Harms and Costs of Not Screening

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RADIOLOGY

Overview

- Absence of screening does not mean absence of breast related problems
- There are harms of omission – that is of ***not*** screening
- Majority of clincal “errors” may relate to omission of care*

*N Engl J Med 1991;324:377-84, J Gen Intern Med 2005, 20: 686-691

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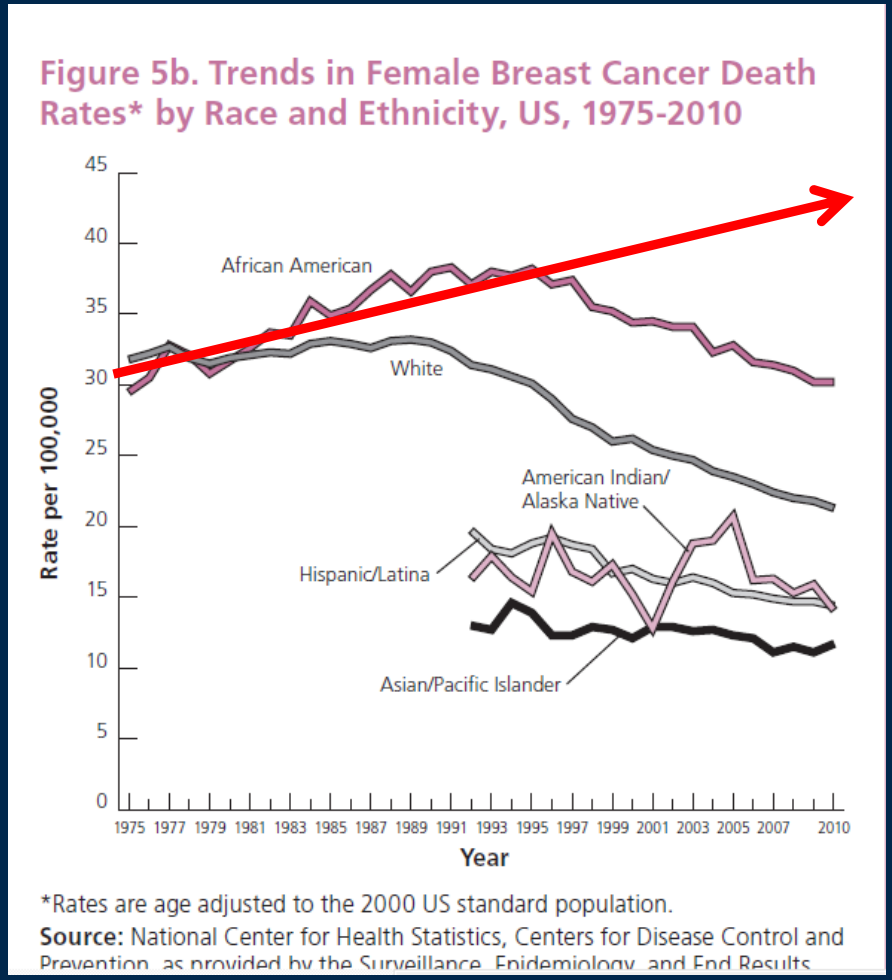
Mammographic Screening

- Screening mammography saves lives for women age 39-69 based upon meta analysis of 8 RCT
- 2015: 40-49 “USPSTF concluded the benefits outweigh the harms...small amount”
- Imperfect test, “harms” exist
- Qualitative rating of benefit and harms - a value judgment regarding a human life

USA Female Breast Ca Mortality Rate is now declining



-2 % / yr

1990-2011 = 35%

Screening and Treatment

Greater decline if Mortality trend used

ACS 2014, SEER 2015

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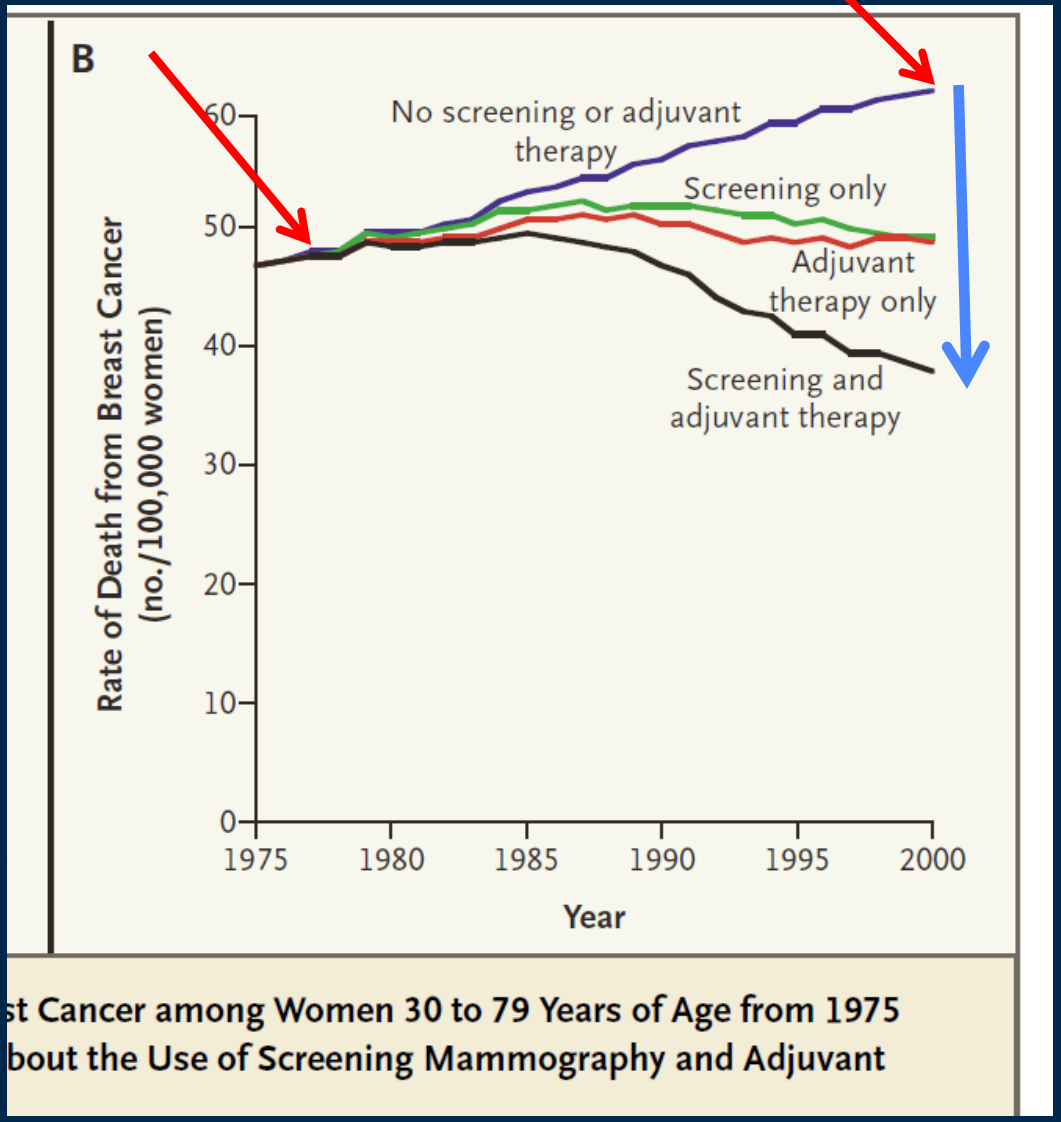
Mortality Trend estimates: NCI-CISNET Models



st Cancer among Women 30 to 79 Years of Age from 1975
bout the Use of Screening Mammography and Adjuvant

Mortality rate was predicted to have ***increased*** *1.2% per year* due to increasing incidence and demographic trends

Berry et al N Engl J Med 2005;353:1784-92.

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International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
N° 223

12 December 2013

Latest world cancer statistics
Global cancer burden rises to 14.1 million new cases in 2012:
Marked increase in breast cancers must be addressed

From 2008 to 2012, Breast Cancer Worldwide:

1. Incidence increased 20% (4% per year)
2. Mortality increased 14% (3% per year)

US data is divergent from overall world trends

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Harms of not Screening
Harms of omission

1. Under diagnosis/Death
2. Increased morbidity
3. FP – physical exam/bx
4. Costs: financial and human
5. Lack of identification and treatment of pre invasive breast cancer

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The language of screening
"harms" of commission often pejorative
"False positive, unnecessary biopsy, over diagnosis"

Recall, needle sampling, optimal level of diagnosis for lowest mortality

Visit internist for Health Maintenance

- Check cholesterol per USPSTF guidelines

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Series of Events: “harms”

- “Incomplete” HME: need further laboratory evaluation
- “Recall” to Cholesterol test
  (100% recall rate)
- Need to fast 12 hours
- Anxiety- Do I have CAD?

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At the lab….

Invasive blood biopsy (often “unnecessary”)
Without anesthesia

Anxiety: no immediate reading

Recall for results reporting

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Harms of not Screening Evidence: Lack of mortality reduction

- RCT (invitation NOT as treated)
- Service screening of populations
- Computer models (CISNET)

Breast specific mortality reduction (relative risk)

Lives saved/Life Years Gained (absolute)

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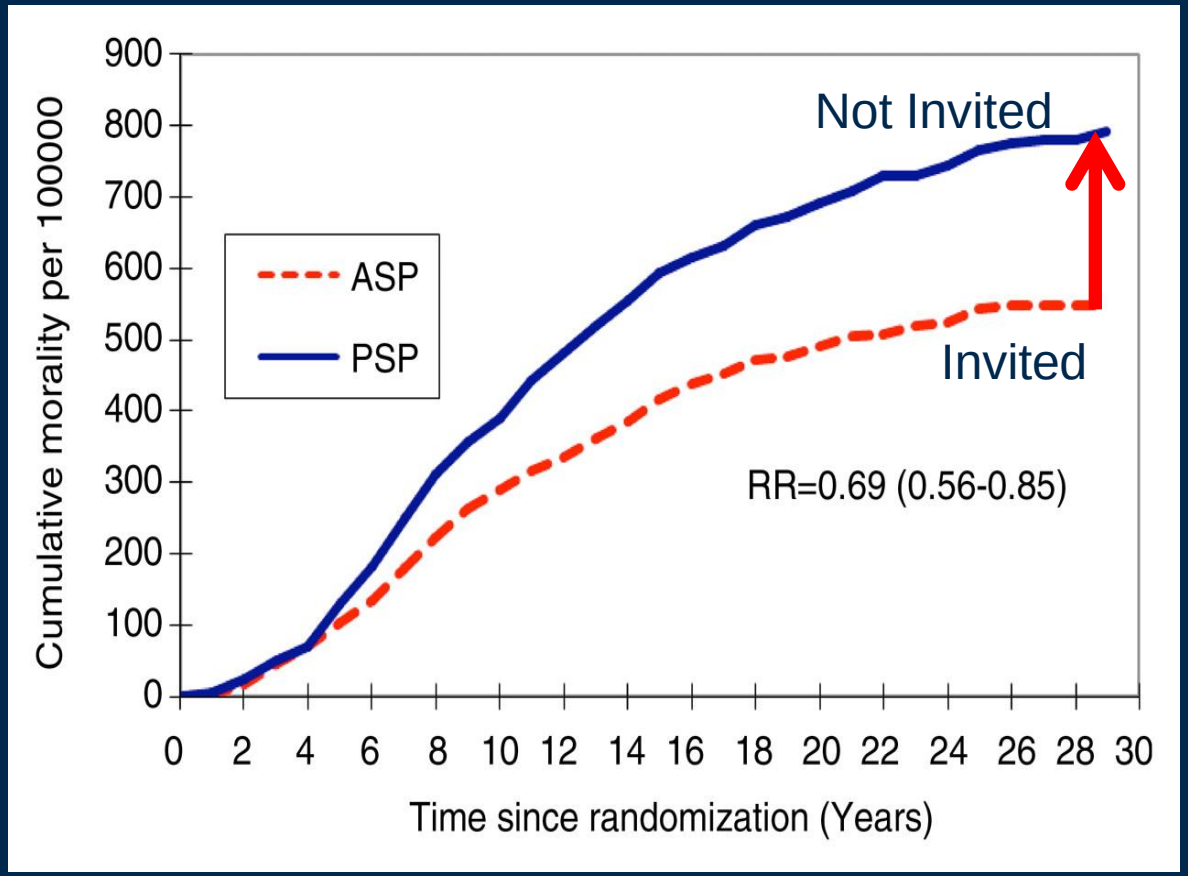
Swedish 2 County RCT 29 year update: Age 40-74
Cumulative mortality from breast cancer



Significant reduction of BC deaths in invited group means:

Excess BC deaths in non invited groups (harm)

Tabár L et al. Radiology 2011;260:658-663 Radiology

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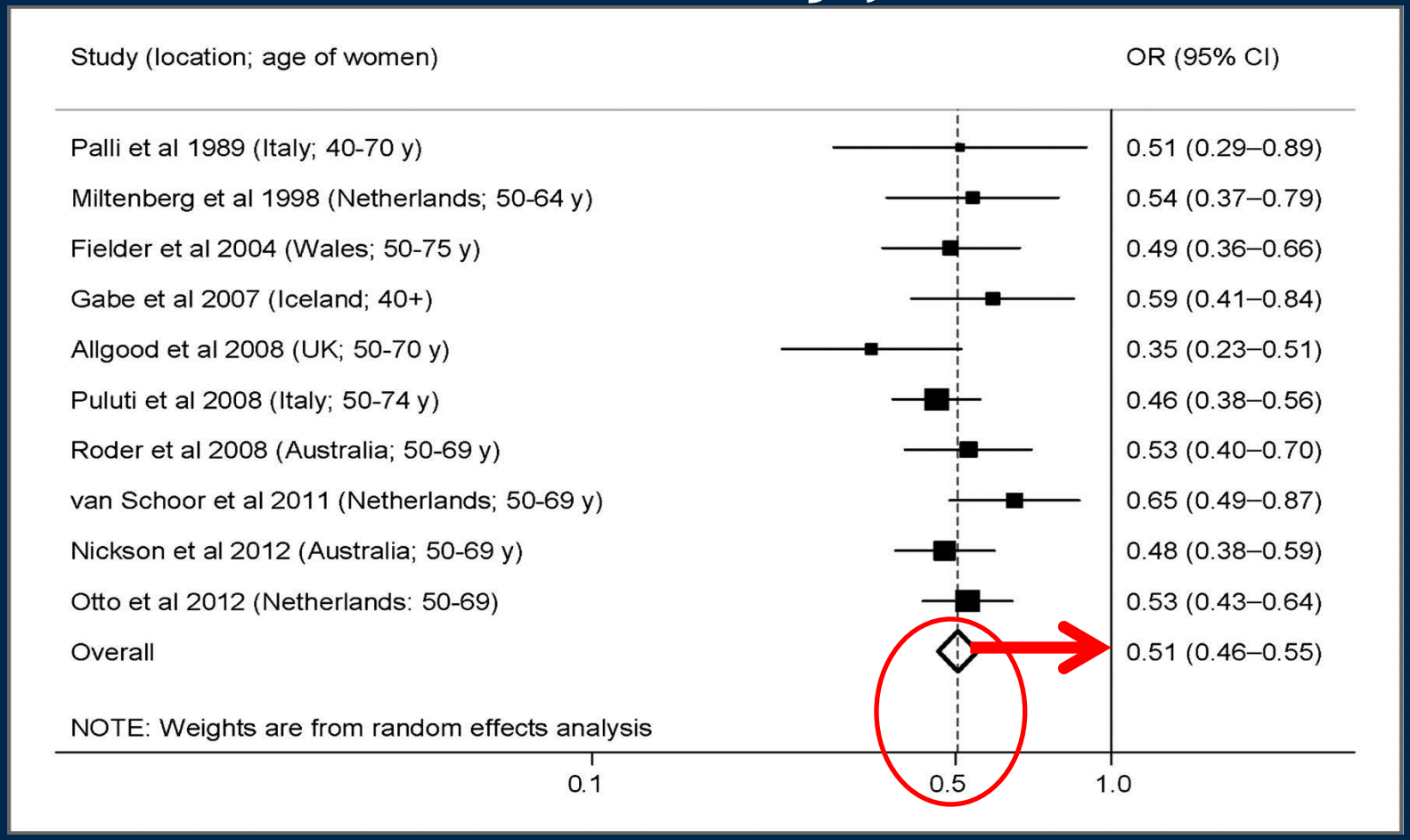
10 observational studies: Meta-analysis
49% Mortality Reduction
= *96% increase mortality from screen level*



Nickson C et al. Cancer Epidemiol Biomarkers Prev 2012;21:1479-1488

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Less frequent Screening means higher mortality
Biennial 50-74 vs Annual 40-84
(mean 6 CISNET models 2009)
2015: 10-20% better LYG /mortality reduction

	LYG/1000	Mortality Reduction (%)
B 50-74	110	23
A 40-84	189	40
Difference(%)	*79 (72%)*	*16.3 (71%)*

Hendrick and Helvie, AJR 2011
Derived from: Mandelblatt J S et al. Ann Intern Med 2009;151:738-747

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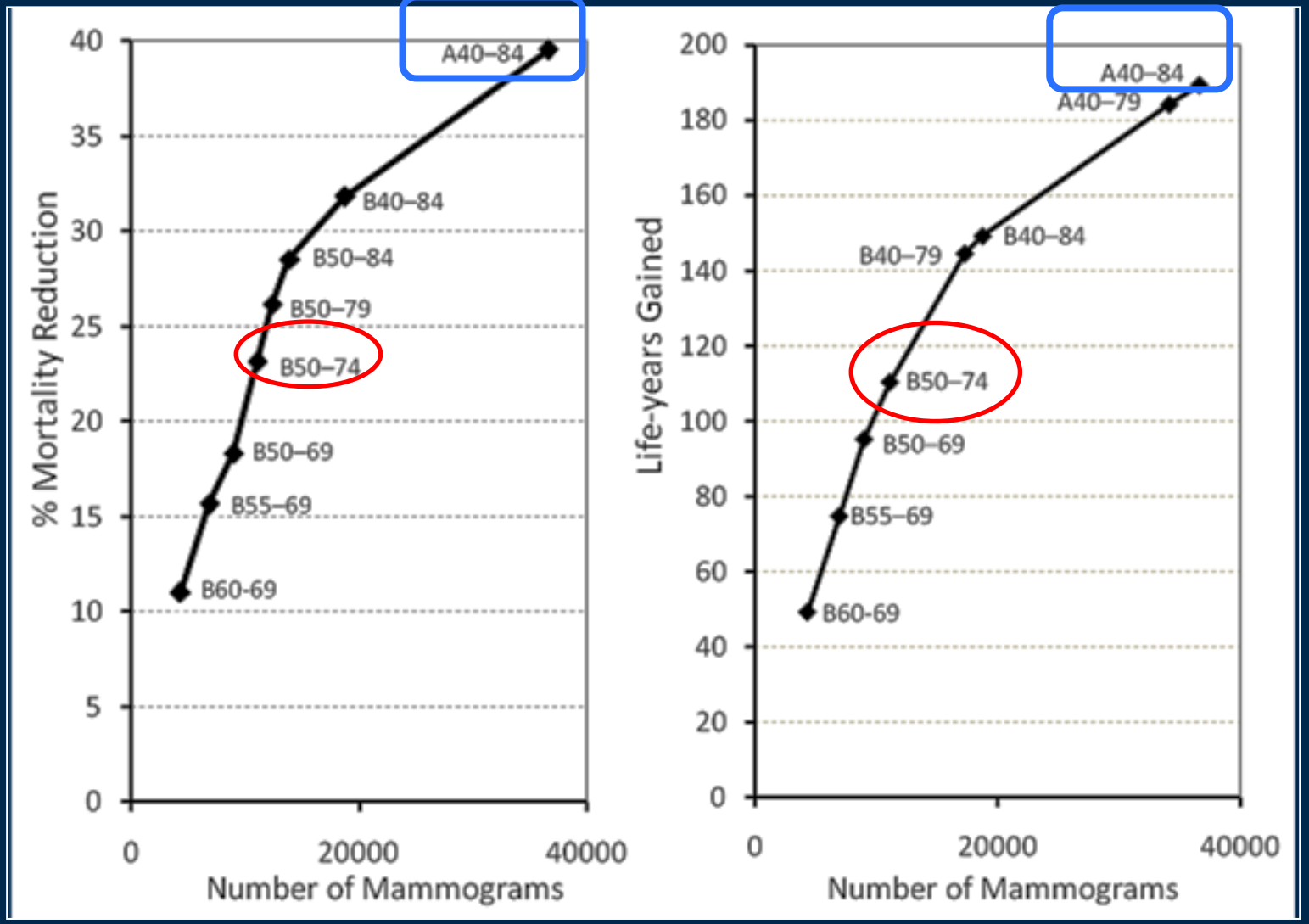
Mortality reduction and LYG vs number of mammograms (per 1,000 women screened)



Hendrick & Helvie, *AJR* 2012

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Mortality reduction by screen frequency(UK) More frequent screening means higher mortality reduction

Screen Method	Mortality Reduction	%Difference re: T50-70
50-70 triennial	16%	-
40-73 triennial	20%	25%
40-73 annual	37%	131%

Source: Gunsoy, British Journal of Cancer (2014) 110, 2412–2419

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Treatment Morbidity

- In general, more advanced stage requires more treatment
- "reduced risk for advanced cancer…"
  2015 USPSTF
- Chemotherapy, hormonal therapy and full axillary dissection carries associated harms of treatment

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Increased Morbidity
Screen vs Palpable Detection
Age 40-49

	Screened	Symptoms
Mastectomy	25%	47%
Chemotherapy	45%	81%

Malmgren J A et al. Radiology 2012;262:797-806

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Morbidity: Age 40-79, British Columbia

Int. J. Cancer: **120,** 2185–2190 (2007)

A retrospective study of the effect of participation in screening mammography on the use of chemotherapy and breast conserving surgery

Andrew J. Coldman[1]*, Norm Phillips[2] and Caroline Speers[3]

46% less Chemotherapy among screened
47% higher use of BCT among screened

TABLE V – REGULAR SMPBC PARTICIPANTS VERSUS NONSMPBC PARTICIPANTS OBSERVED AND MODEL-PREDICTED ODDS RATIOS OF USE OF BREAST CONSERVING SURGERY AND CHEMOTHERAPY WITH CONFIDENCE INTERVALS

	Observed odds ratio (95% CI)	Age-adjusted odds ratio (95% CI)	Predicted odds ratio
Chemotherapy			
Nonparticipants	1.0	1.0	1.0
Participants	0.54 (0.42, 0.68)	0.53 (0.41, 0.69)	0.54
BCS			
Nonparticipants	1.0	1.0	1.0
Participants	2.2 (1.76, 2.78)	2.3 (1.79, 2.86)	1.47

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Breast Symptoms: False Positives : 10 yrs

- 1983-93, 2400 women Harvard HMO
- 23% symptoms

  32% for age 40s
- 6.5 % had invasive procedures
- 4 % PPV per episode (96% False positive)
- Fewer (.59) symptom evaluation if mammo screened

Barton et al Ann Intern Med. 1999;130:651-657.

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False Positive biopsies per 10 year period Annual Screening (age 40-79)

FP Biopsy 4.3-6.7%

149 – 233 years of screening per biopsy

vs 6.5% palpable- baseline is not zero

Hendrick and Helvie, AJR 2011
Derived from: Nelson, et al.
Annals of Internal Med. 2009:151

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Cost of (Not) Screening

- Very complex financial analysis
- Cost of screening should not be isolated from down stream cost of not screening
- Cost of treating more advanced and metastatic disease
- Loss of economic productivity cost due to disability and death

- Human cost

Helvie MA. Ann Intern Med. 2014 Aug 19;161(4):304-5

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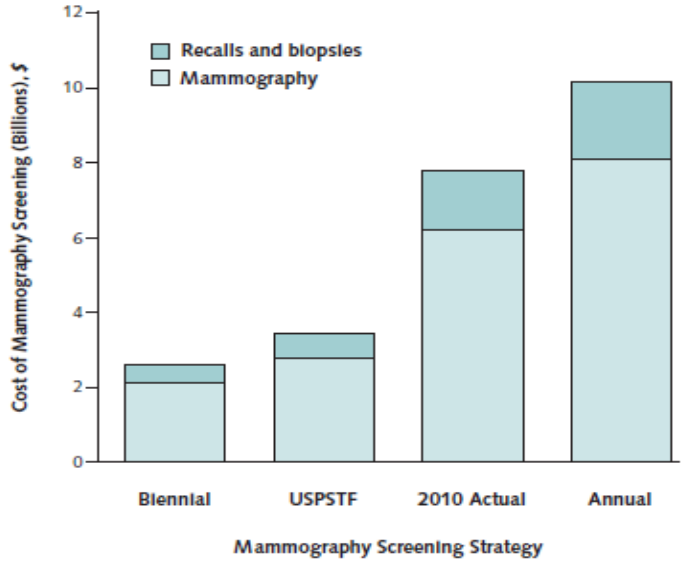
Aggregate Cost of Mammography Screening in the United States: Comparison of Current Practice and Advocated Guidelines

Cristina O'Donoghue, MD, MPH; Martin Eklund, PhD; Elissa M. Ozanne, PhD; and Laura J. Esserman, MD, MBA

Figure 1. **Comparison of the costs of screening strategies per year.**



Each bar represents the total cost of mammography screening per year, demarcating the costs from screening mammography and the subsequent recalls and biopsies. USPSTF = U.S. Preventive Services Task Force.

"The billions saved from avoiding less-effective mammography screening could alternatively be used to improve women's health…"

Primary Funding Source: University of California and the Safeway Foundation.

Ann Intern Med. 2014;160:145-153.

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Cost to treat metastatic Breast Cancer

Breast Cancer Res Treat (2012) 134:815–822
DOI 10.1007/s10549-012-2097-2

EPIDEMIOLOGY

The economic burden of metastatic breast cancer: a U.S. managed care perspective

Alberto J. Montero · Sara Eapen · Brian Gorin · Paulette Adler

non-Medicare patient population. Assuming average PPPM costs of $9,788 and an average life expectancy of 2.2 years, the total average expenditure to treat mBC would be ~$250,000 per patient.

$ 4.5 billion if 18,000 deaths averted

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Productivity Costs of Cancer Mortality in the United States: 2000–2020

Cathy J. Bradley, K. Robin Yabroff, Bassam Dahman, Eric J. Feuer, Angela Mariotto, Martin L. Brown

Employment and caregiver cost by Age at Death

Age 40-44	$1.6 million
Age 50-54	$1.1 million
Age 60-64	$0.6 million
Age 70-74	$0.2 million

Productivity Costs are shifted to patients and families and not covered by medical insurers

J Natl Cancer Inst 2008;100:1763–1770

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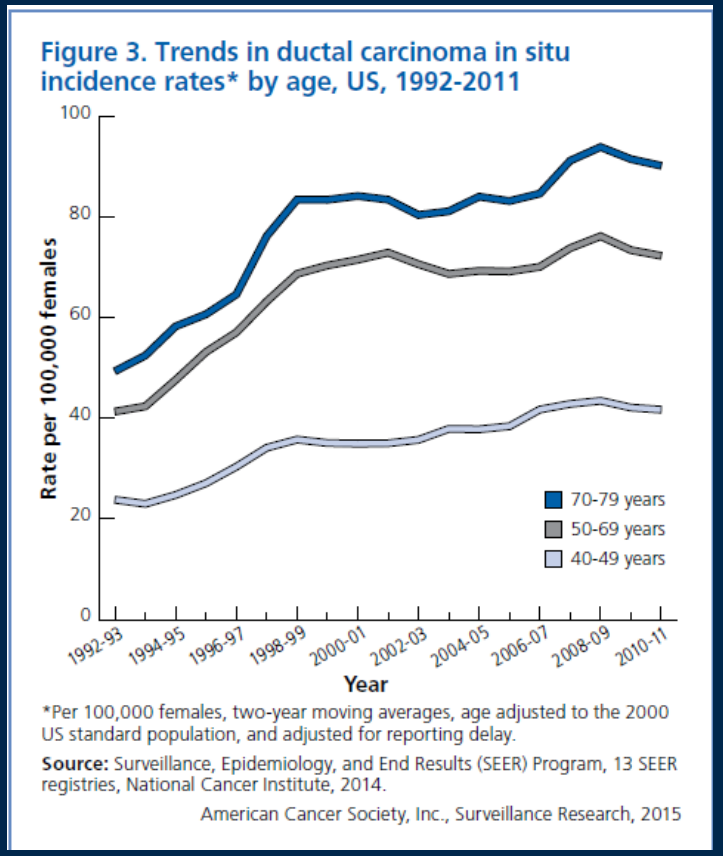
Lack of pre-Invasive Cancer Detection: DCIS, ADH, LCIS

- Allows risk based screening and prevention options
- DCIS progressive in 20-96% of cases
- Decrease (prevent) invasive cancer



Yen et al Eur J Cancer. 2003 Aug;39(12):1746-54.

ACS 2015

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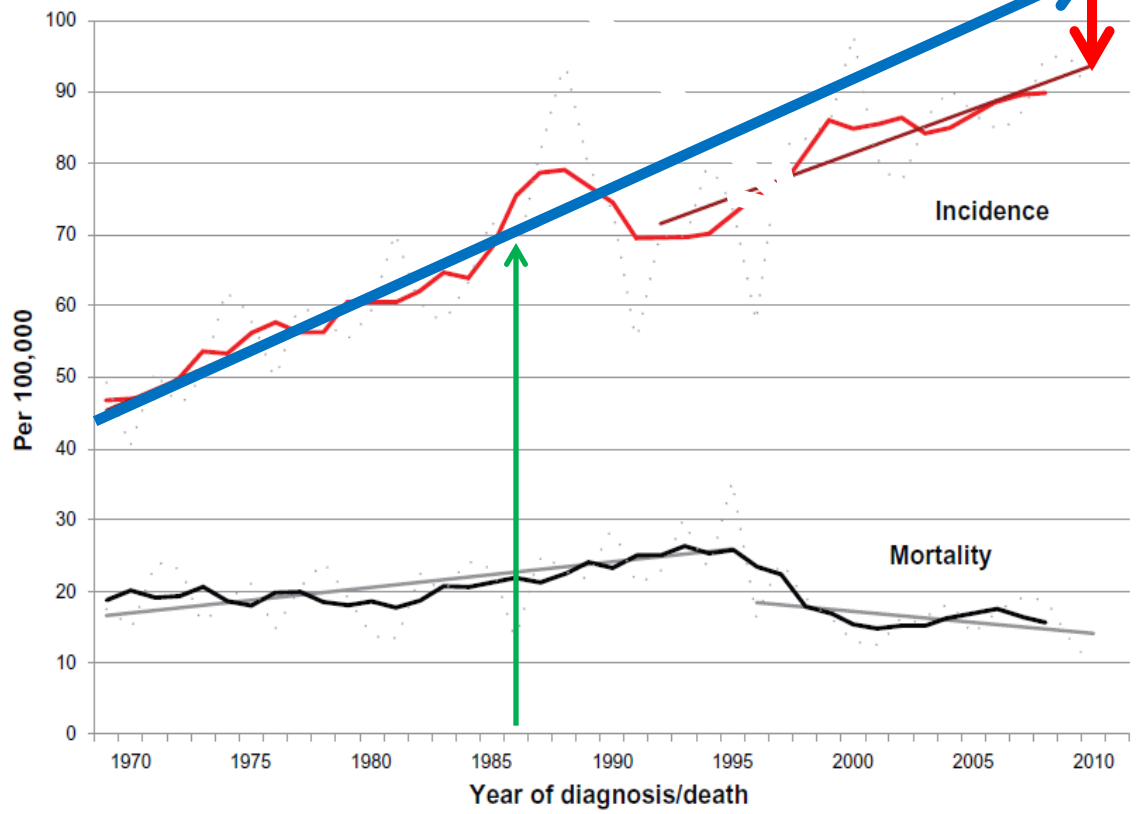
Iceland screening 40-70 : Begins 1987
Incidence of invasive cancer



ure 1 Invasive breast cancer in Iceland.
tes: All ages 1969–2010, age-world-standardized incidence, and mortality rates per 100,000 per year, with 5-year moving average rates. Linear regression lines idence in 1969–1987 and 1992–2010 and for mortality in 1969–1995 and from that point to 2010.

11% Reduction of invasive cancer

Sigurdsson and Ólafsdóttir , Breast Cancer: Targets and Therapy 2013

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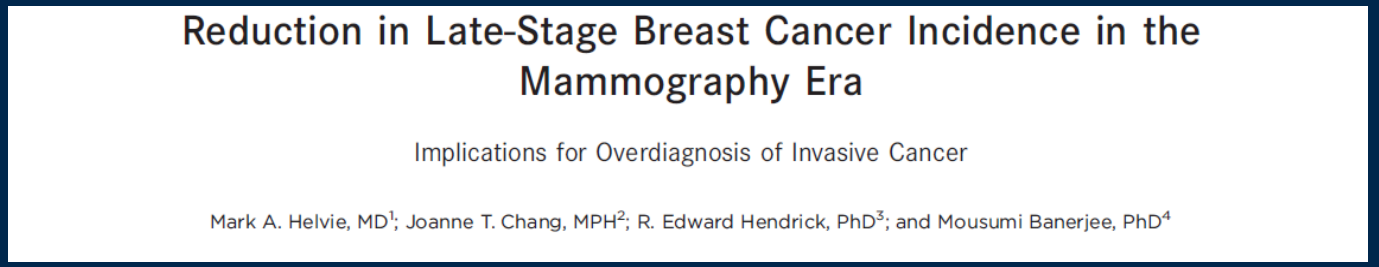
Reduction in Late-Stage Breast Cancer Incidence in the Mammography Era

Implications for Overdiagnosis of Invasive Cancer

Mark A. Helvie, MD[1]; Joanne T. Chang, MPH[2]; R. Edward Hendrick, PhD[3]; and Mousumi Banerjee, PhD[4]

Observed vs projected incidence (adjusted @1.3% /yr) 1977-2009

	rate/100,000	% change re projected	
DCIS	58	537%	early
Localized	181	19%	48%
Regional	77	-39%	late
Distant	18	-26%	-37%
Total Invasive cancer	276	-9%	
Total breast cancer		7%	

Helvie et al Cancer. 2014 Sep1;120(17):2649-56.

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Sweden age 40-49 Overdiagnosis

1% in situ plus invasive (CI .94-1.08)

Overdiagnosis in the population-based service screening programme with mammography for women aged 40 to 49 years in Sweden

Barbro Numan Hellquist, Stephen W Duffy, Lennarth Nyström and Håkan Jonsson

J Med Screen 2012;**19**:14–19
DOI: 10.1258/jms.2012.011104

Results The prescreening incidence rate ratio was estimated at 0.92 (95% confidence interval [CI]: 0.88–0.97). The number of breast cancer cases and person-years were 6047 and 3.8 million, and 7790 and 5.2 million, in the study group and control group respectively during the study period. The RR estimate for all cancers was 1.01 (95% CI: 0.94–1.08) when adjusted for prescreening difference and a lead time of 1.2 years. The corresponding estimate for invasive breast cancers was 0.95 (95% CI: 0.88–1.02).

Conclusions We found no significant overdiagnosis for women aged 40–49 in the Swedish service screening programme with mammography.

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Harms of Not Screening

- The harms of omission include death, excess morbidity, costs, lack of high risk identification, and possibly excess incidence of invasive cancer

- The harms of omission (not screening) should be considered as well as harms of commission when discussing screening options