Where’s Waldo?

Staying Abreast 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

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

Ultrasound

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
How can we do better?
ABUS
Automated Breast Ultrasound

• Contrast enhanced mammography
  - CEM/CEDM/CESM

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

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Overutilization of Health Care Resources for Breast Pain

Anne C. Kushwaha¹
Kyungmin Shin
Meaan 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.

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...
HOT OFF THE PRESS

ORIGINAL ARTICLE

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

Linh Tran, BAa, Alison L. Chetlen, DOb, Douglas L. Leslie, PhDc, Joel E. Segel, PhDa,d,e

Abstract

Objective: Although the Affordable Care Act (ACA) requires that all health insurance plans cover mammography, diagnostic mammography spending among women at low risk is high.

Methods: The study included 5.6 million women aged 50 to 69 years with health insurance in 2016. We estimated multiple linear regression models with years 2010 to 2013 as the reference group and adjusted for demographic characteristics, insurance type, and state-level controls.

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

<table>
<thead>
<tr>
<th>Estimated New Cases</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>Prostate</td>
<td>268,490</td>
<td>Breast</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>117,910</td>
<td>Lung &amp; bronchus</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>80,690</td>
<td>Colon &amp; rectum</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>61,700</td>
<td>Uterine corpus</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>57,180</td>
<td>Melanoma of the skin</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>50,290</td>
<td>Non-Hodgkin lymphoma</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>44,120</td>
<td>Thyroid</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>38,700</td>
<td>Pancreas</td>
</tr>
<tr>
<td>Leukemia</td>
<td>35,810</td>
<td>Kidney &amp; renal pelvis</td>
</tr>
<tr>
<td>Pancreas</td>
<td>32,970</td>
<td>Leukemia</td>
</tr>
<tr>
<td>All sites</td>
<td>983,160</td>
<td>All sites</td>
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</table>

<table>
<thead>
<tr>
<th>Estimated Deaths</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>68,820</td>
<td>Lung &amp; bronchus</td>
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<tr>
<td>Prostate</td>
<td>34,500</td>
<td>Breast</td>
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<tr>
<td>Colon &amp; rectum</td>
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<td>Colon &amp; rectum</td>
</tr>
<tr>
<td>Pancreas</td>
<td>25,970</td>
<td>Pancreas</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>20,420</td>
<td>Ovary</td>
</tr>
<tr>
<td>Leukemia</td>
<td>14,020</td>
<td>Uterine corpus</td>
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<tr>
<td>Esophagus</td>
<td>13,250</td>
<td>Liver &amp; intrahepatic bile duct</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>12,120</td>
<td>Leukemia</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>11,700</td>
<td>Non-Hodgkin lymphoma</td>
</tr>
<tr>
<td>Brain &amp; other nervous system</td>
<td>10,710</td>
<td>Brain &amp; other nervous system</td>
</tr>
<tr>
<td>All sites</td>
<td>322,090</td>
<td>All sites</td>
</tr>
</tbody>
</table>

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.

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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

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

What you need to know about COLON CANCER

1 IN 20 WILL BE DIAGNOSED WITH COLON CANCER IN THEIR LIFETIME

60% OF ALL COLON CANCER DEATHS COULD BE PREVENTED WITH REGULAR SCREENING

COLON CANCER IS THE 2ND LEADING CAUSE OF CANCER DEATHS AMONG MEN AND WOMEN IN THE U.S.

1 IN 3 ADULTS, AGE 50 TO 70, ARE NOT UP-TO-DATE WITH RECOMMENDED COLON CANCER SCREENING

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

Many adults are not being tested

Testing status of adults aged 50–75 years

65% Up-to-date CRC testing
28% Tested but not up-to-date
7% Never tested

Insurance status of never tested adults aged 50–75 years

76% Insured
24% Uninsured


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
  - CO₂

- 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)

CT Colonography

https://youtu.be/AdhzLwpulPQ
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

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

Calculating pack years

Average # of packs smoked per/day

# of years you smoked

(20 cigarettes = 1 pack)

PACK YEARS

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

https://www.acr.org/Clinical-Resources/Lung-Cancer-Screening-Resources/FAQ
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
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<th>Lung-RADS</th>
<th>Category Descriptor</th>
<th>Findings</th>
<th>Management</th>
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<tbody>
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<td>0</td>
<td>Incomplete</td>
<td>Prior chest CT examination being located for comparison (see note 9)</td>
<td>Comparison to prior chest CT;</td>
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<tr>
<td></td>
<td>Estimated Population Prevalence: ~ 1%</td>
<td>Part or all of lungs cannot be evaluated</td>
<td>Additional lung cancer screening CT imaging needed;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Findings suggestive of an inflammatory or infectious process (see note 10)</td>
<td>1-3 month LDCT</td>
</tr>
<tr>
<td>1</td>
<td>Negative</td>
<td>No lung nodules OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimated Population Prevalence: 39%</td>
<td>Nodule with benign features:</td>
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<tr>
<td></td>
<td></td>
<td>• Complete, central, popcorn, or concentric ring calcifications OR</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• Fat-containing</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Juxtapleural nodule:</td>
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<tr>
<td></td>
<td></td>
<td>• &lt; 10 mm (524 mm³) mean diameter at baseline or new AND</td>
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<td></td>
<td></td>
<td>• Solid; smooth margins; and oval, lentiform, or triangular shape</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid nodule;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• &lt; 6 mm (&lt; 113 mm³) at baseline OR</td>
<td></td>
</tr>
</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th>Lung-RADS</th>
<th>Category Descriptor</th>
<th>Findings</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Probably Benign - Based on imaging features or behavior Estimated Population Prevalence: 9%</td>
<td>Airway nodule, subsegmental - at baseline, new, or stable (see note 11)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid nodule:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ≥ 6 to &lt; 8 mm (≥ 113 to &lt; 268 mm³) at baseline OR</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• New 4 mm to &lt; 6 mm (34 to &lt; 113 mm³)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part solid nodule:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ≥ 6 mm total mean diameter (≥ 113 mm³) with solid component &lt; 6 mm (&lt; 113 mm³) at baseline OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New &lt; 6 mm total mean diameter (&lt; 113 mm³)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Non solid nodule (GGN):</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ≥ 30 mm (≥ 14,137 mm³) at baseline or new</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atypical pulmonary cyst: (see note 12)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Growing cystic component (mean diameter) of a thick-walled cyst</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 4A lesion that is stable or decreased in size at 3-month follow-up CT (excluding airway nodules)</td>
<td></td>
</tr>
</tbody>
</table>

|         |                                              | Solid nodule:                                                             |                                                                             |
|         |                                              | • ≥ 8 to < 15 mm (≥ 268 to 1,767 mm³) at baseline OR                      |                                                                             |
|         |                                              | • Growing < 8 mm (< 268 mm³) OR                                           |                                                                             |
|         |                                              | • New 6 to < 8 mm (113 to < 268 mm³)                                     |                                                                             |
|         |                                              | Part solid nodule:                                                       |                                                                             |
|         |                                              | • ≥ 6 mm total mean diameter (≥ 113 mm³) with solid component ≥ 6 mm to < 8 mm (≥ 268 to 1,767 mm³) |                                                                             |
|         |                                              | 3-month LDCT; PET/CT may be considered if suspicious features            |                                                                             |

|         |                                              | Solid nodule:                                                             |                                                                             |
|         |                                              | • ≥ 6 to < 8 mm (≥ 113 to < 268 mm³) at baseline OR                       |                                                                             |
|         |                                              | • New 4 mm to < 6 mm (34 to < 113 mm³)                                    |                                                                             |
|         |                                              | Part solid nodule:                                                       |                                                                             |
|         |                                              | • ≥ 6 mm total mean diameter (≥ 113 mm³) with solid component ≥ 6 mm to < 8 mm (≥ 268 to 1,767 mm³) |                                                                             |
|         |                                              | 3-month LDCT; PET/CT may be considered if suspicious features            |                                                                             |
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
- $\rightarrow$ = 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

<table>
<thead>
<tr>
<th>Anatomic Region</th>
<th>Findings/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abdominal</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Adrenal $^1$    | • Adrenal calcification – OK.  
• Nodule $<10$ HU (fat density), likely adenoma – OK.  
• Soft tissue density nodule $<1$ cm – OK.  
• Adrenal nodule stable $\geq 1$ year – OK.  
$\rightarrow$ Any other nodule or mass $\rightarrow$ 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.  
$\rightarrow$ Soft tissue density (or mixed density) renal mass $\rightarrow$ w/u: CT or MRI of the Kidneys without and with IV contrast. |
| Liver           |                          |

ACR® Lung Cancer Screening  
CT Incidental Findings  
Quick Reference Guide
Incidental Lung Nodule Program

Wesley knows that finding lung cancer at an early stage can make all the difference for a patient's outlook. To help with early detection, any patient that visits one of our Wesley Healthcare emergency rooms and has a CT scan as part of their care will have their scan examined for lung nodules.

If a lung nodule is detected, you will be referred to our lung nurse navigator. Your primary care physician will receive a CT scan report with the recommended follow-up care. The recommendations are based on the 2017 Fleischner Society guidelines for incidental pulmonary nodules.

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

September 19, 2022
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?

#### Female

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Estimated New Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>287,850</td>
<td>31%</td>
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<tr>
<td>Lung &amp; bronchus</td>
<td>118,830</td>
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#### Female Estimated New Cases

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</table>
Why start at 40?

Figure 1. Age-specific Female Breast Cancer Incidence and Mortality Rates, US, 2008-2012

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***


<table>
<thead>
<tr>
<th></th>
<th>Life Expectancy</th>
<th>Age at death</th>
<th>YOL Lost</th>
<th>% YOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>80</td>
<td>47</td>
<td>33</td>
<td>33/98 = 34%</td>
</tr>
<tr>
<td>Patient 2</td>
<td>80</td>
<td>54</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Patient 3</td>
<td>80</td>
<td>60</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Patient 4</td>
<td>80</td>
<td>62</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>320</td>
<td>222</td>
<td>98 years YOL</td>
<td></td>
</tr>
</tbody>
</table>
Why start at 40?

Why start at 40?

Clinical Review & Education

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 Herzog, 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 Lorre-Tielvent, 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

Why start at 40?

Figure 1. Breast Cancer Burden by Age at Diagnosis for the Period 2007-2011
Why start at 40?

\[ \{ \sim 20\% \} \]
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?

Annals of Internal Medicine

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*

Clinical Review & Education

Special Communication

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

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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.”
Why all the controversy?

**Swedish Two-County Trial: Impact of Mammographic Screening on**

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

**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 Yuch-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

From the Centre for Cancer Prevention, Wolfson Institute of Preventive Medicine, Barts and the London School of Medicine and Dentistry, Queen Mary University of London, Charterhouse Square, London EC1M 6BQ, England (S.W.D., R.M.); Department of Mammography, Falun Central Hospital, Falun, Sweden (L.T.); School of Oral Hygiene, College of Oral Medicine, Taipei Medical University, Taipei City, Taiwan (A.M.F., S.L.S.C.); Department of Diagnostic Radiology, University of Turku, Turku, Finland (P.B.D.); Department of Cancer Control Sciences, American Cancer Society, Atlanta, Ga (R.A.S.); Regional Cancer Center, Umeå University, Umeå, Sweden (H.J.); Karolinska Institute, Karolinska University Hospital, Stockholm, Sweden (S.T.); Department of Health Care Management, College of Management, Chang Gung University, Taoyuan, Taiwan (S.Y.H.C.); Department of Internal Medicine, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan (S.Y.H.C.); Graduate Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University Hospital, Taipei City, Taiwan (S.Y.H.C., G.H.H.J., M.M.S.K., C.Y.H., T.H.H.C.); Regional Cancer Center, Uppsala University Hospital, Uppsala, Sweden (J.A.); Translational Oncology & Urology Research (TOUR), School of Cancer and Pharmaceutical Sciences, King’s College London, London, England (L.H.); and Department of Surgical Sciences, Uppsala University, Uppsala, Sweden (L.H.). Received October 9, 2020; revision requested November 17; revision received December 20; accepted January 12, 2021. Address correspondence to S.W.D. (e-mail: s.w.duffy@qmul.ac.uk).

Supported by the American Cancer Society through a gift from the Longaberger Company’s Horizon of Hope campaign (NHPDSCGBR-GBRLONG) and
Why start at 40?

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

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
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.

<table>
<thead>
<tr>
<th>Screening strategy</th>
<th>Breast cancer deaths averted per 1,000 women alive at age 40</th>
<th>Mortality reduction (%) with 15 years follow-up</th>
<th>LY saved per 1,000 women alive at age 40</th>
<th>Maximum screening examinations per woman</th>
<th>Screening examinations per death averted</th>
<th>Women screened per death averted</th>
<th>Women screened per LY gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual 40 to 69</td>
<td>9.1</td>
<td>50.2</td>
<td>201.1</td>
<td>30</td>
<td>2,984</td>
<td>99</td>
<td>4.5</td>
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<td>Annual 40 to 74</td>
<td>10.1</td>
<td>53.4</td>
<td>213.5</td>
<td>35</td>
<td>3,023</td>
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<td>Annual 50 to 69</td>
<td>7.4</td>
<td>45.5</td>
<td>188.0</td>
<td>20</td>
<td>2,360</td>
<td>118</td>
<td>5.9</td>
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<td>49.2</td>
<td>160.9</td>
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<td>2,484</td>
<td>99</td>
<td>5.2</td>
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<td>7.3</td>
<td>38.5</td>
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<td>2,165</td>
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<td>32.3</td>
<td>105.2</td>
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<td>1,696</td>
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<td>Biennial 50 to 74</td>
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<td>35.9</td>
<td>116.3</td>
<td>13</td>
<td>1,783</td>
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<td>Triennial 50 to 69</td>
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<td>24.6</td>
<td>80.0</td>
<td>7</td>
<td>1,557</td>
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<td>Triennial 50 to 74</td>
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<td>89.2</td>
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<td>1,589</td>
<td>177</td>
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<td>Annual 40 to 49,</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Biennial 50 to 69</td>
<td>7.0</td>
<td>38.7</td>
<td>158.2</td>
<td>20</td>
<td>2,651</td>
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<td>Annual 40 to 49,</td>
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<td>Biennial 50 to 74</td>
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<td>42.0</td>
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<td>2,593</td>
<td>118</td>
<td>5.5</td>
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<tr>
<td>Annual 40 to 49</td>
<td>2.0</td>
<td>18.6</td>
<td>58.0</td>
<td>10</td>
<td>5,152</td>
<td>526</td>
<td>17.2</td>
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</tbody>
</table>

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


\[39\%\]
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
  - 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).”
Screening for Prostate Cancer: U.S. Preventive Services Task Force Recommendation Statement

Anxiety

Anxiety

Adobe Reader

Reader has finished searching the document. No matches were found.

OK
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\textsuperscript{a}, Debra L. Monticciolo, MD\textsuperscript{b}, Barbara Monsees, MD\textsuperscript{c}, Geraldine McGinty, MD, MBA\textsuperscript{a}, Edward A. Sickles, MD\textsuperscript{d}
When to stop?

• 80?
• No right answer
• Less controversy
Breast Cancer Screening in Women at Higher-Than-Average Risk: Recommendations From the ACR

Debra L. Monticciolo, MD\textsuperscript{a}, Mary S. Newell, MD\textsuperscript{b}, Linda Moy, MD\textsuperscript{c}, Bethany Niell, MD, PhD\textsuperscript{d}, Barbara Monsees, MD\textsuperscript{e}, Edward A. Sickles, MD\textsuperscript{f}

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
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 radiologist
Questions