Staying A*breast* of Current Radiologic Screening Exams

(with a focus on breast imaging)

Michael S. Morrow, D.O.

Disclosures

- I have no financial disclosures

Objectives

- Overview of breast imaging
- Review the most common radiologic screening exams
- Know indications for different radiologic screening
- Be familiar with and understand current screening guidelines
- Become knowledgeable on risks/benefits of screening exams
- Be aware of local resources and screening programs

Intro

- OSU-COM
- Internship – St. Anthony OKC
- Navy Flight Surgeon
  - Primary care
- Diagnostic Radiologist
  - Breast Imaging
- Clinical Faculty KCOM

mmorrow2@kansashsc.org

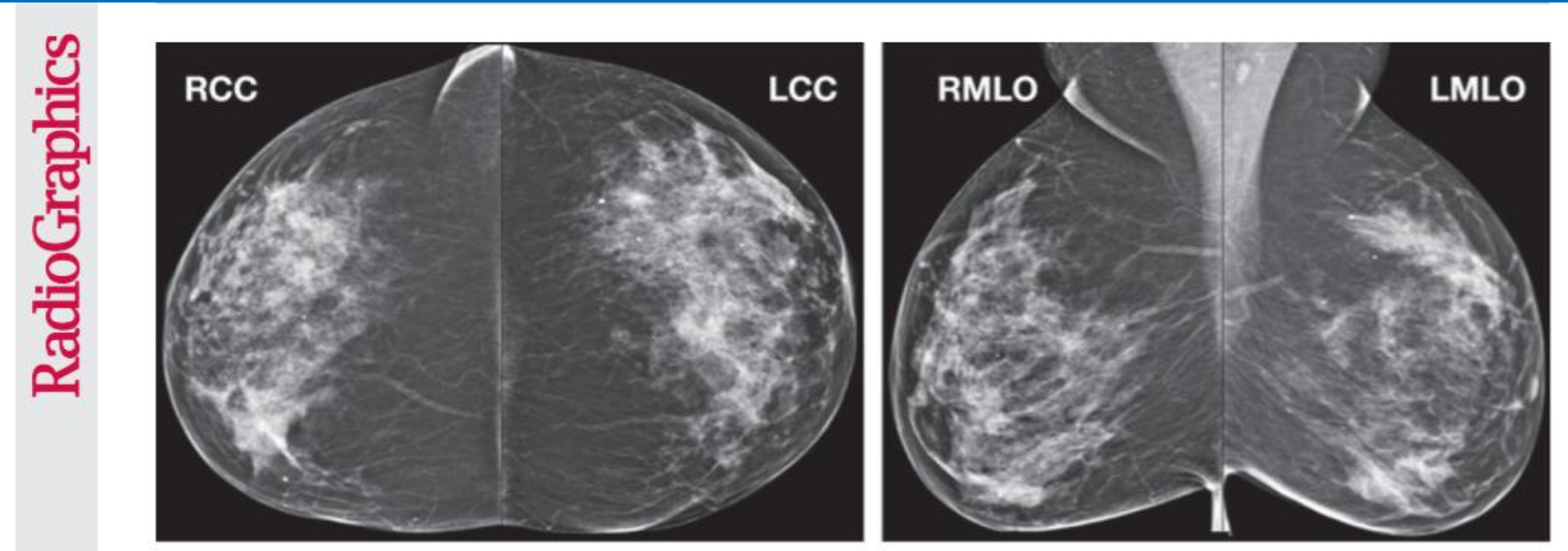
Goals

- KISS
  - Stick to the facts
  - Facts that are routinely accepted, hard to argue against
- Stay away from controversy
  - “It is now clear that there is a coordinated effort to deny women access to screening mammography.”-Dr. Daniel Kopans, April 28, 2014

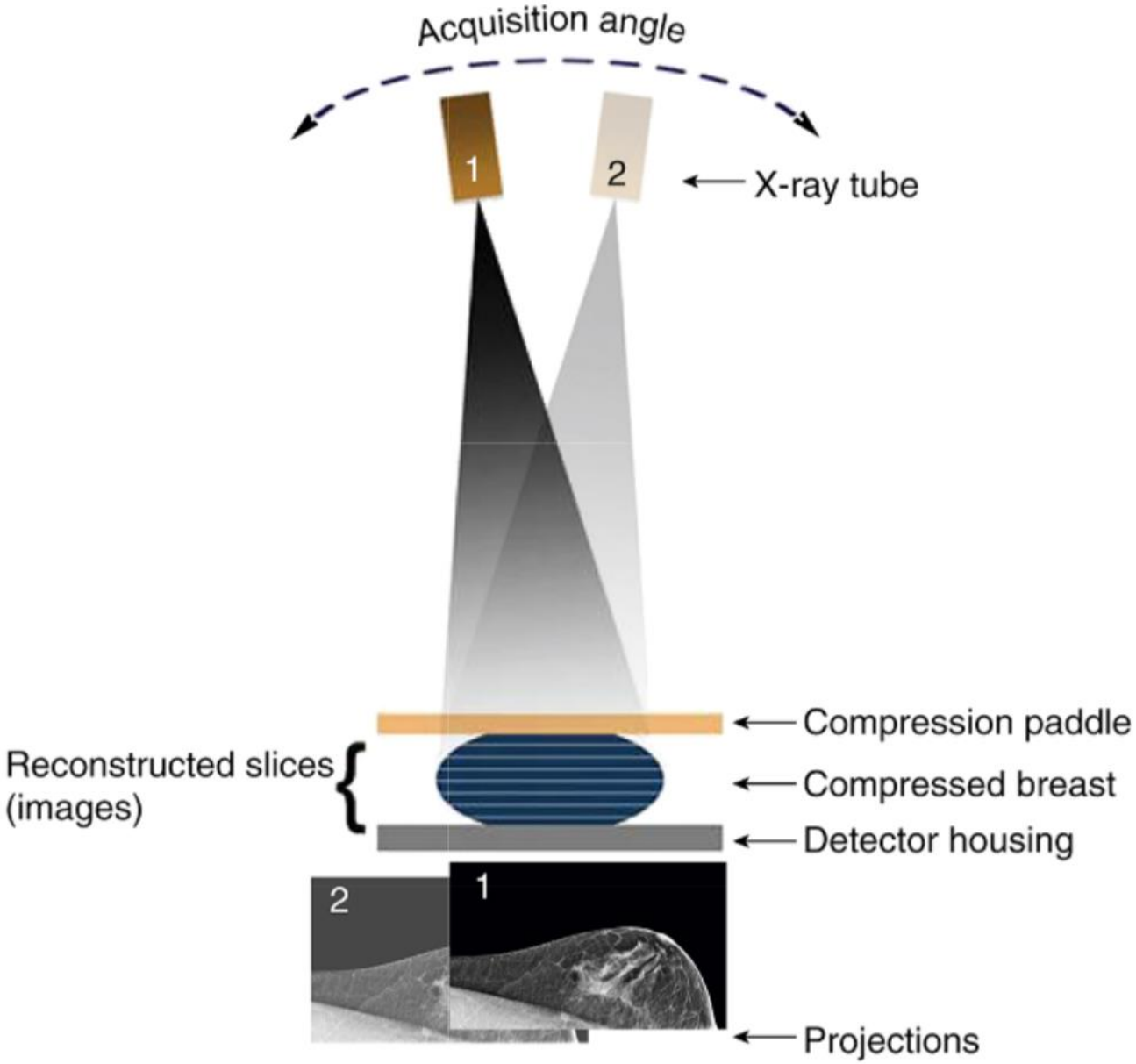
Breast Imaging

- Screening/diagnostic mammogram
  - Tomosynthesis (3D)
- Breast Ultrasound
- Breast MRI
- Newer technologies
  - Contrast enhanced mammography (CEM, CEDM,CESM)
  - Automated (whole-breast) ultrasound→ABUS
- *Thermography

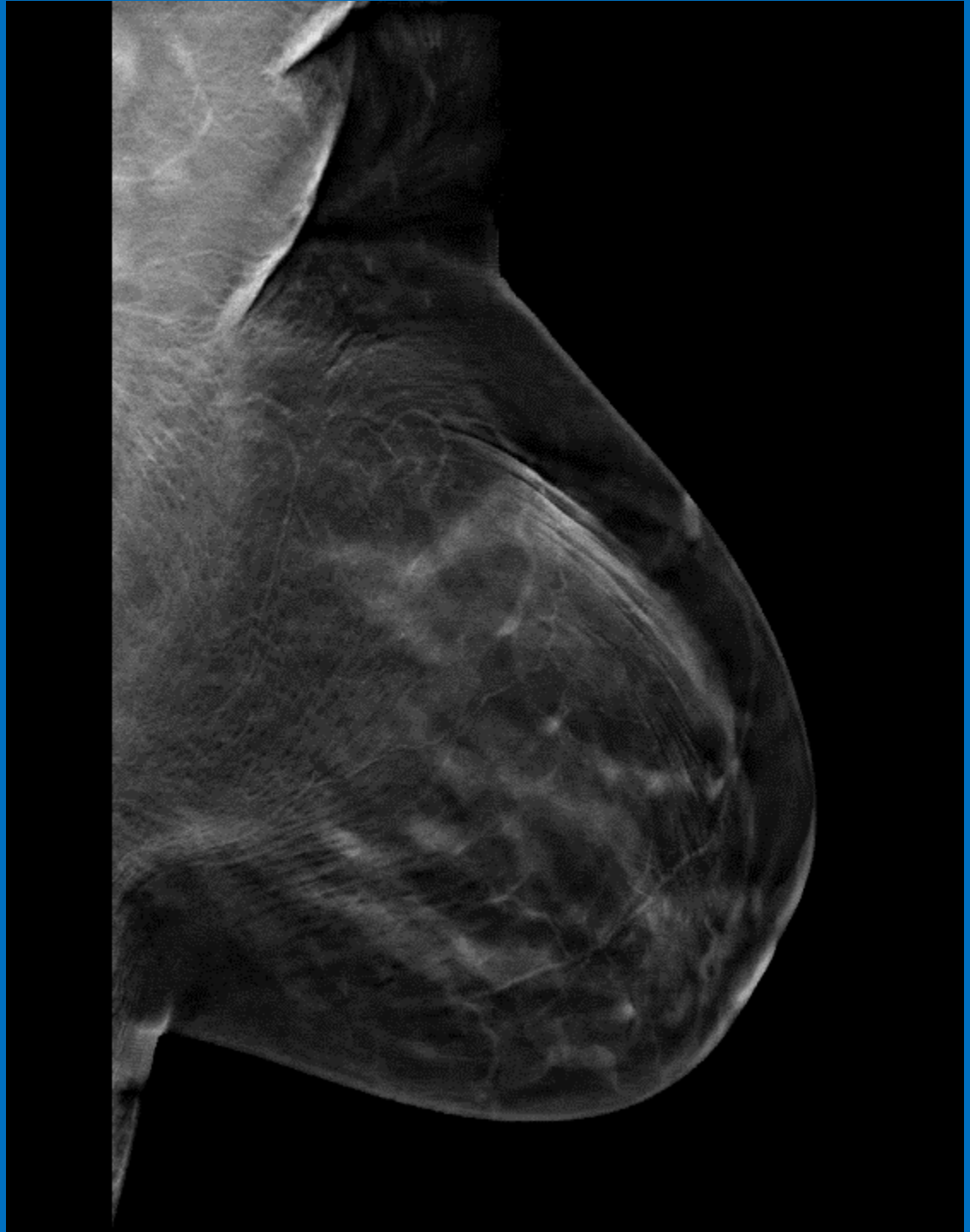
Screening



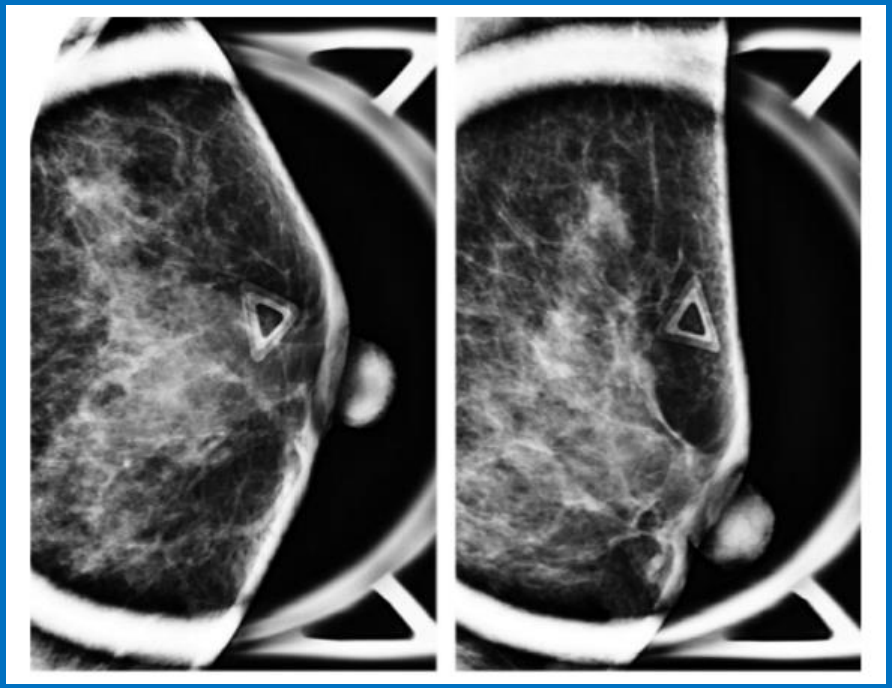
Digital Breast Tomosynthesis in the Diagnostic Setting: Indications and Clinical Applications. RadioGraphics 2015; 35:975–990

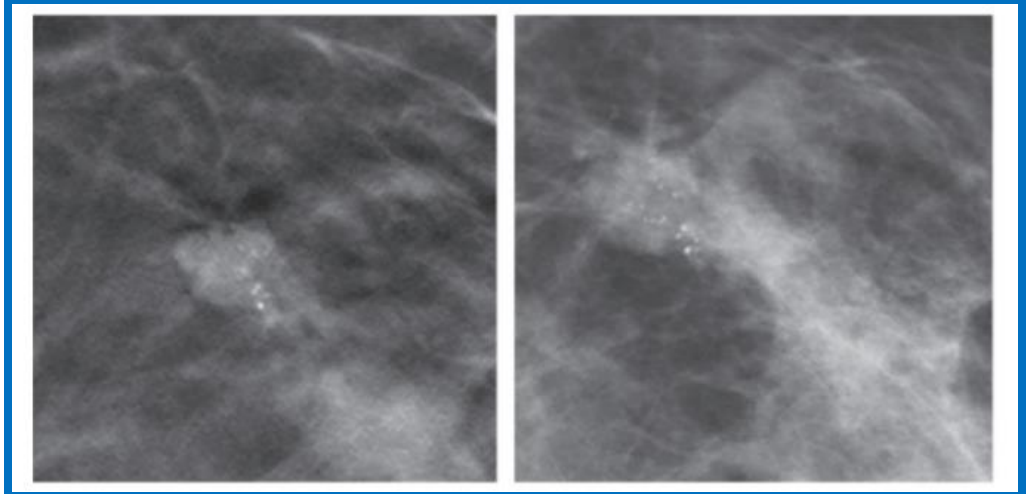


Breast tomosynthesis: Liane E. Philpotts, Regina J. Hooley.



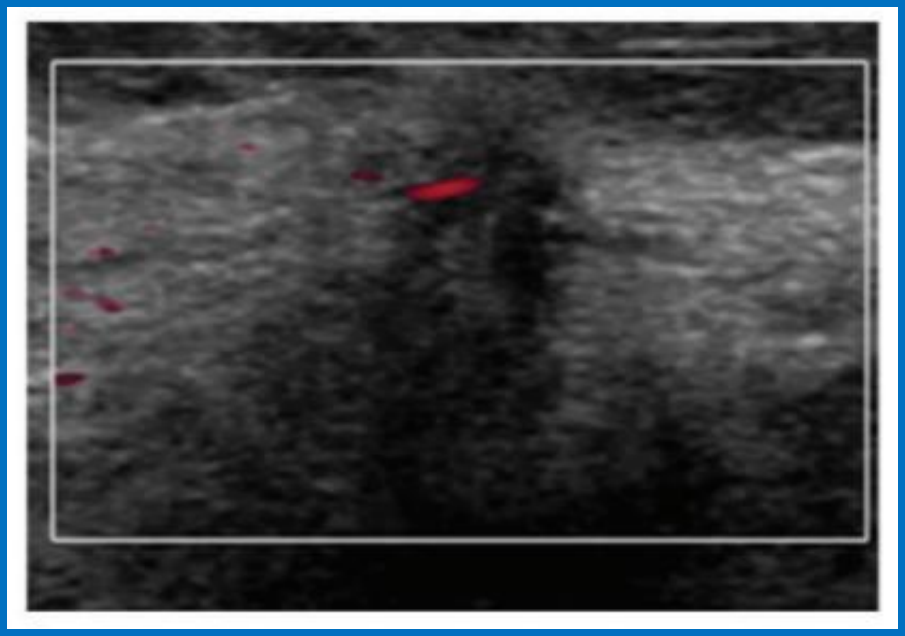
Diagnostic Mammogram

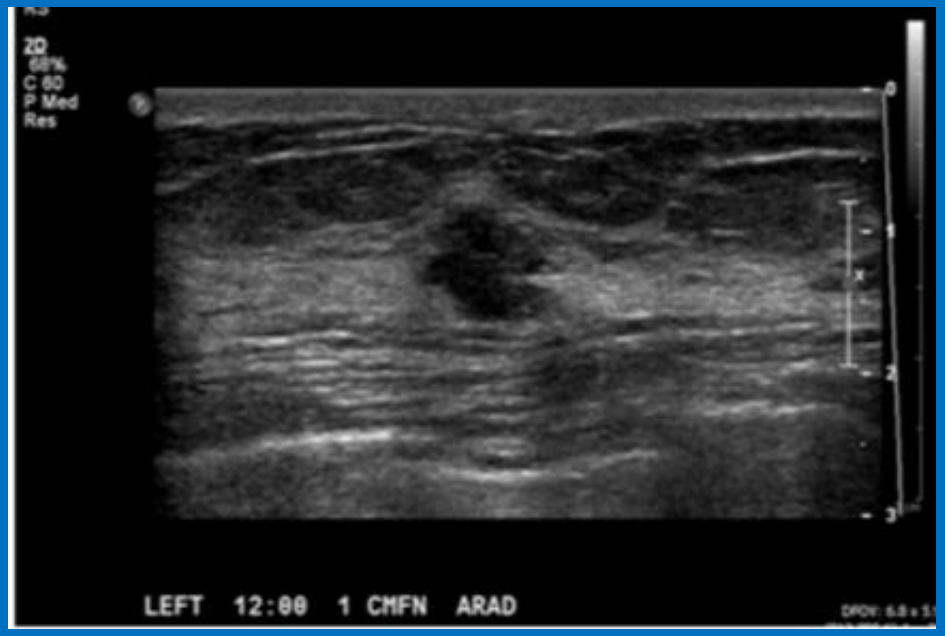




Digital Breast Tomosynthesis in the Diagnostic Setting: Indications and Clinical Applications. RadioGraphics 2015; 35:975–990

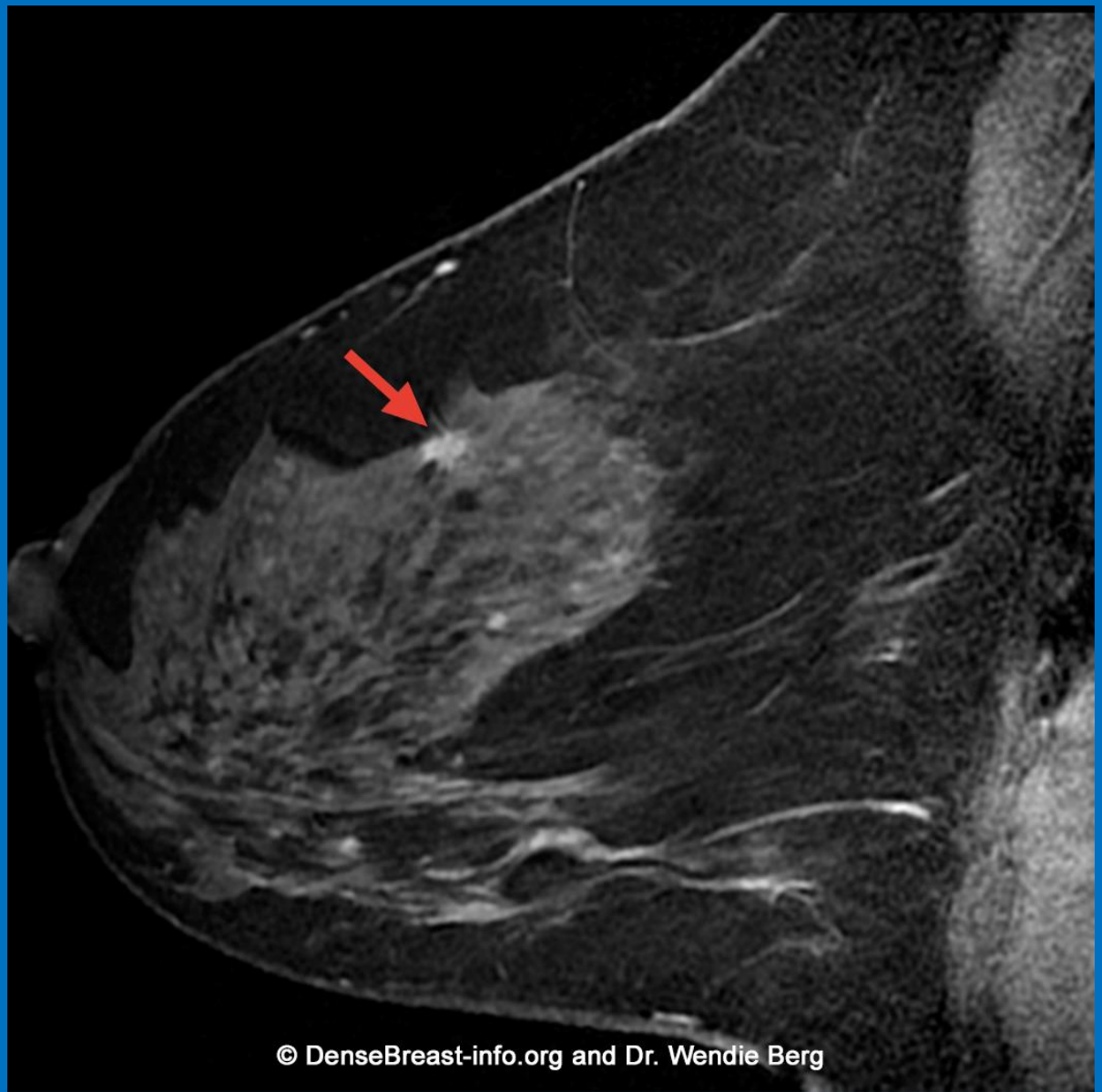
Ultrasound





Digital Breast Tomosynthesis in the Diagnostic Setting: Indications and Clinical Applications. RadioGraphics 2015; 35:975–990

MRI



Follow-up Testing Risks of Mammography Screening

Out of every **100** women who get a screening mammogram:

90 will be told that their mammograms are normal

10 will be asked to return for additional mammograms or ultrasounds

6 will be reassured that their mammograms are normal

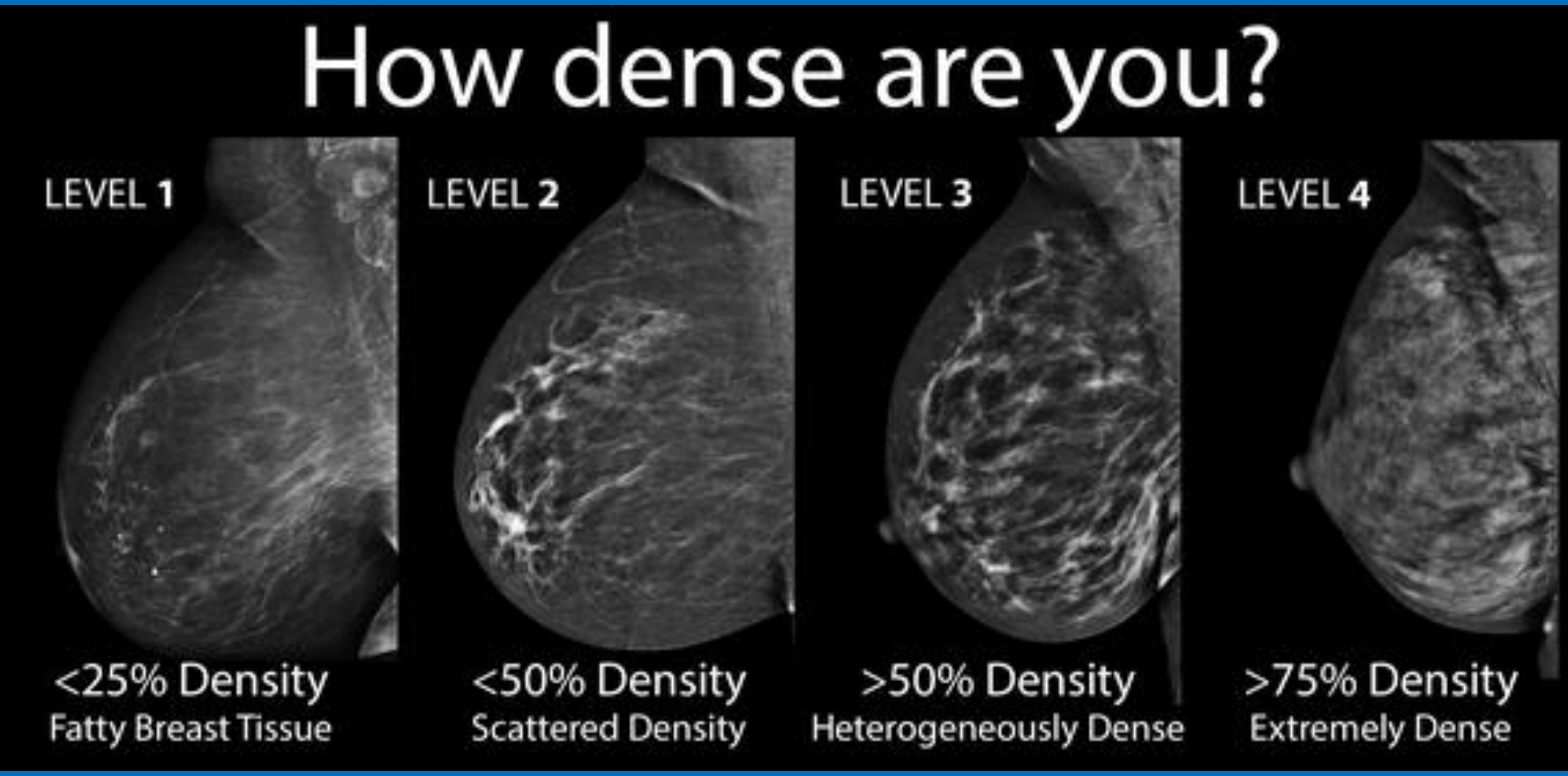
2 will be asked to return in 6 months for a follow-up exam

2 will be recommended to have a needle biopsy

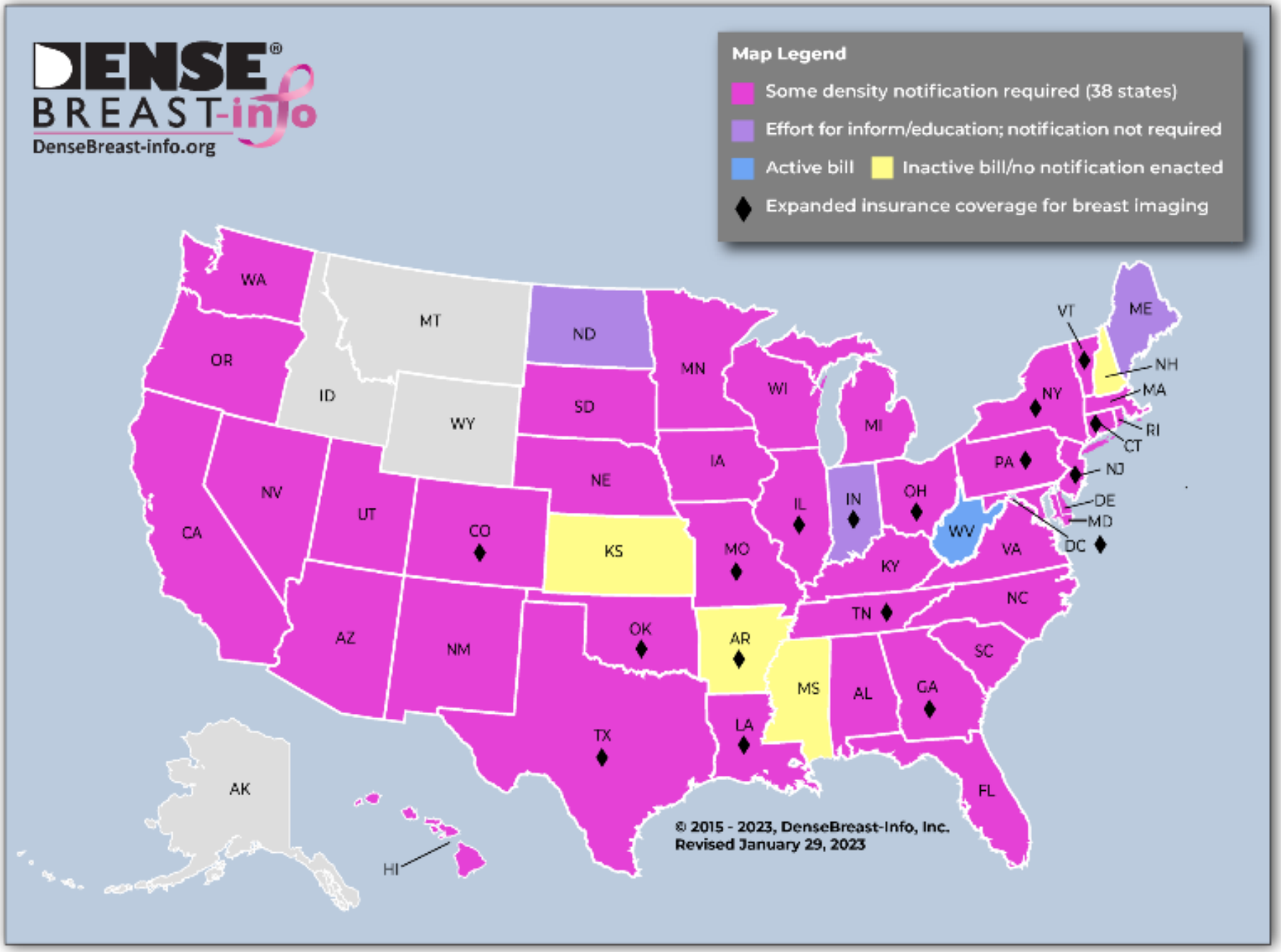
MammographySavesLives®

... one of them may be yours

To learn more about mammography benefits and risks visit **mammographysaveslives.org**



https://mammalivefoundation.org/decrease-breast-density-reduce-breast-cancer-risk/


DENSE® BREAST-info
DenseBreast-info.org
Map Legend
Some density notification required (38 states)
Effort for inform/education; notification not required
Active bill
Inactive bill/no notification enacted
Expanded insurance coverage for breast imaging
WA
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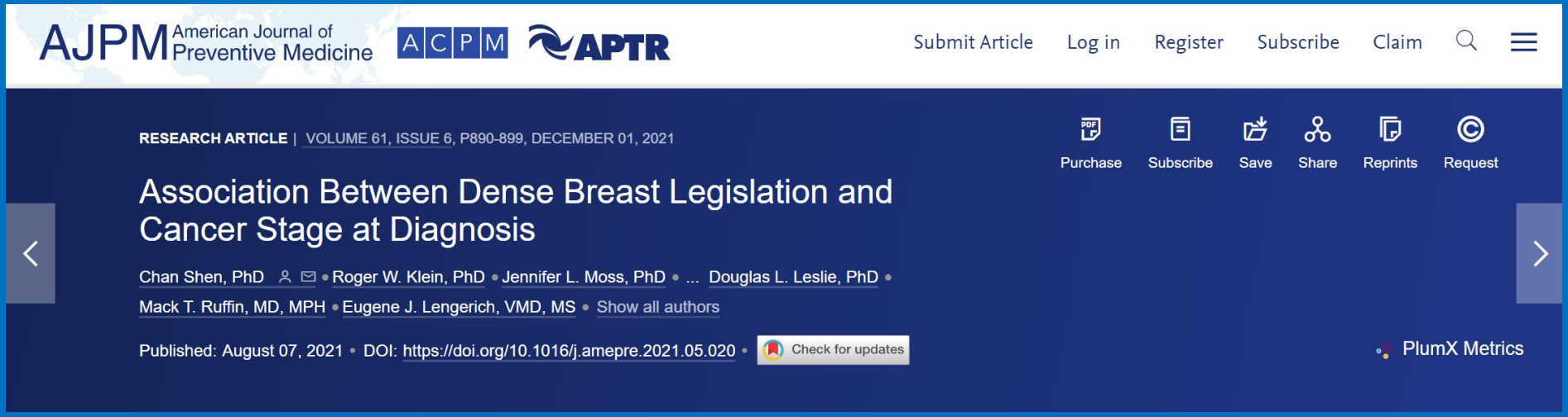
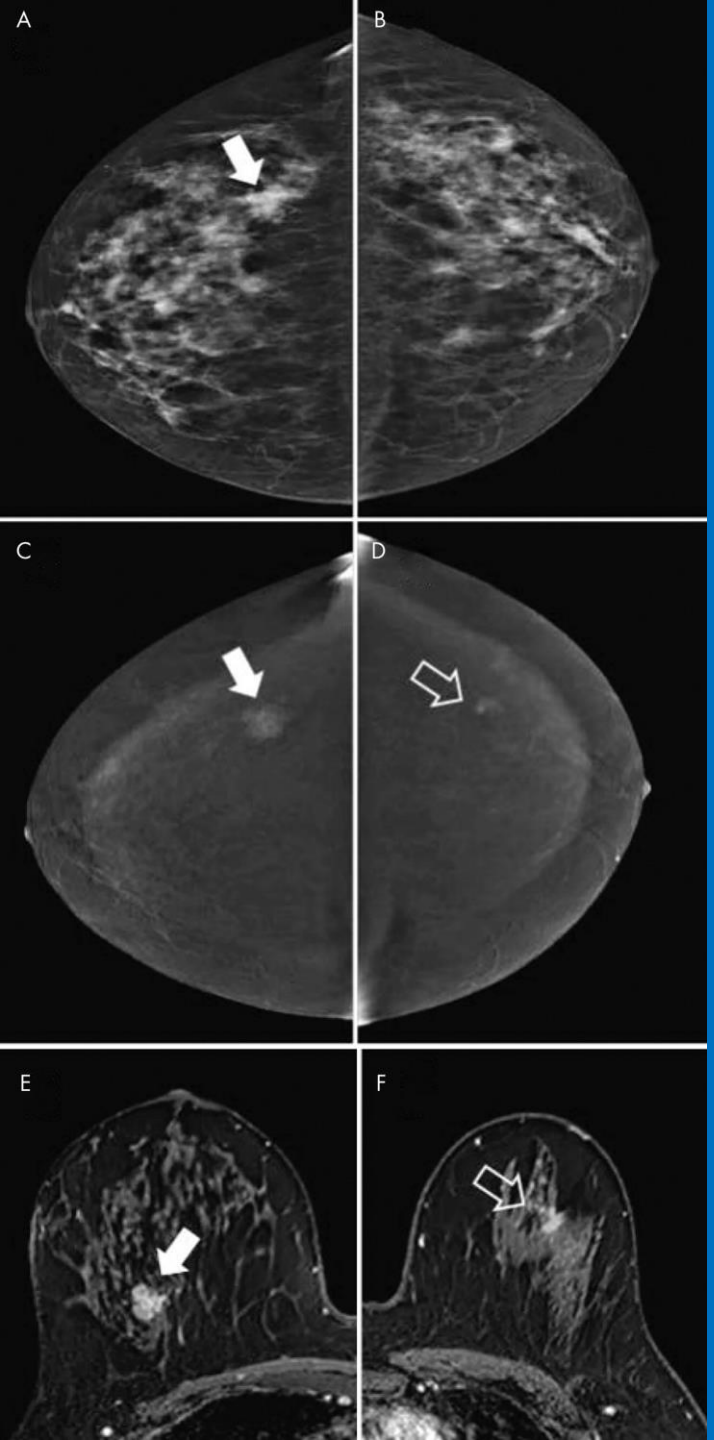
Revised January 29, 2023

How can we do better?



ABUS
Automated Breast Ultrasound

https://www.gehealthcare.com/products/ultrasound/breast-ultrasound/invenia-abus



- Contrast enhanced mammography
  - CEM/CEDM/CESM

Published Online: Mar 2 2021https://doi.org/10.1148/radiol.2021201948

Diagnostic Mammogram

[redacted]

Date of Service	Total Charges	Other Insurance Payment	Provider Contractual Write-off	Amount Paid	See Note Below	YOUR RESPONSIBILITY *				
						Non-covered Charges	Applied to Deductible	Patient's Share (Co-ins)	Copay	Total Patient Responsibility
12/09/20	113.00		53.73	59.27	H					
12/09/20	88.00		51.18	36.82	H					
Claim Total	201.00		104.91	96.09						

[redacted]

Date of Service	Total Charges	Other Insurance Payment	Provider Contractual Write-off	Amount Paid	See Note Below	YOUR RESPONSIBILITY *				
						Non-covered Charges	Applied to Deductible	Patient's Share (Co-ins)	Copay	Total Patient Responsibility
12/14/20	113.00		43.97	69.03	H					
12/14/20	88.00		66.14	21.86	H					
12/14/20	101.00		47.19	53.81	H					
12/14/20	101.00		47.19	53.81	H					
Claim Total	403.00		204.49	198.51						

Overutilization of Health Care Resources for Breast Pain

Anne C. Kushwaha[1]
Kyungmin Shin
Megan Kalambo

OBJECTIVE. The objective of this study is to analyze the incidence of women with breast pain who present to an imaging center and assess the imaging findings, outcomes, and workup costs at breast imaging centers affiliated with one institution.

CONCLUSION. Breast pain represents an area of overutilization of health care resources. For female patients who present with pure breast pain, breast imaging centers should consider the following imaging protocols and education for referring physicians: an annual screening mammogram should be recommended for women 40 years or older, and reassurance without imaging should be offered to patients younger than 40 years.

aminations performed), breast pain was not found to be a sign of breast cancer ($p = 0.027$). Patients younger than 40 years (316/799) underwent a total of 454 workup studies for breast pain; all findings were benign, and the cost of these studies was $87,322. Patients 40 years or older (483/799) underwent 745 workup studies, for a cost of $152,732.

CONCLUSION. Breast pain represents an area of overutilization of health care resources. For female patients who present with pure breast pain, breast imaging centers should consider the following imaging protocols and education for referring physicians: an annual screening mammogram should be recommended for women 40 years or older, and reassurance without imaging should be offered to patients younger than 40 years.

Keywords: breast, cost analysis, mammography, MRI, pain, ultrasound

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Breast pain is a common and chronic symptom in women, having a prevalence of 52% in the general population and affecting quality of life in up to 41% of women [1–3]. Two-thirds of reported cases of breast pain are self-limiting in nature [1]. Ader and

breast pain and one-third of these latter patients consulting a physician. Davies et al. [4] studied the long-term course of breast pain and found that the median age at onset was 36 years and the median duration of pain was 12 years, with most women experiencing pain for at least 5 years. Breast pain was the

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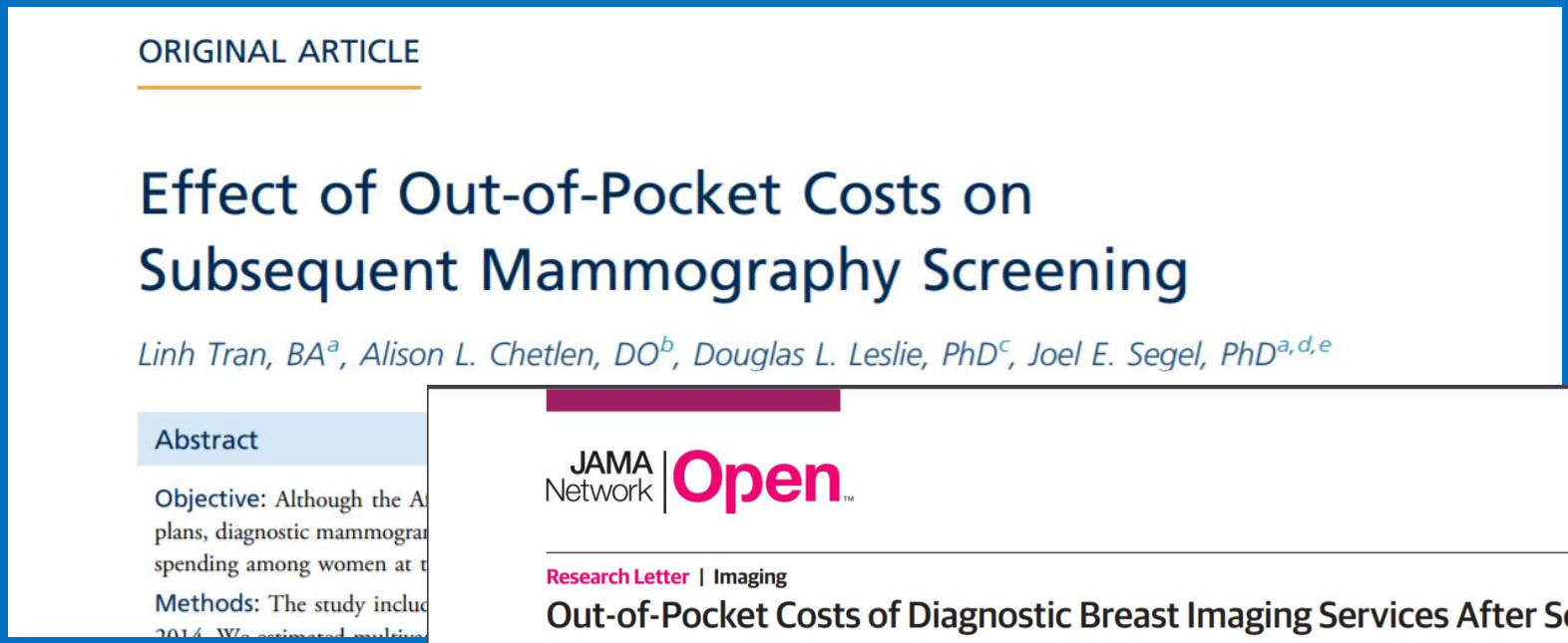

ORIGINAL ARTICLE

Effect of Out-of-Pocket Costs on Subsequent Mammography Screening

Linh Tran, BA[a], Alison L. Chetlen, DO[b], Douglas L. Leslie, PhD[c], Joel E. Segel, PhD[a,d,e]

Abstract

Objective: Although the A
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spending among women at t

Methods: The study includ
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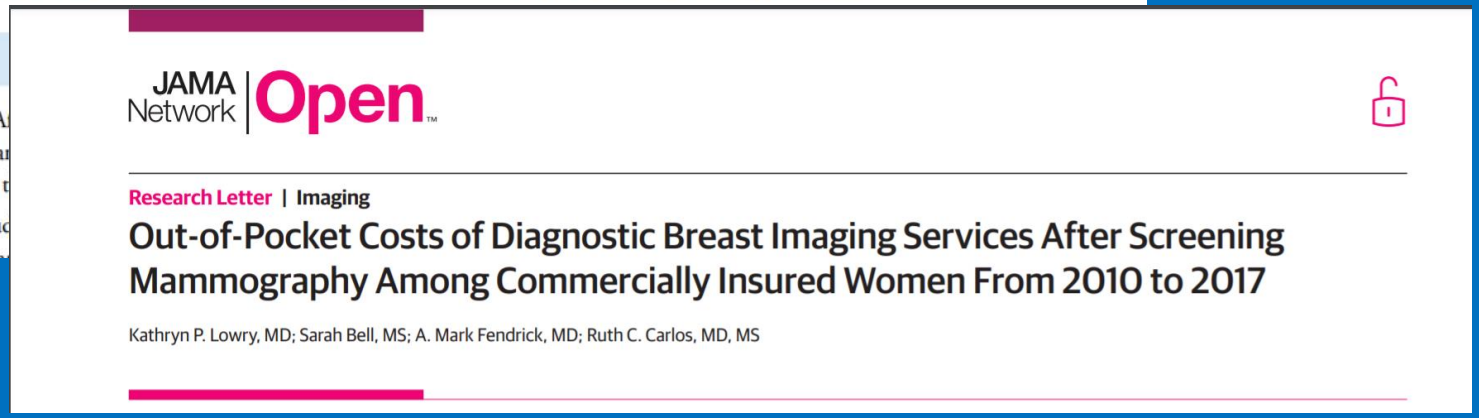


JAMA Network | Open

Research Letter | Imaging

Out-of-Pocket Costs of Diagnostic Breast Imaging Services After Screening Mammography Among Commercially Insured Women From 2010 to 2017

Kathryn P. Lowry, MD; Sarah Bell, MS; A. Mark Fendrick, MD; Ruth C. Carlos, MD, MS

Diagnostic Imaging

- Extension of screening
- Precedent
  - Colonoscopy
- Obstacles
  - Insurance lobby
- Strategy
  - Downstream savings
    - $$$
    - Years of life lost to cancer

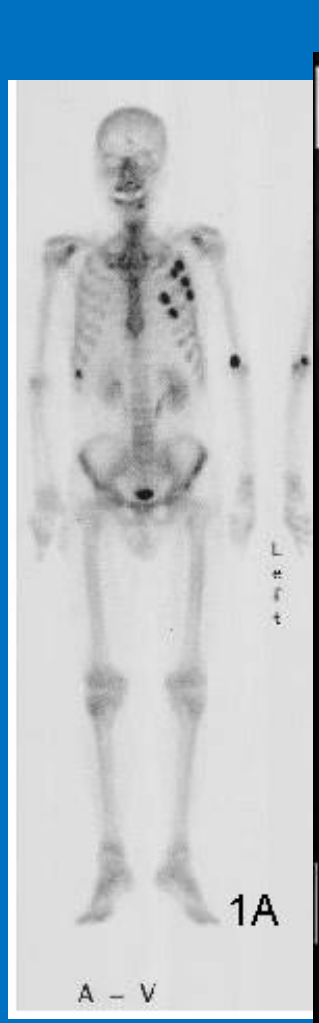
Future Potential Legislative Targets

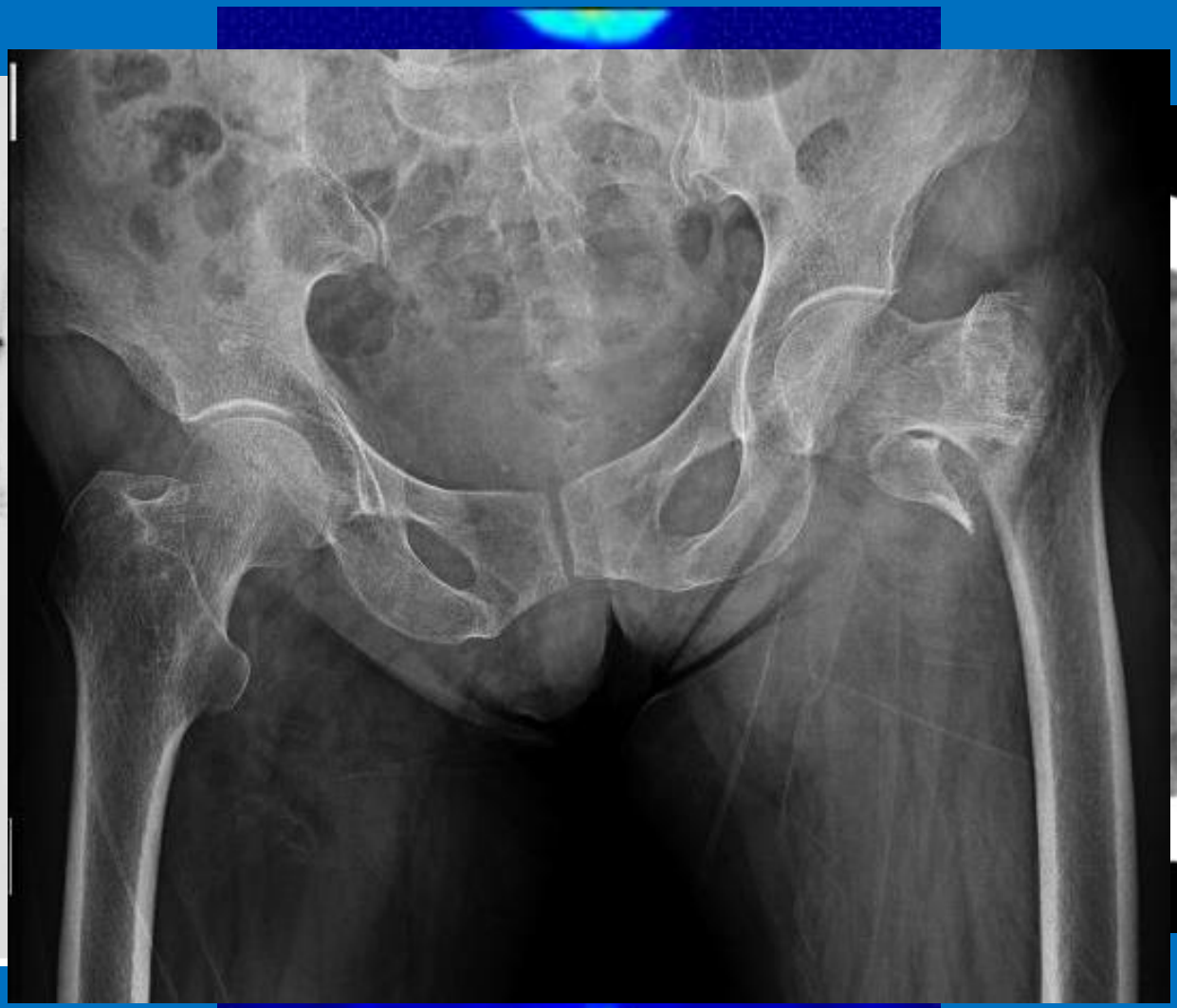
- Coverage of supplemental screening for high-risk women
  - Breast MRI
  - Many states have already adopted related legislature
- Screening starting at age 40
  - Hopefully we never have to do this
  - USPSTF 2009 guidelines
    - biennial screening starting at age 50
  - PALS Act → moratorium through January 1, 2023

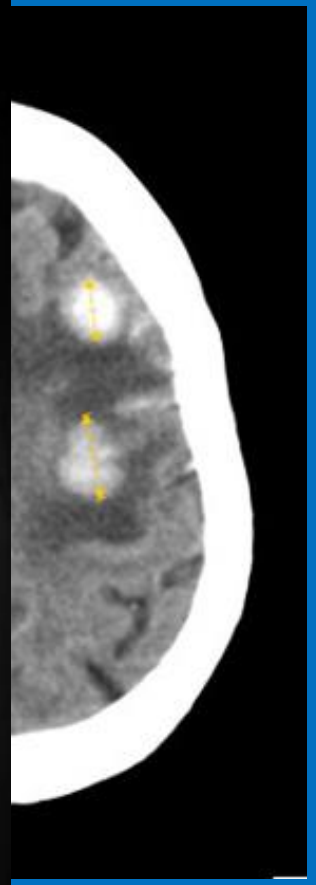
Most Common Screening Exams

- Osteoporosis
  - Bone Densitometry - DEXA
- CT Colonography
  - Not as widely available
- Low Dose Chest CT (LDCT)
- Mammography
  - Ultrasound/MRI

Why screen?





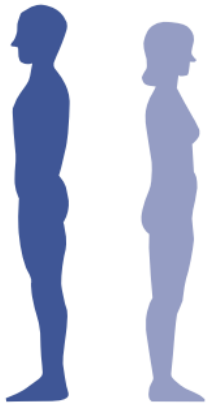


Why is this important?

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

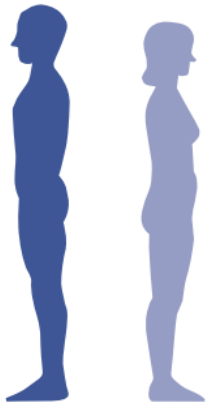
Estimated New Cases

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.

Benefits

- Early diagnosis/treatment
  - Decrease morbidity/mortality
- Health maintenance
- Disease prevention
- Improve healthcare costs

Risks

- Radiation exposure
- False positive
- Overdiagnosis
- “Incidentaloma”

Radiation Dose to Adults From Common Imaging Examinations

Procedure		Approximate effective radiation dose	Comparable to natural background radiation for
 ABDOMINAL REGION	Computed Tomography (CT) — Abdomen and Pelvis	10 mSv	3 years
	Computed Tomography (CT) — Abdomen and Pelvis, repeated with and without contrast material	20 mSv	7 years
	Computed Tomography (CT) — Colonography	6 mSv	2 years
	Intravenous Pyelogram (IVP)	3 mSv	1 year
	Radiography (X-ray) — Lower GI Tract	8 mSv	3 years
	Radiography (X-ray) — Upper GI Tract	6 mSv	2 years
 BONE	Radiography (X-ray) — Spine	1.5 mSv	6 months
	Radiography (X-ray) — Extremity	0.001 mSv	3 hours
 CENTRAL NERVOUS SYSTEM	Computed Tomography (CT) — Head	2 mSv	8 months
	Computed Tomography (CT) — Head, repeated with and without contrast material	4 mSv	16 months
	Computed Tomography (CT) — Spine	6 mSv	2 years
 CHEST	Computed Tomography (CT) — Chest	7 mSv	2 years
	Computed Tomography (CT) — Lung Cancer Screening	1.5 mSv	6 months
	Radiography — Chest	0.1 mSv	10 days
 DENTAL	Intraoral X-ray	0.005 mSv	1 day
 HEART	Coronary Computed Tomography Angiography (CTA)	12 mSv	4 years
	Cardiac CT for Calcium Scoring	3 mSv	1 year
 MEN'S IMAGING	Bone Densitometry (DEXA)	0.001 mSv	3 hours
 NUCLEAR MEDICINE	Positron Emission Tomography — Computed Tomography (PET/CT)	25 mSv	8 years
 WOMEN'S IMAGING	Bone Densitometry (DEXA)	0.001 mSv	3 hours
	Mammography	0.4 mSv	7 weeks

Note: This chart simplifies a highly complex topic for patients' informational use. The effective doses are typical values for an average-sized adult. The actual dose can vary substantially, depending on a person's size as well as on differences in imaging practices. It is also important to note that doses given to pediatric patients will vary significantly from those given to adults, since children vary in size. Patients with radiation dose questions should consult with their radiation physicists and/or radiologists as part of a larger discussion on the benefits and risks of radiologic care.

RadiologyInfo.org
The radiology information resource for patients

RSNA
Radiological Society of North America

ACR
American College of Radiology
Quality is Our Image

For the most current information, visit radiologyinfo.org.

07.16

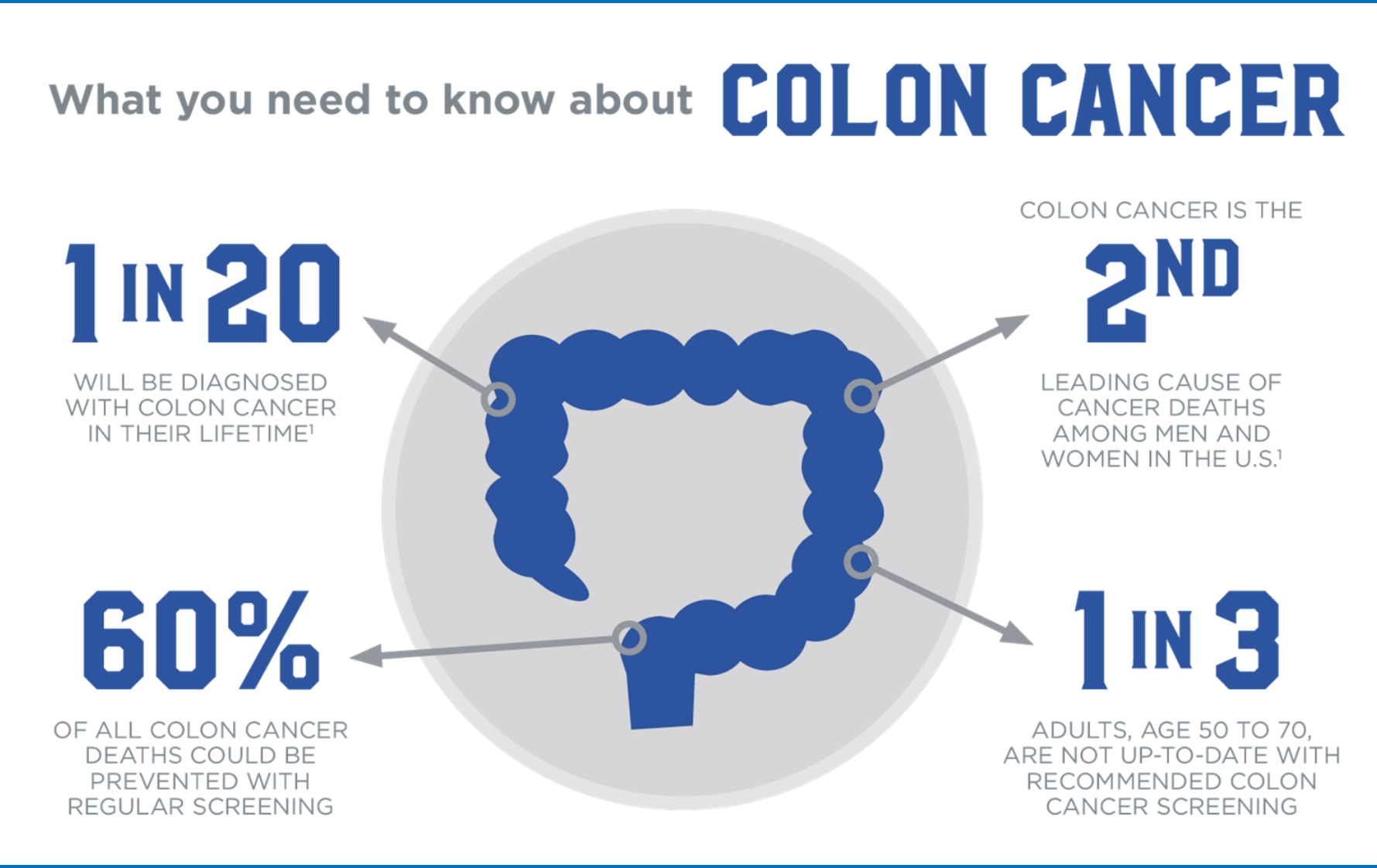
Osteoporosis Screening

- Women 65 years and older
- Post-menopausal women younger than 65 who are at increased risk for osteoporosis
- DEXA Scan
  - Measures bone mineral density
    - Calculate fracture risk
  - No prep
  - Noninvasive
  - Low dose of radiation
    - 0.001 mSv - 3 hours background
      - CXR 0.1 mSv – 10 days

Colon Cancer

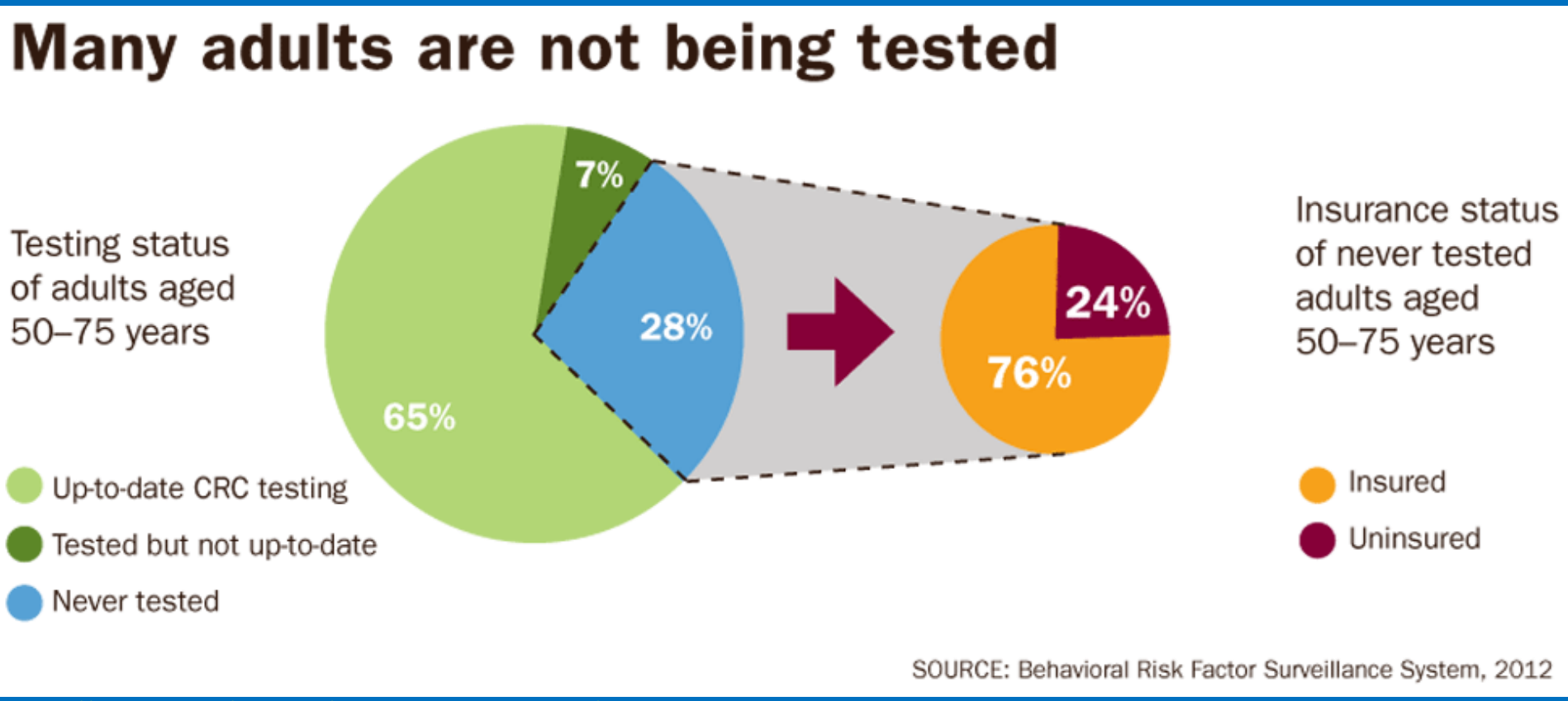
http://i.dailymail.co.uk/i/pix/2015/03/19/26CD8FDD00000578-3002879-image-a-40_1426788974930.jpg

Colon Cancer



https://mysupport360.com/colon-cancer-awareness/

Colon Cancer

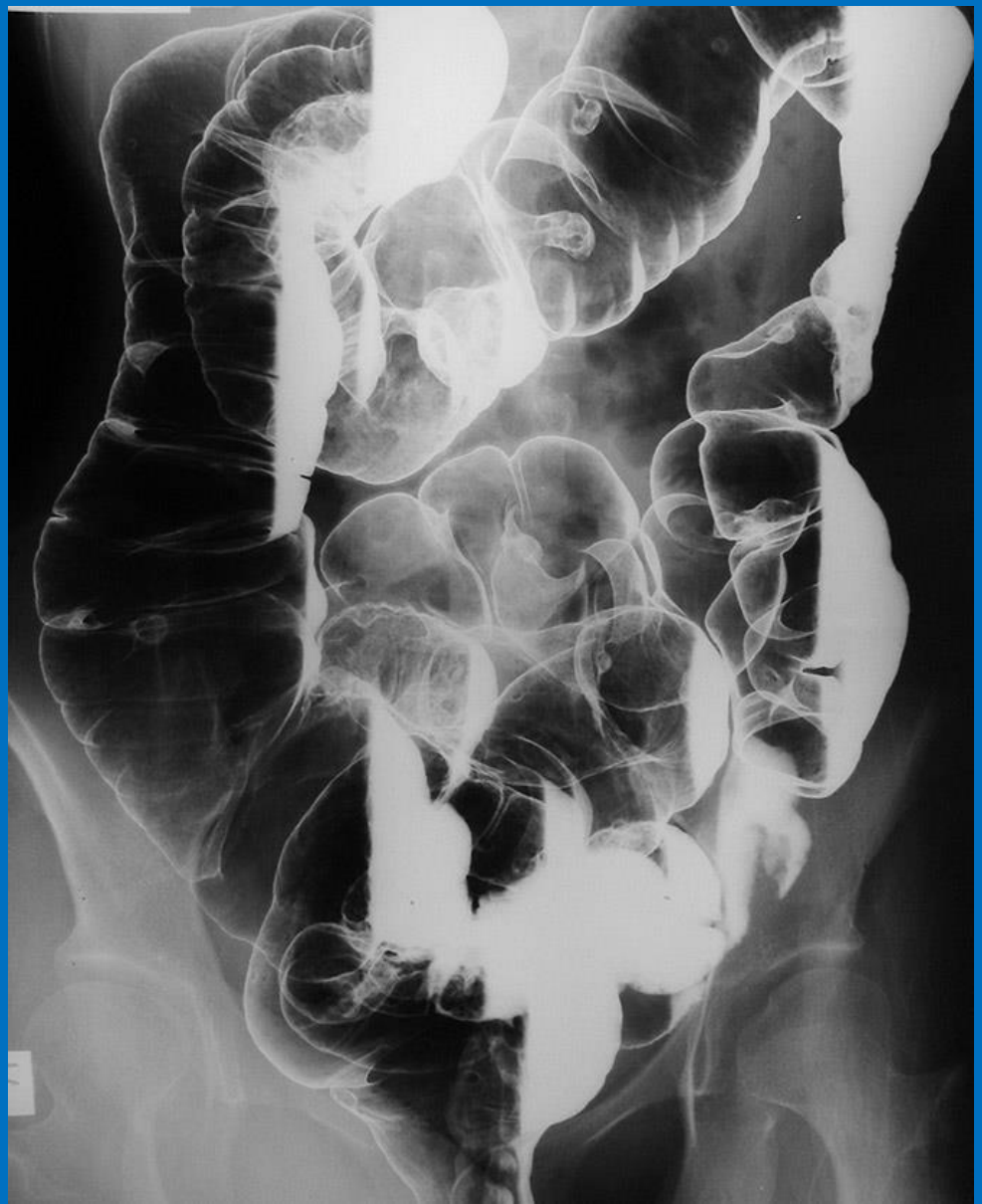


https://www.cdc.gov/vitalsigns/colorectalcancerscreening/infographic.html

Colon Cancer Screening

- USPSTF
  - Begin screening at 45, until age 75
  - Selective screening of adults age 76-85
- Recommended screening tests include:
  - High-sensitivity guaiac fecal occult blood test (HSgFOBT) or fecal immunochemical test (FIT) every year
  - Stool DNA-FIT every 1 to 3 years
  - **Computed tomography colonography every 5 years**
  - Flexible sigmoidoscopy every 5 years
  - Flexible sigmoidoscopy every 10 years + annual FIT
  - Colonoscopy screening every 10 years

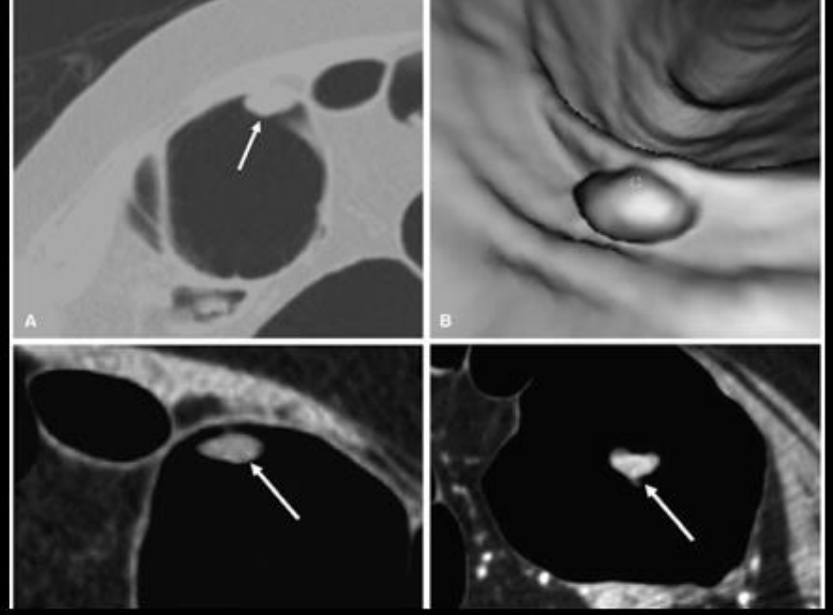
Barium Enema

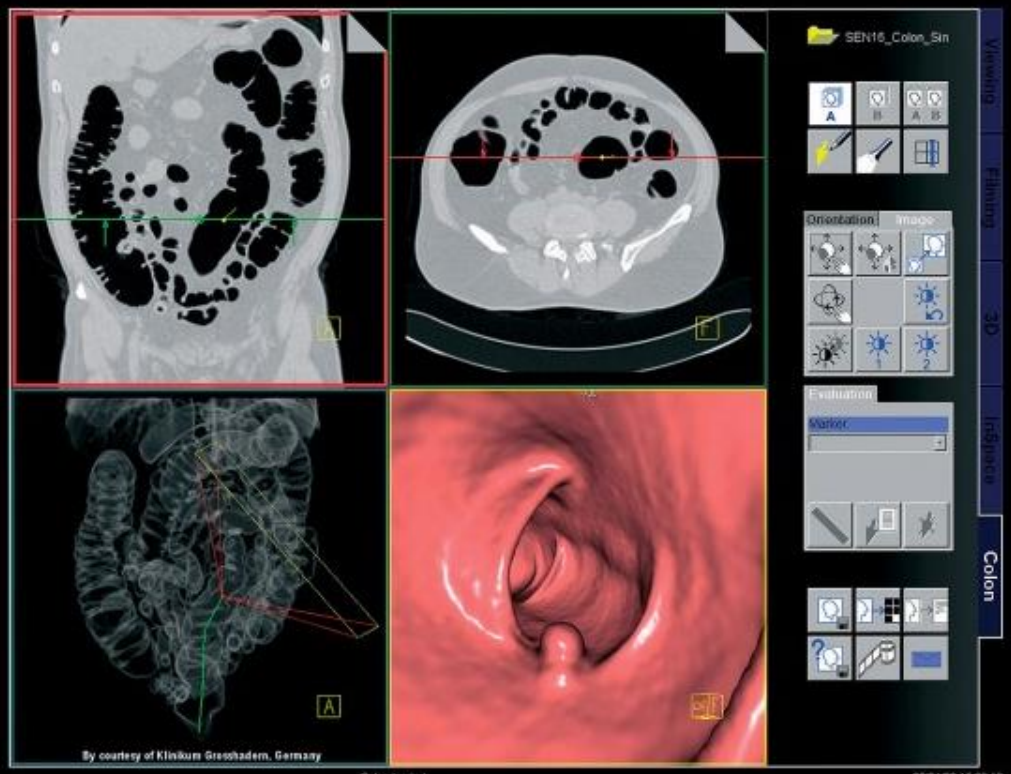


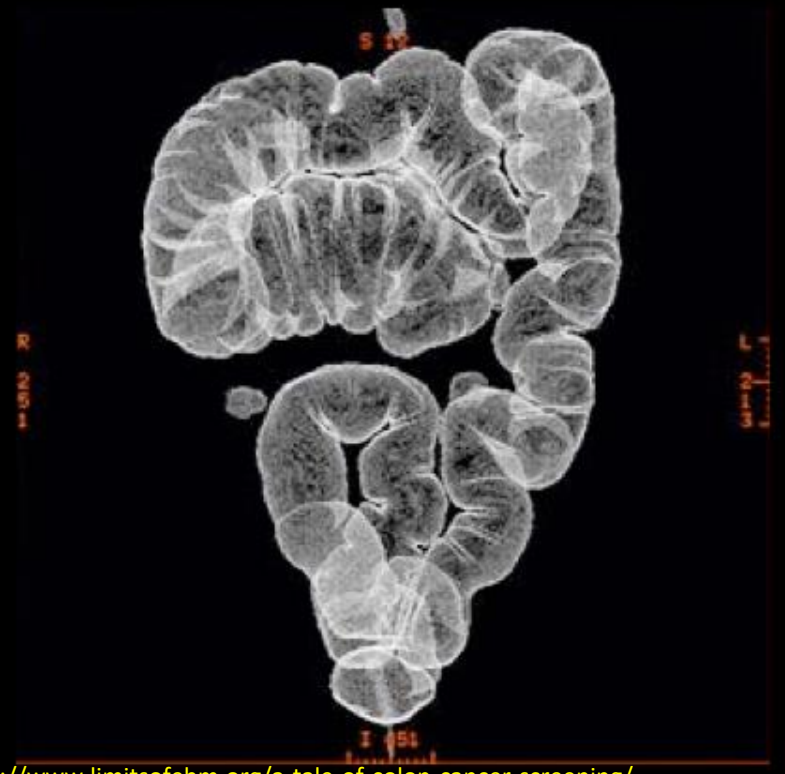
CT Colonography

- Preparation
  - Similar to endoscopy
- Exam
  - CO_2
- Limitations
  - Fecal tagging
  - Will need colonoscopy for abnormal findings
- No sedation/anesthesia
  - Good or bad?
- Risks
  - Perforation
    - Risk is low (0.005%-0.03%); compared to colonoscopy (0.06%-0.19%)*
  - Radiation ➔ 6 mSv - 2 years (CXR 0.1 mSv – 10 days)

* Gastrointest Endosc Clin N Am. 2010 Apr; 20(2): 279–291.

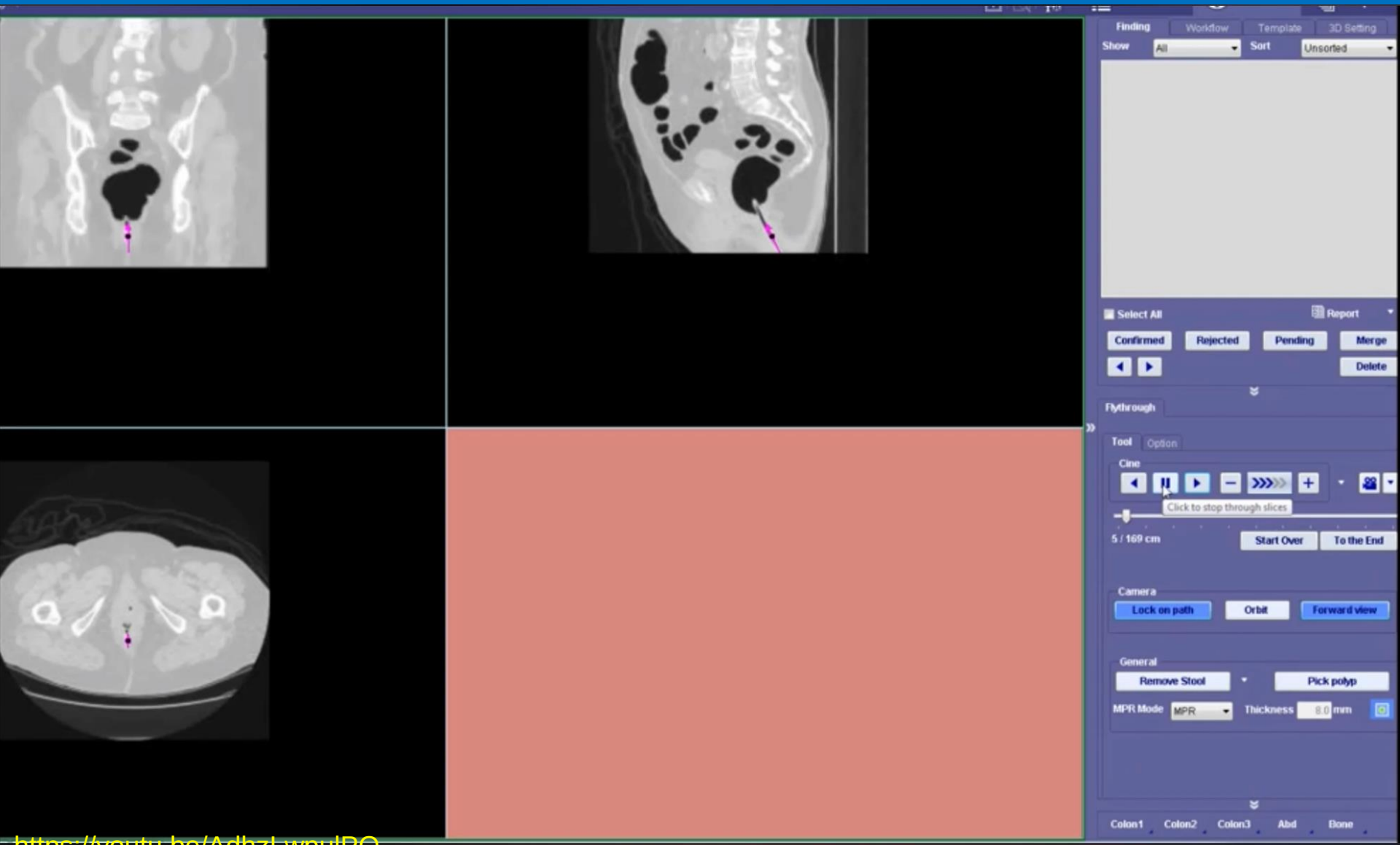






http://www.limitsofebm.org/a-tale-of-colon-cancer-screening/

CT Colonography



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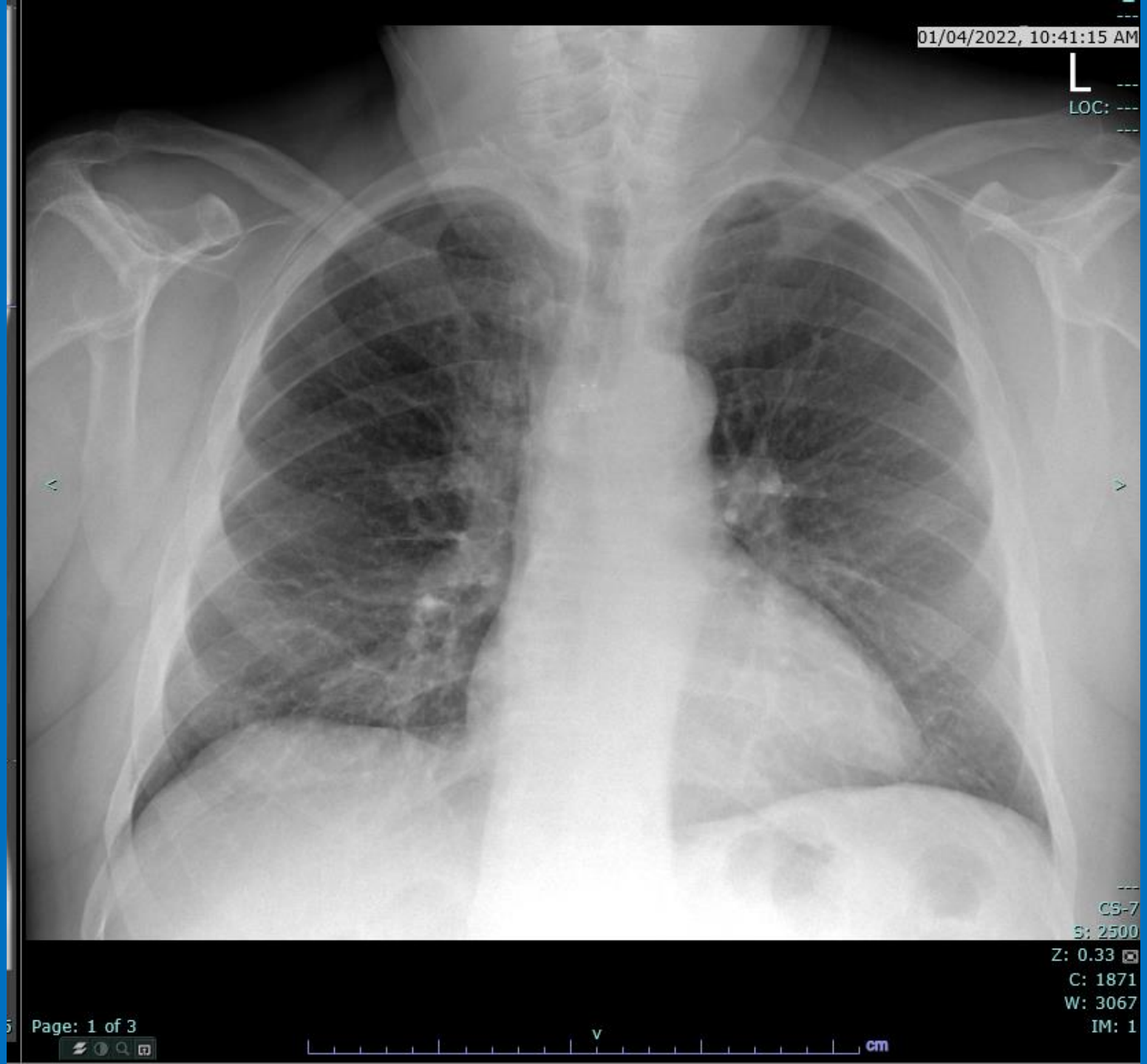
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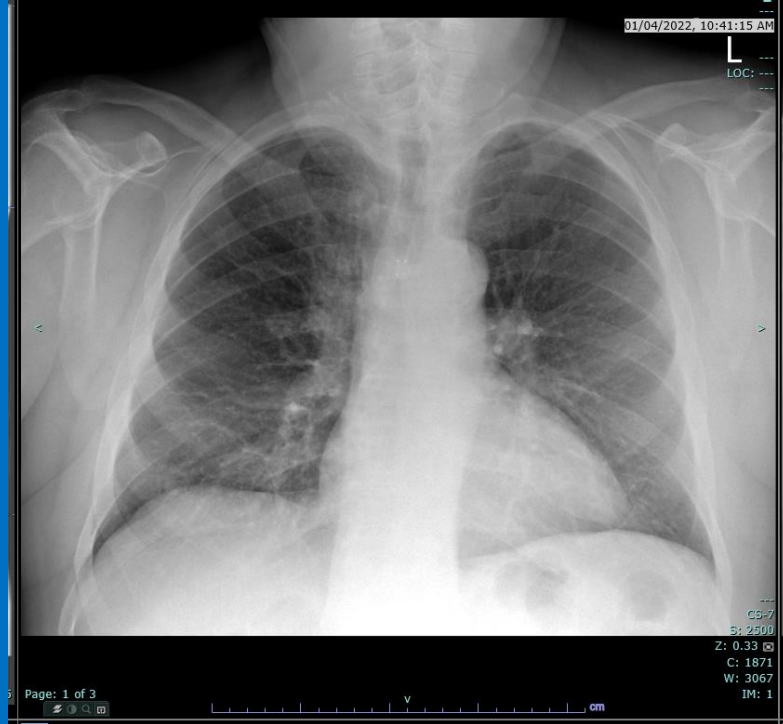
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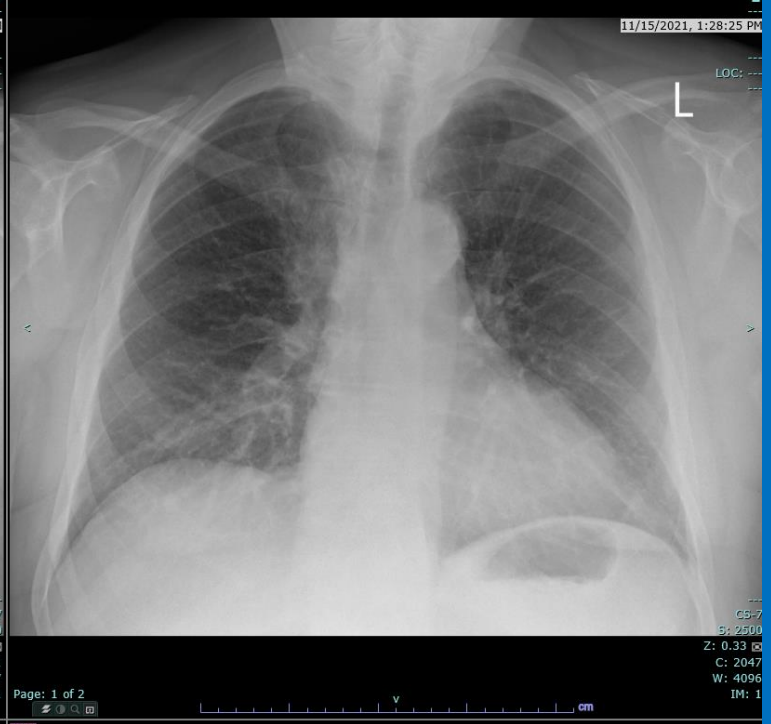
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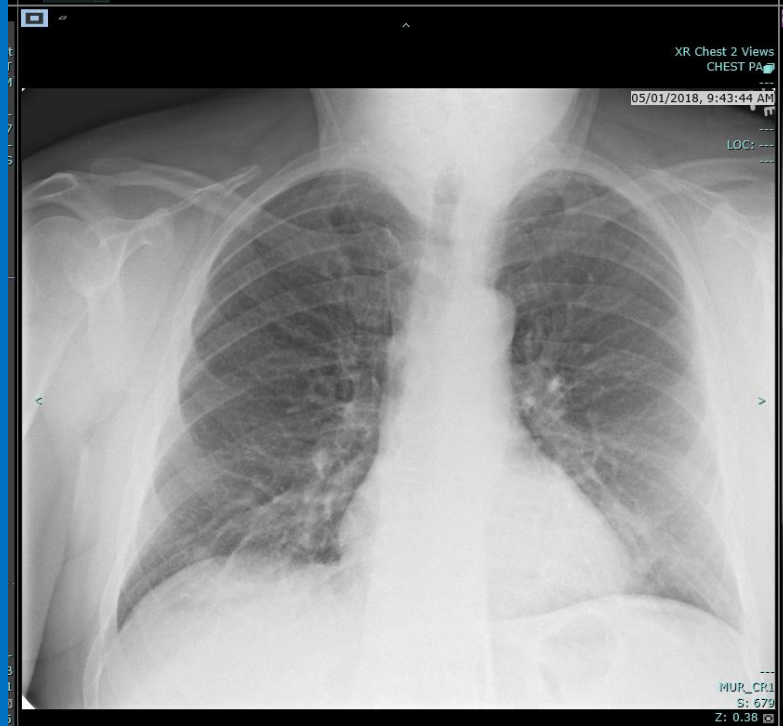
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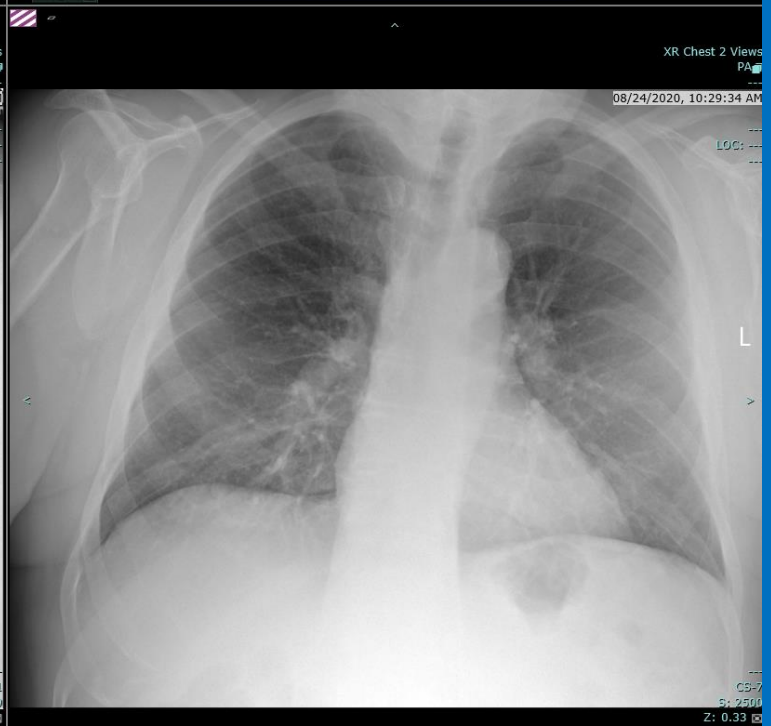
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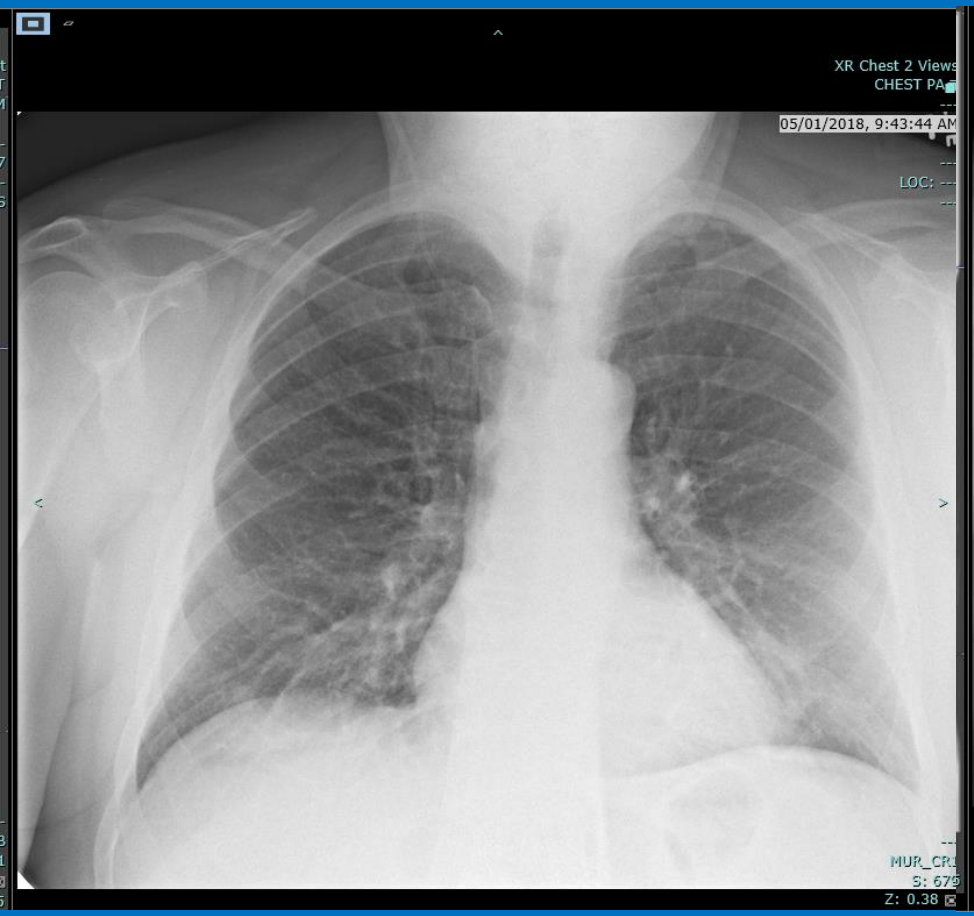
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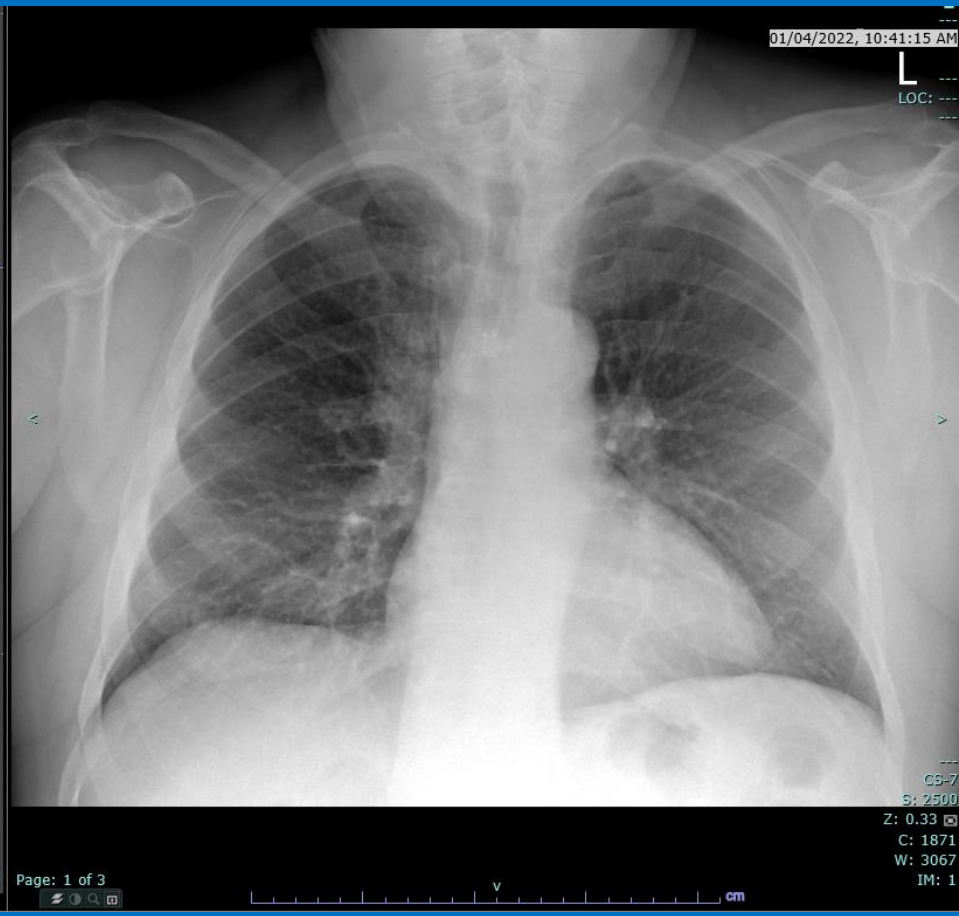
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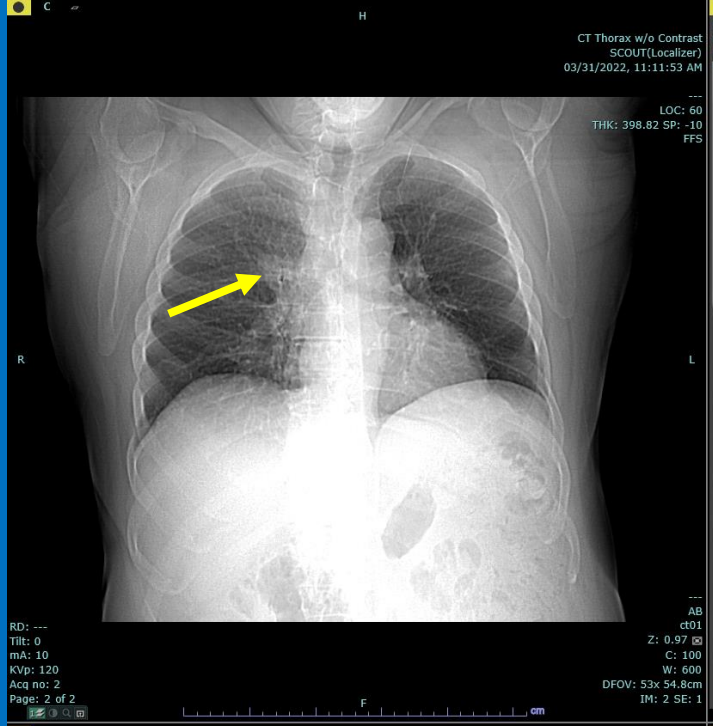
cm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R
L
RD: ---
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AB
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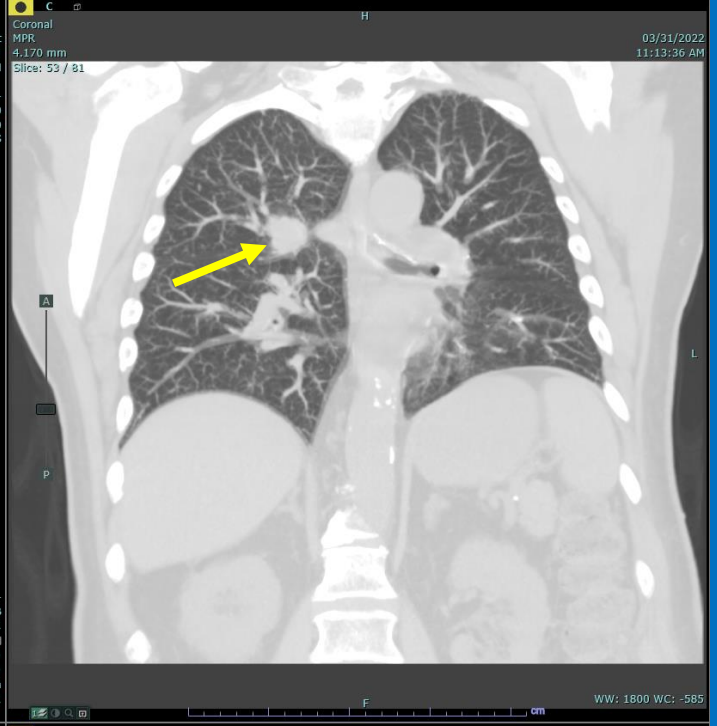
IM: 2 SE: 1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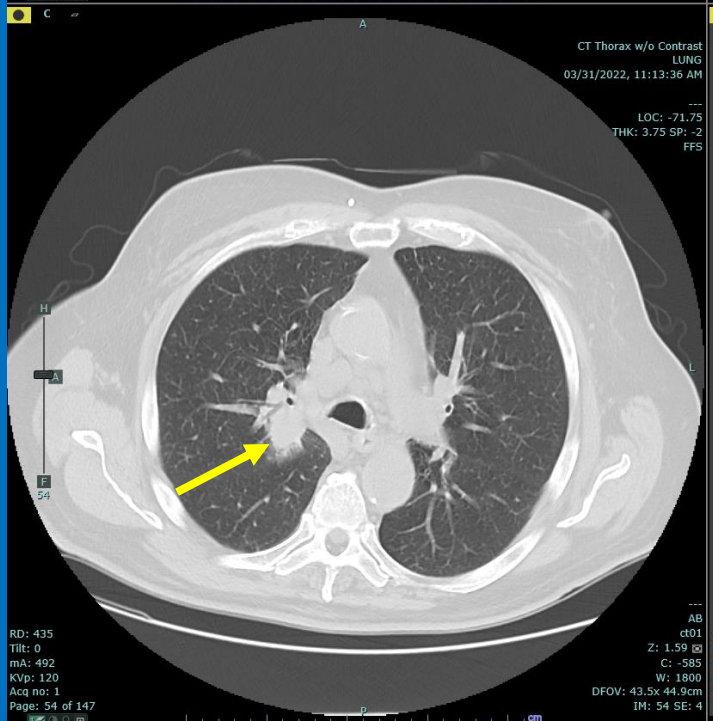
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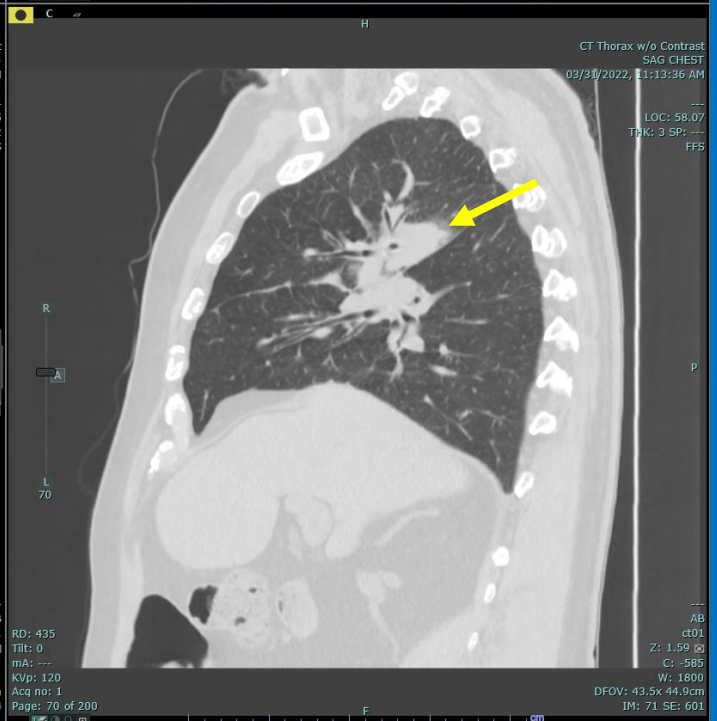
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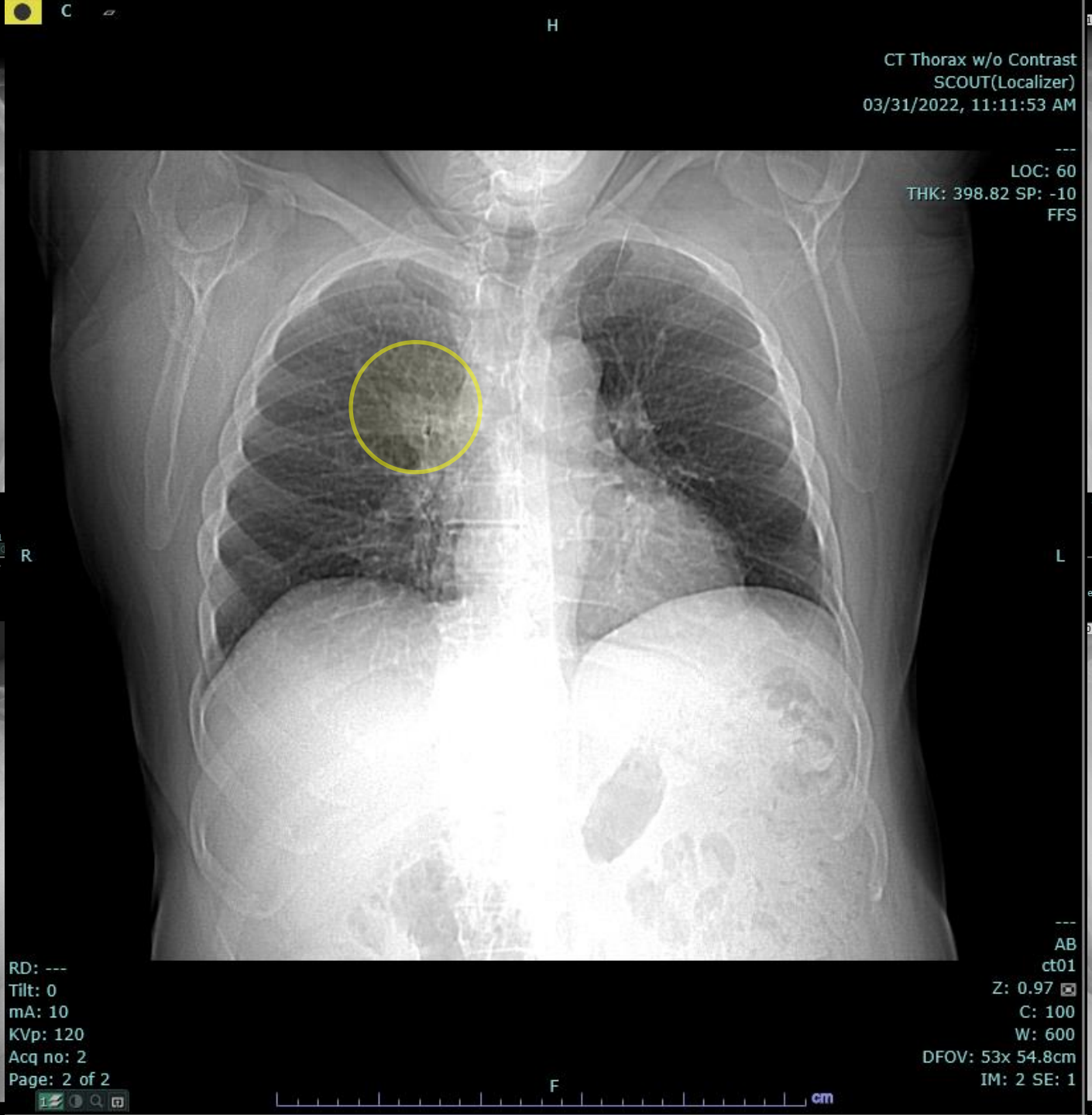
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CT Thorax w/o Contrast
SCOUT(Localizer)
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THK: 398.82 SP: -10
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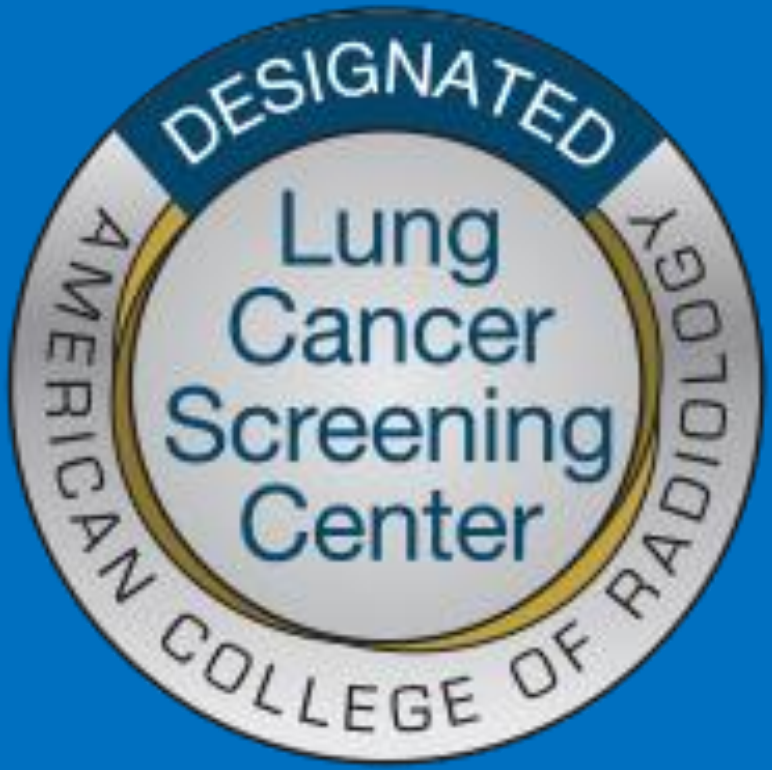
Tilt: 0
mA: 10
KVp: 120
Acq no: 2
Page: 2 of 2
F
cm

AB
ct01
Z: 0.97
C: 100
W: 600
DFOV: 53x 54.8cm
IM: 2 SE: 1

Lung Cancer Screening



National Lung Screening Trial

- Performed to establish efficacy of low-dose chest CT exams in reducing death rates from lung cancer among those at high risk for the disease

- More than 53,000 men and women aged 55 to 74 who were current or former heavy smokers at 33 sites across the United States

National Lung Screening Trial

- Each participant was randomly assigned to receive screenings with either low-dose CT (LDCT) or standard chest x-ray once per year for three consecutive years.

- The trial demonstrated 15 to 20 percent fewer lung cancer deaths among participants screened with LDCT.

Low-Dose Chest CT

Lung Cancer Screening with Chest CT: Efficacy Confirmed

Radiology: Imaging Cancer 2020; 2(3):e204015 • https://doi.org/10.1148/rycan.2020204015 • ©RSNA, 2020

Take-Away Points

- Major Focus: The Dutch-Belgian Lung Cancer Screening Trial (NELSON) is the second largest randomized controlled trial with a primary endpoint of lung cancer mortality designed to evaluate CT screening versus no screening in male current and former smokers.
- Key Result: Participants in the CT screening group had an increased incidence of lung cancer, 24% reduction in lung cancer mortality over a 10-year period, and approximately 40% of lung cancers in the screened group were early stage (stage I).
- Impact: These results corroborate results from the National Lung Screening Trial, supporting the benefits of CT screening for lung cancer and furthering population-based CT screening for high-risk patients.

the CT screening group compared with the control group (rate ratio 1.14; 95% confidence interval [CI]: 0.97, 1.33). There was a 24% reduction in lung cancer mortality with CT screening (rate ratio 0.76; 95% CI: 0.61, 0.94). The benefit of CT screening in a smaller subset of women (n = 2594) was suggested to be greater, with a mortality reduction of 33% (rate ratio 0.67; 95% CI: 0.38, 1.14). Approximately 40% of cancers detected in the screening group were stage IA–B, while more than 70% of lung cancers in the control group were stage IIIA or higher. Overall, after analysis of nodule volumes, including doubling time determination via repeat CT for indeterminate nodules, the percentage of participants with a positive test was 2.1%, and the positive predictive value was 43.5%. There were

Lung Cancer Screening

- 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.

- Stop screening once a person has not smoked for 15 years or has a health problem that limits life expectancy or the ability to have lung surgery.

Lung Cancer Screening

- In 2021 USPSTF made revisions:
  - Expanded the age range to 50 to 80 years (previously 55 to 80 years)
  - Reduced the pack-year history to 20 pack-years of smoking (previously 30 pack-years).

Lung Cancer Screening

https://www.oneidahealth.org/tests-imaging/lung-cancer-screening/

Lung Cancer Screening

https://www.acr.org/Clinical-Resources/Lung-Cancer-Screening-Resources/FAQ

Lung Cancer Screening

- Before the beneficiary's first lung cancer LDCT screening, the beneficiary must receive a counseling and shared decision-making visit that meets all of the following criteria, and is appropriately documented in the beneficiary's medical records:
  - Determination of beneficiary eligibility;
  - Shared decision-making, including the use of one or more decision aids;
  - Counseling on the importance of adherence to annual lung cancer LDCT screening, impact of comorbidities and ability or willingness to undergo diagnosis and treatment; and
  - Counseling on the importance of maintaining cigarette smoking abstinence if former smoker; or the importance of smoking cessation if current smoker and, if appropriate, furnishing of information about tobacco cessation interventions.

Lung Cancer Screening

Note: CMS finalized it will remove the restriction that the counseling and shared decision-making visit must be furnished by a physician or non-physician practitioner. This change allows for this service to be furnished by auxiliary personnel “incident to” a physician’s professional service.

Lung Cancer Screening Coding Information

G0296 — Counseling visit to discuss need for lung cancer screening (LDCT) using low-dose CT scan (service is for eligibility determination and shared decision making), and, is listed as a permanent telehealth code. The code is payable in the facility and the non-facility setting.

71271— Computed tomography, thorax, low dose for lung cancer screening, without contrast material(s)

Medicare will deny G0296 and 71271 for claims that do not contain these ICD-10 diagnosis codes:

- **Z87.891 for former smokers (personal history of nicotine dependence).**
- **F17.21 - for current smokers (nicotine dependence).**
  - **F17.211 Nicotine dependence, cigarettes, in remission**
  - **F17.213 Nicotine dependence, cigarettes, with withdrawal**
  - **F17.218 Nicotine dependence, cigarettes, with other nicotine-induced disorders**
  - **F17.219 Nicotine dependence, cigarettes, with unspecified nicotine-induced disorders**

Note: Medicare coinsurance and Part B deductible are waived for this preventive service.

Low Dose Chest CT (LDCT)

- Radiation exposure
  - LDCT 1.5 mSv – 6 months
    - Conventional chest CT 6.1 mSv – 2 years
    - CXR 0.1 mSv – 10 days
- “Nondiagnostic” for everything else

Lung-RADS® v2022

Release Date: November 2022

Lung-RADS	Category Descriptor	Findings	Management
0	**Incomplete** Estimated Population Prevalence: ~ 1%	Prior chest CT examination being located for comparison (see note 9)	Comparison to prior chest CT;
		Part or all oflungs cannot be evaluated	Additional lung cancer screening CT imaging needed;
		Findings suggestive of an inflammatory or infectious process (see note 10)	1-3 month LDCT
1	**Negative** Estimated Population Prevalence: 39%	**No lung nodules OR**	
		Nodule with benign features: • Complete, central, popcorn, or concentric ring calcifications **OR** • Fat-containing	
		Juxtapleural nodule: • < 10 mm (524 mm^3) mean diameter at baseline or new **AND** • Solid; smooth margins; and oval, lentiform, or triangular shape	
		Solid nodule: • < 6 mm (< 113 mm^3) at baseline **OR**	
S	**Significant or Potentially Significant** Estimated Population Prevalence: 10%	**Modifier:** May add to category 0-4 for clinically significant or potentially clinically significant findings unrelated to lung cancer (see note 15)	As appropriate to the specific finding
		Airway nodule, subsegmental - at baseline, new, or stable (see note 11)	
		Category 3 lesion that is stable or decreased in size at 6-month follow-up CT **OR** Category 4B lesion proven to be benign in etiology following appropriate diagnostic workup	
3	**Probably Benign -** Based on imaging features or behavior Estimated Population Prevalence: 9%	**Solid nodule:** • ≥ 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: • ≥ 6 mm total mean diameter (≥ 113 mm^3) with solid component < 6 mm (< 113 mm^3) at baseline **OR** • New < 6 mm total mean diameter (< 113 mm^3)	6-month LDCT
		Non solid nodule (GGN): • ≥ 30 mm (≥ 14,137 mm^3) at baseline or new	
		Atypical pulmonary cyst: (see note 12) • Growing cystic component (mean diameter) of a thick-walled cyst	
		Category 4A lesion that is stable or decreased in size at 3-month follow-up CT (excluding airway nodules)	
	Suspicious	**Solid nodule:** • ≥ 8 to < 15 mm (≥ 268 to < 1,767 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: • ≥ 6 mm total mean diameter (≥ 113 mm^3) with solid component ≥ 6 mm to < 8 mm	3-month LDCT; PET/CT may be considered if

ACR® Lung Cancer Screening CT Incidental Findings
Quick Reference Guide

This Quick Guide is intended for use by Lung Cancer Screening (LCS) program coordinators and nurse navigators as they assist in the care coordination of LCS patients in collaboration with the referring providers.

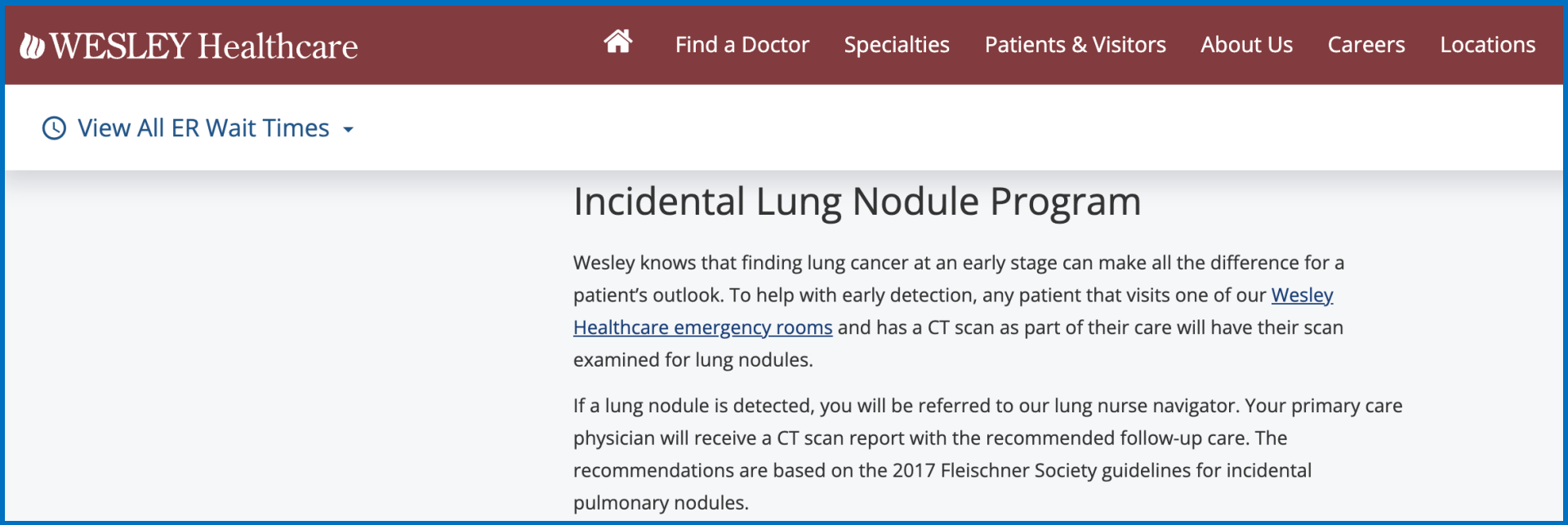
- The Quick Guide lists common incidental findings on LCS CT and the typical management and/or appropriate follow–up recommendations.
- Comparison to prior exams is important to assess for stability or change.
- The guidance provided is intended to serve as a simple reference tool and does not replace the more comprehensive White Paper, ACR Appropriateness Criteria® and reference documents listed on the third page.
- The interpreting radiologist should include significant incidental findings that need attention, with recommended follow-up, in the "Impression" section of the report.
- Questions about the findings in a radiology report are best answered by the radiologist who interpreted the exam.

Legend/Abbreviations:

ASCVD = atherosclerotic cardiovascular disease
CAC = coronary artery calcification
CE = contrast enhanced
CT = computed tomography
→ = action recommended, text in **Bold** type
MR = magnetic resonance imaging
OK = typically, but not always, insignificant or benign
US = ultrasound
w/u: = work up with follow-up imaging
PCP = primary care provider

Anatomic Region	Findings/Recommendations
Abdominal	
Adrenal[1]	• Adrenal calcification – OK. • Nodule < 10 HU (fat density), likely adenoma – OK. • Soft tissue density nodule < 1 cm – OK. • Adrenal nodule stable ≥ 1 year – OK. → **Any other nodule or mass → w/u: CE Adrenal CT or MRI.**
Kidney[2]	• Non-obstructing renal calculi – OK. • Simple or hyperdense/hemorrhagic cyst ("Bosniak 1 or 2") < 4 cm – OK. → **Soft tissue density (or mixed density) renal mass → w/u: CT or MRI of the Kidneys without and with IV contrast.**

Lung Nodule Clinic



Ascension Via Christi expands lung cancer screening, opens lung nodule clinic

September 19, 2022

end the CONFUSION

SOCIETY OF BREAST IMAGING
SBI
Since 1985

The Society of Breast Imaging

has developed this guide that features information on breast imaging and provides clarity as to when and how often a woman should receive a mammogram.

www.sbi-online.org/endtheconfusion

Breast Cancer

As of 2021, breast has become the most commonly diagnosed cancer world-wide

Accounts for ~12% of all cancers

Has surpassed lung cancer incidence

Why is this important?

Estimated New Cases

Female		
Breast	287,850	31%
Lung & bronchus	118,830	13%
Colon & rectum	70,340	8%
Uterine corpus	65,950	7%
Melanoma of the skin	42,600	5%
Non-Hodgkin lymphoma	36,350	4%
Thyroid	31,940	3%
Pancreas	29,240	3%
Kidney & renal pelvis	28,710	3%
Leukemia	24,840	3%
All sites	**934,870**	

Estimated Deaths

Female		
Lung & bronchus	61,360	21%
Breast	43,250	15%
Colon & rectum	24,180	8%
Pancreas	23,860	8%
Ovary	12,810	4%
Uterine corpus	12,550	4%
Liver & intrahepatic bile duct	10,100	4%
Leukemia	9,980	3%
Non-Hodgkin lymphoma	8,550	3%
Brain & other nervous system	7,570	3%
All sites	**287,270**	

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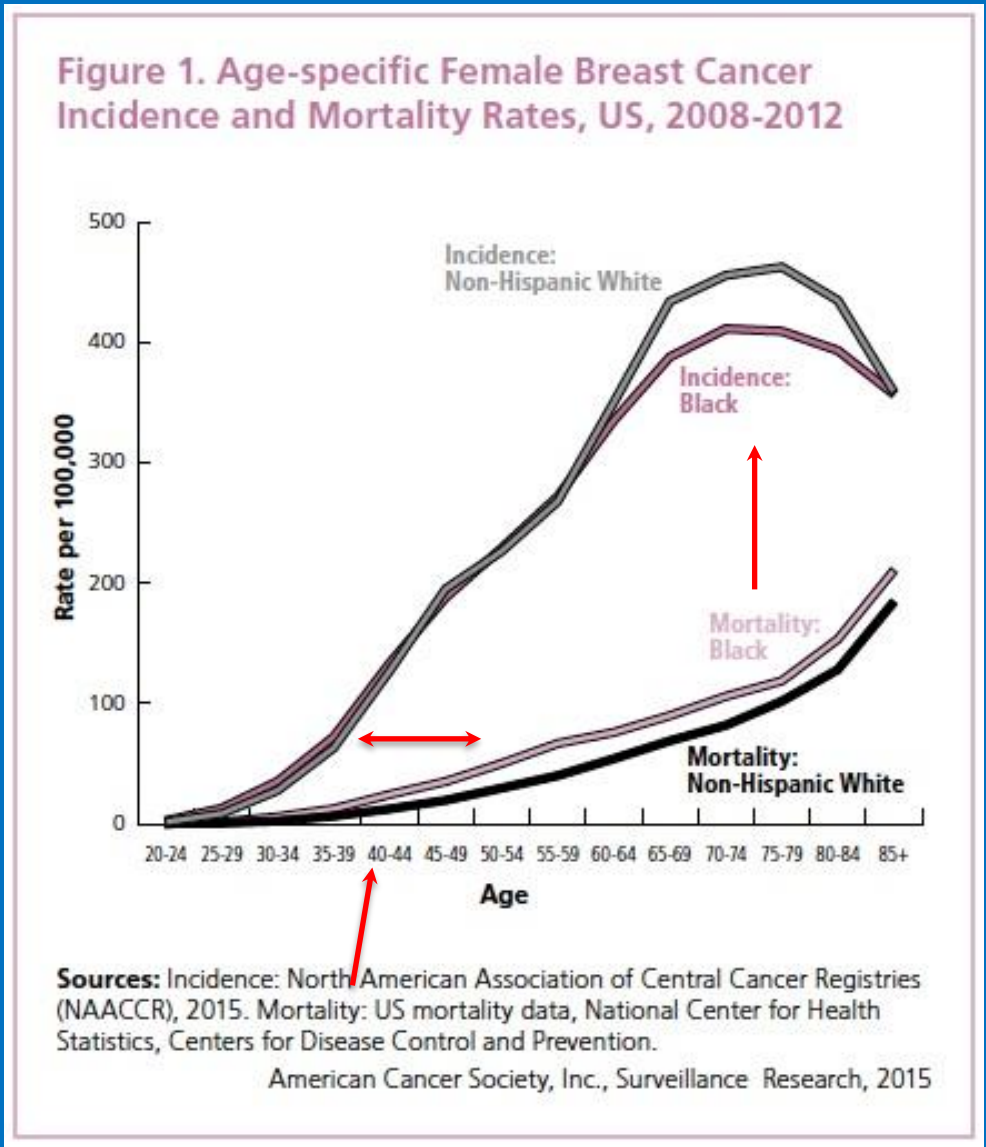
Why start at 40?



Why start at 40?

- It saves the most lives!
  - Multiple Randomized Control Trials

    29% - Hendrick et al. *JNCI Monogr*. 1997

    36% - Andersson et al. *Monogr NCI*. 1997

    45% - Feig et al. *Breast Disease*. 1998

Why start at age 40?

1/3 of all years of life lost from breast cancer occur in women diagnosed in their 40's

Shapiro S. Evidence on screening for breast cancer from a randomized trial. *Cancer*. 1977 Jun; 39(6 Suppl): 2772-2782.

	Life Expectancy	Age at death	YOL Lost	% YOL
Patient 1	80	47	33	33/98 = 34%
Patient 2	80	54	26	
Patient 3	80	60	20	
Patient 4	80	62	18	
Total:	320	222	98 years YOL	

Why start at 40?

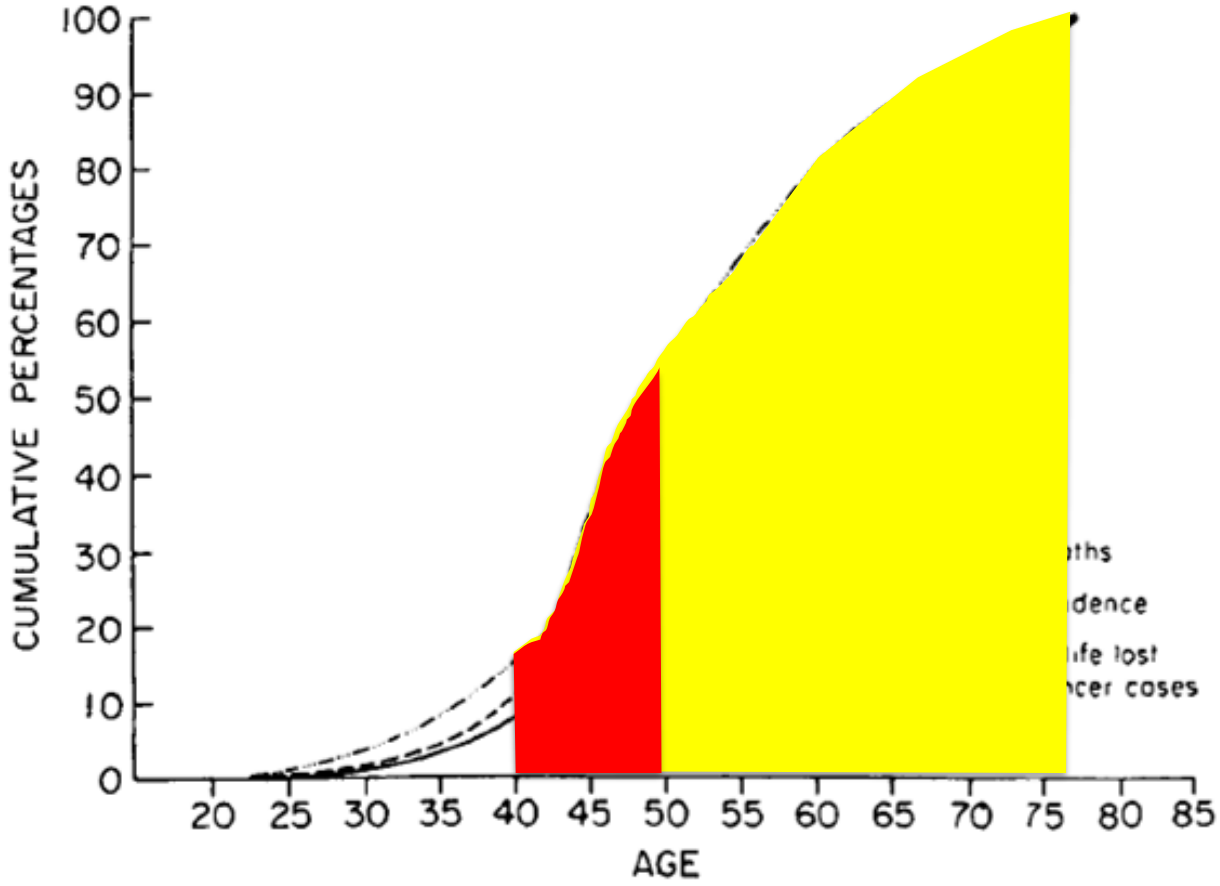


FIG. 2. Cumulative percent distributions of deaths : incidence and person-years of life lost.

Shapiro S. Evidence on screening for breast cancer from a randomized trial. *Cancer*. 1977 Jun; 39(6 Suppl): 2772-2782.

Why start at 40?

Clinical Review & Education

Special Communication

Breast Cancer Screening for Women at Average Risk
2015 Guideline Update From the American Cancer Society

Kevin C. Oeffinger, MD; Elizabeth T. H. Fontham, MPH, DrPH; Ruth Etzioni, PhD; Abbe Herzig, PhD; James S. Michaelson, PhD; Ya-Chen Tina Shih, PhD; Louise C. Walter, MD; Timothy R. Church, PhD; Christopher R. Flowers, MD, MS; Samuel J. LaMonte, MD; Andrew M. D. Wolf, MD; Carol DeSantis, MPH; Joannie Lortet-Tieulent, MSc; Kimberly Andrews; Deana Manassaram-Baptiste, PhD; Debbie Saslow, PhD; Robert A. Smith, PhD; Otis W. Brawley, MD; Richard Wender, MD

IMPORTANCE Breast cancer is a leading cause of premature mortality among US women. Early detection has been shown to be associated with reduced breast cancer morbidity and mortality.

OBJECTIVE To update the American Cancer Society (ACS) 2003 breast cancer screening guideline for women at average risk for breast cancer.

PROCESS The ACS commissioned a systematic evidence review of the breast cancer screening literature to inform the update and a supplemental analysis of mammography registry data to address questions related to the screening interval. Formulation of recommendations was based on the quality of the evidence and judgment (incorporating values and preferences) about the balance of benefits and harms.

EVIDENCE SYNTHESIS Screening mammography in women aged 40 to 69 years is associated with a reduction in breast cancer deaths across a range of study designs, and inferential evidence supports breast cancer screening for women 70 years and older who are in good health. Estimates of the cumulative lifetime risk of false-positive examination results are greater if screening begins at younger ages because of the greater number of mammograms, as well as the higher recall rate in younger women. The quality of the evidence for

Editorial page 1569

Author Video Interview, Author Audio Interview, Animated Summary Video, and JAMA Report Video at jama.com

Related articles pages jrv150015 and 1635 and JAMA Patient Page page 1658

Supplemental content at jama.com

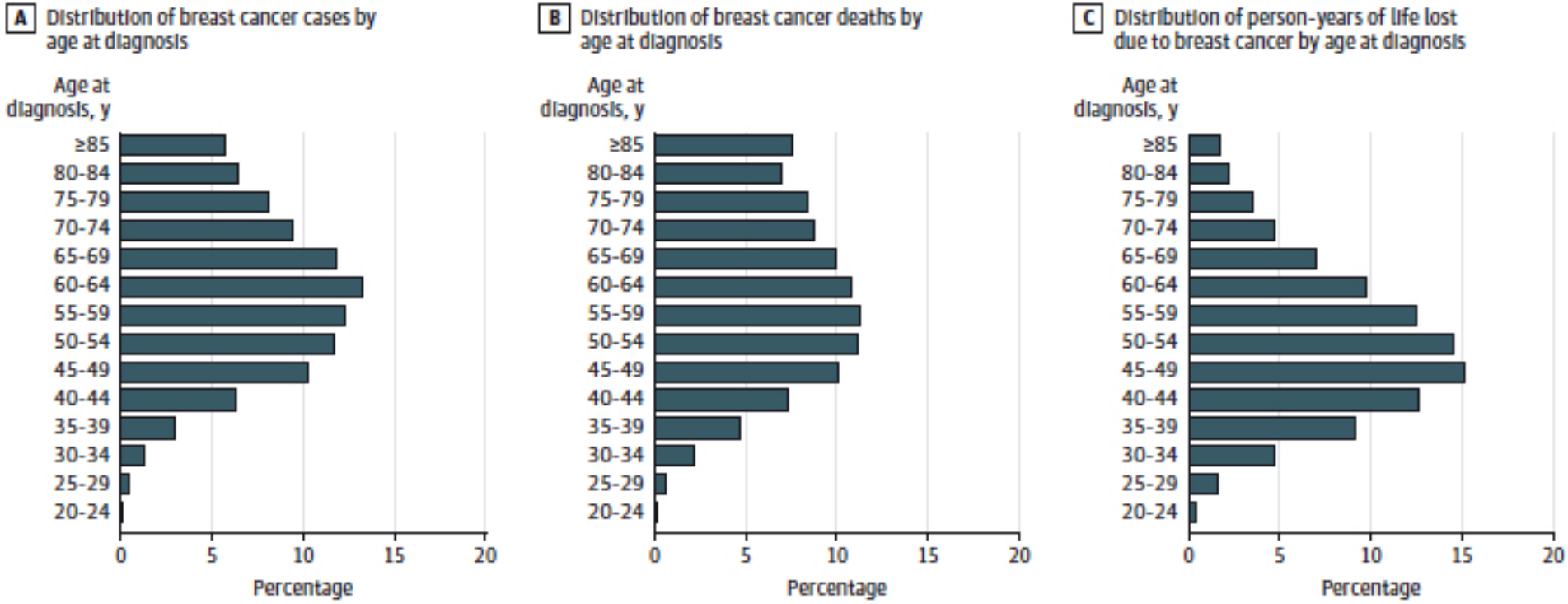
CME Quiz at jamanetworkcme.com and CME Questions page 1640

Related article at jamaoncology.com
Related article at jamainternalmedicine.com

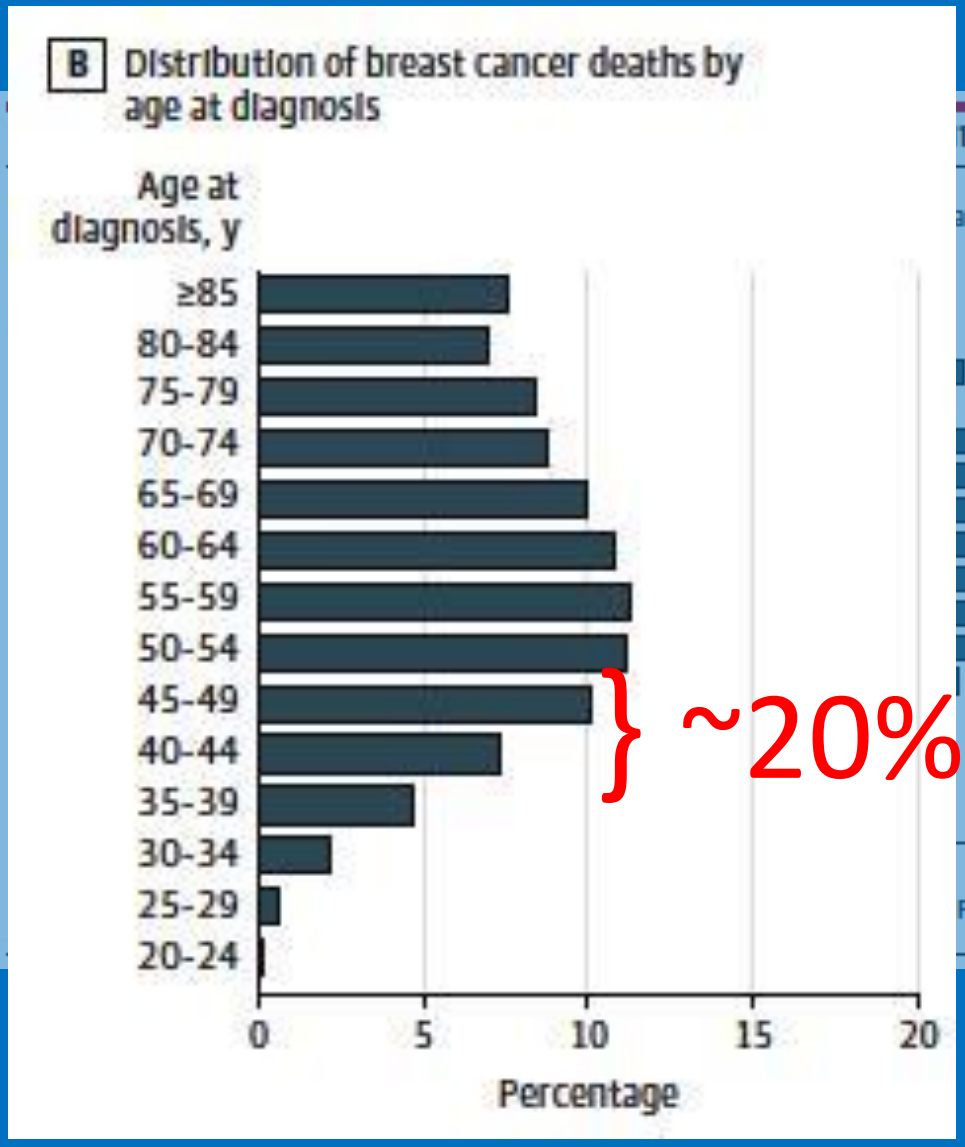
Oeffinger KC et al. *JAMA*. 2015; 314 (15): 1599-1614.

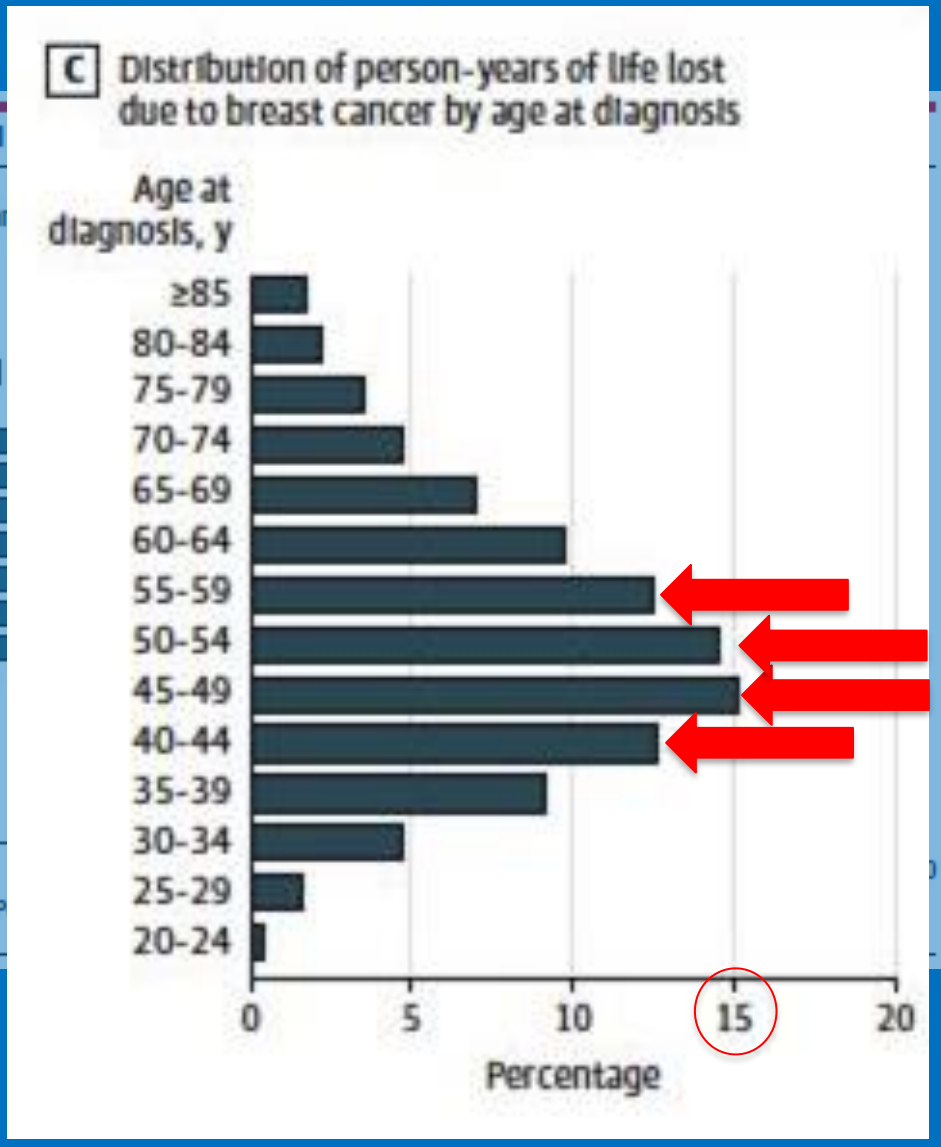
Why start at 40?

Figure 1. Breast Cancer Burden by Age at Diagnosis for the Period 2007-2011



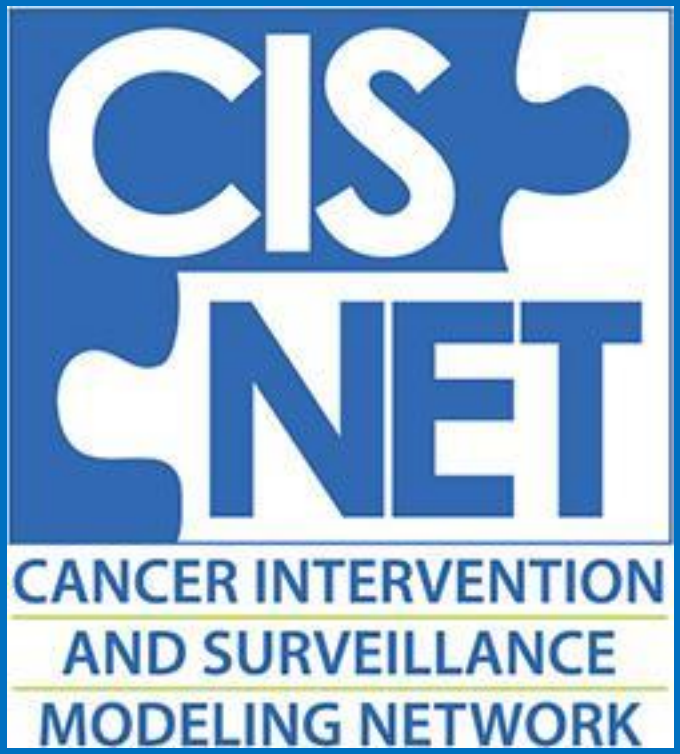
Why start at 40?





Why start at 40?

- CISNET 2015 Models
  - NCI sponsored
  - USPSTF uses
  - 20% more deaths avoided if start at age 40
  - 33% more years of life saved if start at age 40



Why all the controversy/confusion?

USPSTF

Annals of Internal Medicine

CLINICAL GUIDELINE

Screening for Breast Cancer: U.S. Preventive Services Task Force Recommendation Statement

Albert L. Siu, MD, MSPH, on behalf of the U.S. Preventive Services Task Force*

ACOG

ACS

Clinical Review & Education

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Why all the controversy?

Current Mammographic Screening Recommendations

- ACR, SBI, NCCN
  - Annual screening starting at age 40
- ACS
  - Annual screening starting at age 40 (qualified)
  - Annual screening age 45-55 (strong)
  - Annual or biennial age >55 (qualified)
- USPSTF, ACP
  - Biennial screening age 50-74 (“B”)
  - Biennial screening age 40-49 (“C”)

Benefit of Screening Mammography

- ACS 2015
  - "Screening mammography in women aged 40 to 69 years is associated with a reduction in breast cancer deaths across a range of study designs, and inferential evidence supports breast cancer screening for women 70 years and older who are in good health"
- USPSTF 2016
  - "USPSTF found adequate evidence that mammography screening reduces breast cancer mortality in women aged 40-74."

Swedish Two-County Trial: Impact of Mammographic Screening on

ORIGINAL RESEARCH

Original Article

Mammography Screening Reduces Rates of Advanced and Fatal Breast Cancers: Results in 549,091 Women

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Radiology

ORIGINAL RESEARCH • BREAST IMAGING

Beneficial Effect of Consecutive Screening Mammography Examinations on Mortality from Breast Cancer: A Prospective Study

Stephen W. Duffy, MSc • László Tabár, MD* • Amy Ming-Fang Yen, PhD • Peter B. Dean, MD • Robert A. Smith, PhD • Håkan Jonsson, PhD • Sven Törnberg, MD • Sherry Yueh-Hsia Chiu, PhD • Sam Li-Sheng Chen, PhD • Grace Hsiao-Hsuan Jen, PhD • May Mei-Sheng Ku, PhD • Chen-Yang Hsu, PhD • Johan Ahlgren, MD • Roberta Maroni, MSc • Lars Holmberg, MD • Tony Hsiu-Hsi Chen, PhD*

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Why start at 40?

Pitman et al. *JACR*. September, 2017; 209: 1-6

Women's Imaging • Original Research

Screening Mammography for Women in Their 40s: The Potential Impact of the American Cancer Society and U.S. Preventive Services Task Force Breast Cancer Screening Recommendations

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Geraldine B. McGinty[2]
Rohan R. Soman[1]
Michele B. Drotman[2]
Melissa B. Reichman[2]
Elizabeth Kagan Arleo[2]

OBJECTIVE. The purpose of this study was to review screening mammograms obtained in one practice with the primary endpoint of determining the rate of detection of breast cancer and associated prognostic features in women 40–44 and 45–49 years old.

MATERIALS AND METHODS. The retrospective cohort study included women in their 40s with breast cancer detected at screening from June 2014 through May 2016. The focus was on cancer detection rate, pathologic findings, and risk factors.

RESULTS. A total of 32,762 screens were performed, and 808 biopsies were recommended. These biopsies yielded 224 breast cancers (cancer detection rate, 6.84 per 1000 screens). Women 40–49 years old had 18.8% of cancers detected; 50–59 years, 21.8%; 60–69 years, 32.6%; and 70–79 years, 21.4%. Among the 40- to 49-year-old women, women 40–44 years

Why start at 40?

- Screening works
- 1/3 of all YOL to breast cancer in women occurs in their 40s
- Major societies agree that most lives and YOL saved starting at age 40
- SBI/ACR/ACS* all agree to start screening at age 40

Annual vs Biennial

- Annual screening saves the most lives
- Annual screening saves the most years

Annual vs Biennial

Table 1
Breast cancer deaths averted, mortality reduction, life-years (LY) saved, screening examinations per woman, women needed to be screened per death averted, and women needed to be screened per LY gained, compared with No Screening, by screening strategy

Screening strategy	Breast cancer deaths averted per 1,000 women alive at age 40	Mortality reduction (%) with 15 years follow-up	LY saved per 1,000 women alive at age 40	Maximum screening examinations per woman	Screening examinations per death averted	Women screened per death averted	Women screened per LY gained
Annual 40 to 69	9.1	50.2	201.1	30	2,984	99	4.5
Annual 40 to 74	10.1	53.4	213.5	35	3,023	86	4.1
Annual 50 to 69	7.4	45.5	148.0	20	2,360	118	5.9
Annual 50 to 74	8.4	49.2	169.9	25	2,484	99	5.2
Biennial 40 to 74	7.3	38.5	149.8	18	2,165	138	6.7
Biennial 50 to 69	5.2	32.3	105.2	10	1,696	170	8.4
Biennial 50 to 74	6.1	35.9	116.3	13	1,783	137	7.2
Triennial 50 to 69	4.0	24.6	80.0	7	1,557	222	11.1
Triennial 50 to 74	4.8	27.9	89.2	9	1,589	177	9.4
Annual 40 to 49, Biennial 50 to 69	7.0	38.7	158.2	20	2,651	133	5.9
Annual 40 to 49, Biennial 50 to 74	7.9	42.0	170.3	22	2,593	118	5.5
Annual 40 to 49	2.0	18.6	58.0	10	5,152	526	17.2

Source: Canadianized University of Wisconsin Breast Cancer Epidemiology Simulation Model.

39%

Yaffe et al. Clinical outcomes of modelling mammography screening strategies. *Health Reports*. 26 (12); December, 2015: 9-15

Annual vs Biennial

- Annual screening saves 25-40% more lives
- Annual screening saves ~40% more years

“Harms”

- False Positives
  - “Unnecessary” call backs
  - “Unnecessary” biopsies
  - Anxiety
- False Negatives
- Overdiagnosis
- Radiation

False Positives

- Call backs
- DBT: multiple studies
  - reduces recall rate ➔ 14-37% (combo of 2D and tomo)

Follow-up Testing Risks of Mammography Screening

Out of every **100** women who get a screening mammogram:

90 will be told that their mammograms are normal

10 will be asked to return for additional mammograms or ultrasounds

6 will be reassured that their mammograms are normal

2 will be asked to return in 6 months for a follow-up exam

2 will be recommended to have a needle biopsy

MammographySavesLives®

... one of them may be yours

To learn more about mammography benefits and risks visit **mammographysaveslives.org**

False Positives

- Biopsies
  - Hubbard et al. *Ann Intern Med*. 2011; 155(8): 481-492
  - In women starting screening at age 40: 10-year cumulative probability of a false positive leading to biopsy was
    - 7.0% with annual
    - 4.8% with biennial

False Positives

- Biopsies
  - So, given the relative risk of 7%, how many years between biopsies for the average woman?
  - 143 years!!
  - How is that possible?
    - 7% over 10 years
    - .7% for 1 year ➔ 0.007 patients per year
    - 1/0.007 = 143

Anxiety

- Soo et al. *JACR*. 11(7); July, 2014: 709-716
- 136 patients undergoing U/S or stereo-guided biopsy
  - 39.7% ➔ no pain (0 out of 10)
  - 48.5% ➔ mild pain (1-3 out of 10)
  - 11.8% ➔ moderate to severe pain (≥4 out of 10)
- ~ 9 out of 10 women had little or no pain

Anxiety

- Tosteson et al. *JAMA Int Med*. June, 2014; 174(6): 954-961
- ~1,000 patients in Digital Mammographic Imaging Screening Trial (DMIST)
- Anxiety Inventory Scale and attitudes toward future screening

Anxiety

- Increased short-term anxiety but no long-term anxiety
  - Negative screen → 32.7
  - Recalled (False-positive) → 35.3
  - Although difference was statistically significant ($p<0.01$), no measurable health utility decrement

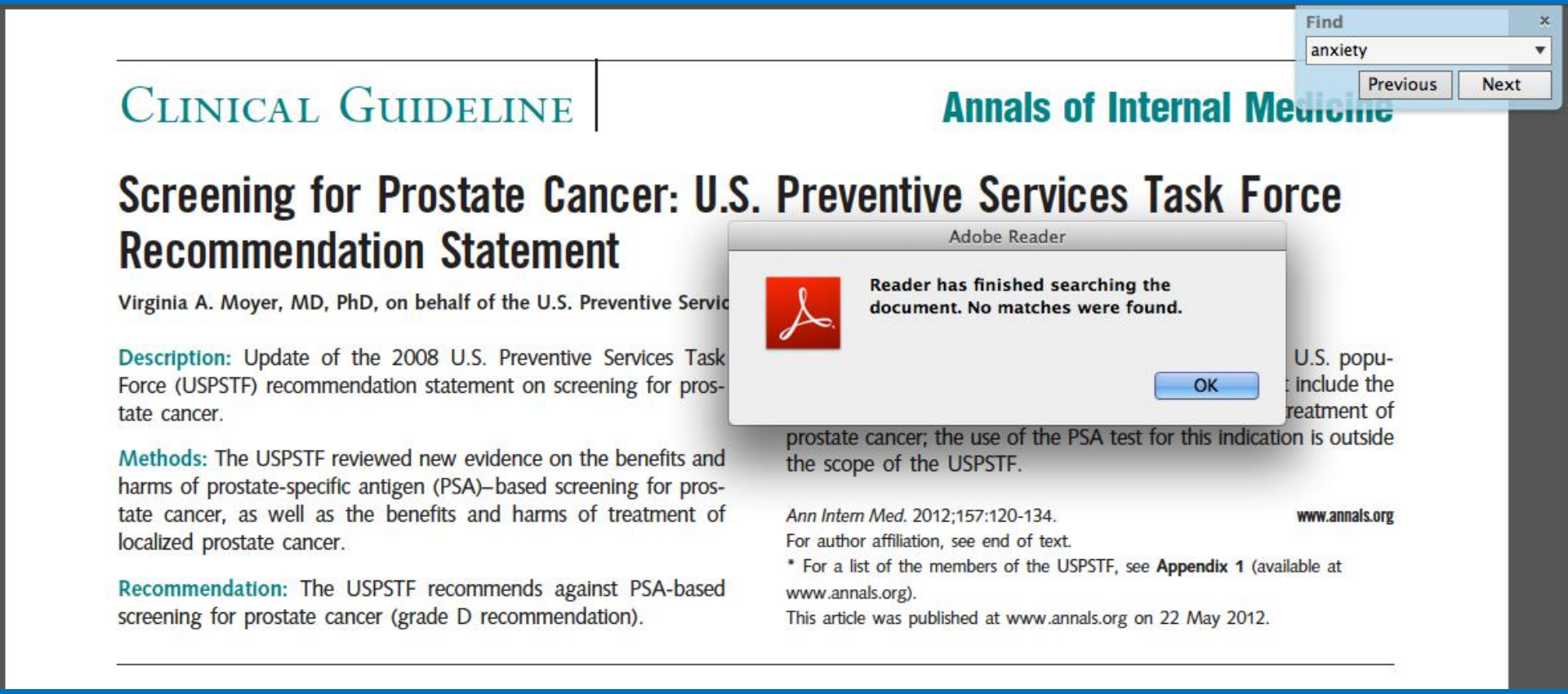
Anxiety

- Follow-up 1 year later
  - Scores not significantly different
    - Negative → 33
    - False-positive → 34
- Intention to return for screening
  - Negative → 93.4%
  - False-positive → 93.5%

Anxiety

"False-positive results are common and lead to unnecessary and sometimes invasive follow-up testing, with the potential for psychological harms (such as anxiety)."

Anxiety


Find
anxiety
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CLINICAL GUIDELINE
Annals of Internal Medicine
Screening for Prostate Cancer: U.S. Preventive Services Task Force Recommendation Statement
Virginia A. Moyer, MD, PhD, on behalf of the U.S. Preventive Servic
Description: Update of the 2008 U.S. Preventive Services Task
Force (USPSTF) recommendation statement on screening for pros-
tate cancer.
Methods: The USPSTF reviewed new evidence on the benefits and
harms of prostate-specific antigen (PSA)–based screening for pros-
tate cancer, as well as the benefits and harms of treatment of
localized prostate cancer.
Recommendation: The USPSTF recommends against PSA-based
screening for prostate cancer (grade D recommendation).
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OK
U.S. popu-
include the
reatment of
prostate cancer; the use of the PSA test for this indication is outside
the scope of the USPSTF.
Ann Intern Med. 2012;157:120-134.
www.annals.org
For author affiliation, see end of text.
* For a list of the members of the USPSTF, see Appendix 1 (available at www.annals.org).
This article was published at www.annals.org on 22 May 2012.

Radiation

- "Radiation-induced breast cancer and resulting death can also occur, although the number of both of these events is predicted to be low." – USPSTF 2016
- 2-view screening mammogram
  - 0.4 mSv - 7 weeks background
    - CXR 0.1 mSv - 10 days
- Fatal, radiation-induced breast cancer in women 40-49
  - Annual mammogram q 100,000 years
  - May induce 1 in 100,000 women in their 40s undergoing mammogram

Hendrick and Helvie. *AJR*. 162(2); 2011

False-negatives (AKA Overdiagnosis)

- Tomosynthesis
  - Multiple studies ranging from +3.5%-50% (1 outlier -14.8%)
  - Weighted average of multiple studies
    - +25% increased cancer detection rate

Overdiagnosis

- Diagnosis of a disease that would not harm a patient, even if left untreated.
- Do we really feel comfortable leaving cancers alone?
- Do cancers disappear?
- Can lead to over treatment
- Doubling time of different cancers

Overdiagnosis

- Limitations
  - Who was screened?
  - Which cancers were screen detected?
- Lead time
- Background incidence
- ACS → no accurate assessment of overdiagnosis
- Only way to prove is to not treat anybody!!

Overdiagnosis

Persistent Untreated Screening-Detected Breast Cancer: An Argument Against Delaying Screening or Increasing the Interval Between Screenings

Elizabeth Kagan Arleo, MD[a], Debra L. Monticciolo, MD[b], Barbara Monsees, MD[c], Geraldine McGinty, MD, MBA[a], Edward A. Sickles, MD[d]

When to stop?

- 80?
- No right answer
- Less controversy

ORIGINAL ARTICLE CLINICAL PRACTICE MANAGEMENT

Breast Cancer Screening in Women at Higher-Than-Average Risk: Recommendations From the ACR

EC: Editor's Choice

SA-CME

Debra L. Monticciolo, MD[a], *Mary S. Newell, MD*[b], *Linda Moy, MD*[c], *Bethany Niell, MD, PhD*[d], *Barbara Monsees, MD*[e], *Edward A. Sickles, MD*[f]

Credits awarded for this enduring activity are designated "SA-CME" by the American Board of Radiology (ABR) and qualify toward fulfilling requirements for Maintenance of Certification (MOC) Part II: Lifelong Learning and Self-assessment. To access the SA-CME activity visit https://cortex.acr.org/Presenters/CaseScript/CaseView?CDId=5qIPiG+nl6k%3d.

Abstract

Early detection decreases breast cancer mortality. The ACR recommends annual mammographic screening beginning at age 40 for women of average risk. Higher-risk women should start mammographic screening earlier and may benefit from supplemental screening modalities. For women with genetics-based increased risk (and their untested first-degree relatives), with a calculated lifetime risk of 20% or more or a history of chest or mantle radiation therapy at a young age, supplemental screening with contrast-enhanced breast MRI is recommended. Breast MRI is also recommended for women with personal histories of breast cancer and dense tissue, or those diagnosed by age 50. Others with histories of breast cancer and those with atypia at biopsy should consider additional surveillance with MRI, especially if other risk factors are present. Ultrasound can be considered for those who qualify for but cannot undergo MRI. All women, especially black women and those of Ashkenazi Jewish descent, should be evaluated for breast cancer risk no later than age 30, so that those at higher risk can be identified and can benefit from supplemental screening.

Key Words: Breast cancer screening, breast cancer, higher risk populations, breast MRI, digital breast tomosynthesis, breast cancer risk assessment

J Am Coll Radiol 2018;15:408-414.

High Risk Screening

- For women with genetics-based increased risk (and their untested first-degree relatives) or with a calculated lifetime risk of 20% or more, DM, with or without DBT, should be performed annually beginning at age 30.
- For women with histories of chest radiation therapy before the age of 30, DM, with or without DBT, should be performed annually beginning at age 25 or 8 years after radiation therapy, whichever is later.
- For women with genetics-based increased risk (and their untested first-degree relatives), histories of chest radiation (cumulative dose of 10 Gy before age 30), or a calculated lifetime risk of 20% or more, breast MRI should be performed annually beginning at age 25 to 30.

High Risk Screening

- For women with personal histories of breast cancer and dense breast tissue, or those diagnosed before age 50, annual surveillance with breast MRI is recommended.
- For women with personal histories not included in the above, or with ADH, atypical lobular hyperplasia, or LCIS, MRI should be considered, especially if other risk factors are present.
- All women, especially black women and those of Ashkenazi Jewish descent, should be evaluated for breast cancer risk no later than age 30, so that those at higher risk can be identified and can benefit from supplemental screening.

Supplemental Topics

- MRI
- Automated Breast Ultrasound (ABUS)
- Breast Implants
- Special Cases
  - Pain
  - Palpable

Summary

- Screening exams
- Mammo
  - Informed decision making
- Call the rdiologist

Questions

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