Quality of Breast Cancer Screening and Diagnosis in Alberta, Canada

Yan Yuan, PhD

Assistant Professor

School of Public Health

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Outline

- History and practice of breast cancer screening in Canada

- Validating administrative health data for research use in Alberta

- Discrepancy in breast cancer screening performance between two systems in Alberta

CANADA – Political

— International boundary
------- Provincial/territorial boundary
Alberta Province/territory
☆ **Ottawa** National capital
✧ Regina Provincial/territorial capital

Scale
0   250   500   750   1 000 km

Breast Cancer Screening in Alberta

Alberta Breast Cancer Screening Program (ABCSP)

Started 2008

Screen Test

- Two clinics: Edmonton, Calgary.
- Mobile units visit rural/remote communities
- Interpreted by sessional radiologists in Edmonton

Fee-for-service Radiologists in Community Practices

Spread through province

Quality of care in breast cancer screening and diagnosis

- Want to use the already collected health administrative data such as physician claims data

- Potential/perceived issues with administrative health data
  - Lack of details (No results; diagnosis not needed for receiving payment; No recommendations for follow-up; etc.)
  - Data quality

1. A Validation Study – Using Administrative Data to Determine First Test, Estimate Percent of Screen-detected Breast Cancer and Time to Diagnosis

Objectives

To develop and validate an algorithm for the administrative health data to identify the **first test** in breast cancer patients through assessing the estimates of the percent of screen/symptom-detected breast cancers.

Data Sources

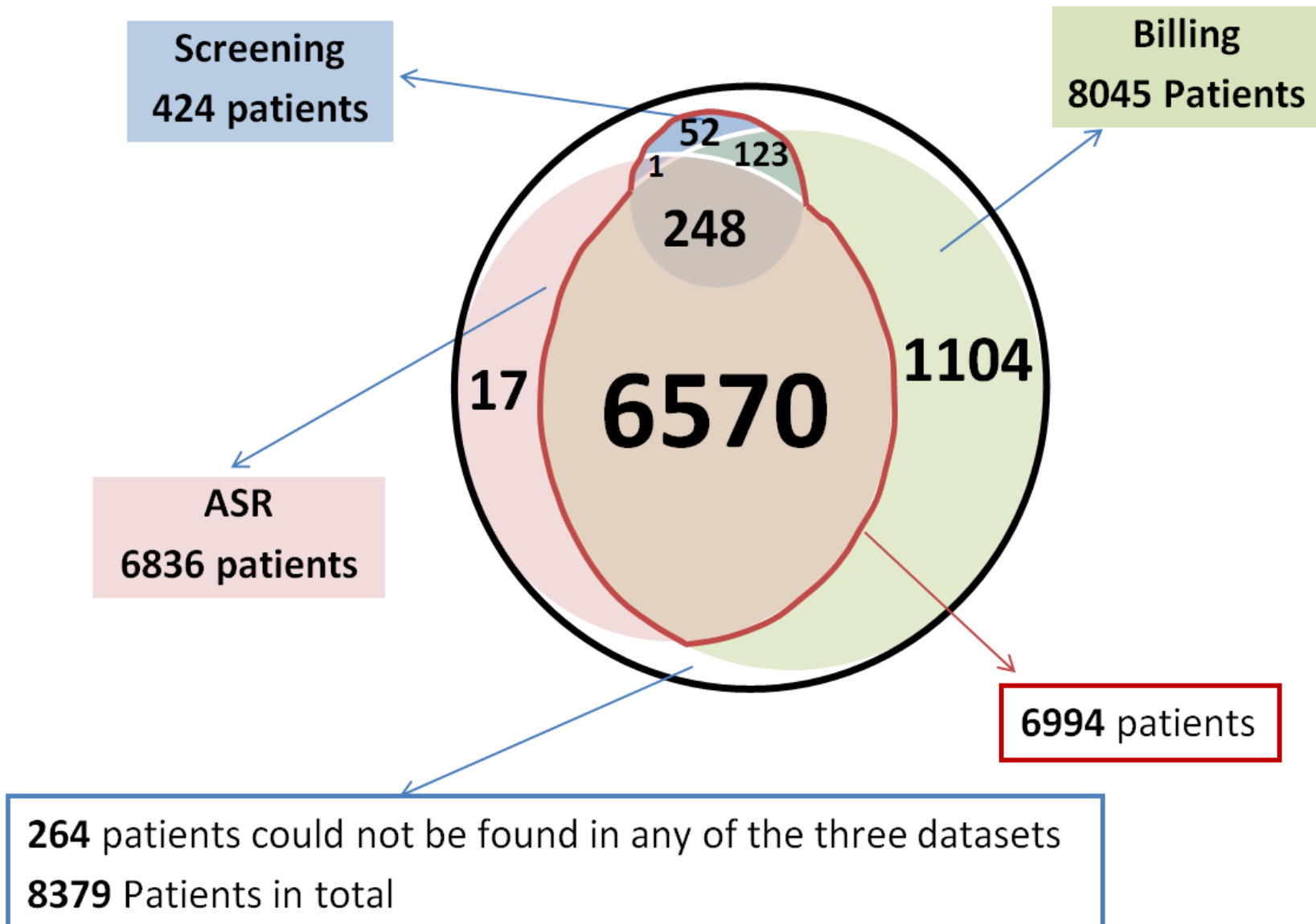| Alberta Cancer Registry (Identify cohort)	Alberta Society of Radiologists (Fee-for-service radiologists)	Screen Test (Salaried radiologists)	Physician Claims (Fee-for-service radiologists bill the province)
•Patient ID •Demographics •Tumor details •Date of breast cancer diagnosis •Method of diagnosis •Diagnosed **2007 to 2010**	• Patient ID • Dates/<u>results</u> of <u>screening</u> and <u>diagnostic</u> mammograms •Dates/<u>results</u> of breast ultrasound and biopsy **ASR 2006-2010**	• Patient ID • Dates/<u>results</u> of <u>screening</u> and <u>diagnostic</u> mammograms Dates/<u>results</u> of breast ultrasound and biopsy **Screening 2006-2010**	• Patient ID • Dates of screening and diagnostic mammograms •Dates of ultrasounds and biopsy **Billing 2006-2010**
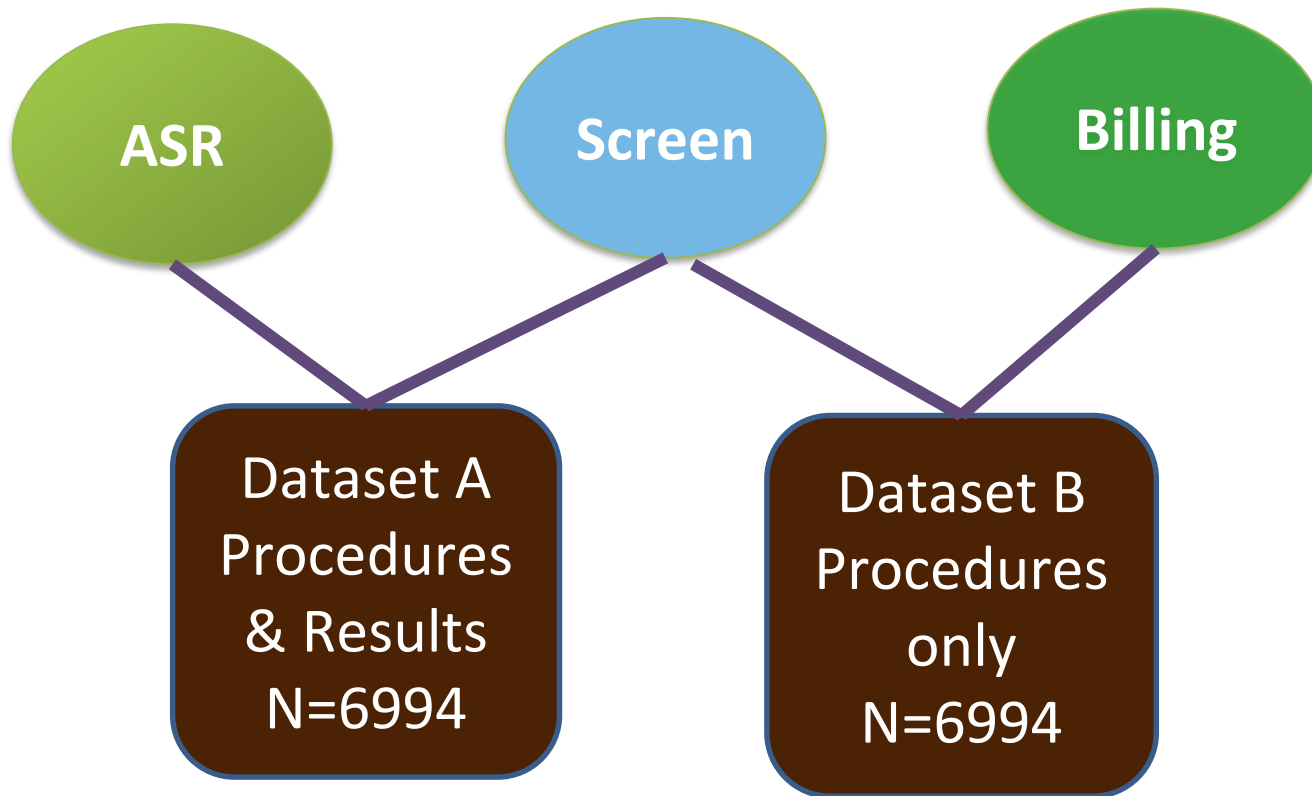
Inclusion Criteria

- Women diagnosed with histological confirmed, first-ever primary breast cancer in Alberta between 2007 and 2010
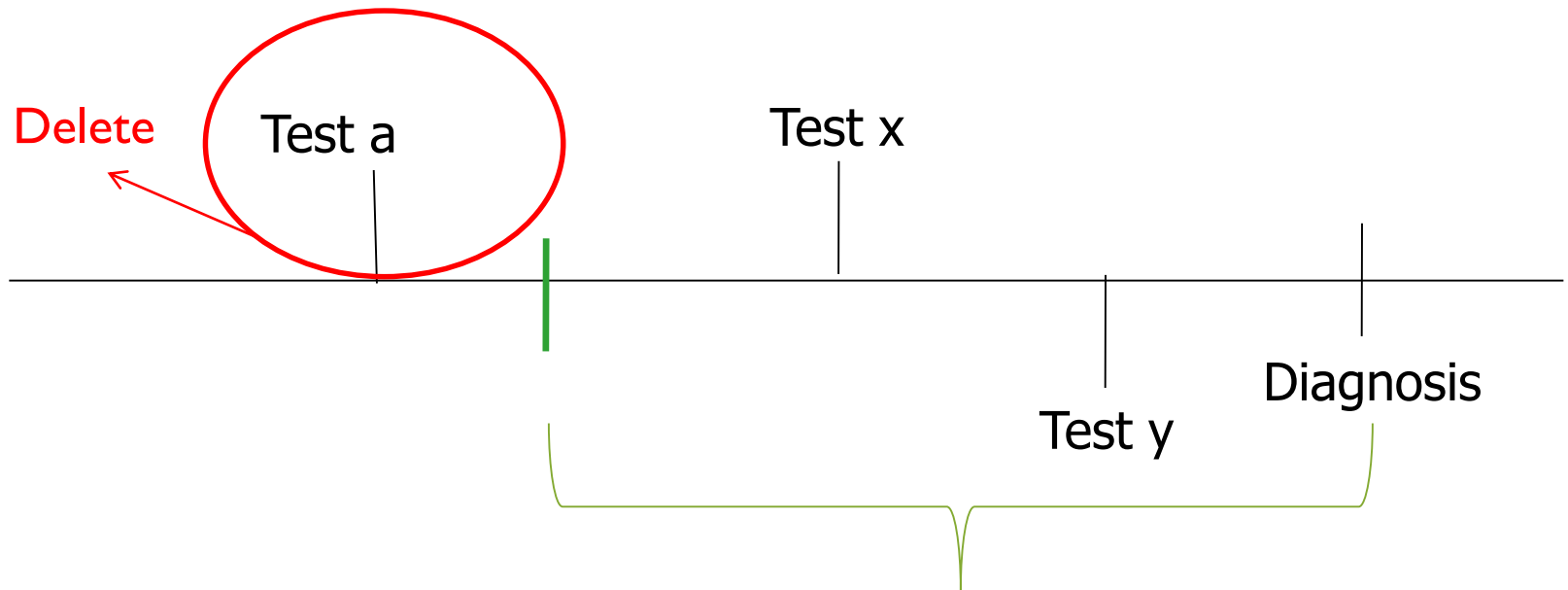- At least one record in both dataset A and B in the year prior to breast cancer diagnose date

Venn Diagram for Datasets

Screening
424 patients

Billing
8045 Patients

52
1   123
248

17   6570   1104

ASR
6836 patients

6994 patients

264 patients could not be found in any of the three datasets
8379 Patients in total

Dataset A: Using **Test Results** of the day to Determine "First test" and Test Type to Determine Detection Mode – the 'Truth'

Remove

Normal
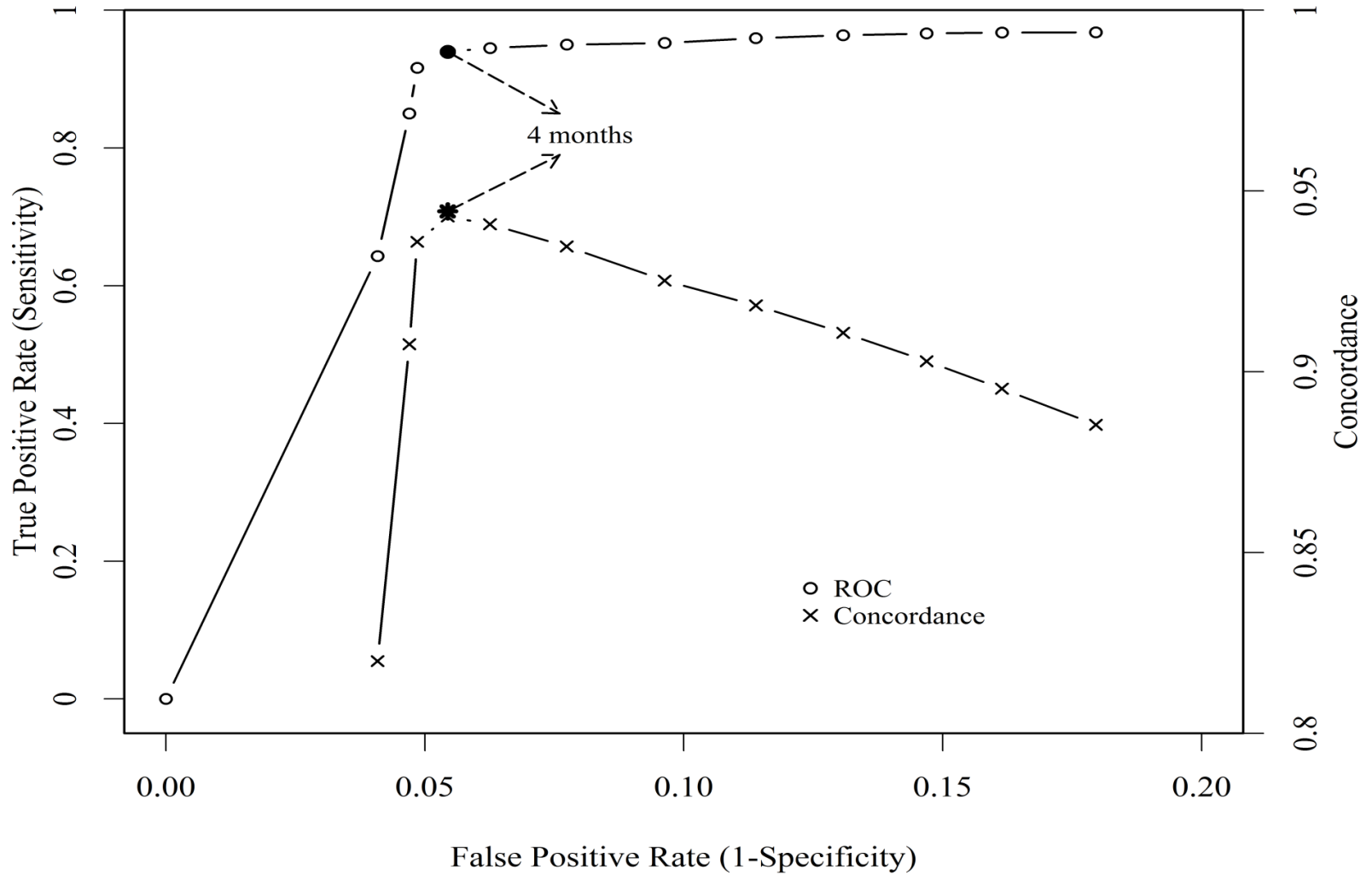
Abnormal day Abnormal day Diagnosis
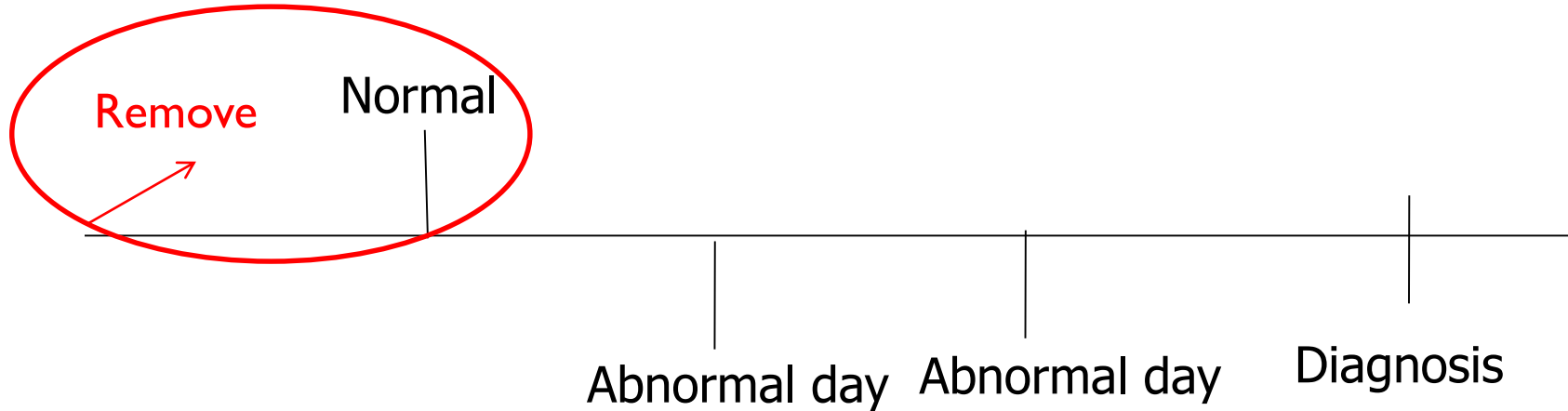
Dataset B: Using Time to Determine "Start" and Test Type to Determine Detection Mode

Delete

Test a

Test x

Test y

Diagnosis

Look-back period
m months
m =1, 2, 3, ..., 12

Results

|	Dataset A: with test results		
Dataset B: no test results Look-back time	Screen-detected N (%)	Symptom-detected N (%)	Total N (%)
4 months — Screen-detected	2893 (41)	213 (3)	3106 (44)
4 months — Symptom-detected	186 (3)	3702 (53)	3888 (56)
6 months — Screen-detected	2925 (42)	303 (4)	3228 (46)
6 months — Symptom-detected	154 (2)	3612 (52)	3766 (54)
Total	3079 (44)	3915 (56)	6994

Time from the 1st Relevant Test to Diagnosis

6 months look-back
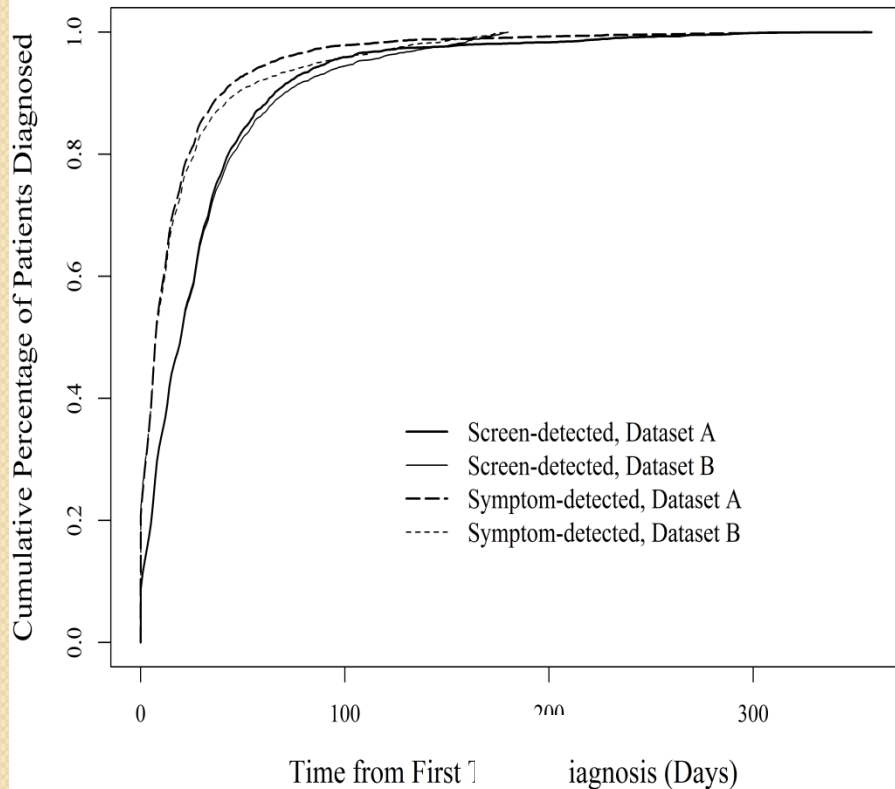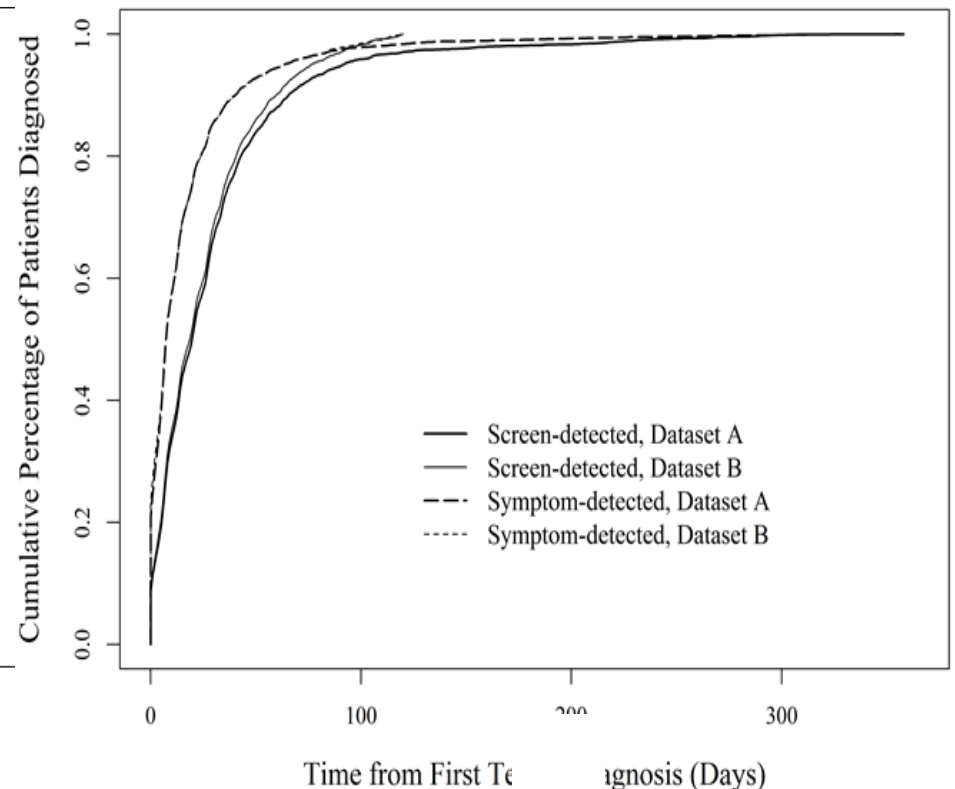
4 months look-back

Special case: A rural region
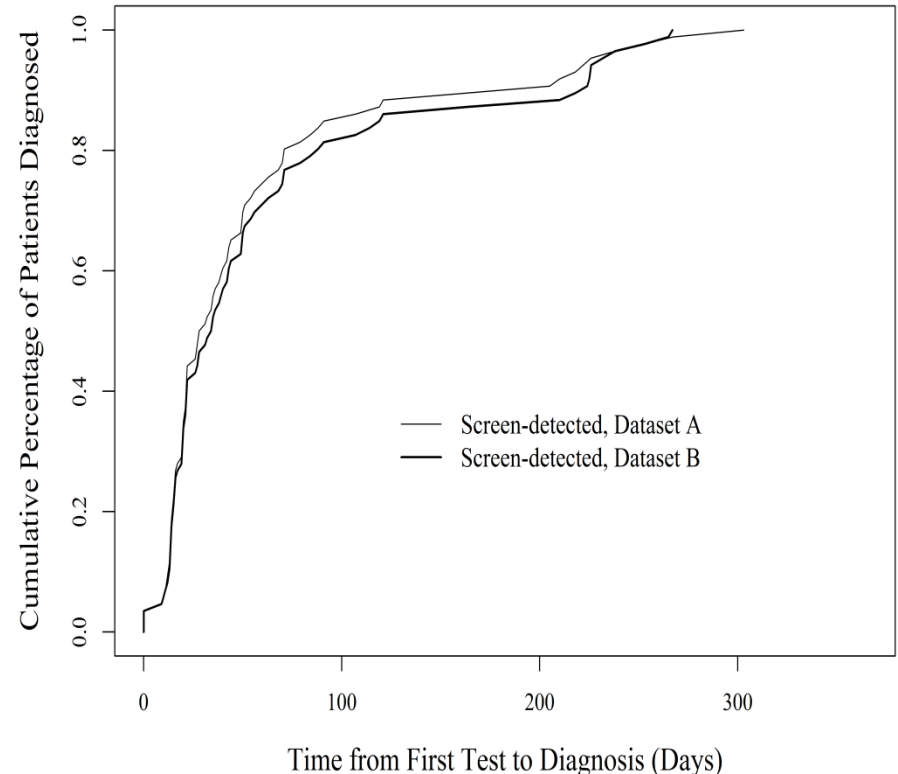
6 months look-back

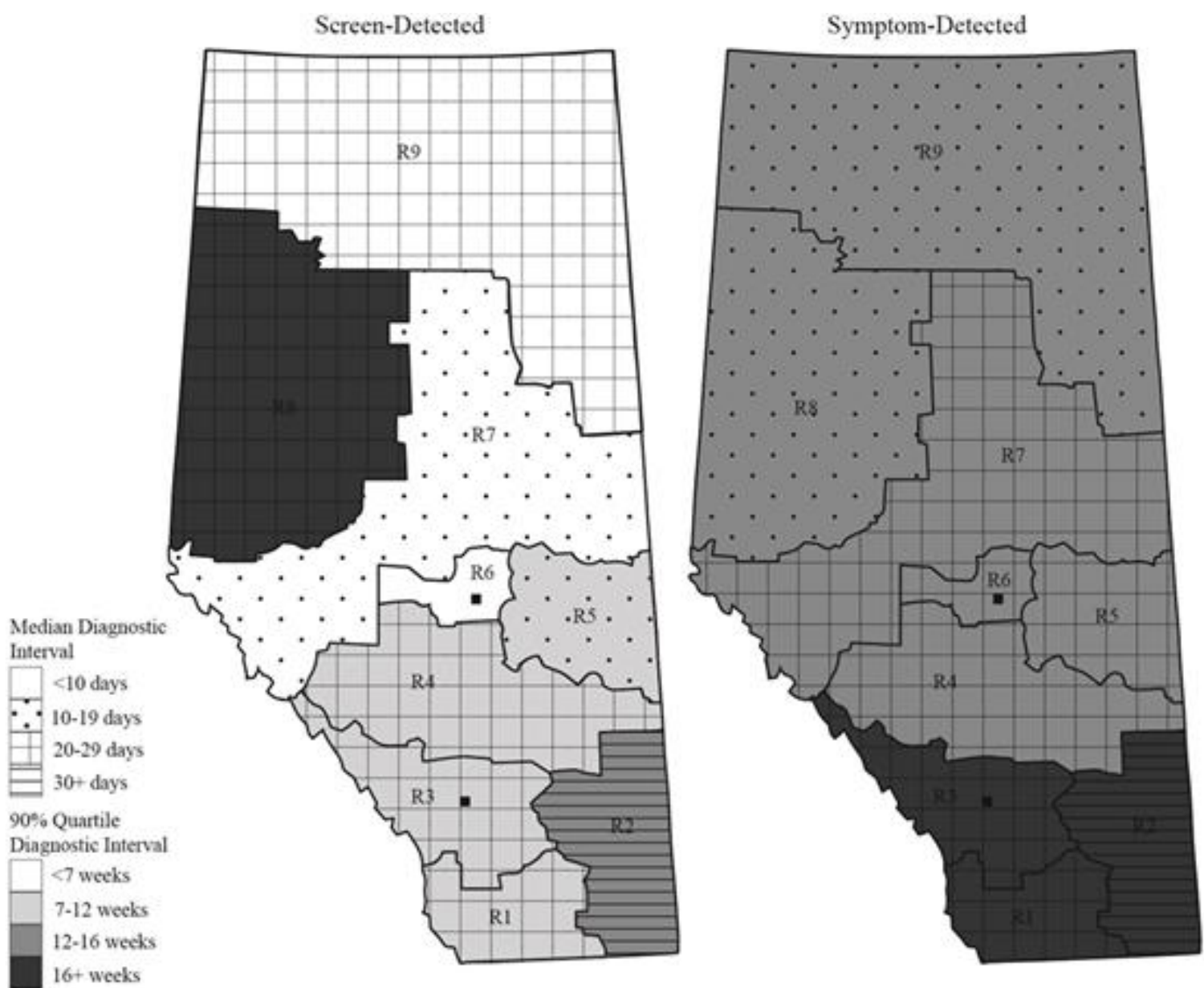9 months look-back

Maps of Alberta displaying the model-estimated median and 90th percentile diagnostic interval by detection mode in each RHA, 2004-2010

Conclusion and Applications

- There is excellent consistency in identifying detection mode and time to diagnosis using the administrative dataset against the dataset with test results.

- A 4 to 6 months look-back period is optimal for the cancer patients population but important geographic variation exists.

- Assess clinical, demographic and health system factors associated with breast cancer detection mode and diagnostic interval.

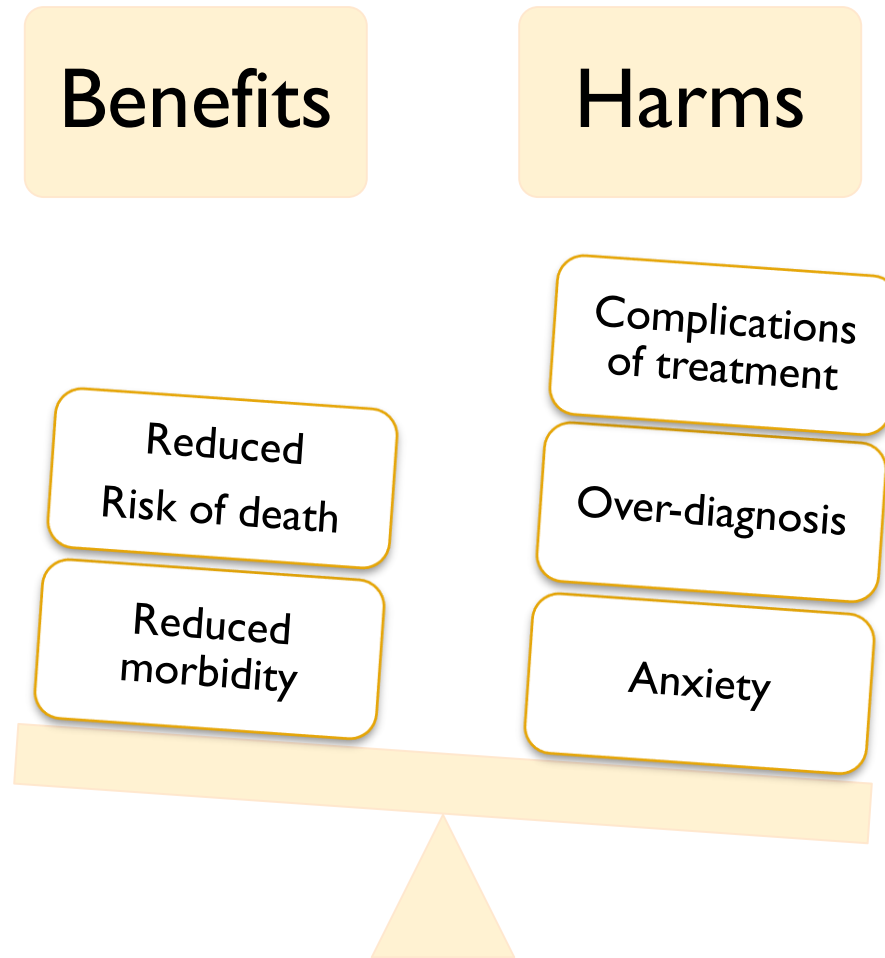# 2. Quality Assurance Process Affects Breast Cancer Screening Performance

Introduction

- Mammogram to screen breast cancer started in 1980
- Variable performance across countries

Per 1000 screens

	False positive rate	Cancer detection rate
US	~90	4.3
EU	<50	5.0
Canada	~70	4.7

Decision balance

Breast Cancer Screening in Alberta

Alberta Breast Cancer Screening Program (ABCSP)

Started 2006

Screen Test (ST)

- Two clinics: Edmonton, Calgary.
- Mobile units visit rural/remote communities
- Interpreted by sessional radiologists in Edmonton

Radiologists in Private Practices (C-FFS)

Spread through Alberta in the communities

Research Question

- Does the screening performance differ between the two service providers, namely Screen Test and community fee-for-service?

Performance Indicators

Abnormal call rate

Cancer detection rate

False positive rate

Positive predictive value

Post-screen cancer rate

Time to re-screen

Study Design and Databases

- Databases
  - Screen Test data (ST)
  - Physician claims data (C-FFS)
    - fee-for-service practices.
  - Alberta Cancer Registry data
    - exclude women with previous breast cancer diagnosis
    - identify cancer diagnosis

Alberta women, 50-69 years of age, screen mammograms in
Study period A: 2006.7.1-2008.6.30 or
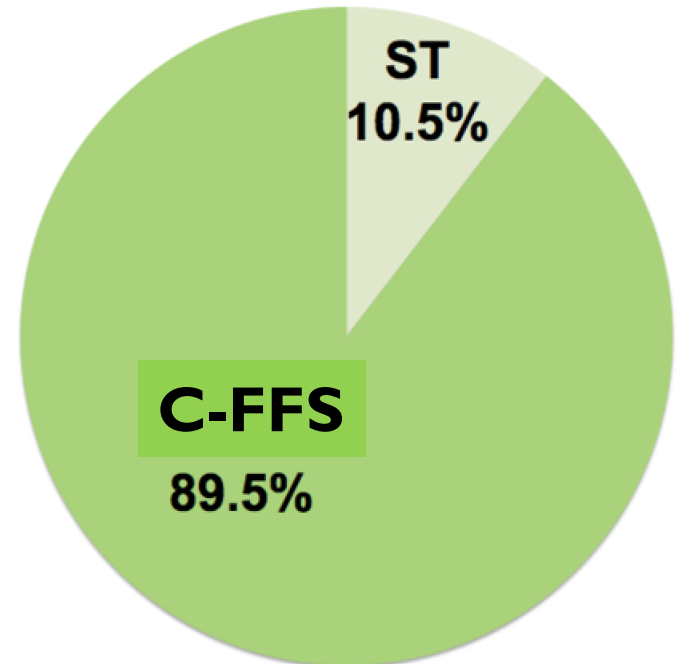Study period B: 2008.7.1-2010.6.30

The Screening Population

July 2006 -- June 2008

ST
15.1%

C-FFS

84.9%
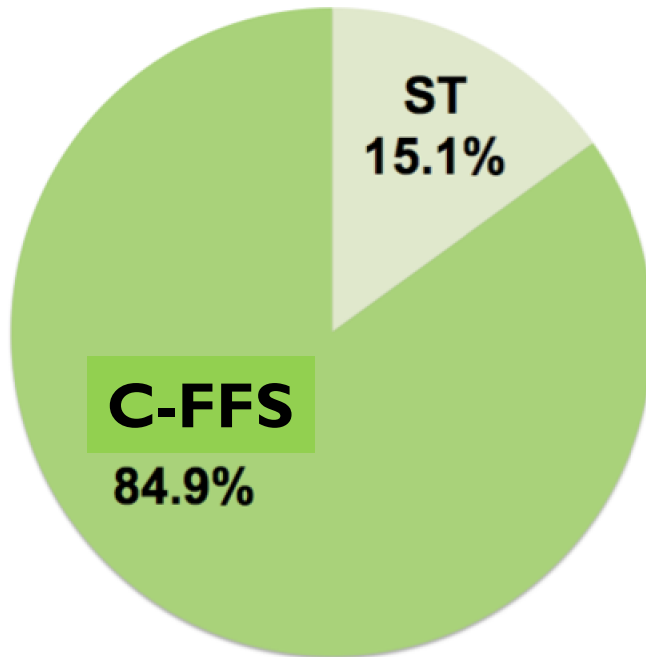
n=183,704

July 2008 -- June 2010

ST
10.5%

C-FFS

89.5%
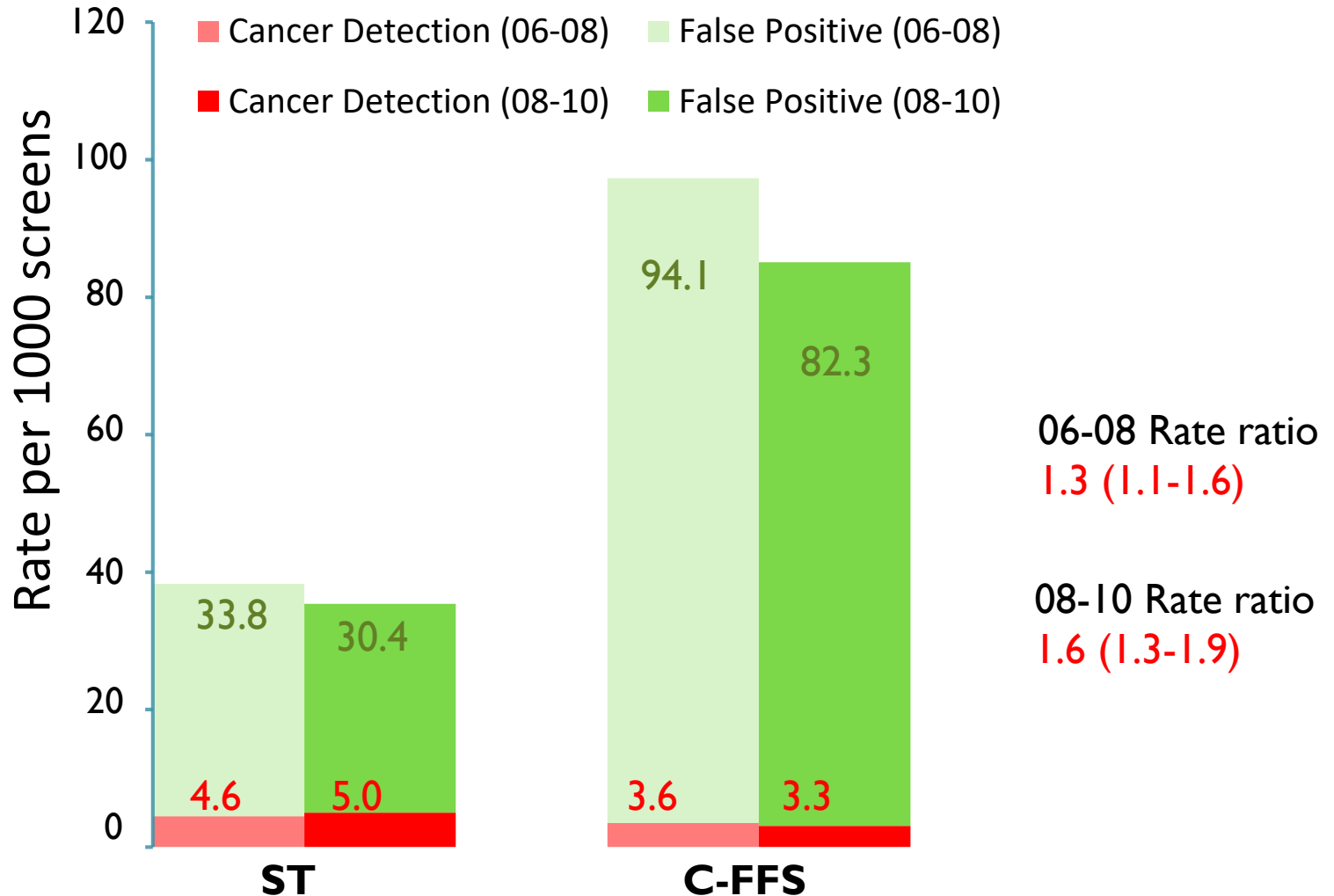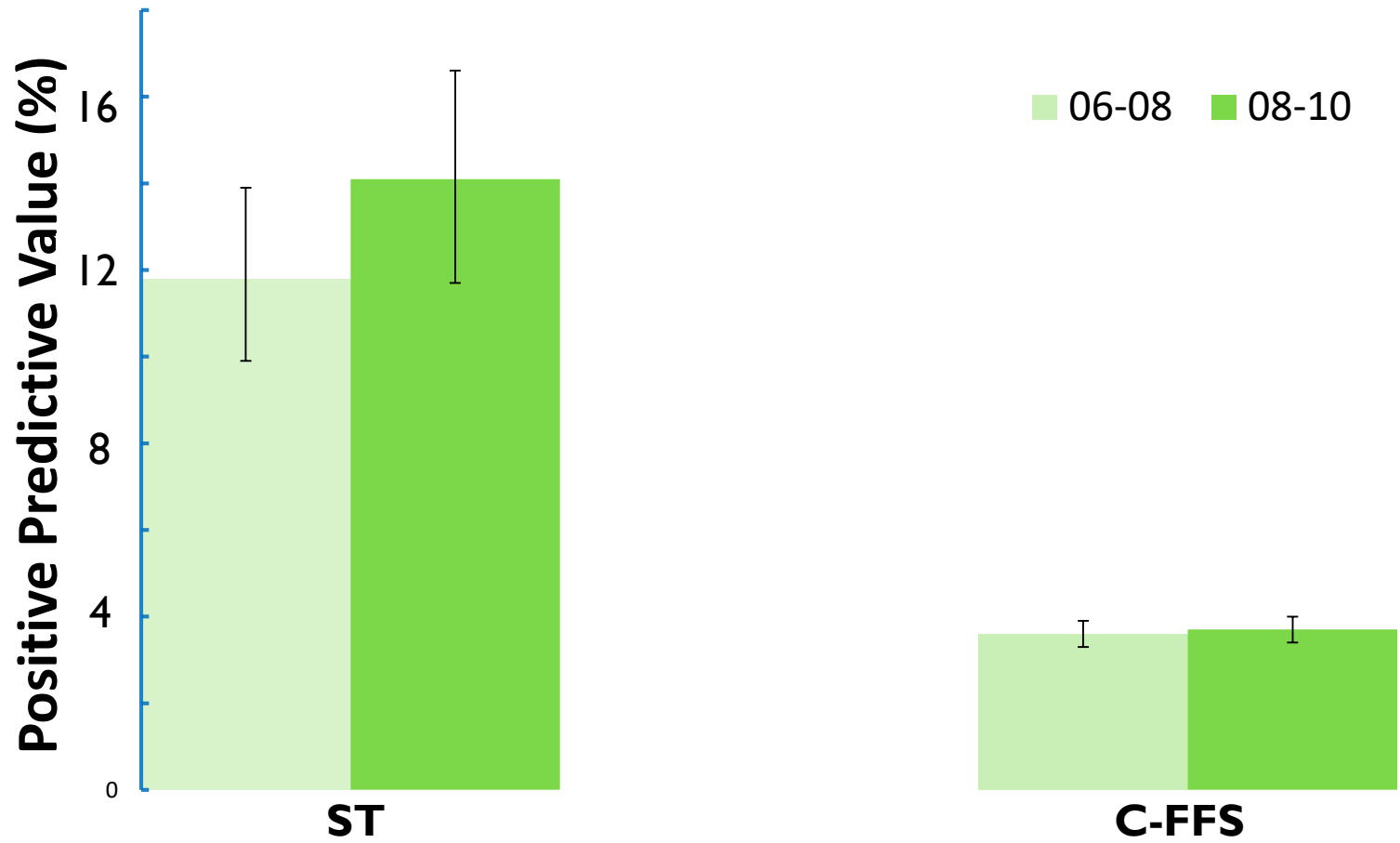
n=206,084

Age distributions in all regions are the same.
Median: 57 years and IQR: 53-62 years

Rates of Abnormal Call, Cancer Detection and False Positive

Positive Predictive Value

Benign Biopsy Rate (per 1000 screens)

Period	C-FFS	ST	Rate Ratio
06-08	8.5 (8.0-8.9)	5.6 (4.8-6.6)	1.5 (1.27-1.77)
08-10	6.7 (6.4-7.1)	4.8 (3.9-5.8)	1.42 (1.16-1.73)

Post-screen Invasive Cancer Rate

After a benign screening episode between 7/2006 and 6/2008, per 10,000 person-years.

Interval	Provider	N*	Rate (95% CI)	Rate ratio (95% CI)	P value
0-12 months	ST	9	3.4 (1.8-6.5)	**0.5** (0.25-0.98)	0.04
	C-FFS	96	6.8 (5.6-8.3)		
12-24 months	ST	17	7.5 (4.7-12.1)	**0.4** (0.27-0.67)	0.0004
	C-FFS	164	18.6 (16.0 – 21.7)		

* Number of post-screen invasive cancer

Legend: ◆ TotalA ■ TotalB ◆ EdmontonA ■ EdmontonB ◆ CalgaryA ■ CalgaryB ◆ OtherA ■ OtherB

Performance Indicator

Abnormal call rate

False positive rate

Benign biopsy rate
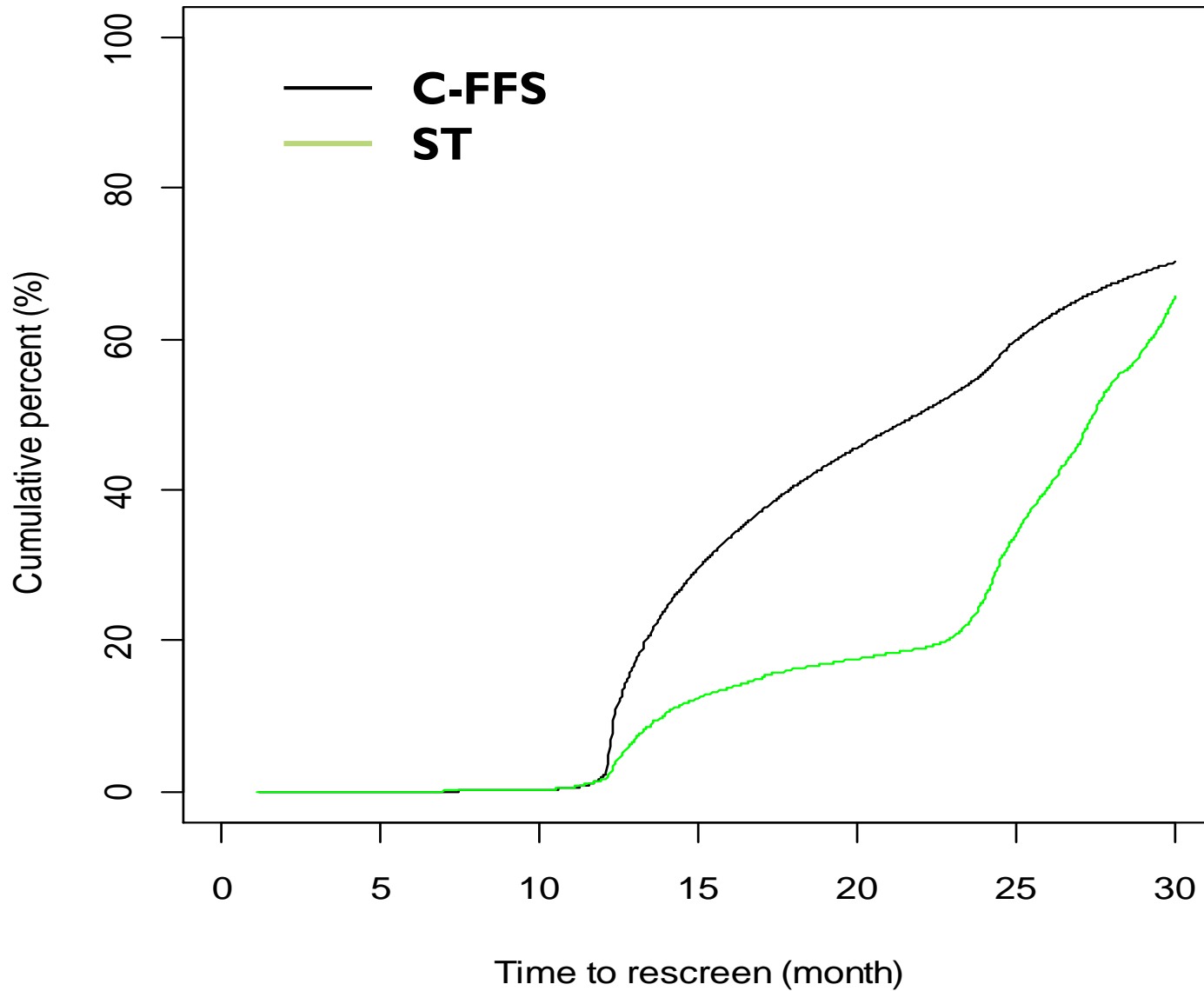
Positive predictive value*

Cancer detection rate

Invasive cancer detection rate

In situ cancer detection rate

Post-screen cancer rate for period A**

0.10   0.20   0.30   0.50   1.0   2.0   3.0   5.0

Adjusted Rate Ratio between Private Provider and Screen Test

Time to Re-screen

Screening Performance Better in ST Comparing to C-FFS

- Lower abnormal calls
- Higher cancer detection
- Lower false positive
- Higher positive predictive value
- Less post-screen invasive cancer
- Longer time to return visits

Discussion

- ST performance similar to the European Union standard.
  - Limit false positives to < 50 per 1000 screens
- Performance in C-FFS similar to US study reports.

Why? – Quality Assurance

- Screen Test
  - Radiologists interpret screen mammograms in batches
  - Monthly quality assurance meeting to receive recall stats and to review cases together
  - Reading volume >2000/year
- Community fee-for-service
  - Many clinics interpret the image right away to decide whether further test is needed
  - Amongst other images
  - Management practice varies, may not provide recall stats

Recommendations

- Must ensure quality of screen in practice to ⬆ benefit and ⬇ harm
- Further study of quality assurance is needed in programs across Canada
- Implementation of health technology requires oversight and evaluation

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women & children's health research institute