



Breast Cancer Screening

Dr Richard Chisholm
Radiologist, Christchurch
Clinical Director
BreastScreen South Ltd



History

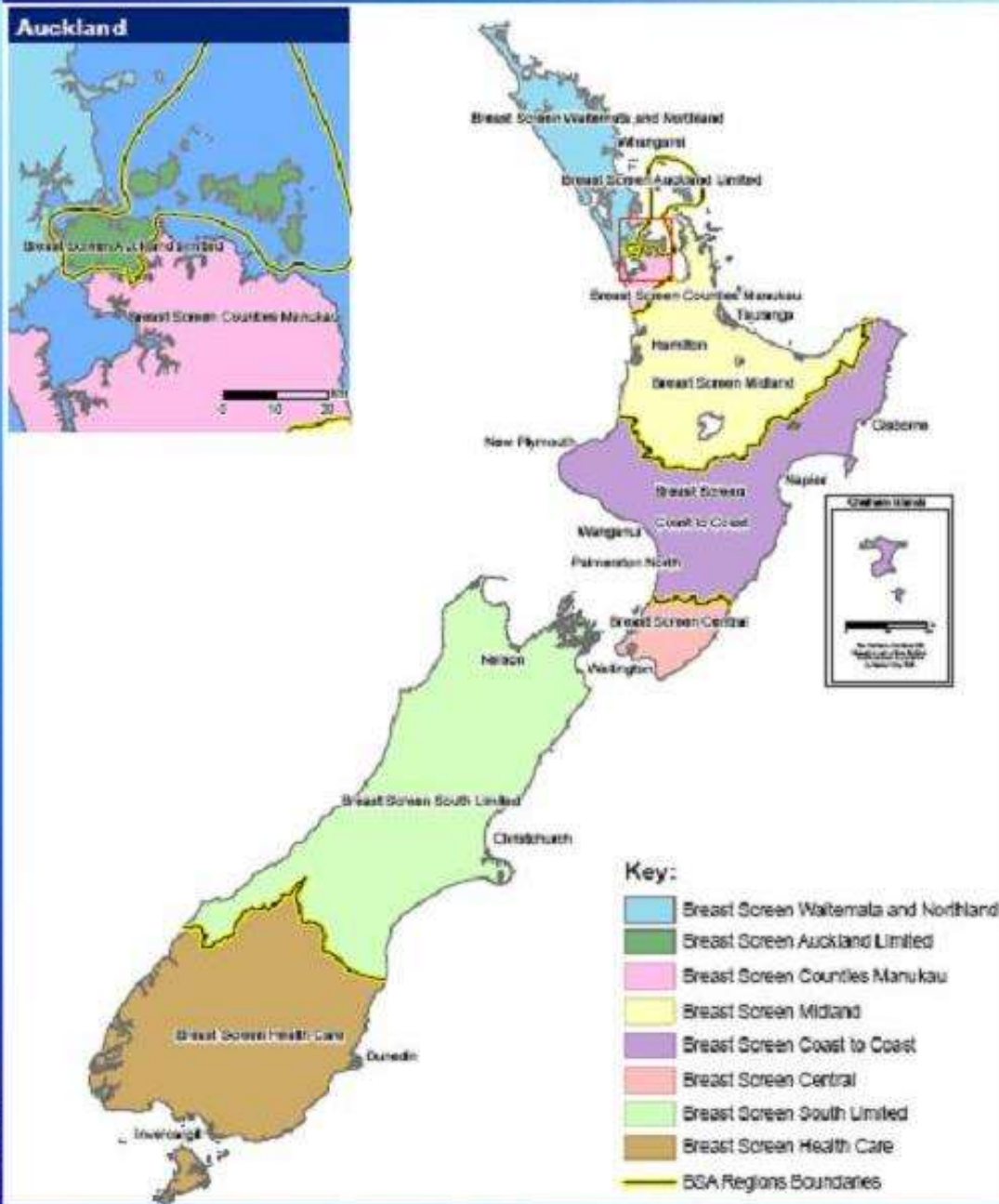
- Started Dec 1998
- Government funded
- Age range 50 – 64 yrs
- Age extension July 2004: 45 – 69 yrs
- Eligible women – 628,015 (2010)
- Cost per woman screened NZD 194 including admin
NZD 171 paid to Lead Provider
- Cost per cancer detected NZD 37, 690



BSA Lead Provider Regions

Breast Screen Aotearoa

Lead Provider	Eligible Pop (2010)
BSWN	102,770
BSAL	59,120
BSCM	61,960
BSM	99,170
BSCtoC	82,550
BSC	67,440
BSL	110,680
BSHC	44,325
BSA TOTAL	628,015





Mobile Bus



10-35% of women are screened on a mobile bus



Population Coverage

July 07 – June 09

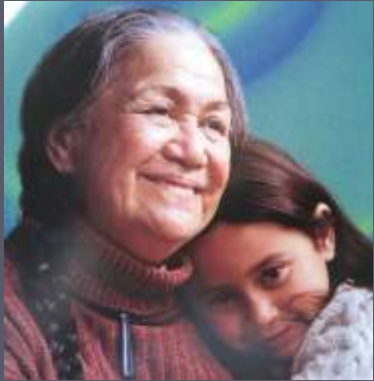
Age	Percent	Range
50 – 69 yrs	65%	53 – 80%
45 – 49 yrs	59%	48 – 88%

Target all age groups - 70%



Coverage by Ethnicity

July 07 – June 09



Maori

52%

Range:

42 – 74%



Pacific

56%

46 – 79%



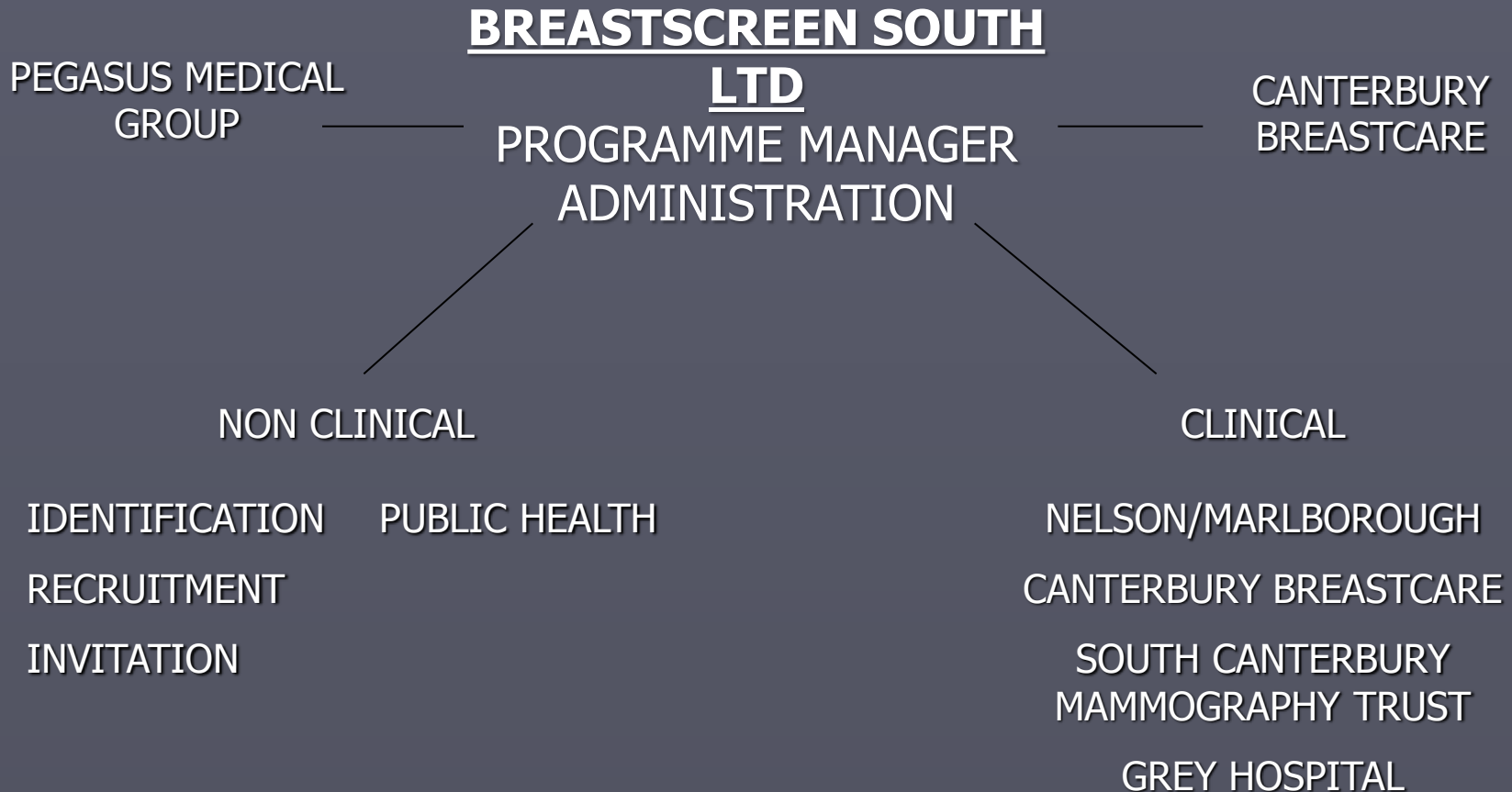
Other

67%

52 – 80%

Target all ethnicities – 70%

BreastScreen South Ltd





BSL Recruitment Process

Identify eligible population and set sub-contractor targets

- ▶ General practice based (64%)
- ▶ 0800 number self enrolment (36%)
- ▶ Health promotion - Maori and Pacific Island
- ▶ Success
 - GP Co-ordinators – 70% target
 - Payment to general practices
 - Stand alone structure

Referral of Patients to BreastScreen South or Private/Public Provider

Diagnostic/Symptoms

GP determines that specialist assessment or treatment is required, especially if symptom(s) are indeterminate or suspicious of cancer
Or
GP requires specialist input for patients of any age with breast issues.

GP determines symptoms to be not suspicious / low risk of malignancy but imaging/workup required

Referral to DHB or Private Provider *

CDHB WCDHB
SCDHB NMDHB
Private Providers
Canterbury Breastcare
Greymouth Mammography Unit
South Canterbury Mammography Unit
Nelson Radiology

At Risk/Surveillance Screening

Asymptomatic women aged 40-74
who are not eligible for any other MoH funded mammography screening and who:

- Have a mother or sister with pre-menopausal breast cancer or post-menopausal bilateral breast cancer
- Have had a previous breast cancer
- Have a breast histology demonstrating an at-risk lesion (eg atypical hyperplasia, papillomatosis etc)
- Are considered by a radiologist to be at risk

Asymptomatic women aged under 40 who:

- Have a personal history of breast cancer
- Are within 5 years of the age which their mother/sister was diagnosed with breast cancer.

Also included are women eligible for 2 yearly screening with BSA but who require annual screening due to meeting at risk criteria above.

Canterbury Breastcare – holds At Risk contract for Canterbury & West Coast regions
South Canterbury Mammography Unit – holds At Risk contract for South Canterbury
Nelson Radiology – holds At Risk contract for Nelson Marlborough

BreastScreen Aotearoa (BSA) National Screening Programme

•**Asymptomatic women** aged 45-69

- Have not had a mammogram in the last 12 months (may enrol in the interim but will not be screened until 12 months have elapsed)
- Non-pregnant and 3 months post cessation of lactation.
- If previous breast cancer, eligible to rejoin 5 years post diagnosis.
- NZ citizen or immigration permit for 2 or more years stay.

Referral:

GP (with woman's informed consent) or

Self-referral to:

BreastScreen South Ltd

Ph: 0800 270 200 or 03 379 2411

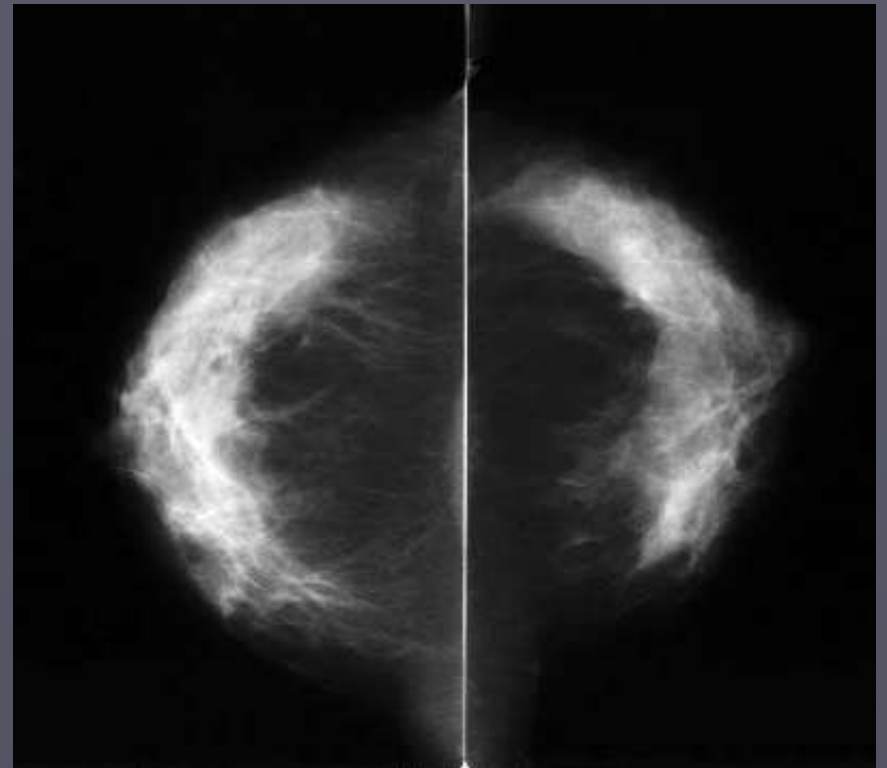
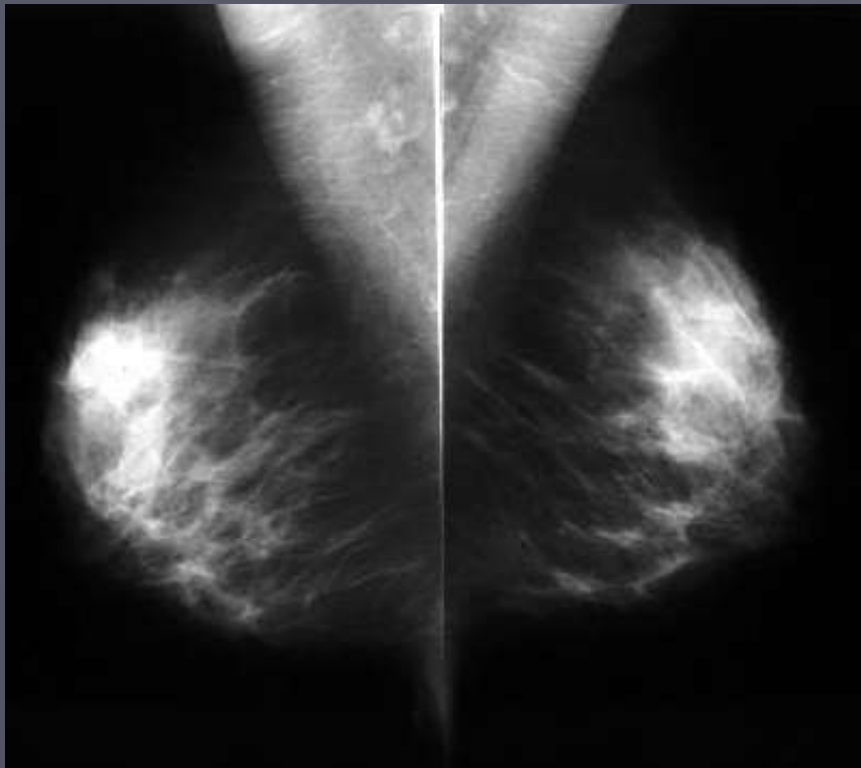
(Screening appt will be generated/offered for appropriate screening location: Canterbury BreastCare, After Hours Radiology, Cashmere Radiology, Nelson Radiology, Wairau Hospital, South Canterbury Mammography, Greymouth Mammography Unit or Mobile Screening Unit)

NB: BSA is not able to assess women who have a significant symptom (eg new lump, thickening, puckering or dimpling of skin, any change to one nipple, or other new symptoms).



Screening Process

Mediolateral oblique and craniocaudal view each breast



Two yearly – 45 to 69 years
Analogue or Digital Mammography

Population and MRTs





Screening Process

Batch reading

At least two radiologists



Screen Reading Radiologist





Recalled to Assessment

July 07 – June 09

	Initial %		Subsequent %	
	45-49	50-69	45-49	50-69
Recalled to Assess	9.3	9.8	4.1	3.0
BSL	7.3	7.1	4.1	2.9
Target		<10		<5
Desired		<7		<4
Positive Predictive Value	5.5*	9.7	7.6*	18.3
BSL	5.9*	10.4	6.6*	18.0
Target		≥9		≥9

Radiologist at Assessment





Assessments – BSL

July 07 – June 09

➤ Number of Women Assessed		3348
➤ Surgical Opinion	435	13% of Recalls
➤ Needle Biopsy	1017	30.4% of Recalls
➤ FNA	30	0.9% of Recalls
➤ Core (U/S)	560	16.7% of Recalls
➤ Core (Stereo)	427	12.8% of Recalls
➤ Open Biopsy	49	1.5% of Recalls
		0.05% of Screens

Target ≤ 1 % of screens



Early Detection of DCIS or Invasive Breast Cancer

July 07 – June 09

Age (years)	Rate per 1000 screens			
	Initial	BSL	Subsequent	BSL
45 – 49	5.1*	4.3*	3.1*	2.7*
50 – 69	9.4	7.3	5.6	5.2
Target	≥ 6.9		≥ 3.45	

DCIS = 23.4% of all Screen Detected Cancers

Target 10 – 25%



Small Invasive Cancers

July 07 – June 09

	Initial ≤10mm	Subsequent ≤10mm	Initial <15mm	Subsequent <15mm
45-49	25.8	25.6*	40.4*	43.9*
50-69	28.0	39.9	41.7*	58.5
Target	≥25%	≥ 30%	>50%	>50%
No. / 10,000 screens				
45-49	8.8*	5.5*	13.9*	9.5*
50-69	19.6	16.8	29.3*	24.6
Target	≥17.3	≥10.45	>34.5	>17.3



Lymph Node Involvement

Node negative invasive screen detected cancers

	45-49	50-69	
Initial	71%	74%	Target > 70%
Subsequent	65%*	78%	Target > 75%



Provision of Appropriate and Acceptable Service

	BSA (%)	BSL (%)	Target
Informed of Screening result within 10 working days	95	98	90/95%
Offered first assessment appointment within 15 working days of screening	79*	94	90%
Receiving needle biopsy within 5 working days of assessment	90	87*	≥90%
Having open biopsy within 20 working days of being informed of need	72*	96	≥90%
Receiving final diagnostic biopsy results within 5 working days	87*	93	≥90%
Receiving surgical treatment within 20 days of final diagnostic result	64*	72*	90%



Multidisciplinary Telelink BSL



Does screening mammography work?

- ▶ 7 main prospective randomised controlled trials
- ▶ Most started at 40 years age
- ▶ 5 showed reduced mortality
- ▶ 2 showed reverse

Meta-analysis of data from all 7 trials:

- ▶ 24% reduction in mortality from breast cancer
- ▶ 30% reduction for those women screened
- ▶ Compliance not complete. Screened and control groups.

Ref:- Why the critics of screening mammography are wrong

“They distort data, rely on weak science, but refuse to defend when challenged”

Kopans, D. B. *Diagnostic Imaging* Vol. 31 No. 12 December 4, 2009

(Professor of Radiology, Harvard Medical School)

Radiation Risk of Mammography (Medical Physicist)

- Stochastic effect - Latent period 5 – 10 years
- Age-related - Age 30 risk 3-4 x greater than 50

Net benefit of screening

- Number of detected cancers vs. number of induced 170:1
- Number of lives saved 110:1

Dose

- Mammogram - 0.6mSv
- Equivalent to
 - 15 weeks background irradiation
 - 5 return flights to UK

Risk

- 1 in 100,000 risk of death
- Equivalent to
 - 15,000 km flying
 - 1000 km driving
 - 150 km cycling
 - 3 weeks L.A. smog
 - 5 bottles of wine
 - 4 months as a radiologist
 - 60 year old male for 3 hours



Cancers found in BreastScreen Aotearoa

Size of the
smallest
cancer found
by regular
mammography
(2mm)

Average size of cancer
found by regular
mammography
(14.5mm)

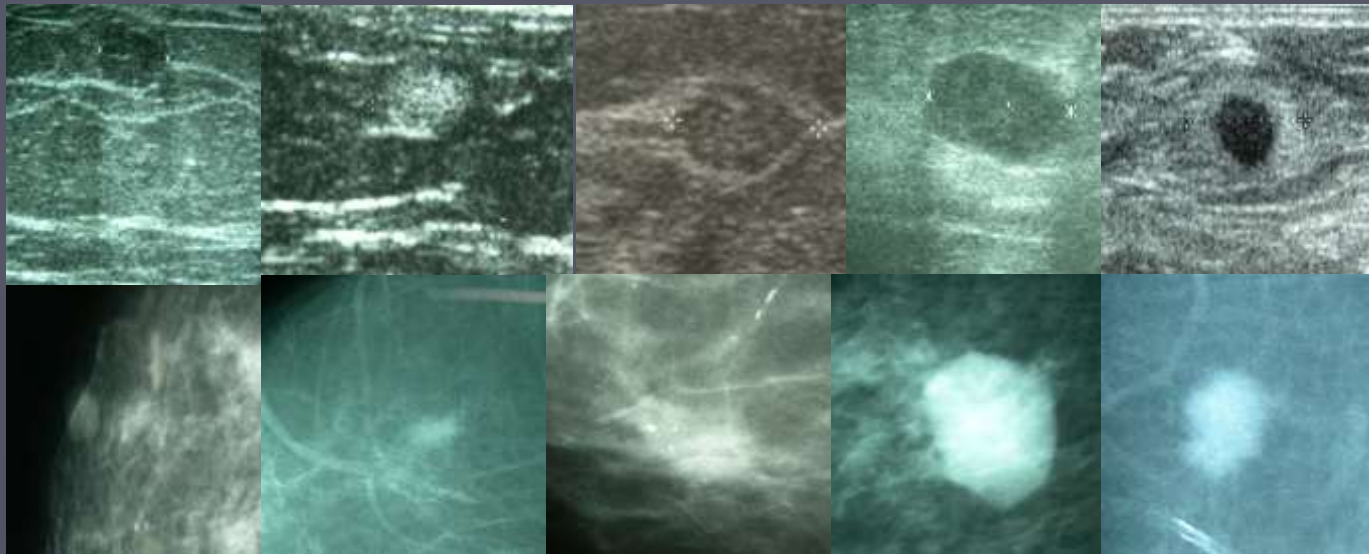
Average size of
cancer found by a
first mammogram
(15.6mm)

Average
size of a
cancer
found by
chance
(22mm)



Screening Ultrasound

- ▶ Operator dependant
- ▶ Yield 3 to 4 cancers per 1000
- ▶ Limited DCIS detection
- ▶ Double biopsy rate compared with cf mammography



Thermography

The National Screening Unit (NSU), the Cancer Society of New Zealand and The New Zealand Breast Cancer Foundation do not support the use of thermography as a breast cancer screening or diagnostic tool as there is insufficient evidence to do so.

Position Statement

“The use of thermography as a breast cancer screening or diagnostic tool”

January 2005

Screening High Risk

High Risk

- ▶ BRCA 1 or 2 mutation carrier or 1st degree relative (untested)
- ▶ Chest RTH age 10-30 (after 8 years)
- ▶ $\geq 20\%$ lifetime risk (various models)

Protocol:

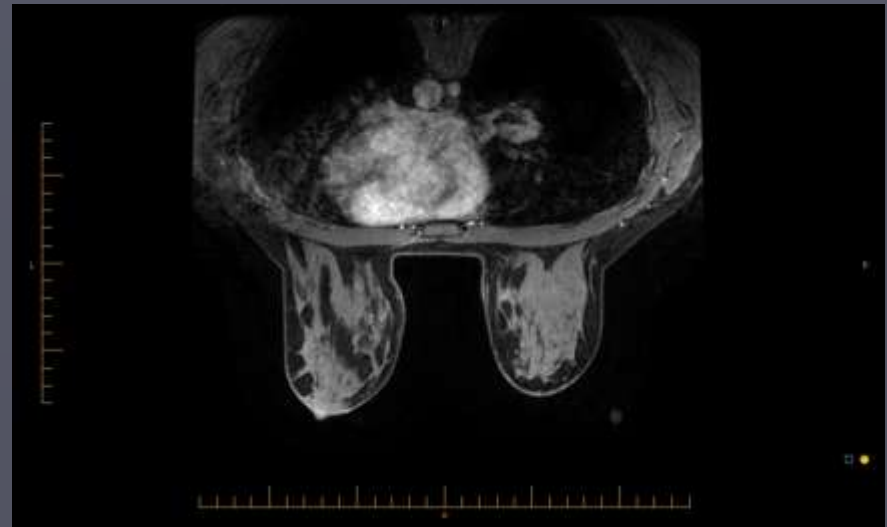
Begin annual mammography and MRI (US if unable) at 30 (25 BRCA)

Sensitivity (Kuhl et al)

n = 1679 annual screen high risk

27 cancers found

Mammography	33%
Mammography and Ultrasound	48%
MRI	93%
Mammography & Ultrasound & MRI	100%



Screening Intermediate and Average Risk

Intermediate Risk

- ▶ Previous breast cancer, LCIS, ALH, ADH
- ▶ Lifetime risk 15-20%
- ▶ Dense breasts

Protocol:

- ▶ Annual mammography
- ▶ Begin 10 years before family member (not before 30)
- ▶ Optional MRI or US

Average Risk

- ▶ Annual mammography 40-50 years
- ▶ 2 yearly mammography 50+

Stop Screening

- ▶ 5-7 years before life expectancy
- ▶ MRI – 59 years. US continue.

The End





Small Invasive Cancers

July 07 – June 09

	Initial $\leq 10\text{mm}$	Subsequent $\leq 10\text{mm}$	Initial $< 15\text{mm}$	Subsequent $< 15\text{mm}$
45-49	25.8% (30.6%)	25.6% (16.0%)	40.4% (44.4%)	43.9% (32.0%)
50-69	28.0% (30.0%)	39.9% (38.3%)	41.7% (50.0%)	58.5% (63.7%)
Target	$\geq 25\%$	$\geq 30\%$	$> 50\%$	$> 50\%$
No. / 10,000 screens				
45-49	8.8 (9.9)	5.5 (3.1)	13.9 (14.4)	9.5 (6.2)
50-69	19.6 (16.3)	16.8 (15.2)	29.3 (27.1)	24.6 (25.3)
Target	≥ 17.3	≥ 10.45	> 34.5	> 17.3



Lymph Node Involvement

Node negative invasive screen detected cancers

	45-49	50-69	
Initial (BSL)	71% (64%*)	74% (75%)	Target > 70%
Subsequent (BSL)	65%* (60%*)	78% (79%)	Target > 75%



Recalled to Assessment

July 07 – June 09

50-69 Year Old Women

	Initial	Subsequent
Recalled to Assess	9.8	3.0
BSL	7.1	2.9
Target	<10	<5
Desired	<7	<4
Positive Predictive Value	9.7	18.3
BSL	10.4	18.0
Target	≥9	≥9



Assessment Data

July 07 – June 09

Preoperative Diagnosis of Malignancy – 95%

BSL – 98%

Target > 90% Desired

>70% Expected

Benign Open Biopsy Rate

Initial (Prevalent)

1.9 per 1000

Subsequent (Incident)

0.5 per 1000

BSL 0.9 per 1000

0.3 per 1000

Target ≤ 3.5 per 1000 screens

≤ 1.6 per 1000 screens



Recalled to Assessment

July 07 – June 09

45-49 Year Old Women

	Initial	Subsequent
Recalled to Assess	9.3	4.1
BSL	7.3	4.1
Target	<10	<5
Desired	<7	<4
Positive Predictive Value	5.5	7.6
BSL	5.9	6.6
Target	≥9	≥9



Staff Numbers

Lead Provider	MRTs	Radiologists	Breast Nurses	Surgeons	Pathologists
BSL	27	15	4	16	3
BSWN	18	12	3	6	6
BSM	15	13	2	4	3
BSCtoC	15	7	3	9	3
BSC	13	5	3	4	4
BSCM	8	4	2	6	9
BSAL	11	6	2	6	3
BSHC	11	5	4	3	3
TOTAL	118	67	23	54	34

Average screen detected cancers per annum in BSA = 1100 (approx)



Interval Cancers – BSL

Presented within first year from Screen:

- 0.58 per 1000 screens
- Target: <0.69 per 1000 screens

Presented within second year from Screen:

- 0.92 per 1000 screens
- Target: <1.2 per 1000 screens