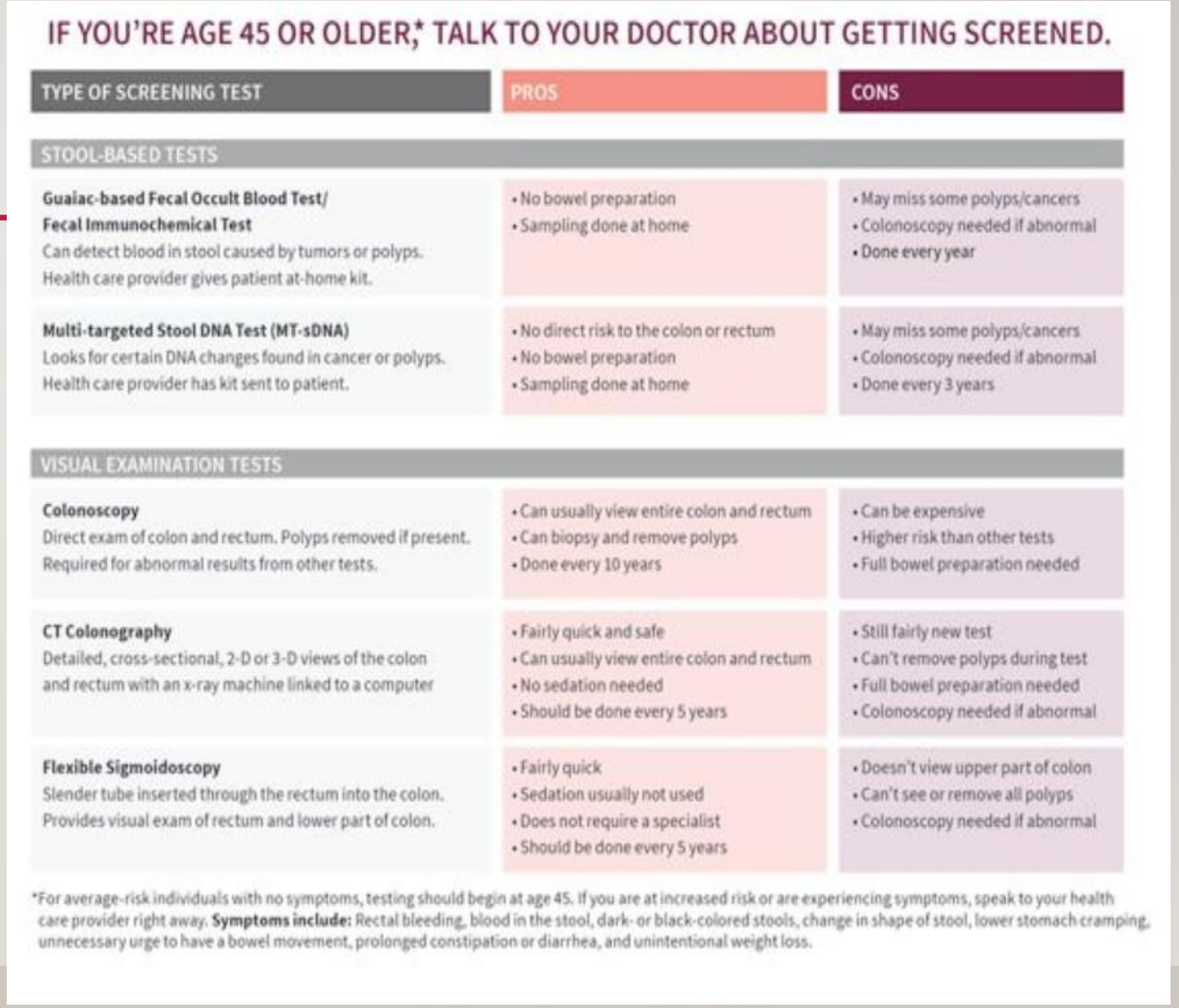
Christina E Bailey, MD[1], Chung-Yuan Hu, PhD[1], Y Nancy You, MD[1], Brian K Bednarski, MD[1], Miguel A Rodriguez-Bigas, MD[1], John M Skibber, MD[1], Scott B Cantor, MD[2], and George J Chang, MD[1]

MYTH #3

I ONLY NEED TO DO STOOL TESTS

OTHER SCREENING METHODS FOR COLORECTAL CANCER

- Stool test mainly test for presence of cancer
  - Doesn't prevent cancer like a colonoscopy
  - Has to be done every year
- False negatives and false positives
  - Colonoscopy is the GOLD standard
- Stool studies alone not recommended for patients with significant risk factors



IF YOU'RE AGE 45 OR OLDER,* TALK TO YOUR DOCTOR ABOUT GETTING SCREENED.

TYPE OF SCREENING TEST	PROS	CONS
STOOL-BASED TESTS		
Guaiac-based Fecal Occult Blood Test/ Fecal Immunochemical Test Can detect blood in stool caused by tumors or polyps. Health care provider gives patient at-home kit.	• No bowel preparation • Sampling done at home	• May miss some polyps/cancers • Colonoscopy needed if abnormal • Done every year
Multi-targeted Stool DNA Test (MT-sDNA) Looks for certain DNA changes found in cancer or polyps. Health care provider has kit sent to patient.	• No direct risk to the colon or rectum • No bowel preparation • Sampling done at home	• May miss some polyps/cancers • Colonoscopy needed if abnormal • Done every 3 years
VISUAL EXAMINATION TESTS		
Colonoscopy Direct exam of colon and rectum. Polyps removed if present. Required for abnormal results from other tests.	• Can usually view entire colon and rectum • Can biopsy and remove polyps • Done every 10 years	• Can be expensive • Higher risk than other tests • Full bowel preparation needed
CT Colonography Detailed, cross-sectional, 2-D or 3-D views of the colon and rectum with an x-ray machine linked to a computer	• Fairly quick and safe • Can usually view entire colon and rectum • No sedation needed • Should be done every 5 years	• Still fairly new test • Can't remove polyps during test • Full bowel preparation needed • Colonoscopy needed if abnormal
Flexible Sigmoidoscopy Slender tube inserted through the rectum into the colon. Provides visual exam of rectum and lower part of colon.	• Fairly quick • Sedation usually not used • Does not require a specialist • Should be done every 5 years	• Doesn't view upper part of colon • Can't see or remove all polyps • Colonoscopy needed if abnormal

*For average-risk individuals with no symptoms, testing should begin at age 45. If you are at increased risk or are experiencing symptoms, speak to your health care provider right away. **Symptoms include:** Rectal bleeding, blood in the stool, dark- or black-colored stools, change in shape of stool, lower stomach cramping, unnecessary urge to have a bowel movement, prolonged constipation or diarrhea, and unintentional weight loss.

MYTH #4

NO SYMPTOMS = NO COLONOSCOPY

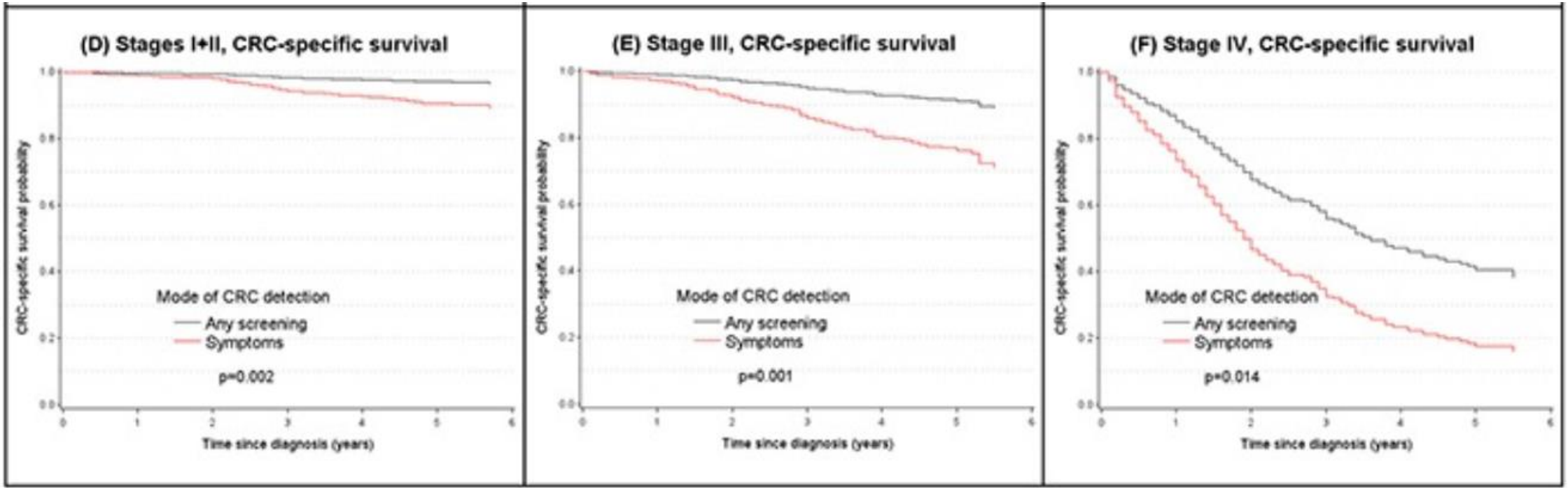
Symptoms versus Screening – The Disadvantage in Waiting Until You Feel Something

	Symptoms		Colonoscopy		
Cancer stage					
I	291	17%	139	50%	
II	545	33%	47	17%	<0.001
III	547	33%	76	27%	
IV	283	17%	15	5%	
Cancer site					
Prox. colon	428	26%	97	35%	
Distal colon	449	27%	96	34%	<0.001
Rectum	790	47%	86	31%	

- Analysis of 2450 pts btwn 50-65
- Outcomes between patients who presented with symptoms for CRC vs. screened patients with CRC

Brenner H, Jansen L, Ulrich A et al. Oncotarget 2016; 7(28): 44695 - 44704

Symptoms vs. Screening (Continued)



- Screened patients had better survival!!!!

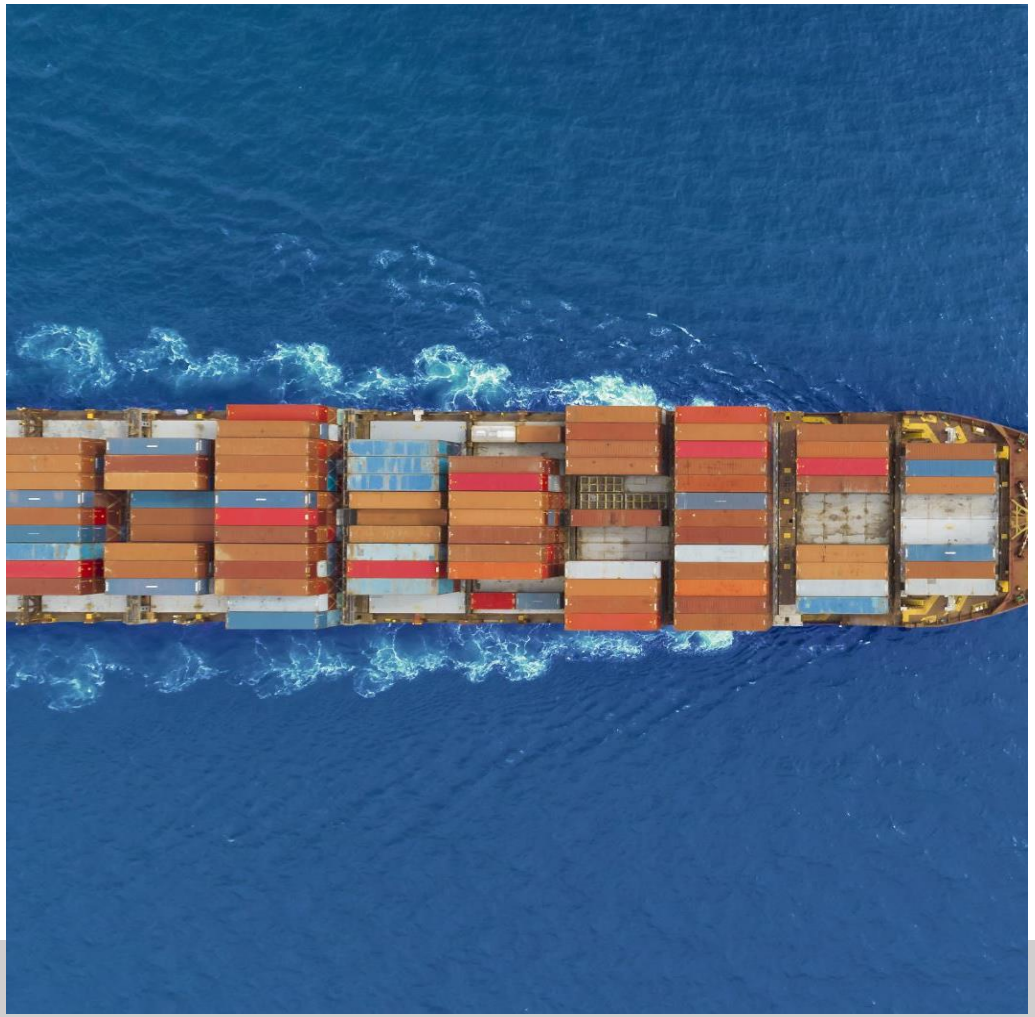
Brenner H, Jansen L, Ulrich A et al. Oncotarget 2016; 7(28): 44695 - 44704

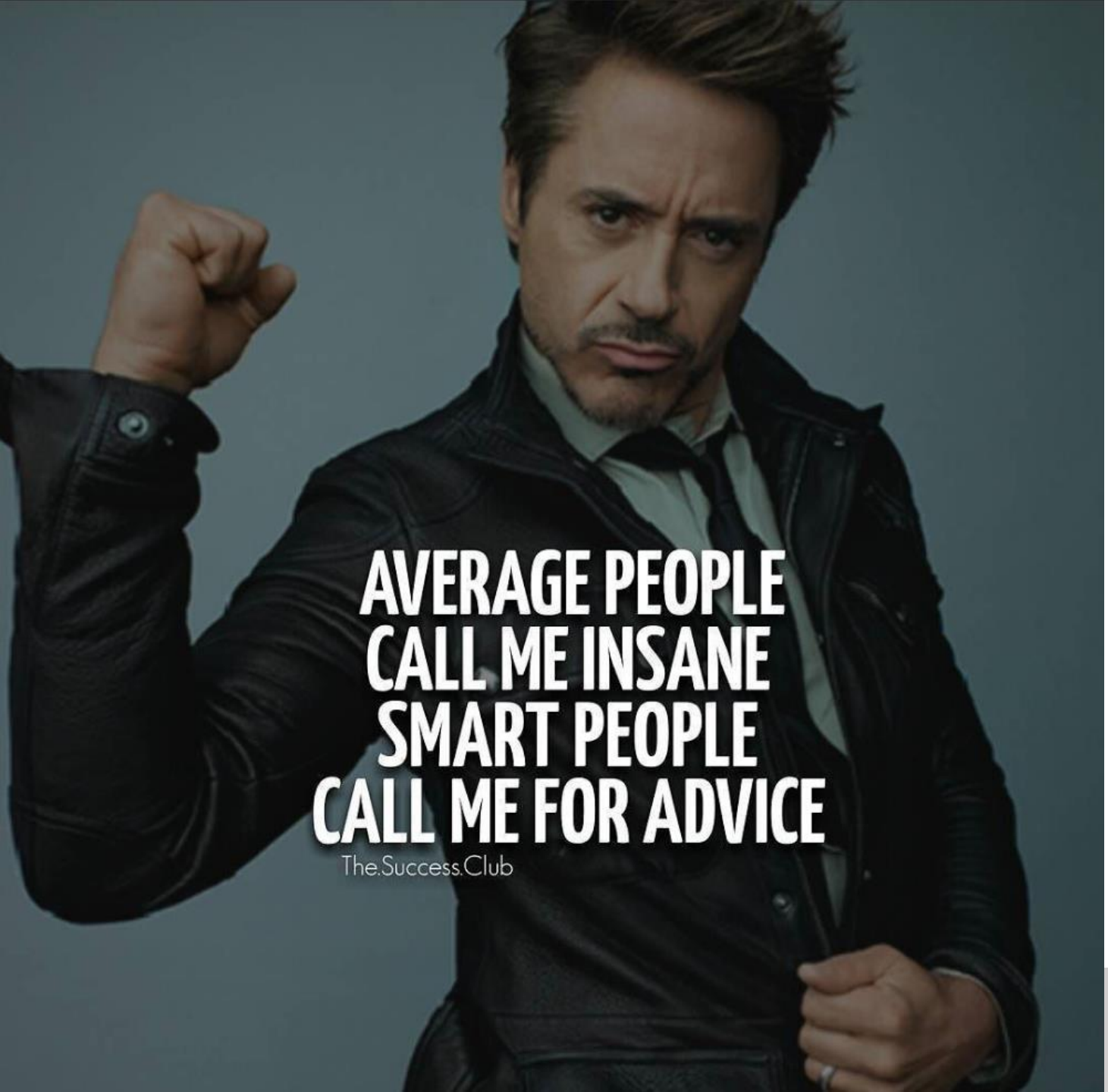
MYTH #5

ONCE I GET A COLONOSCOPY, I LOSE MY DIGNITY / IT'S HARD TO PREP

Increasing Patient Compliance with Instructions for Colonoscopy

- The reality
  - ~50% of patients comply with physicians' complete instructions
- Take your time
  - Avg clinic visit is 15.7 minutes
  - Surgeons < PMD
- Simplify things
  - 3 or less
  - Repeat instructions during visit
- Take information home
  - Information in desired media (paper/email/phone)
  - Post-visit phone call
- Avoid argumentatives





Conclusion

- Goal is not to convince but inform
- Trend in CRC is down overall except for younger population
- Colonoscopies are the GOLD standard for preventing, screening, diagnosing CRC
- If it's important spend more time talking about it.

Useful References and Resources

- www.cdc.gov/cancer/colorectal/
- www.cancer.org
- Seer.cancer.gov
- uspreventiveservicestaskforce.org/
- Clinical Practice Guidelines from ASCRS

END

It's 2022 –
Let's Get Back to Cancer Screening

May Lin Tao, MD, MSHS

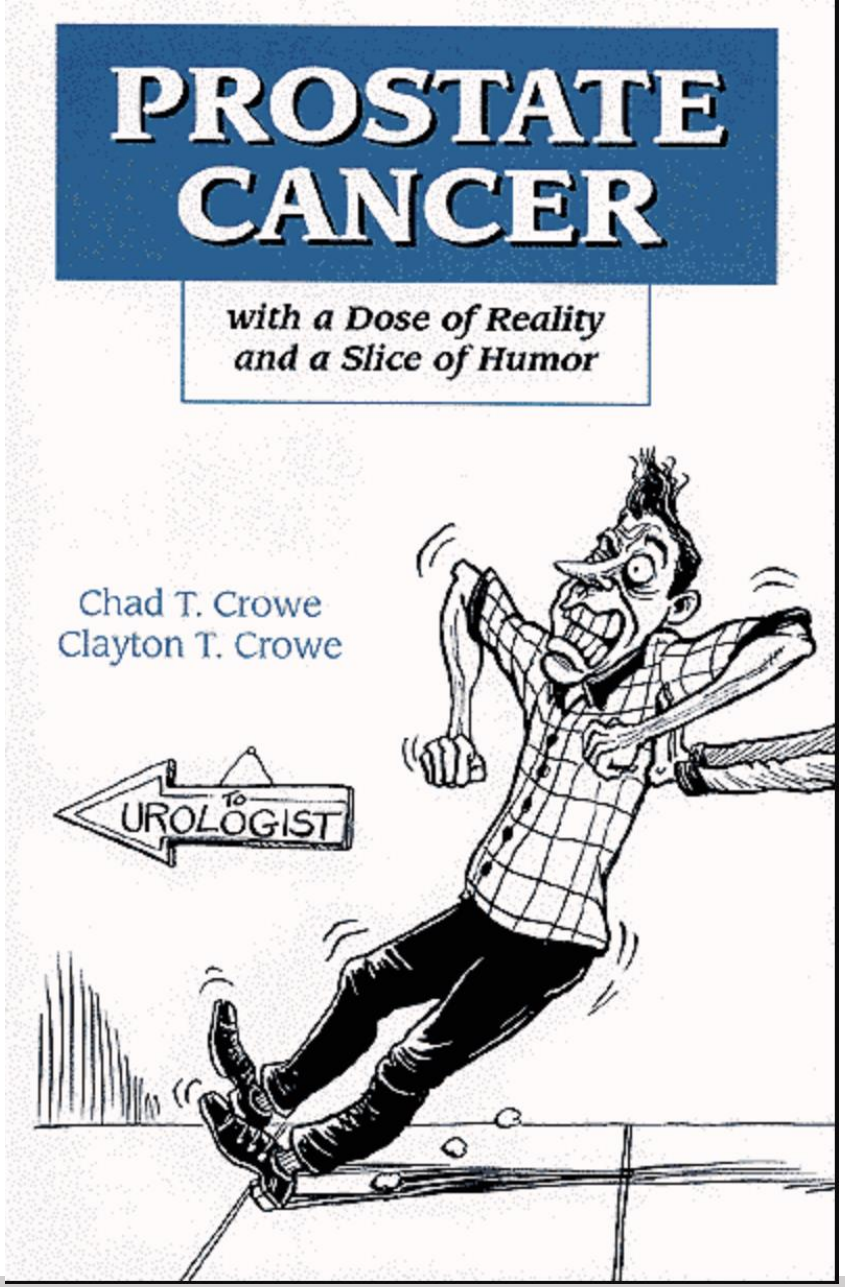
Director of USC/**Henry Mayo Cancer Program**, Santa Clarita Valley
Clinical Associate Professor of Radiation Oncology, Keck Medicine of USC

Coming up:

Prostate Cancer Screening

No Need to Fear or Delay,
All you need is your PSA!

Digital Rectal Exam is not necessary.



Prostate cancer screening:

Why, who and how of screening, and who are considered high risk?

Presented By: Edward Forsyth, MD
Clinical Assistant Professor of Urology
Keck Medicine of USC

9/10/22

Prostate Cancer Foundation
Curing Together.

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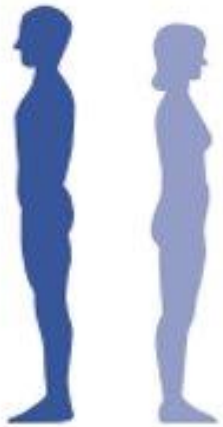
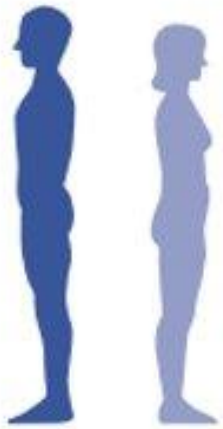
September is Prostate Cancer Awareness Month

Figure 3. Leading Sites of New Cancer Cases and Deaths – 2022 Estimates



Estimated New Cases

Male			Female		
Prostate	268,490	27%	Breast	287,850	31%
Lung & bronchus	117,910	12%	Lung & bronchus	118,830	13%
Colon & rectum	80,690	8%	Colon & rectum	70,340	8%
Urinary bladder	61,700	6%	Uterine corpus	65,950	7%
Melanoma of the skin	57,180	6%	Melanoma of the skin	42,600	5%
Kidney & renal pelvis	50,290	5%	Non-Hodgkin lymphoma	36,350	4%
Non-Hodgkin lymphoma	44,120	4%	Thyroid	31,940	3%
Oral cavity & pharynx	38,700	4%	Pancreas	29,240	3%
Leukemia	35,810	4%	Kidney & renal pelvis	28,710	3%
Pancreas	32,970	3%	Leukemia	24,840	3%
All sites	**983,160**		**All sites**	**934,870**	



Estimated Deaths

Male			Female		
Lung & bronchus	68,820	21%	Lung & bronchus	61,360	21%
Prostate	34,500	11%	Breast	43,250	15%
Colon & rectum	28,400	9%	Colon & rectum	24,180	8%
Pancreas	25,970	8%	Pancreas	23,860	8%
Liver & intrahepatic bile duct	20,420	6%	Ovary	12,810	4%
Leukemia	14,020	4%	Uterine corpus	12,550	4%
Esophagus	13,250	4%	Liver & intrahepatic bile duct	10,100	4%
Urinary bladder	12,120	4%	Leukemia	9,980	3%
Non-Hodgkin lymphoma	11,700	4%	Non-Hodgkin lymphoma	8,550	3%
Brain & other nervous system	10,710	3%	Brain & other nervous system	7,570	3%
All sites	**322,090**		**All sites**	**287,270**	

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates do not include Puerto Rico or other US territories. Ranking is based on modeled projections and may differ from the most recent observed data.

Seeking balance

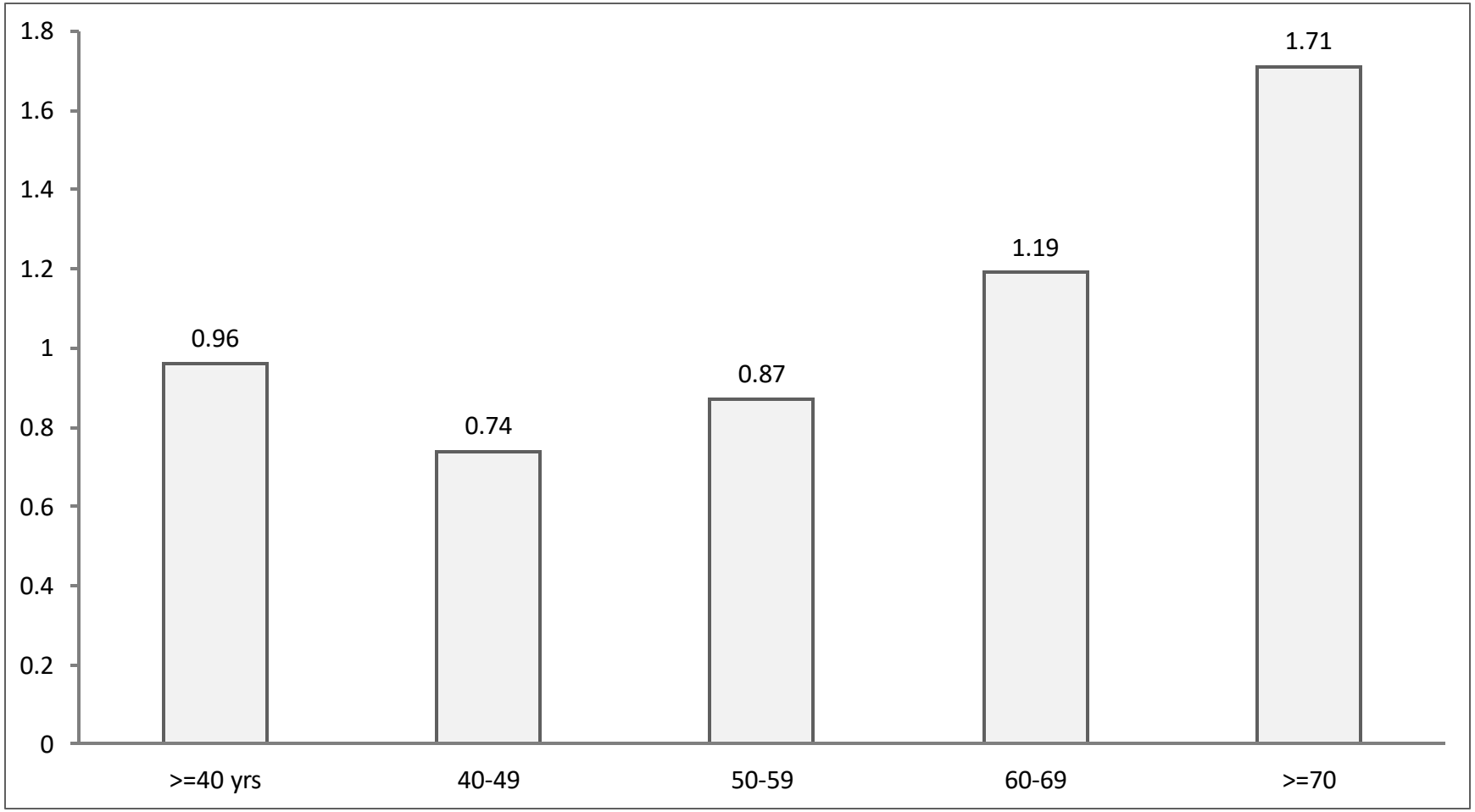
Pro	Con
• Decrease mortality • Prevent morbidity • Earlier stage detection	• Overdetection • Overtreatment: • ED, Incontinence, QoL

PSA blood test

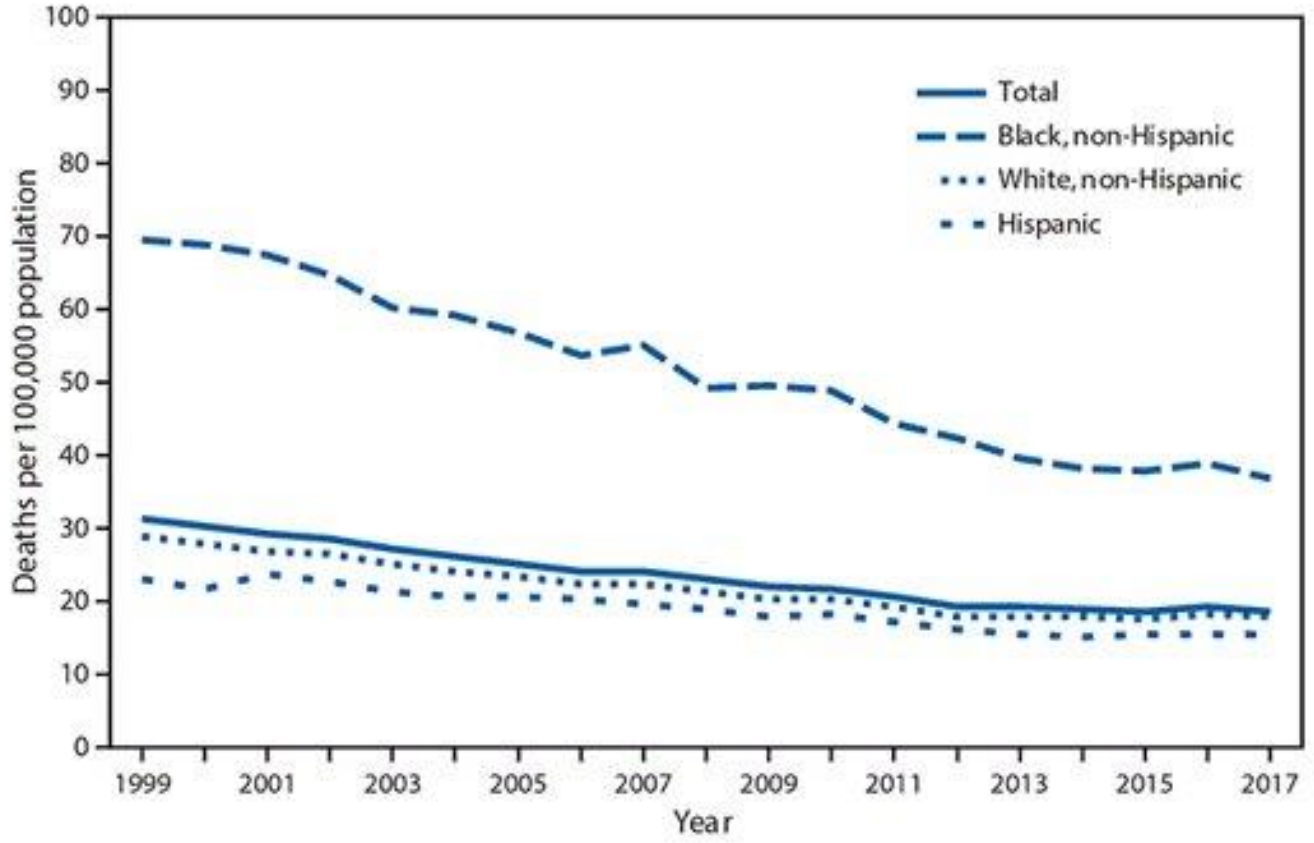
PSA

- Enzyme produced by epithelial cells of the prostate
- FDA approved in 1986 for monitoring relapse of prostate cancer
- Used for screening for prostate cancer since early 90s
- PSA elevation can be caused by cancer, infection, inflammation, BPH, etc.

Mean PSA by age



3,251 men in NHANES; Lacher et al. Clinica Chimica Acta 2015



* Deaths per 100,000 population, age-adjusted to the 2000 U.S. standard population.

† Prostate cancer deaths were those with the *International Classification of Diseases, Tenth Revision* (ICD-10) underlying cause of death code C61.

1999–2017. MMWR Morb Mortal Wkly Rep 2019;68:531. DOI: http://dx.doi.org/10.15585/mmwr.mm6823a4 .

PSA: USPSTF (US Preventative Services Task Force)

2012:

- Recommended against PSA screening for **ALL** men (previously if only >75yo)
- *"D" rating*: Moderate-high certainty that screening has no benefit and that the "harms outweigh the benefits"

2017: Updated Recommendation Statement

- *"C" rating:* 55-69yo: should discuss potential benefits vs. risks
- *"D" rating:* >70yo, PSA screening not recommended

5/8/2018: USPSTF Final Draft:

For 55-69yo men: screening should be individualized

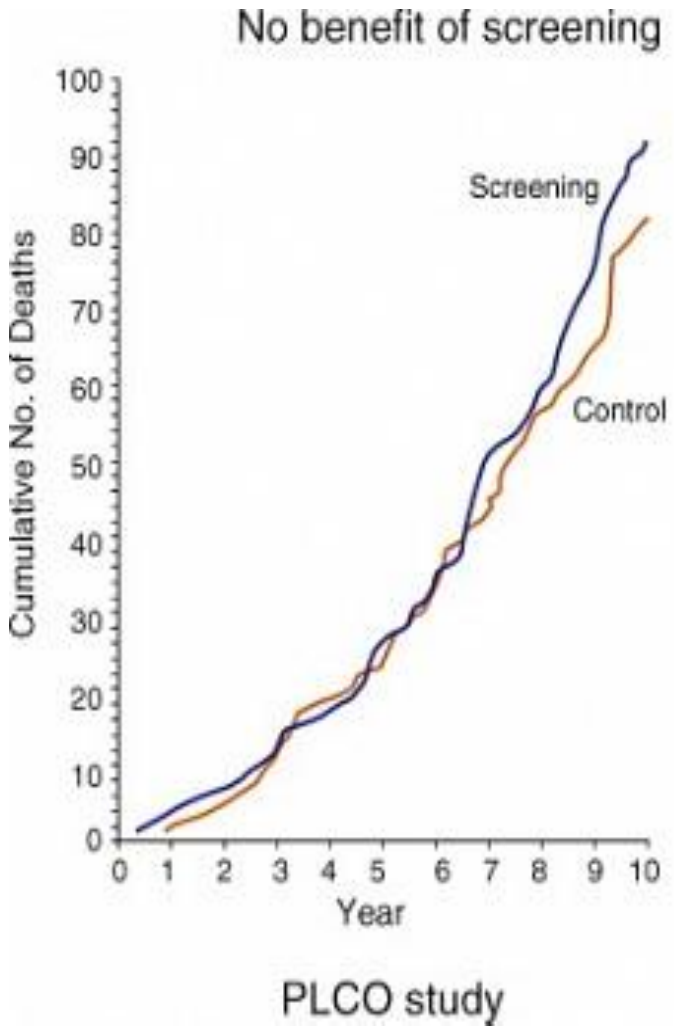
Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial

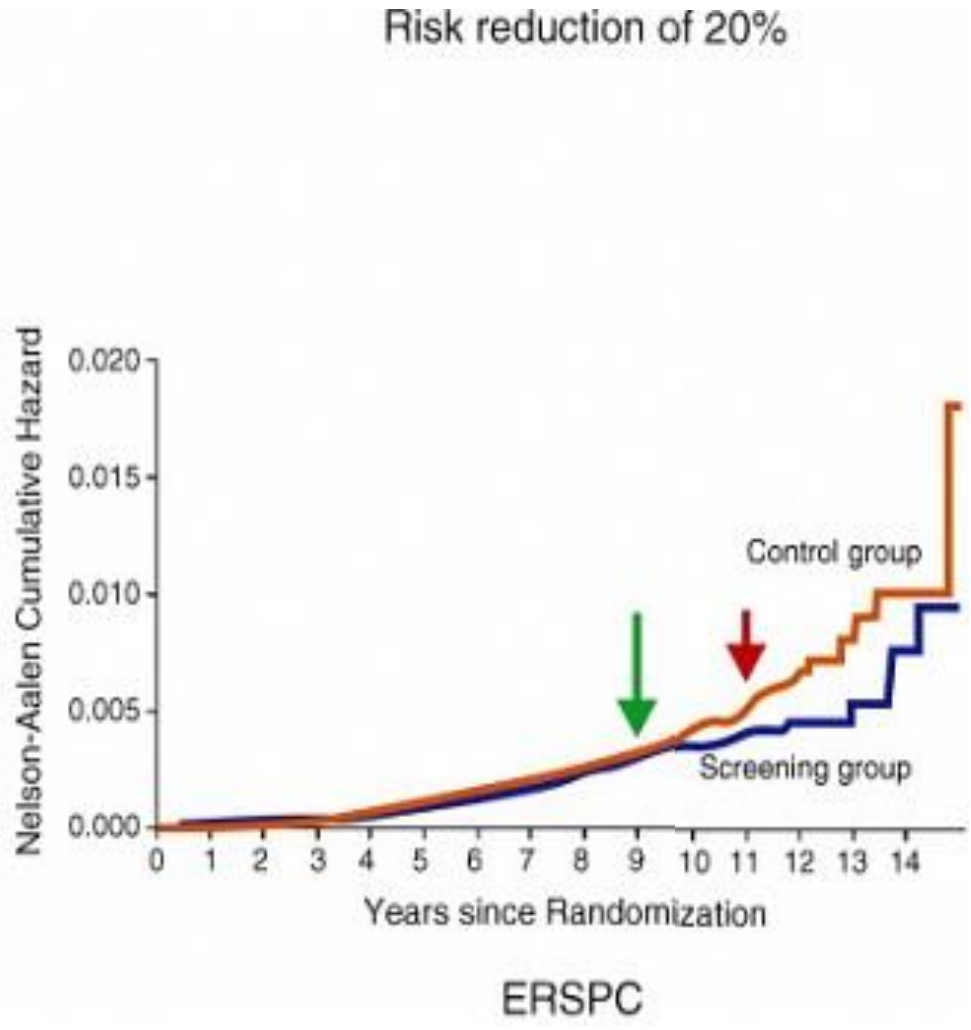
- 76,693 men at 10 U.S. study centers.
- Annual screening (38,343 subjects).
- Usual care as the control (38,350 subjects).

European Randomized Study of Screening for Prostate Cancer (ERSPC)

- 162,388 subjects at 9 European centers.
- Screening arm (72,891 subjects).
- Control arm (89,251 subjects).

Screening Controversy: PLCO vs ERSPC

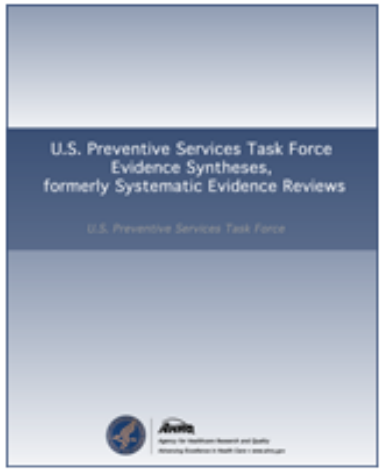




Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial

During each year of the PLCO screening phase approximately **46 percent of control arm participants** received PSA screening...

...the PLCO has been characterized as trial comparing organized versus opportunistic screening.

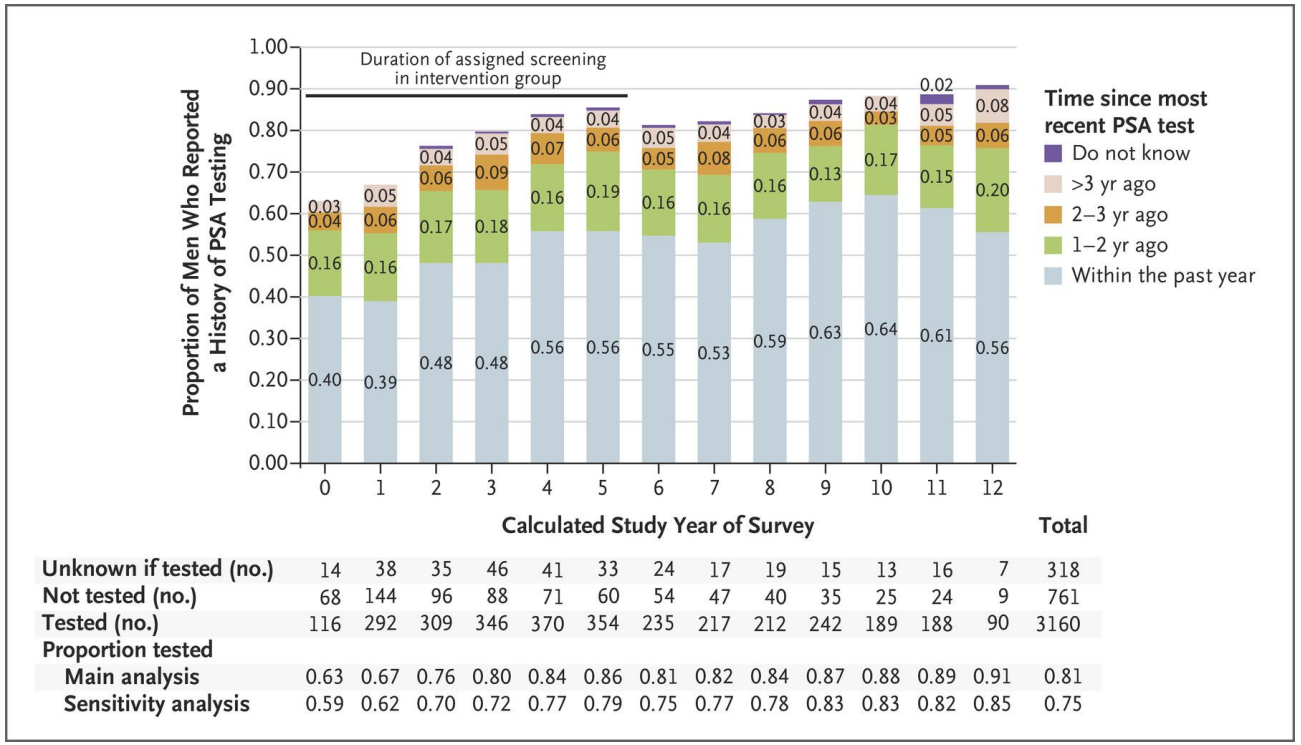


Prostate-Specific Antigen-Based Screening for Prostate Cancer: A Systematic Evidence Review for the U.S. Preventive Services Task Force

Evidence Synthesis, No. 154

Investigators: Joshua J. Fenton, MD, MPH, Meghan S. Weyrich, MPH, Shauna Durbin, MPH, Yu Liu, MS, Heejung Bang, PhD, and Joy Melnikow, MD, MPH.

Rockville (MD): Agency for Healthcare Research and Quality (US); 2018 May.
Report No.: 17-05229-EF-1



Calculated Study Year of Survey	0	1	2	3	4	5	6	7	8	9	10	11	12	Total
Unknown if tested (no.)	14	38	35	46	41	33	24	17	19	15	13	16	7	318
Not tested (no.)	68	144	96	88	71	60	54	47	40	35	25	24	9	761
Tested (no.)	116	292	309	346	370	354	235	217	212	242	189	188	90	3160
Proportion tested														
Main analysis	0.63	0.67	0.76	0.80	0.84	0.86	0.81	0.82	0.84	0.87	0.88	0.89	0.91	0.81
Sensitivity analysis	0.59	0.62	0.70	0.72	0.77	0.79	0.75	0.77	0.78	0.83	0.83	0.82	0.85	0.75

(After screening period ~90% of control arm has PSA tested)

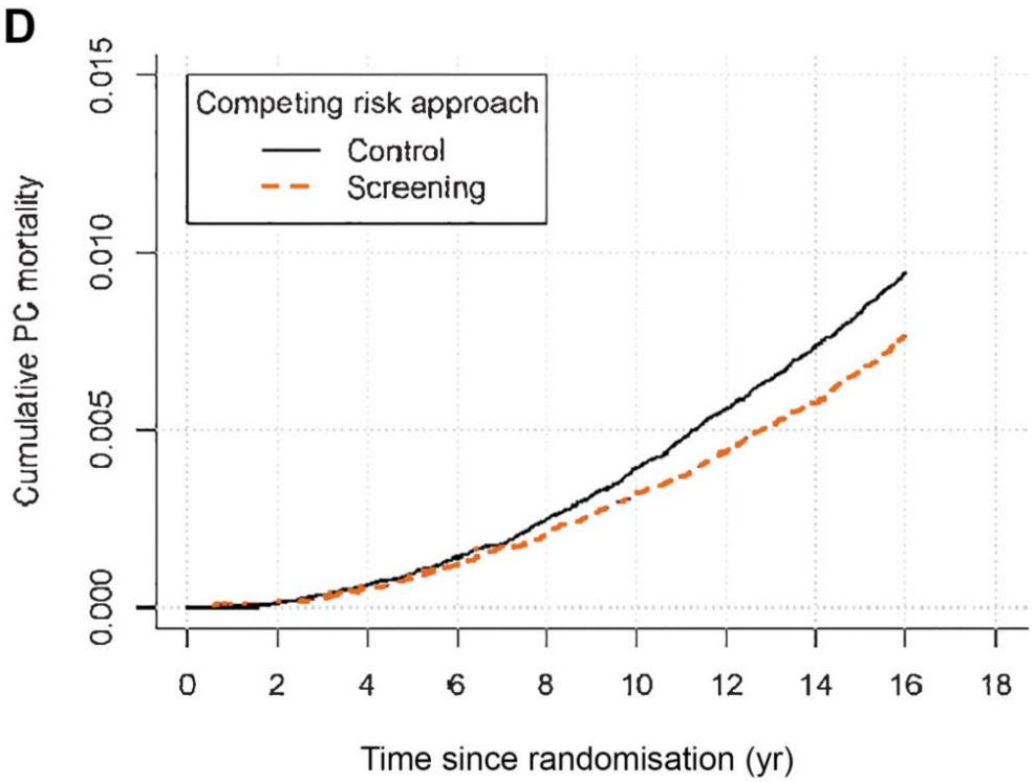
May 5, 2016
N Engl J Med 2016; 374:1795-1796
DOI: 10.1056/NEJMc1515131

European Randomized Study of Screening for Prostate Cancer (ERSPC)

16 year follow-up

- The rate ratio of PCa mortality was 0.80 (95% confidence interval [CI] 0.72-0.89, p<0.001) at 16yr.

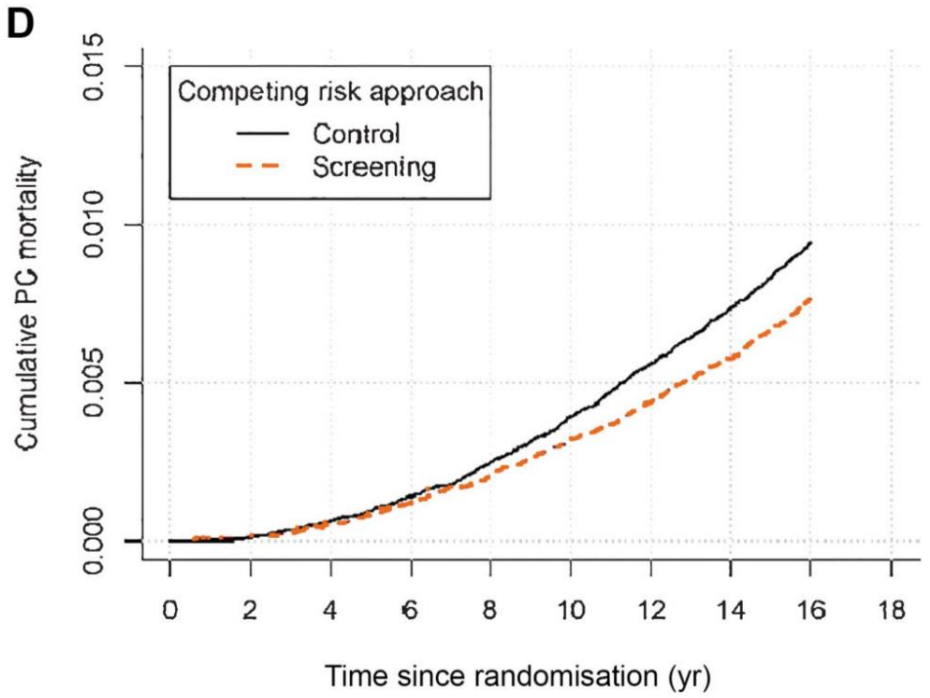
- The difference in absolute PCa mortality increased from 0.14% at 13yr to 0.18% at 16yr.



ESRPC-
16 year follow-up

- The number to be invited for screening to prevent one PCa death:
  - **742** at 13yr
  - **570** at 16yr

- The number needed to diagnose was reduced from 26 to 18.
- **Conclusions:** PSA screening significantly reduces PCa mortality, showing larger absolute benefit with longer follow-up.



Randomized Controlled Trial > Eur Urol. 2019 Jul;76(1):43-51. doi: 10.1016/j.eururo.2019.02.009. Epub 2019 Feb 26.

A 16-yr Follow-up of the European Randomized study of Screening for Prostate Cancer

Recommendations: USPSTF

Under 55	55-69	70+
…	The decision to be screened for prostate cancer should be an individual one.	Do not screen

Original Investigation | Urology

March 14, 2022

Trends in Incidence of Metastatic Prostate Cancer in the US

Mihir M. Desai, MD, MPH[1]; Giovanni E. Cacciamani, MSc, MD[1]; Karanvir Gill, MS[1]; Juanjuan Zhang, PhD[2,3]; Lihua Liu, PhD[2,3,4]; Andre Abreu, MD[1]; Inderbir S. Gill, MD, MCh[1]

» Author Affiliations | Article Information

JAMA Netw Open. 2022;5(3):e222246. doi:10.1001/jamanetworkopen.2022.2246

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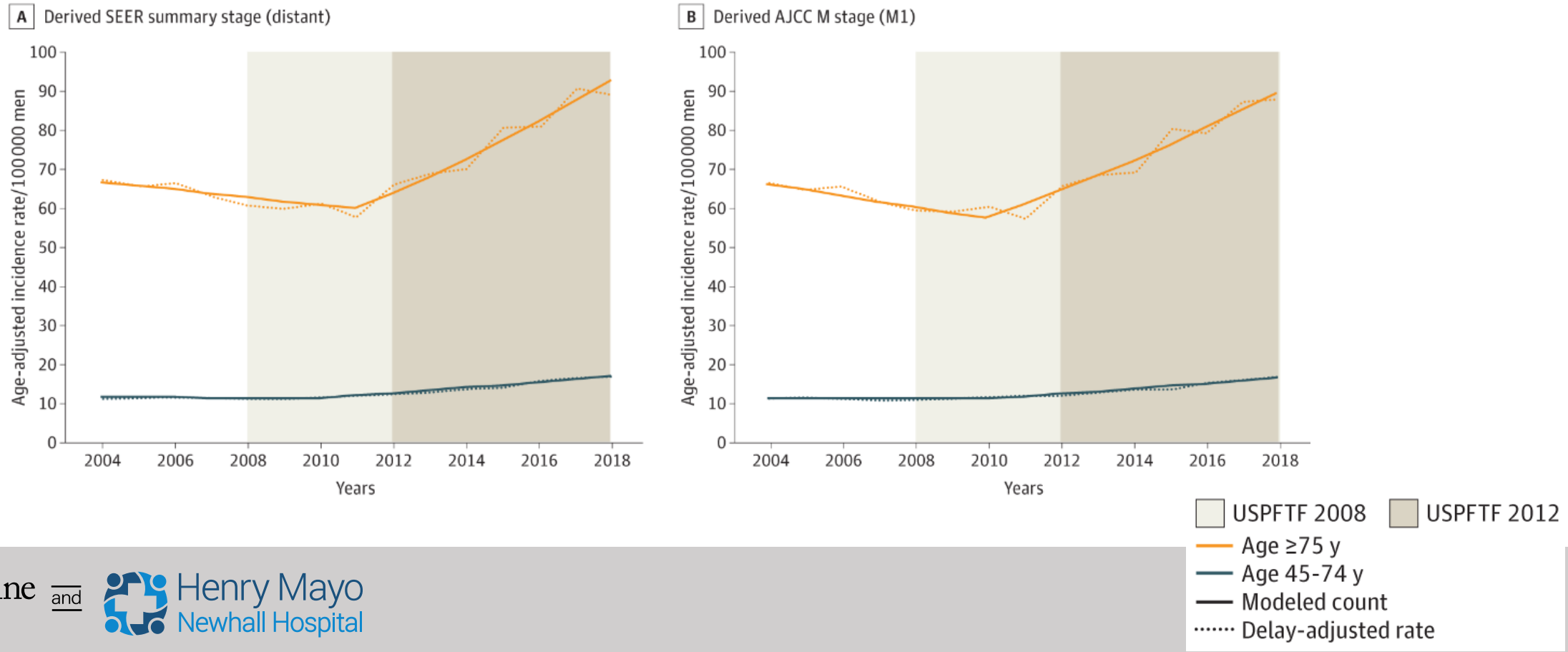


Keck Medicine of USC and Henry Mayo Newhall Hospital

UpToDate®

What's New

Increased rates of metastatic prostate cancer in the United States (May 2022)

The United States Preventive Services Task Force (USPSTF) recommended against routine screening for prostate cancer for men over 75 years beginning in 2008 and for all men in 2012. There is concern that this shift may have resulted in increased rates of advanced disease. A new analysis of population-based data from the United States from 2004 to 2018 demonstrates that since the change in recommendations, there has been an increase in the incidence of metastatic cancer in men of all ages, and especially in men aged 75 years or older (annual increase of 6.5 percent in 2018 compared with 2011) [1]. We continue to use shared decision-making in our approach to prostate cancer screening, incorporating research findings and patient preferences; the USPSTF amended their recommendations in 2018 to emphasize shared decision-making for men ages 55 to 69 years. (See "Screening for prostate cancer", section on 'Epidemiology and natural history'.)

Recommendations: American Urological Association

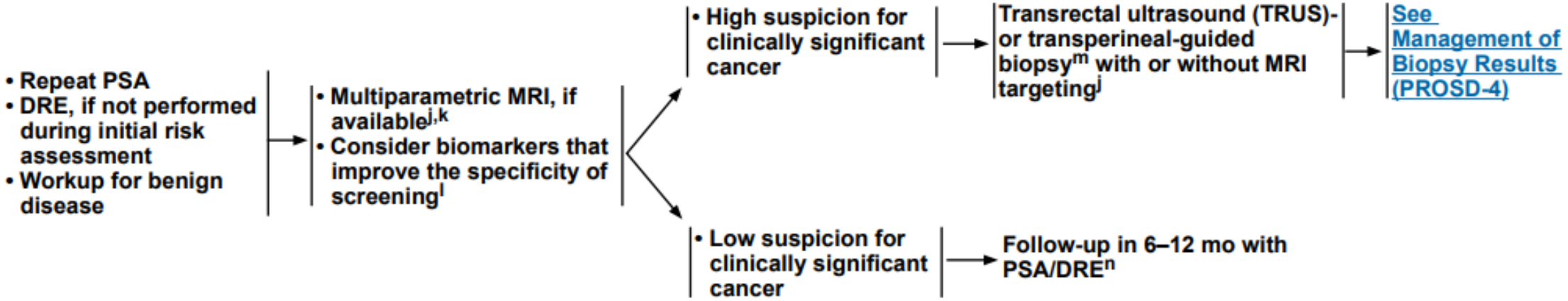
Under 55	55-69	70+
40+: Consider if High risk (African American, Family history of aggressive adenoCA)	The decision to be screened for prostate cancer should be an individual one.	Consider if in EXCELLENT health (10+ year life expectancy)

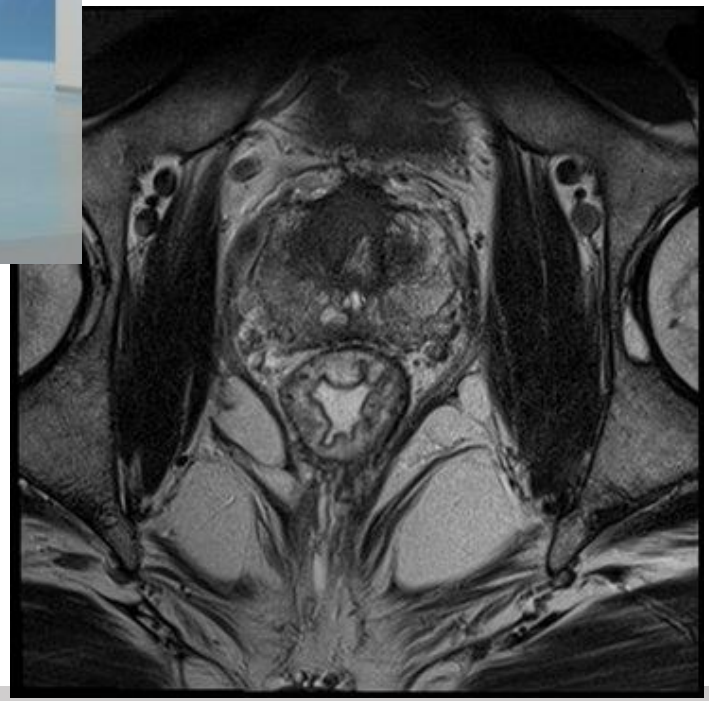
Recommendations: NCCN

40+	45-75	75+
40+: Consider if High risk (African American, suspicious FH, germline mutation)	Screen if opting to participate in an early detection program (after receiving the appropriate counseling on the pros and cons).	Consider in healthy with no co-morbidities

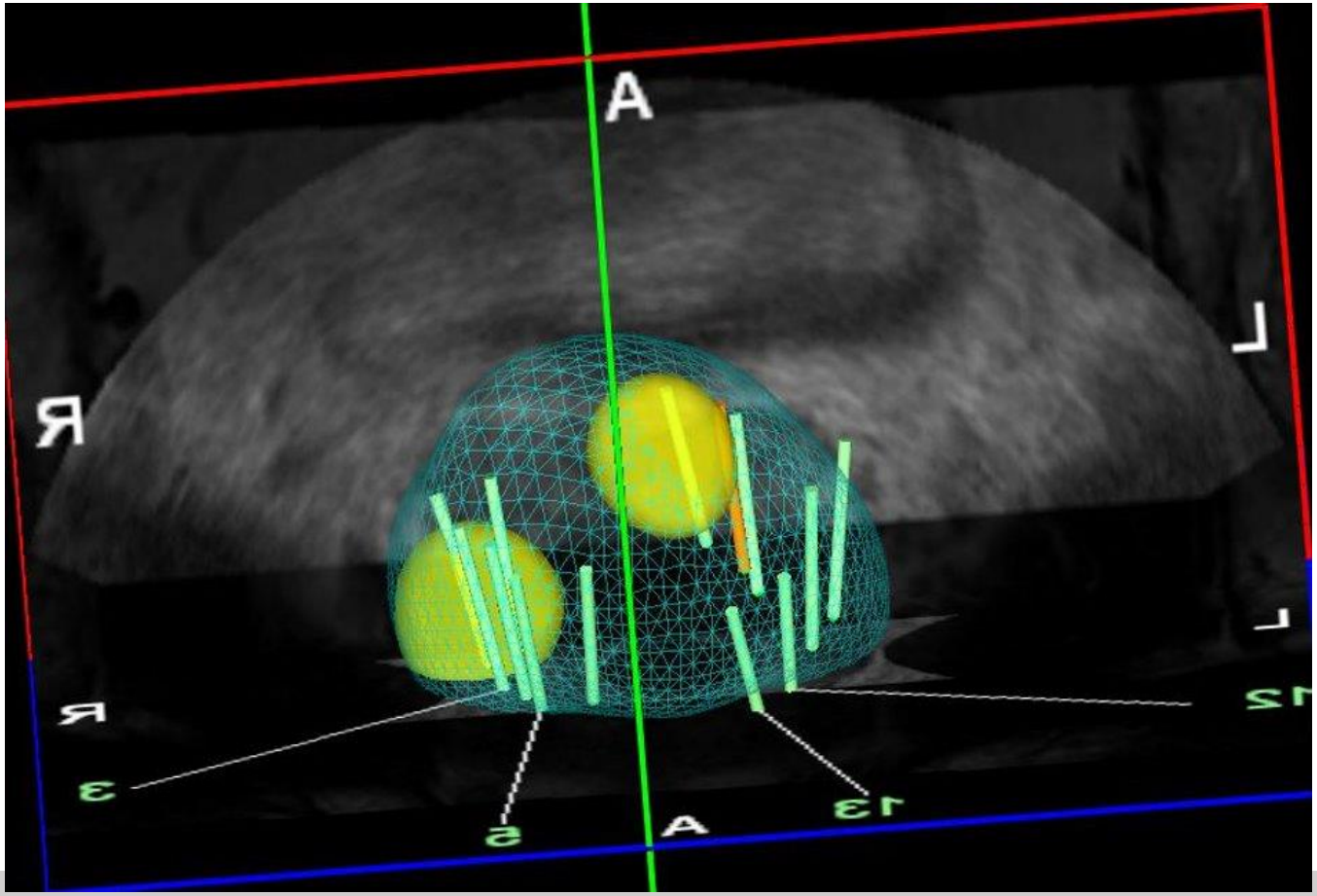
Reducing Overtreatment

- MRI/advanced testing (PCA3, PHI, 4k, Confirm MDX) usage before biopsy
  - Avoid unnecessary biopsies
  - Reduce biopsy morbidity
- Increased active surveillance—avoid or delay definitive treatment
- Focal therapy/alternative treatment


• Repeat PSA
• DRE, if not performed during initial risk assessment
• Workup for benign disease
• Multiparametric MRI, if available[j,k]
• Consider biomarkers that improve the specificity of screening[l]
• High suspicion for clinically significant cancer
Transrectal ultrasound (TRUS)- or transperineal-guided biopsy[m] with or without MRI targeting[j]
See Management of Biopsy Results (PROSD-4)
• Low suspicion for clinically significant cancer
Follow-up in 6–12 mo with PSA/DRE[n]




MRI
Ultrasound
Fused MRI + Ultrasound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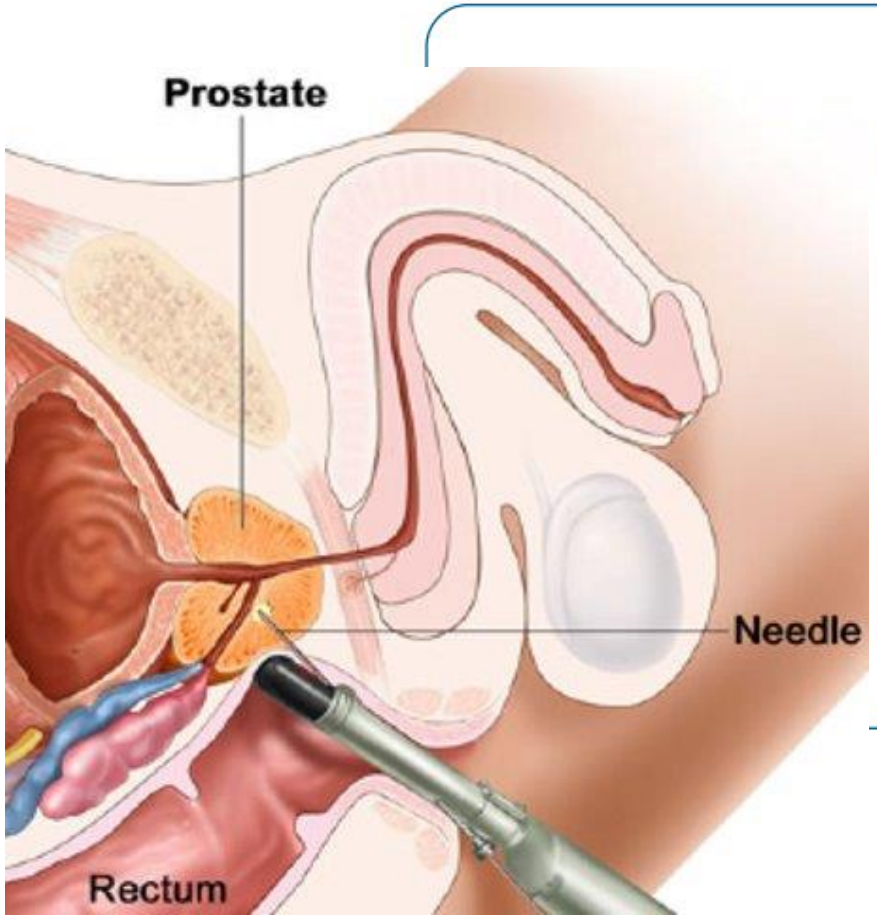
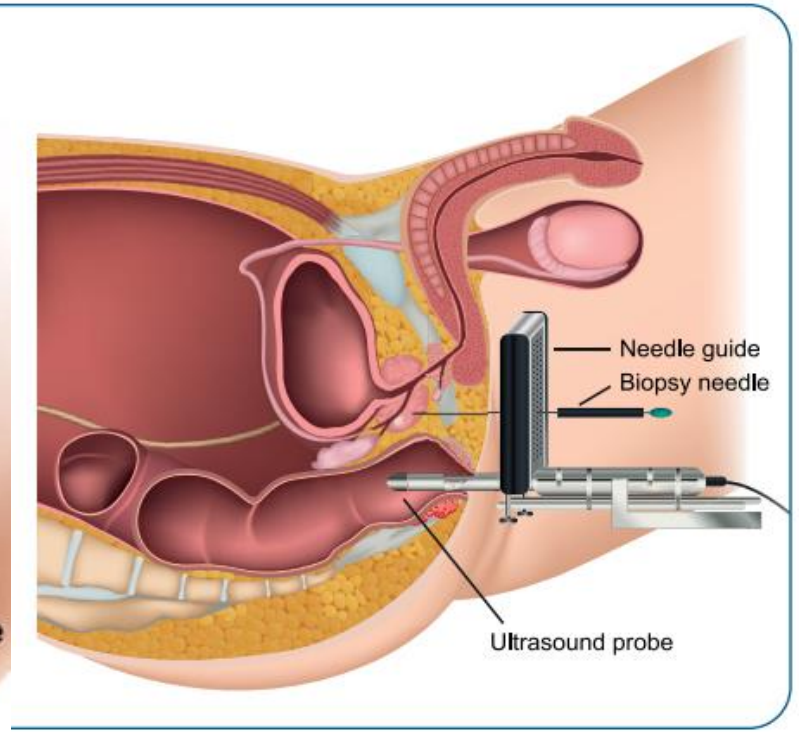
Reduce biopsy complications





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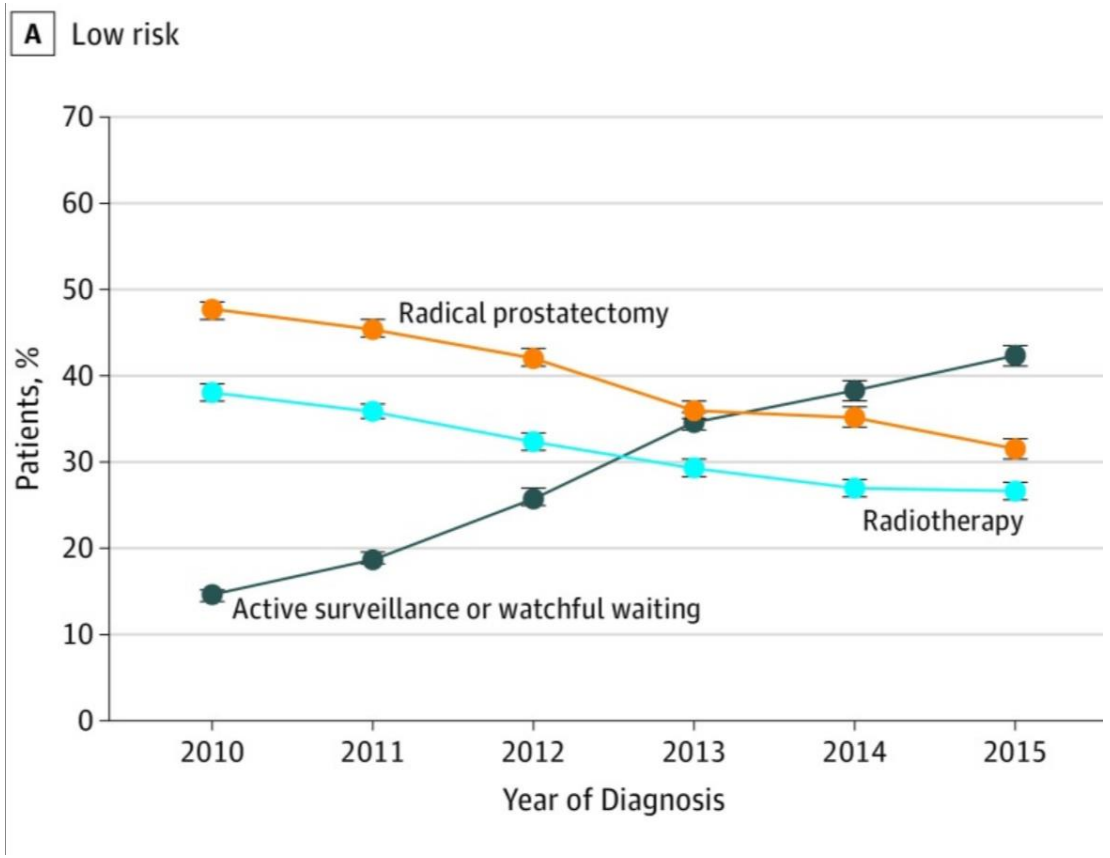
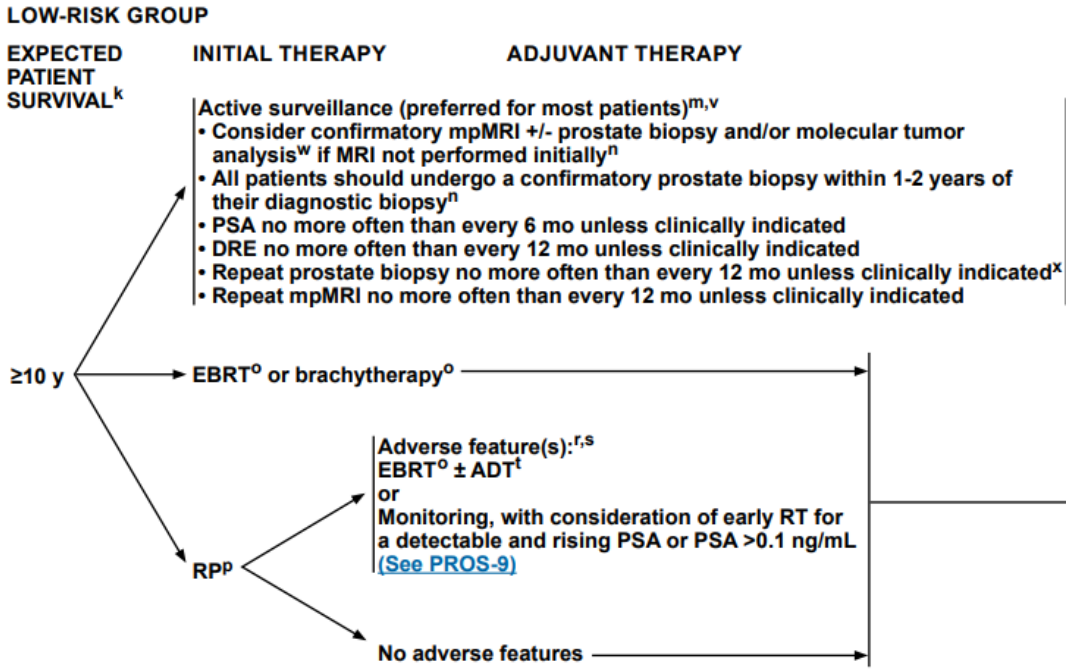
Active Surveillance

National Comprehensive Cancer Network®

NCCN Guidelines Version 4.2022
Prostate Cancer





JAMA. 2019 Feb 19;321(7):704-706. doi: 10.1001/jama.2018.19941.

What about DRE?

Digital Rectal Examination for Prostate Cancer Screening in Primary Care: A Systematic Review and Meta-Analysis

- 7 studies with 9,241 patients.
- All patients analyzed underwent both DRE and biopsy.

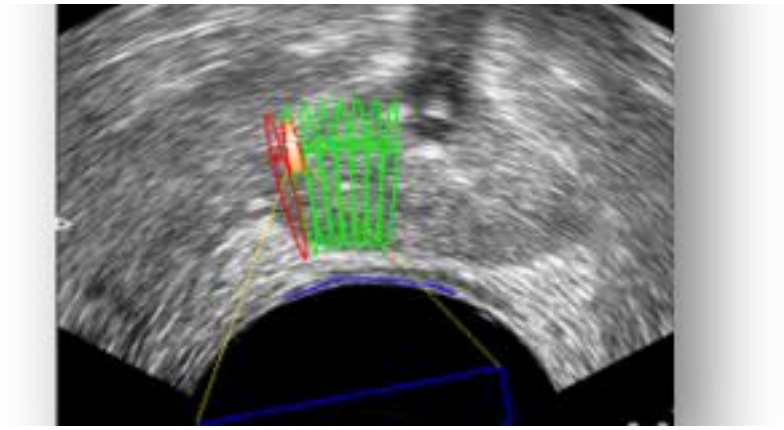
- Pooled sensitivity: 0.51.
- Pooled specificity was 0.59.
- Pooled PPV was 0.41.
- Pooled NPV was 0.64.

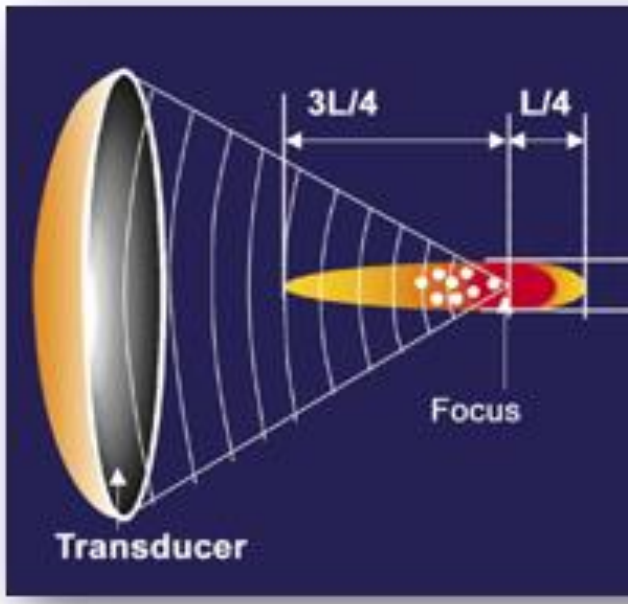
- The quality of evidence as assessed...was very low.
- Given the considerable lack of evidence supporting its efficacy, we recommend against routine performance of DRE to screen for prostate cancer in the primary care setting.

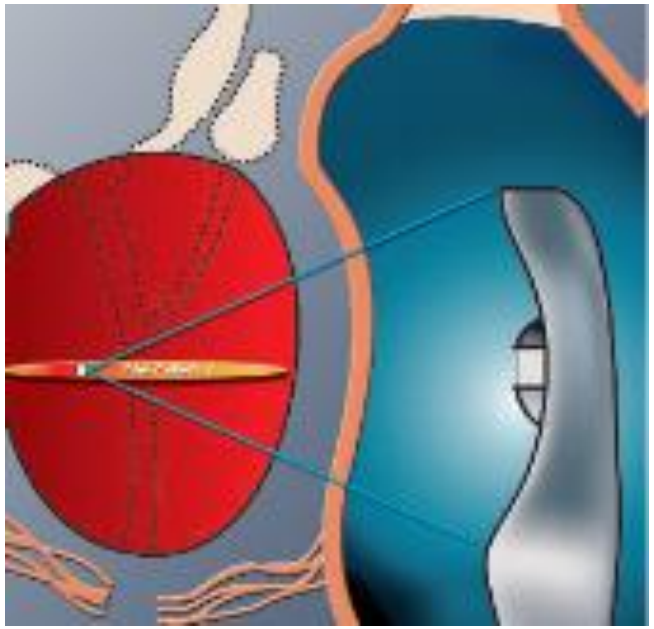
- Ann Fam Med 2018;16:149-154. https://doi.org/10.1370/afm.2205

What about DRE?

- NCCN:
- The best evidence supports the use of serum PSA for the early detection of prostate cancer.
- **DRE should not be used as a stand-alone test**.
- DRE can be **considered** as a baseline test in addition to serum PSA in all patients, but has its greatest **usefulness in those with elevated PSA**.
- Consider referral for biopsy or further testing if DRE is suspicious for cancer at any PSA.
- Halpern JA, et al. J Urol 2018;199:947-953.







HIFU Focal Therapy
Prostate Cancer
Emerging Data and Clinical Utility

Published on May 02, 2022

Henry Mayo Newhall Hospital to Provide Enhanced Specialty Services with Keck Medicine of USC

Keck Medicine of USC and Henry Mayo Newhall Hospital

END

Q and A

Panelists:

- Julie Culver MS
- Amanda Woodworth, MD
- Anjali Date, MD
- Mostafa Tabassomi, MD
- Marjum Duldulao, MD
- Edward Forsyth, MD

Reminders

- Stop at our Patient and Provider Educational Materials Station.
- For instructions on CME credit hours, please see the reference sheet in the red folder in your bags.
- Pick up your laminated Let's Get Back to Screening Poster on your way out.

Have a Happy Day!