Breast Cancer Incidence in 2,305,427 Screened Asymptomatic Women:
Long Term Outcomes During Menopause

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PURPOSE

To provide scientifically based data to help gynecologists and their asymptomatic patients make informed risk/benefit judgments on mammograms during the peri/postmenopause.

Linear regression was used to estimate: What percentage of asymptomatic peri/postmenopausal women will be diagnosed with a first invasive breast cancer over their next 25 years? What percentage of these women will remain cancer-free?

METHOD

We systematically searched for all published breast cancer screening studies that met 5 criteria at enrollment.

- Breast cancer-free history
- Each woman counted only once
- Number of women specified
- Number diagnosed shown
- Length of follow-up stated

Linear regression was used to predict incidence of first invasive breast cancer based on follow-up duration in the 19 studies that met these criteria

THE DATA

- All 2,305,427 women so identified were peri/postmenopausal. [Fig 2]
- Undue Influence biases were ruled out [e.g. Fig 3]
- 1,686,123 women ≥ 50 years old [Fig 4]
- 1,711,178 women ≥ 50 or < 50 and surgically menopausal [Fig 5]
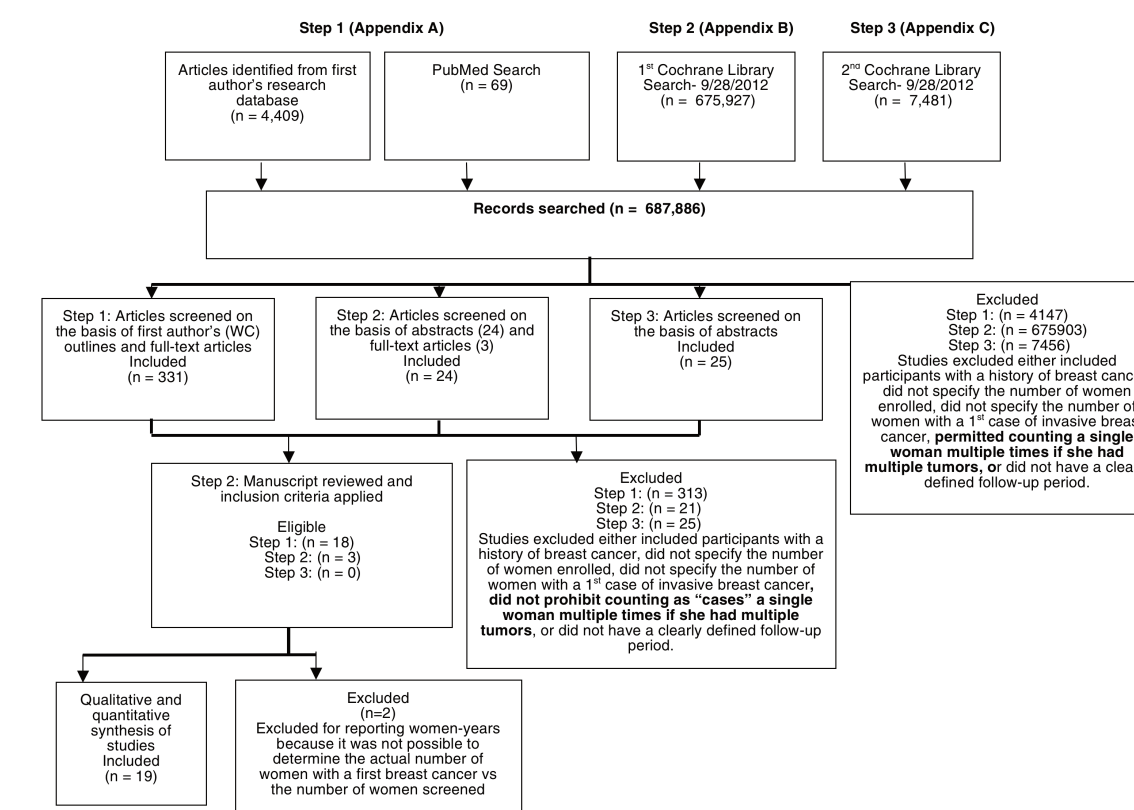
RESULTS

Figure 1: Flow Chart of Search Process

Table 1: Percent screened Peri/Postmenopausal Women Diagnosed with 1st Incident Invasive Breast Cancer in 19 published Studies

Table 1 #	Trial	Number of Women	Baseline Age	Years Studied	Number with Breast Cancer	Incidence [Percent]
1	UK Million Women Study [18]	1,084,110	50-64	2.6	9364	0.86%
2	Danish Nurses Health [19]	10,874	>44	6	244	2.24%
3	Melbourne Postmenopausal [20]	13,444	40-69	10	336	2.50%
4	Finnish Registry ERT [21]	110,980	>50	8	2171	1.96%
5	Finnish Registry E&P [22]	221,551	>50	11	6211	2.80%
6	French Cohort [23]	3175	>50	13	105	3.31%
7	Prempro 8506				166	1.95%
	Placebo 8102	16,608	50-79	5.2	124	1.53%
	WHI I [25]					
	Premarin 5310				104	1.96%
8	Placebo 5429	10,739	50-79	7.1	133	2.45%
9	Sweden: The Gothenburg Breast Screening Trial [26]	51,611	39-59	14	1509	2.92%
10	UK Trial of Early Detection of Breast Cancer [10]	39,773	45-64	7	459	1.15%
11	Australia Record Review of Postmenopausal Women [27]	508	35-84	5.8	7	1.38%
12	Osteoporosis Fracture Study [28]	9704	>65	3.2	117	1.21%
13	Italy ORDET [29]	4040	40-69	3.5	25	0.62%
14	NYU Postmenopausal [30]	7063	35-65	5.5	121	1.71%
15	US Breast Cancer Demonstration Detection Program [31]	283,222	40-93	3.5	4275	1.51%
16	Sweden-Malmo [32]	42,283	45-69	25	2316	3.47%
17	Norwegian Cohorts [33]	229,256	50-64	6	3997	1.74%
18	Swedish Two-Country Trial: Active Screened Group [34]	77,052	40-74	7	1398	1.81%
19	Canadian National Breast Screening Study [35]	89,434	40-59	7	1332	1.49%
	Total Numbers	**2,305,427**			**34,514**	
	Calculated Mean Incidence			34,514 women w. Breast Cancer /2,305,427 screened		1 - 50%

Plotted points are located at the intersection duration and total incidence of breast cancer for each study.
[Scatterplot and regression with 95% CI]
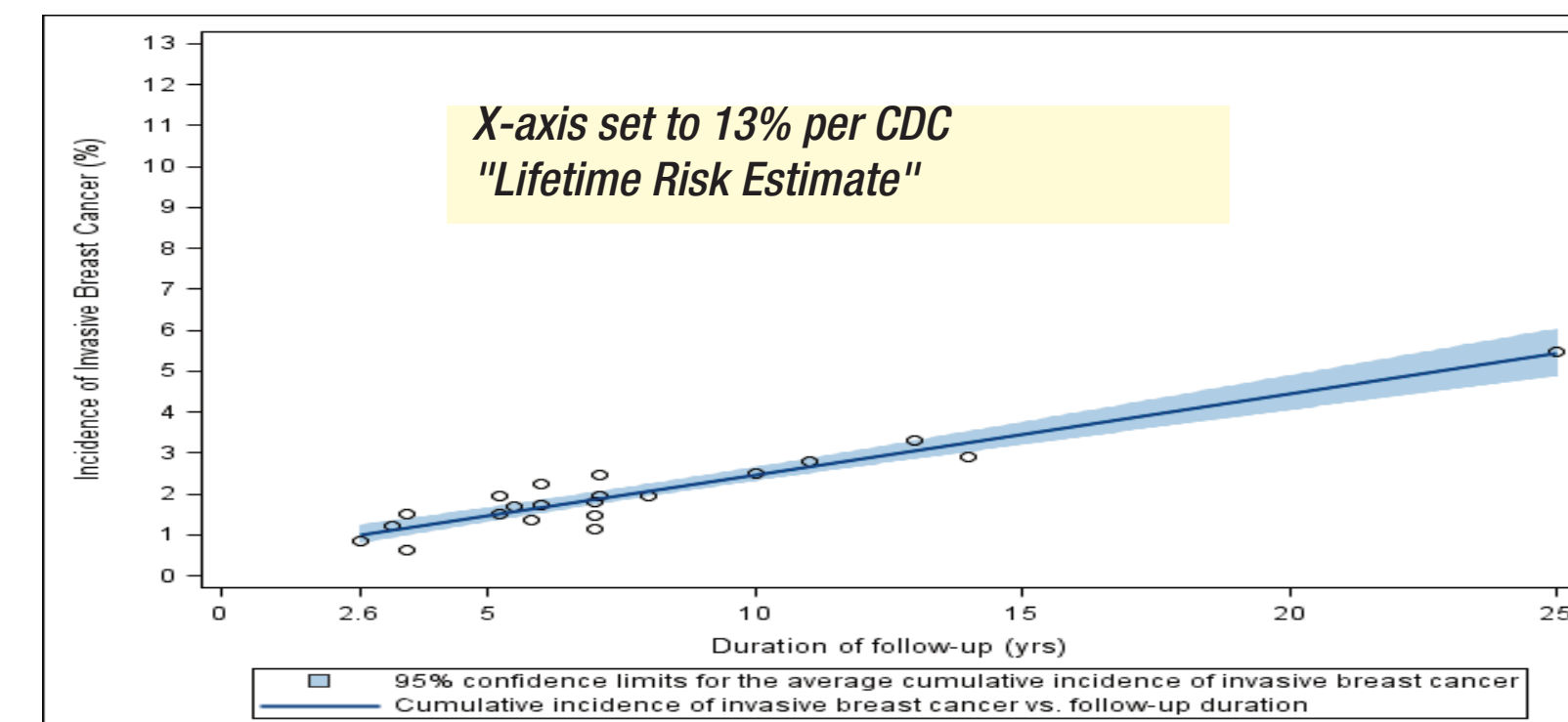
Figure 2: All 19 studies 2,305,427 women

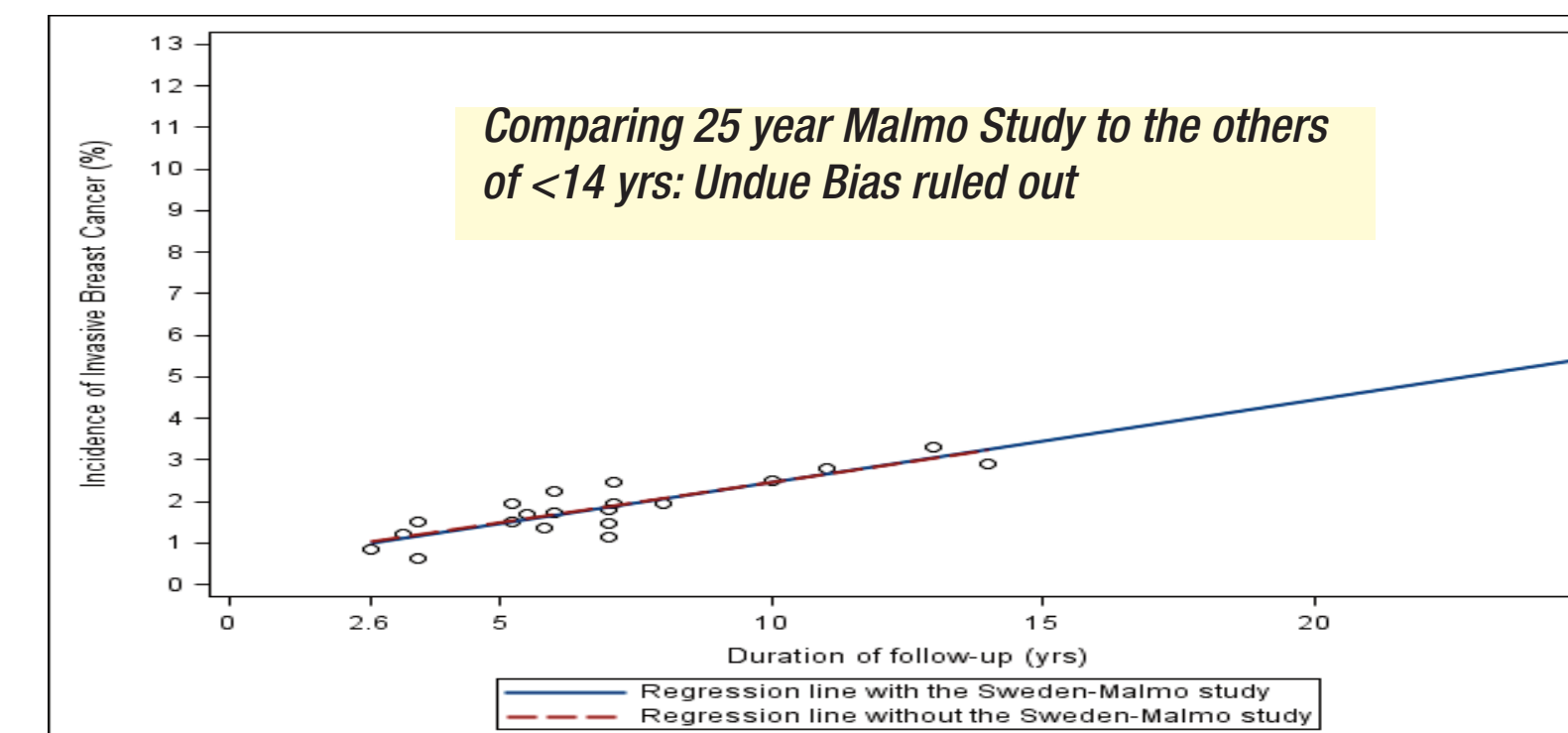X-axis set to 13% per CDC "Lifetime Risk Estimate"

95% confidence limits for the average cumulative incidence of invasive breast cancer
Cumulative incidence of invasive breast cancer vs. follow-up duration

Figure 3: Sensitivity Analysis

Comparing 25 year Malmo Study to the others of <14 yrs: Undue Bias ruled out

Regression line with the Sweden-Malmo study
Regression line without the Sweden-Malmo study

Figure 4: 1,686,123 women ≥ 50 years

~ 0.22% per year increase in breast cancer

95% confidence limits for the average cumulative incidence of invasive breast cancer
Cumulative incidence of invasive breast cancer vs. follow-up duration in women 50 and over
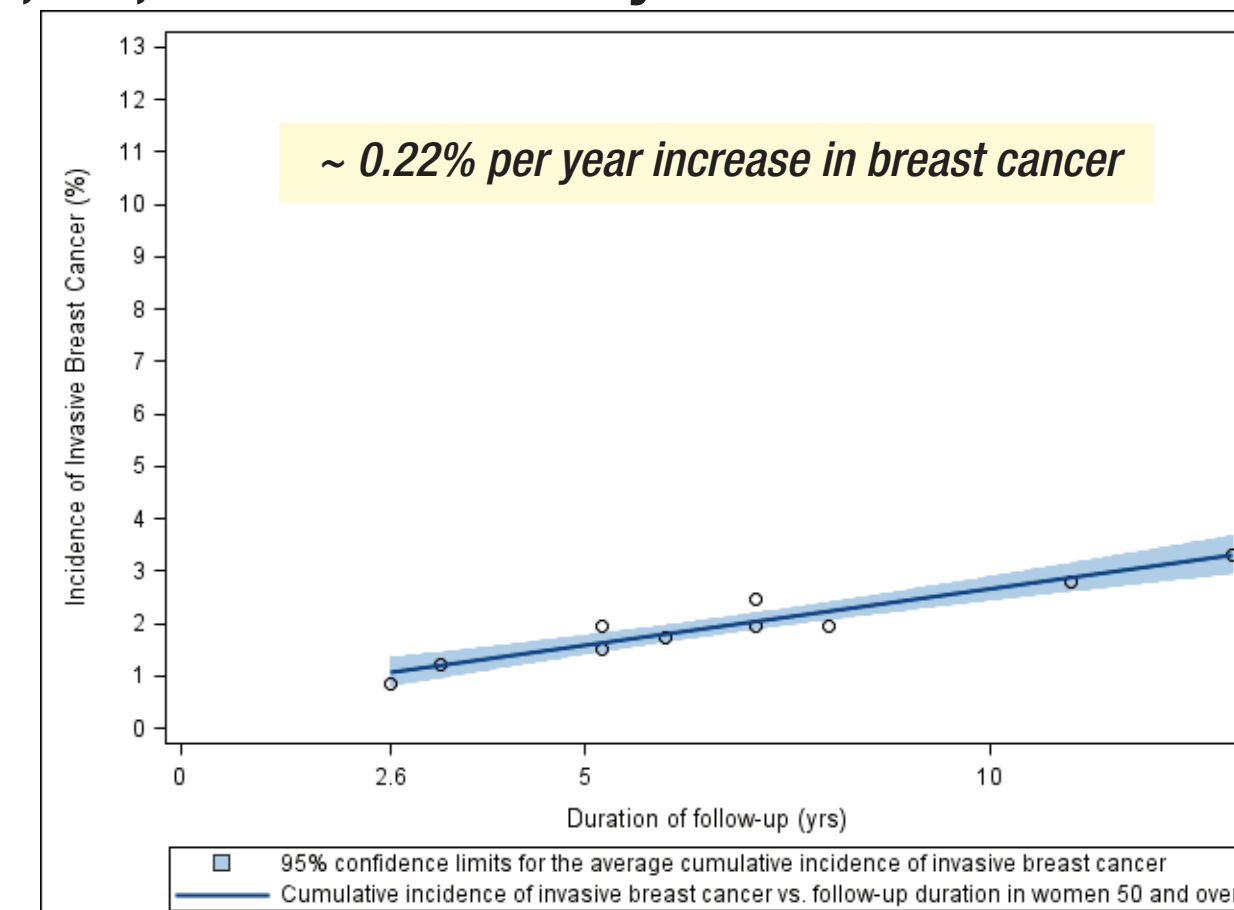
Figure 5: 1,711,178 women > 50 years or surgically menopausal

~ 0.23% per year

95% confidence limits for the average cumulative incidence of invasive breast cancer
Cumulative incidence of invasive breast cancer vs. follow-up in postmenopausal women
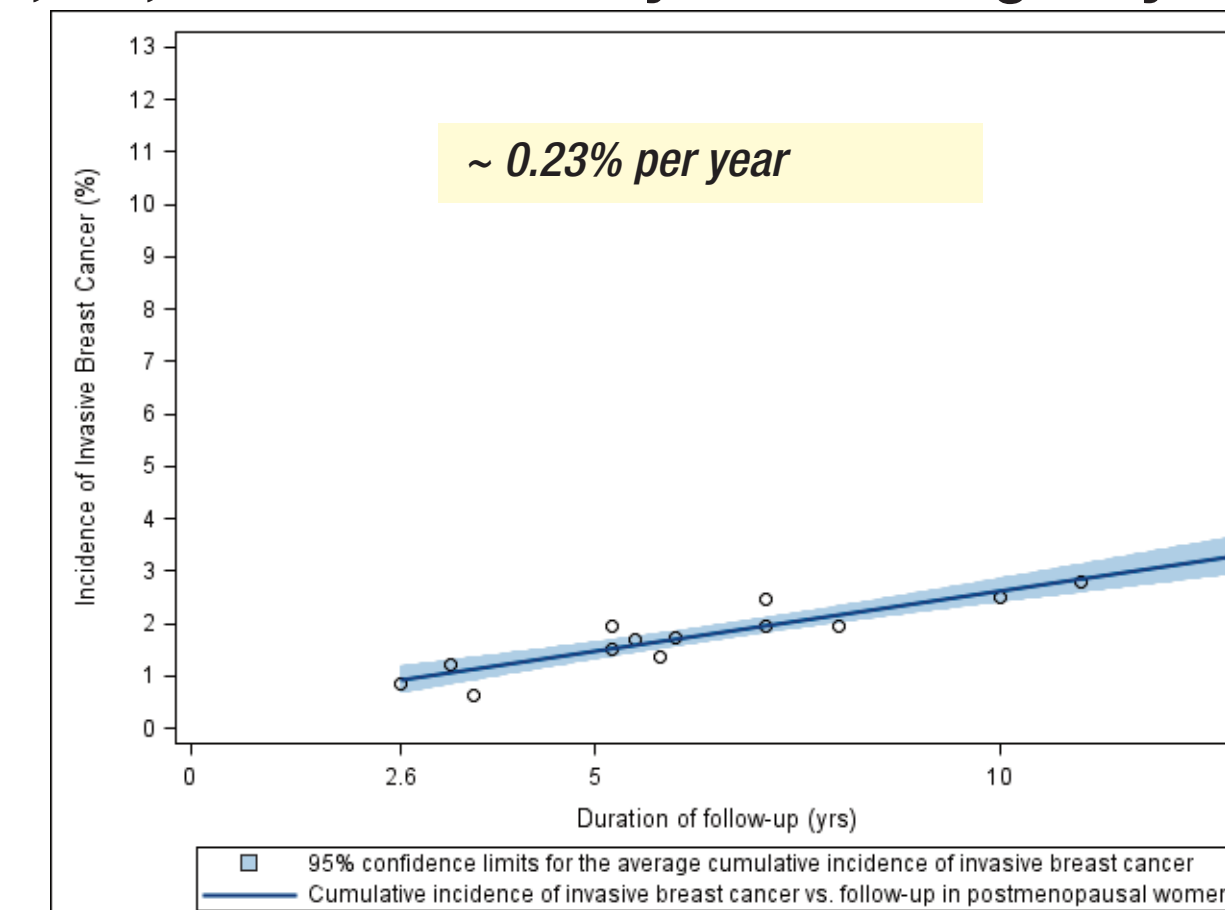
CONCLUSIONS AND CLINICAL IMPLICATIONS FOR ASYMPTOMATIC WOMEN

- **For peri/postmenopausal** women, the vast majority (99.75%) will not be diagnosed with invasive breast cancer each year and ~ 95% will not be diagnosed with an invasive breast cancer during 25 years of follow-up.

- **Among women ≥ 50 years old** at enrollment, cumulative incidence rate of a first case of invasive breast cancer increased by ~ 0.22% per year (95% CI: 0.16%, 0.27%; $p < 0.001$; $R^2 = 0.91$).

  97.34% remained disease free after 10 years of routine follow-up

- **Among women ≥ 50 or < 50 and surgically menopausal,** cumulative incidence rate increased by ~0.23% per year year (95% CI: 0.18%, 0.28%, $p < 0.0001$, $R^2 = 0.88$)

- **Women who do not have screening mammograms will have even higher cancer-free rates** because innocuous positives (comprising 30-50% of mammography diagnoses) will remain undetected.

- **Shallow Slope:** The merely gradual annual increase in cumulative incidence in initially asymptomatic women argues for limiting mammograms to diagnostic purposes and for high-risk women.

- **Full disclosure of the potential benefits and harms of mammograms should be made to asymptomatic women.**