



# Screening Mammography Remains Effective among Older Women

Brittany L. Murphy MD MS<sup>1,2</sup>, Elizabeth B. Habermann PhD MPH<sup>2</sup>, Amy E. Glasgow MHA<sup>2</sup>, Amy Lynn Connors MD<sup>3</sup>, Judy C. Boughey MD<sup>1</sup>, Amy C. Degnim MD<sup>1</sup>, Lila J. Finney Rutten PhD MPH<sup>2</sup>

<sup>1</sup>Department of Surgery, <sup>2</sup>The Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery, and <sup>3</sup>Department of Radiology

Mayo Clinic, Rochester, MN

## Background

- Life expectancy continues to increase; it is expected that there will be over 28 million people between the ages of 75 and 85 by the year 2050
- The USPSTF recently concluded that there is currently insufficient evidence to support recommendation of **screening mammography among women aged 75 years or older**
- While false positive mammography results increase medical expense, unnecessary procedures, and patient anxiety, false negative results delay diagnosis; patients with clinically detected breast cancers experience poorer prognosis than those found at an earlier stage
- Given the lack of inclusion of patients over the age of 75 years in randomized controlled trials, we pursued a retrospective review of the performance of screening mammography among older women

## Aim

We sought to compare the **performance of screening mammography in younger women compared to older women** to help determine the **risk versus benefit profile** of screening mammography in this patient population

## Methods

### Population

- After IRB approval, all women  $\geq 50$  years of age who underwent a screening mammogram were identified

### Setting

- Patients seen at Mayo Clinic Rochester between 1/2007 to 1/2017

### Procedures

- Current Procedural Terminology (CPT) codes 70052, 77057 and G0202, and a UB code) and International Classification of Diseases (ICD)-9/10 codes

### Exclusions

- Prior DCIS or invasive cancer
- BRCA mutation
- 242,263 screening mammograms
- 63,480 patients

### Data Collection

- Data collected by electronic medical record review and review of pathology database
- All mammograms were originally read by a Mayo breast radiologist
  - BIRADS recorded
  - Density recorded

### Analysis

- Sensitivity, Specificity, Positive Predictive Value, and Negative Predictive Value** were evaluated and compared for age categories via univariate analysis

## Definitions

		Cancer Diagnosis within One Year	
		Positive	Negative
Mammography Result	Positive	Abnormal mammogram + biopsy showing diagnosis of high risk lesion or cancer within one year of mammogram (True Positive)	Abnormal mammogram + benign biopsy with no cancer within one year of mammogram (False Positive)
	Negative	Negative mammogram + cancer diagnosis within one year of mammogram (False Negative)	Negative mammogram + no cancer within one year of mammogram (True Negative)
Sensitivity: Of all patients diagnosed with cancer, the proportion who had an abnormal mammogram			
Specificity: Of all patients without cancer, the proportion with a negative mammogram			
Positive Predictive Value: Of all patients with abnormal mammogram, the proportion who had cancer			
Negative Predictive Value: Of all patients with a negative mammogram, the proportion without cancer			

	Overall	Age 50-69	Age 70-74	Age 75-79	Age 80+	P-value
<b>N</b>	242263	169231	33130	22240	17662	
<b>Biopsy Performed</b>	3365 (1.4%)	2426 (1.4%)	448 (1.4%)	285 (1.3%)	206 (1.2%)	
<b>Biopsy Result</b>						<0.0001
Benign (False Positive)	2196 (65.3%)	1660 (68.4%)	267 (59.6%)	158 (55.4%)	111 (54.9%)	
High Risk (True Positive)	358 (10.6%)	277 (11.4%)	37 (8.3%)	30 (10.5%)	14 (6.8%)	
Malignant (True Positive)	811 (24.1%)	489 (10.2%)	144 (32.1%)	97 (34.1%)	81 (39.3%)	
<b>No Biopsy Performed</b>						
True Negative	238204(98.3%)	166324(98.3%)	32601(98.4%)	21866(98.4%)	17393(99.0%)	0.09
False Negative	3025 (1.3%)	2292 (1.4%)	346 (1.0%)	231 (1.0%)	156 (0.9%)	<0.0001
<b>Sensitivity</b>	96.4%	96.8%	97.3%	95.1%	94.7%	0.54
<b>Specificity</b>	98.8%	98.6%	99.0%	99.0%	99.1%	<0.0001
<b>Positive Predictive Value</b>	24.8%	20.6%	34.0%	33.6%	40.7%	<0.0001
<b>Negative Predictive Value</b>	100%	100%	100%	100%	100%	0.06

## Results

- 63,480 patients underwent 242,263 screening mammograms
- 3,365 (1.4%) mammograms resulted in a biopsy
  - This number was slightly but significantly lower for older patients 1.3% in ages 75-79 and 1.2% in age 80+, compared to 1.4% in ages 50-69 and 70-74,  $p=0.0009$
  - The majority of biopsies were benign - **false positive mammogram result** (2,196 mammograms [65.3%])
    - False positive results were most frequent in the younger age categories**, ranging from 54.9%-68.4% across the age groups,  $p<0.0001$
  - Malignant lesions were more often found in the older age groups**: 20.2% 50-69, 32.1% 70-74, 34.0% 75-79, and 39.3% 80+ years,  $p<0.0001$

- Sensitivity remained stable** across all age groups (94.7-97.3% for all age groups,  $p=0.27$ )
- Specificity was slightly higher in older patients** (98.6-99.1% for all age groups,  $p<0.0001$ )
- Positive predictive value improved with increasing age** from 20.6% to 40.7% ( $p<0.0001$ )
- Negative predictive value was 100%** for all age groups

## Conclusions

- Among **women** aged 70+ who had mammographic screening and biopsy, a **higher proportion had malignant findings** compared to women aged 50-69, **while mammographic sensitivity and specificity remain consistent** across age groups
- While screening mammography remains effective in elderly patients, individual **life expectancy and patient preference should be considered** when assessing benefit and harm for individual patients, as **false positive results are common**