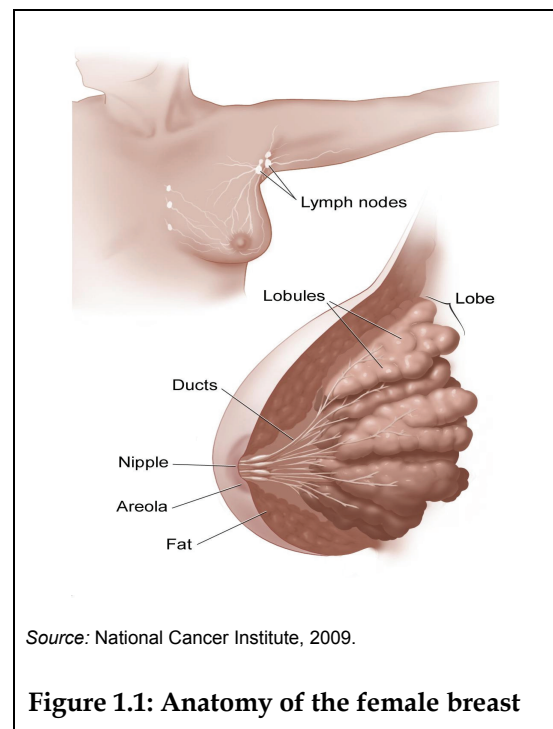


# 1 Introduction

Ductal carcinoma in situ (DCIS) is a non-invasive tumour arising from, and contained entirely within, a milk duct of the breast. Prior to the introduction of mammography screening, DCIS diagnoses were uncommon. Since the introduction and progressive extension of breast screening in Australia from 1988, the detection of DCIS has increased substantially.

The objectives of this report are:

- to determine the probability of a future diagnosis of invasive breast cancer following initial diagnosis of DCIS, and to compare this probability with the probability of invasive breast cancer generally encountered by Australian women
- to describe and compare two staging features, namely tumour size and nodal status, of invasive breast cancers that follow a DCIS diagnosis with corresponding features of breast cancers generally presenting in Australian women.



**Figure 1.1: Anatomy of the female breast**

DCIS may progress to invasive breast cancer if left untreated, although the probability of this occurring would vary with characteristics of the DCIS, including its size, grade and whether necrosis is present (WHO & IARC 2002). Early studies indicated that progression to invasive cancer might occur in 40% to 70% of untreated DCIS lesions, although progression may be more likely for the types of lesions detected through mammography screening (were they not treated), due to their more unfavourable prognostic features (WHO & IARC 2002). There is increasing research evidence that DCIS is a heterogeneous group of lesions and that management protocols may need to be developed that take account of differences in DCIS characteristics (Patani et al. 2008).

The risk of progression of DCIS to invasive cancer can be eliminated or greatly reduced by treatment, but if common risk factors exist, DCIS may still be a risk indicator for invasive cancer of the other breast or cancers arising independently of the DCIS in the same breast. Some early studies indicated a 4- to 12-fold increase in risk of invasive breast cancer in women with a prior DCIS diagnosis, whereas more recent studies, while confirming an increase in risk, have indicated that it may be of smaller magnitude (Habel et al. 1997; WHO & IARC 2002; Claus et al. 2003; Li et al. 2006; Luke et al. 2006; Innos et al. 2008).

Information on the likely scale and timing of any elevation in risk of invasive breast cancer following a DCIS diagnosis is an important consideration when planning the medical surveillance of women diagnosed with DCIS. In this report, data provided by the eight Australian state and territory cancer registries to the National Cancer Statistics Clearing House at the Australian Institute of Health and Welfare are used to investigate this risk.

Existing Australian data on this topic are limited and have not previously been collated and analysed at a national level.

Although DCIS can occur in men, the Australian data are too sparse for meaningful analysis of DCIS in males. Therefore this report is restricted to DCIS and invasive breast cancer in women.

## 2 Incidence of DCIS

Although DCIS is not an invasive cancer and is therefore not a primary focus of data collection for cancer registries, it is generally recorded by state and territory cancer registries in Australia. DCIS data are also collected within the national breast cancer screening program, BreastScreen Australia.

This chapter presents background data on trends in DCIS incidence from 1995 to 2005 and on the proportion of DCIS cases detected through BreastScreen Australia from 1996 to 2005.

### Incidence of DCIS in Australia

The most recent DCIS data available Australia-wide are for 2005 when there were 1,558 new DCIS cases reported (Table 2.1), giving an age-standardised rate of 14.4 cases per 100,000 females (Table 2.2).

The incidence of DCIS varies considerably by age, being lowest in women under 40 years (2005 incidence rate of 1.1 cases per 100,000 females) and highest in those aged 60 to 69 years (50.8) (Table 2.2). These differences are explained by the following:

- DCIS is most commonly detected on mammogram.
- Women aged 40 years or more are eligible for screening mammography.
- Women aged 50 to 69 years are the 'target population' of BreastScreen Australia, increasing their chances of DCIS detection.

From 1995 to 2005, the age-standardised incidence rate of DCIS increased on average by 3.0% per year (Figure 2.1). The size of the average annual increase varied by age, ranging from 1.0% for women under 40 years to 5.7% for women aged 60 to 69 years.

### DCIS detected by BreastScreen Australia

The detection of DCIS has been shown in various settings to increase markedly with the introduction of screening mammography. For example, South Australian data demonstrated a 7-fold increase in annual incidence of in situ breast lesions (mostly DCIS) from 1.9 per 100,000 females in 1985–1988 to 13.6 per 100,000 in 2001–2004, with most of the increase occurring between 1985–1988 and 1997–2000 (Luke et al. 2006). This coincided with the introduction of pilot screening mammography from 1988 and the roll-out of the national screening program from 1991.

Similar increases are thought to have accompanied the introduction of screening mammography in other states and territories. In New South Wales, DCIS data showed an increase in incidence between 1995 and 2000 that correlated with the increased number of women participating in the screening program (Krickler et al. 2004).

In the period from 1996 to 2005, the number of DCIS cases detected through BreastScreen Australia, expressed as a proportion of the total number of DCIS cases, peaked at 66.9% in 2000 and was 61.9% in 2005 (Table 2.4). These are sizeable proportions that reflect the population coverage achieved by the screening program and the ability of screening

mammography to detect DCIS lesions that are not found by clinical or self examination (Burstein et al. 2004).

The proportion of DCIS cases detected through BreastScreen Australia varies by age, with the highest proportions applying to women in the screening target age range of 50–69 years (Table 2.4). This reflects the contribution made by screening mammography. For women outside the target age range, the reduction between the 2000 and 2005 proportions (Figure 2.2) may reflect an increasing focus placed by the screening program on the principal screening target age range of 50–69 years compared to other age groups during this period.

**Table 2.1: Incidence of DCIS expressed as numbers of female cases, Australia, 1995–2005**

<b>Age (years)</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Under 40	51	38	58	51	44	57	39	60	43	51	63
40–49	158	194	233	239	237	230	257	250	243	279	263
50–59	261	244	324	361	412	457	497	479	483	520	522
60–69	188	205	264	303	306	321	402	364	388	419	435
70–79	140	121	138	180	157	208	204	190	231	210	208
80+	26	30	25	45	44	36	48	47	48	53	67
<b>Total</b>	<b>824</b>	<b>832</b>	<b>1,042</b>	<b>1,179</b>	<b>1,200</b>	<b>1,309</b>	<b>1,447</b>	<b>1,390</b>	<b>1,436</b>	<b>1,532</b>	<b>1,558</b>

*Notes*

1. DCIS counts were not available for SA or NT for 1995.
2. DCIS counts were not available for SA for 1996.

*Source:* AIHW analysis of data supplied by state and territory cancer registries.

**Table 2.2: Age-standardised incidence rate of DCIS, females, Australia, 1995–2005**

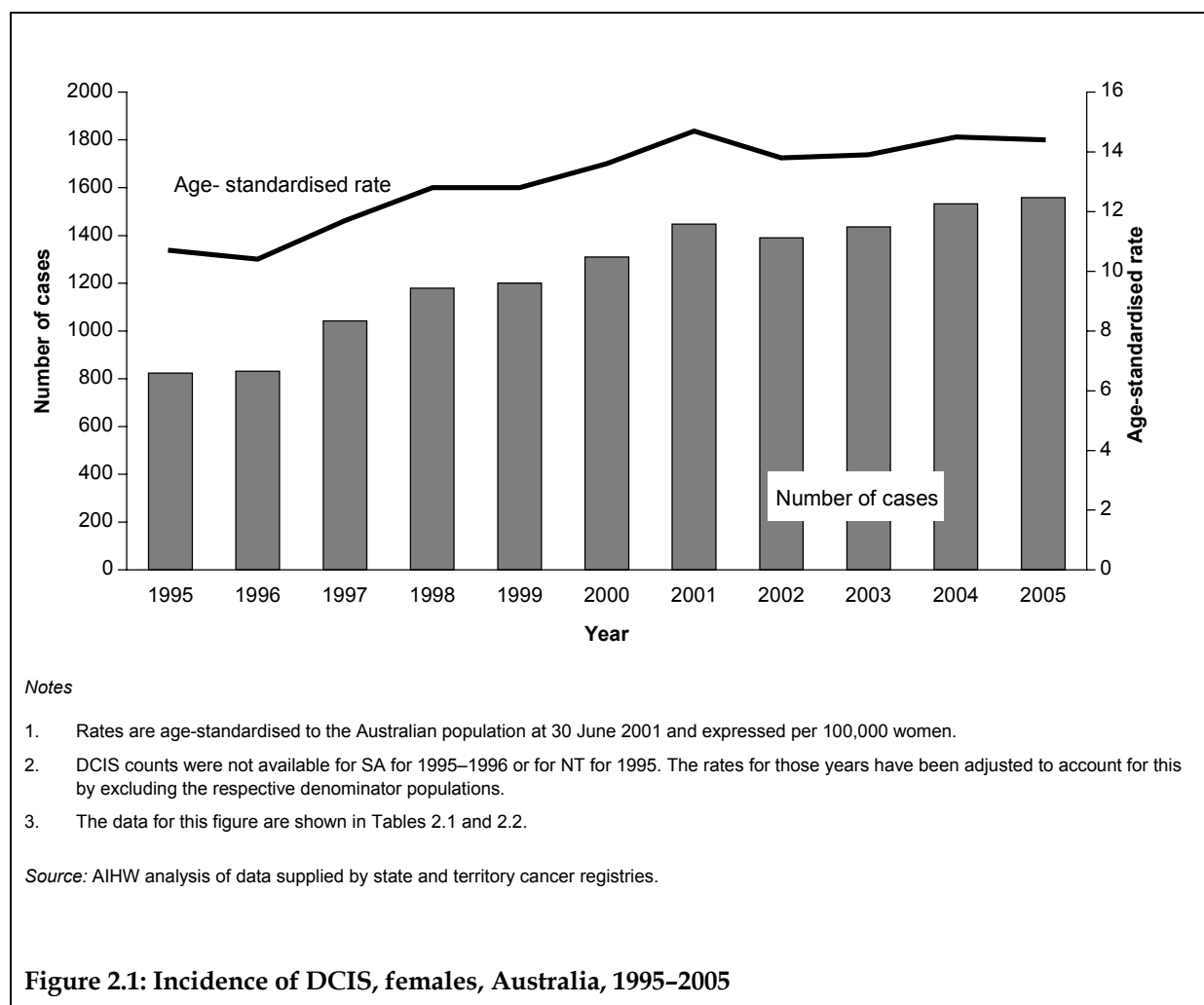
Year	Age (years)						ASR <sup>(a)</sup>	95% CI <sup>(b)</sup>
	Under 40	40–49	50–59	60–69	70–79	80+		
1995	1.0	13.5	32.9	29.2	27.9	9.4	10.7	9.9–11.4
1996	0.8	16.0	29.4	31.6	23.4	10.4	10.4	9.7–11.1
1997	1.1	17.5	33.8	36.9	23.6	7.6	11.7	11.0–12.4
1998	0.9	17.6	35.9	42.0	30.0	13.3	12.8	12.1–13.6
1999	0.8	17.2	39.2	41.9	25.6	12.6	12.8	12.1–13.5
2000	1.1	16.4	41.7	43.3	33.5	9.9	13.6	12.9–14.4
2001	0.7	18.0	43.4	53.2	32.5	12.5	14.7	13.9–15.4
2002	1.1	17.2	40.4	47.0	30.3	11.7	13.8	13.0–14.5
2003	0.8	16.4	39.4	48.8	36.9	11.6	13.9	13.1–14.6
2004	0.9	18.6	41.3	50.9	33.6	12.4	14.5	13.8–15.2
2005	1.1	17.4	40.5	50.8	33.3	15.1	14.4	13.7–15.1

(a) Age-standardised rate. Rates are age-standardised to the Australian population at 30 June 2001 and expressed per 100,000 women. Age-standardisation both within age groups and overall is based on 5-year age groups.

(b) 95% confidence interval for age-standardised rate.

*Note:* DCIS counts were not available for SA for 1995–1996 or for NT for 1995. The rates for those years have been adjusted to account for this by excluding the respective denominator populations.

*Source:* AIHW analysis of data supplied by state and territory cancer registries.



**Table 2.3: Number of cases of DCIS detected through BreastScreen Australia, females, 1996–2005**

Age (years)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
40–49	60	84	105	94	118	104	103	101	113	89
50–59	169	197	267	275	335	349	356	362	370	386
60–69	153	180	223	233	239	297	260	280	313	339
70–79	73	78	95	98	133	133	129	165	127	102
80+	5	7	8	13	12	17	17	10	17	9
<b>Total for 40+</b>	<b>460</b>	<b>546</b>	<b>698</b>	<b>713</b>	<b>837</b>	<b>900</b>	<b>865</b>	<b>918</b>	<b>940</b>	<b>925</b>

*Note:* Although data for 1996 for SA are available from BreastScreen Australia, they are not included in this table to maintain consistency with Table 2.1.

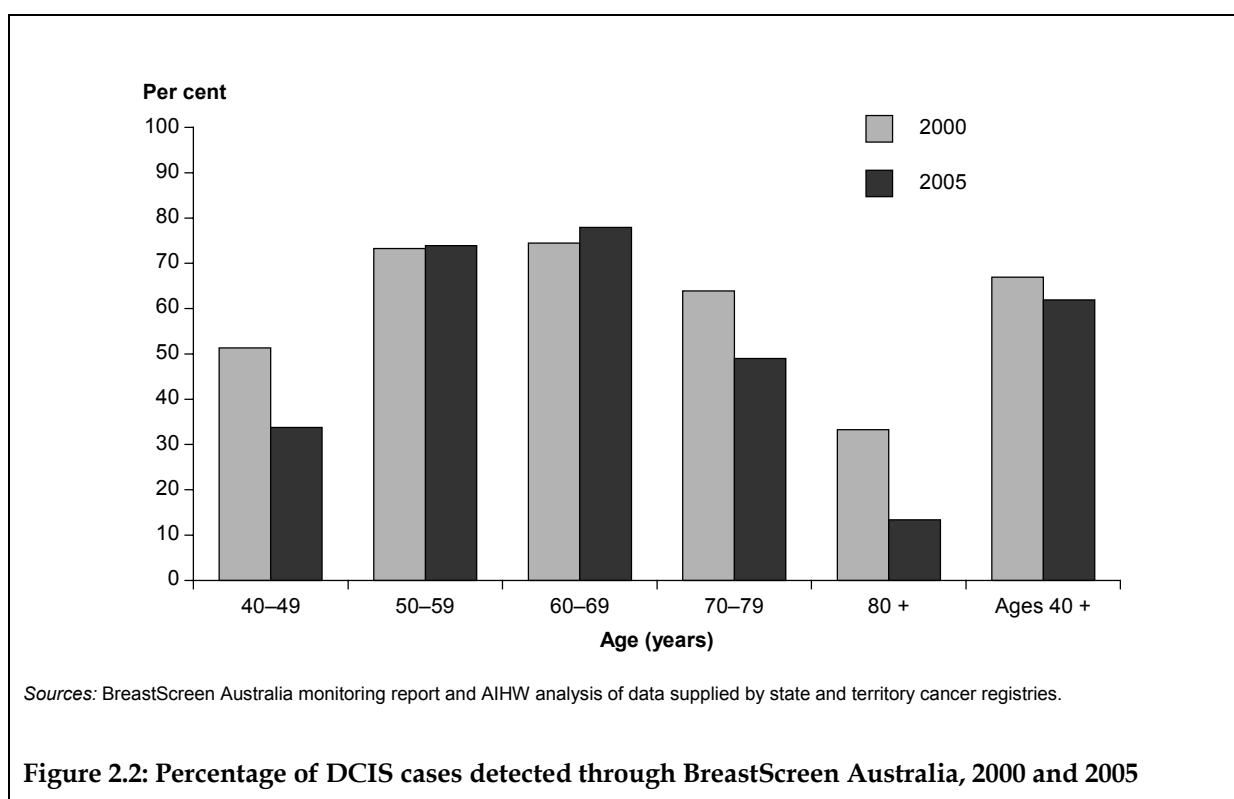
*Source:* BreastScreen Australia monitoring report.

**Table 2.4: Percentage of DCIS cases detected through BreastScreen Australia, females, 1996–2005**

Age (years)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
40–49	30.9	36.1	43.9	39.7	51.3	40.5	41.2	41.6	40.5	33.8
50–59	69.3	60.8	74.0	66.7	73.3	70.2	74.3	74.9	71.2	73.9
60–69	74.6	68.2	73.6	76.1	74.5	73.9	71.4	72.2	74.7	77.9
70–79	60.3	56.5	52.8	62.4	63.9	65.2	67.9	71.4	60.5	49.0
80+	16.7	28.0	17.8	29.5	33.3	35.4	36.2	20.8	32.1	13.4
<b>Total for 40+</b>	<b>57.9</b>	<b>55.5</b>	<b>61.9</b>	<b>61.7</b>	<b>66.9</b>	<b>63.9</b>	<b>65.0</b>	<b>65.9</b>	<b>63.5</b>	<b>61.9</b>

*Note:* Each value in the table is the number of cases of DCIS detected within BreastScreen Australia (Table 2.3) expressed as a percentage of the number of DCIS cases recorded by cancer registries for the same age group (Table 2.1).

*Sources:* BreastScreen Australia monitoring report and AIHW analysis of data supplied by state and territory cancer registries.



# 3 Probability of invasive breast cancer following a diagnosis of DCIS

In this chapter, the probability of diagnosis of invasive breast cancer following an earlier diagnosis of DCIS is presented by age at time of DCIS diagnosis and time elapsing since DCIS diagnosis.

## Brief description of data and method

The data set used in this analysis comprised unit records for all women diagnosed with DCIS in Australia between 1 January 1995 (1996 for NT and 1997 for SA) and 31 December 2005. There were 13,749 such women. The data set also included information on subsequently diagnosed invasive breast cancers prior to 2006 and deaths occurring from any cause prior to 2006.

The Kaplan-Meier product limit technique was used to calculate the probability of diagnosis with invasive breast cancer by period of time following DCIS diagnosis.

It should be noted that the probability computed was that of a woman being diagnosed with *any* histology type of invasive breast cancer, and in *either* breast, irrespective of the breast in which the DCIS was diagnosed. As no treatment data were available, the analysis did not investigate possible effects of differences in treatment of DCIS on risk of subsequent invasive breast cancer.

Details of how the data set was constructed are given in the appendix.

## Results

Following a diagnosis of DCIS, the probability of a woman being diagnosed with an invasive breast cancer was found to be 5.3% within five years and 10.9% within 10 years (Table 3.1, Figure 3.1). These probabilities apply to the whole data set and would not be expected to apply universally to all subgroups of women. For example, the probability of diagnosis with invasive breast cancer following a diagnosis of DCIS was strongly influenced by age at time of the DCIS diagnosis (Table 3.1, Figures 3.2–3.4). The highest probabilities of invasive cancer were seen in women less than 40 years of age at DCIS diagnosis, being 8.4% within 5 years of DCIS diagnosis and 15.5% within 10 years. The lowest probabilities were seen in women aged in their 50s at time of DCIS diagnosis, being 4.4% within 5 years and 8.9% within 10 years.

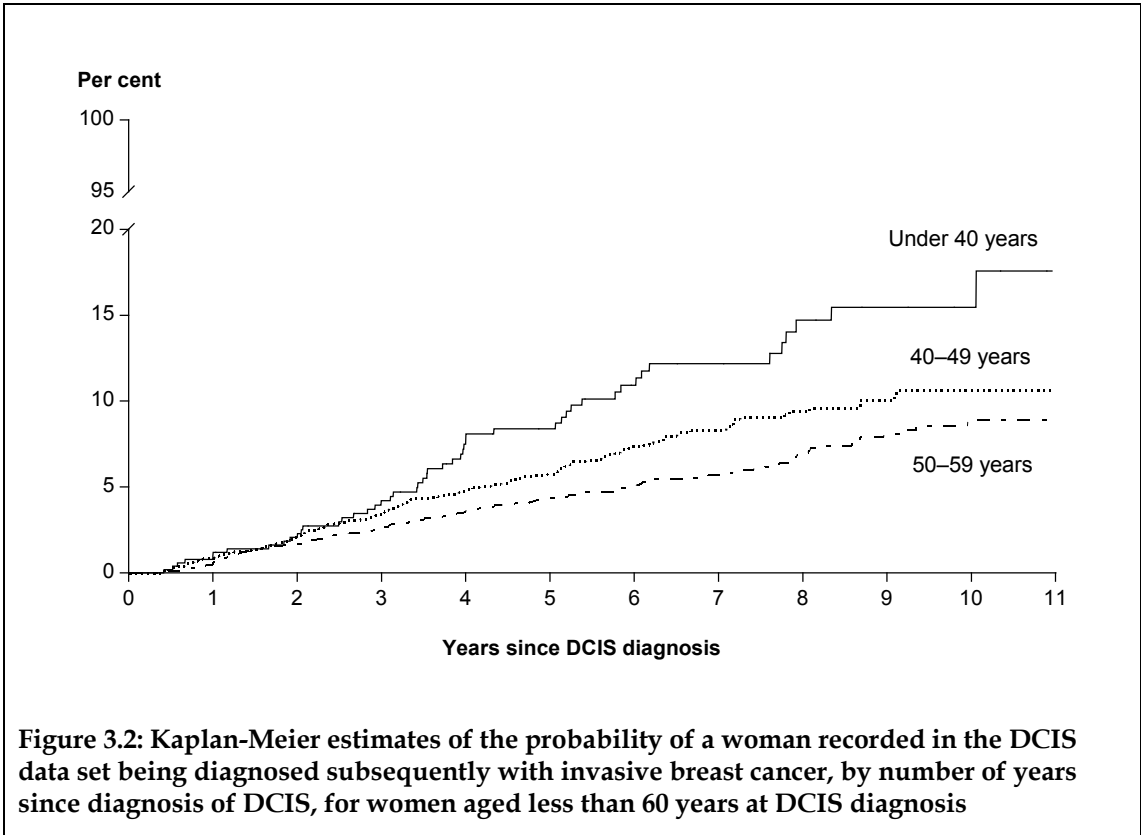
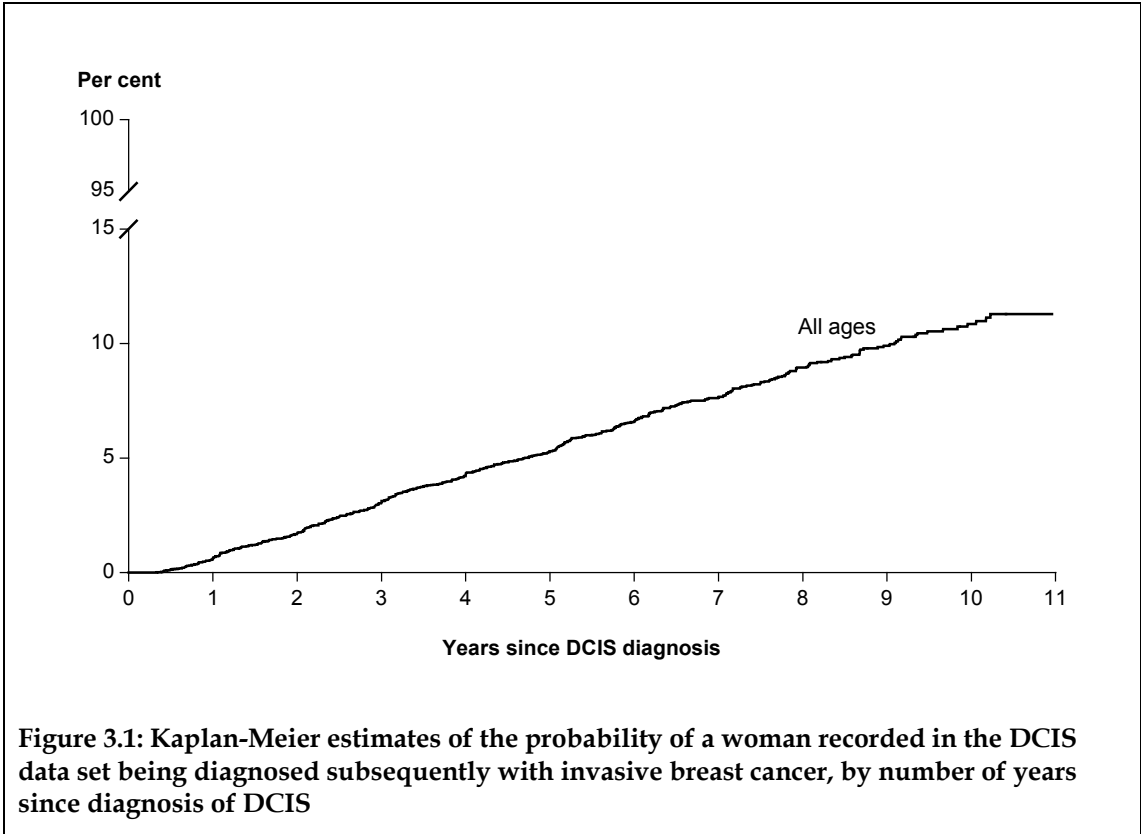


**Table 3.1: Kaplan-Meier estimates of the probability of a female recorded in the DCIS data set being diagnosed subsequently with invasive breast cancer, by age at DCIS diagnosis and number of years since DCIS diagnosis**

Years since DCIS diagnosis	Age at DCIS diagnosis (years)													
	Under 40		40–49		50–59		60–69		70–79		80+		All ages	
	Prob. (%)	95% CI	Prob. (%)	95% CI	Prob. (%)	95% CI	Prob. (%)	95% CI	Prob. (%)	95% CI	Prob. (%)	95% CI	Prob. (%)	95% CI
1	1.0	0.1–1.9	0.9	0.5–1.3	0.7	0.4–0.9	0.3	0.1–0.5	0.5	0.2–0.8	1.7	0.4–3.0	0.6	0.5–0.8
2	2.3	0.9–3.6	2.2	1.6–2.8	1.7	1.3–2.1	1.3	0.9–1.7	1.9	1.2–2.5	2.0	0.6–3.4	1.7	1.5–2.0
3	4.2	2.3–6.1	3.5	2.7–4.3	2.7	2.2–3.2	2.8	2.2–3.5	3.6	2.7–4.6	3.4	1.4–5.4	3.1	2.8–3.5
4	8.1	5.4–10.8	4.8	3.8–5.7	3.7	3.0–4.3	3.7	3.0–4.5	5.0	3.8–6.1	5.6	2.9–8.3	4.3	3.9–4.7
5	8.4	5.6–11.2	5.7	4.7–6.8	4.4	3.6–5.1	5.1	4.2–6.0	6.3	4.9–7.6	5.6	2.9–8.3	5.3	4.8–5.8
6	10.9	7.6–14.2	7.4	6.1–8.7	5.1	4.3–5.9	6.6	5.5–7.7	7.7	6.1–9.3	7.8	4.1–11.4	6.6	6.1–7.2
7	12.2	8.6–15.8	8.3	6.9–9.7	5.7	4.8–6.6	8.0	6.7–9.3	9.1	7.3–11.0	8.6	4.6–12.6	7.7	7.0–8.3
8	14.7	10.4–19.0	9.4	7.8–11.0	6.9	5.7–8.0	9.5	8.0–11.1	10.2	8.2–12.2	8.6	4.6–12.6	9.0	8.2–9.7
9	15.5	11.0–20.0	10.0	8.3–11.8	8.1	6.7–9.5	11.0	9.1–12.9	10.5	8.4–12.6	8.6	4.6–12.6	9.9	9.1–10.8
10	15.5	11.0–20.0	10.6	8.7–12.6	8.9	7.2–10.6	12.5	10.2–14.8	11.8	9.0–14.5	8.6	4.6–12.6	10.9	9.8–11.9

Note: The 'Prob. (%)' column gives the estimated probability, expressed as a percentage, of diagnosis with invasive breast cancer, by age at DCIS diagnosis and number of years elapsing since DCIS diagnosis. The '95% CI' column gives a 95% confidence interval for the estimated probability.

Source: AIHW analysis of data supplied by state and territory cancer registries.



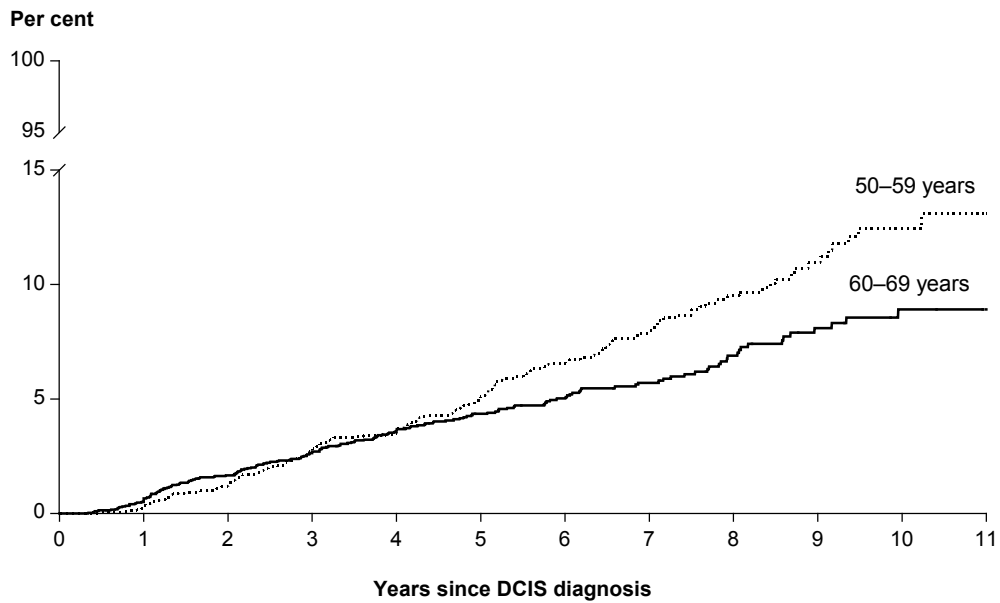


Figure 3.3: Kaplan-Meier estimates of the probability of a woman recorded in the DCIS data set being diagnosed subsequently with invasive breast cancer, by number of years since diagnosis of DCIS, for women aged 50 to 69 years at DCIS diagnosis

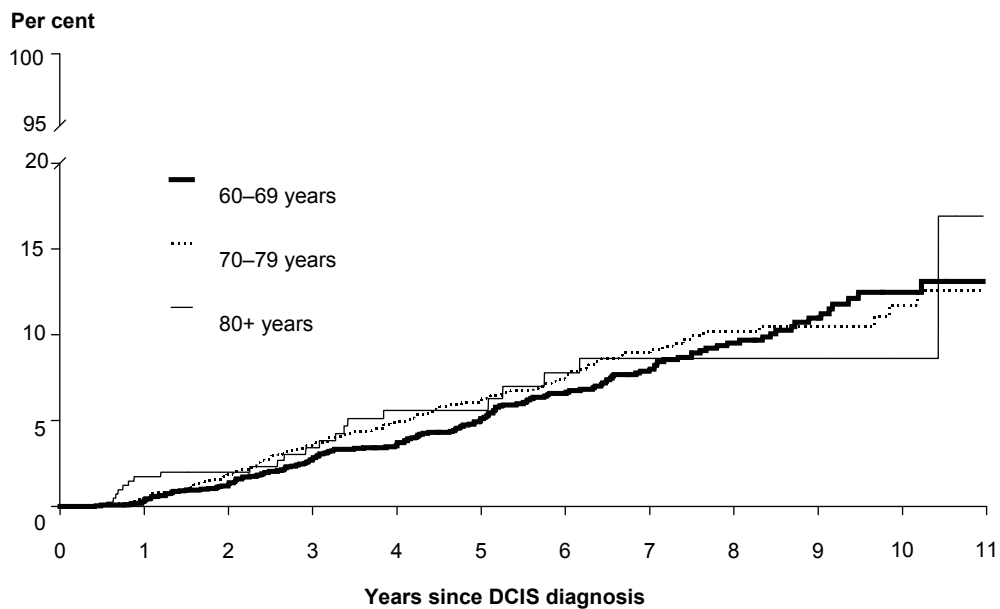


Figure 3.4: Kaplan-Meier estimates of the probability of a woman recorded in the DCIS data set being diagnosed subsequently with invasive breast cancer, by number of years since diagnosis of DCIS, for women aged 60 years or over at DCIS diagnosis

## 4 Relative risk of invasive breast cancer for women diagnosed with DCIS

In the previous chapter, the probability of diagnosis with invasive breast cancer by time elapsed since diagnosis with DCIS was described. In this chapter, complementary information is provided by comparing this probability with the probability of invasive breast cancer generally encountered by Australian women. The purpose is to assess whether diagnosis of DCIS is an indicator of increased risk of a subsequent diagnosis of invasive breast cancer, and, if so, the magnitude of the increased risk.

### Brief description of method

The incidence rate of invasive breast cancer for all Australian women by age and calendar year was used to compute the number of invasive breast cancers that would be *expected* in the DCIS cohort, if these cohort women had the same risk of invasive breast cancer as all Australian women. The actual number of invasive breast cancers observed in the DCIS cohort was compared with this 'expected' number. The observed number divided by the expected number was used as an estimate of the 'relative risk' of invasive breast cancer for the women in the DCIS cohort. For example, if the number observed was twice the number expected, the relative risk would be 2.

### Results

Women who had been diagnosed with DCIS were at greater risk of being diagnosed with invasive breast cancer than were Australian women overall (of similar age). The relative risk of invasive breast cancer for women in the DCIS cohort was 3.9 (Table 4.1). That is, women diagnosed with DCIS were, on average, 3.9 times as likely to develop invasive breast cancer as generally seen for Australian women of similar age. This figure is a little lower than the relative risk of 4.5 estimated in a Swedish study (Wärnberg et al. 2000), although the results were subject to influence from differences in methodology and possible differences in the age structures of the cohorts of women studied.

The relative risk varied by age at DCIS diagnosis and was greater for younger women (Table 4.1). For women aged less than 40 years of age at DCIS diagnosis, the relative risk was 19.8 and for women age 40 to 49 years, the relative risk was 5.6. For women aged 50 years and over the relative risk ranged between 3.0 and 4.2.

In order to determine if the relative risk had changed over the period under study, the relative risk by year of DCIS diagnosis was calculated (Table 4.2). Although the risk was variable from year to year, the data suggest a decreasing risk over the period of study.

A further question was whether the relative risk varied by the period of follow-up. Table 4.3 indicates that the relative risk in the period up to five years from DCIS diagnosis was 3.6. This was lower than the relative risk of 5.3 seen in the subsequent period from 5 up to 11 years. This suggests that women previously diagnosed with DCIS and not diagnosed with invasive breast cancer within 5 years have an even greater relative risk of being diagnosed in the next 5 years.

**Table 4.1: Relative risk of developing invasive breast cancer by end of 2005 for women diagnosed with DCIS in 1995–2005, by age group, Australia**

Age at DCIS diagnosis (years)	Number of women in DCIS cohort	Number of women in DCIS cohort expected to develop invasive breast cancer (E)	Number of women in DCIS cohort who did develop invasive breast cancer (O)	Relative risk (O/E)	95% confidence interval for relative risk
Under 40	555	2.5	50	19.8	14.2–25.4
40–49	2,583	26.9	151	5.6	4.7–6.5
50–59	4,560	62.6	186	3.0	2.5–3.4
60–69	3,595	53.4	182	3.4	2.9–3.9
70–79	1,987	28.3	115	4.1	3.3–4.8
80+	469	5.3	22	4.2	2.4–5.9
<b>Total</b>	<b>13,749</b>	<b>179.0</b>	<b>706</b>	<b>3.9</b>	<b>3.6–4.2</b>

Source: AIHW analysis of data supplied by state and territory cancer registries.

**Table 4.2: Relative risk of developing invasive breast cancer by end of 2005 for women diagnosed with DCIS in 1995–2005, by year of DCIS diagnosis, Australia**

Year of DCIS diagnosis	Number of women in DCIS cohort	Number of women in DCIS cohort expected to develop invasive breast cancer (E)	Number of women in DCIS cohort who did develop invasive breast cancer (O)	Relative risk (O/E)	95% confidence interval for relative risk
1995	824	22.6	94	4.2	3.3–5.0
1996	832	20.8	80	3.8	3.0–4.7
1997	1,042	23.4	109	4.7	3.8–5.5
1998	1,179	23.6	112	4.7	3.9–5.6
1999	1,200	21.0	81	3.8	3.0–4.7
2000	1,309	19.5	80	4.1	3.2–5.0
2001	1,447	17.7	52	2.9	2.1–3.8
2002	1,390	12.8	49	3.8	2.7–4.9
2003	1,436	9.6	27	2.8	1.7–3.9
2004–2005	3,090	8.0	22	2.8	1.6–3.9
<b>Total</b>	<b>13,749</b>	<b>179.0</b>	<b>706</b>	<b>3.9</b>	<b>3.6–4.2</b>

Note: Due to the observation period ending in 2005, DCIS diagnoses in 2005 have been combined with those in 2004 for analysis purposes.

Source: AIHW analysis of data supplied by state and territory cancer registries.

**Table 4.3: Relative risk of developing invasive breast cancer by end of 2005 for women diagnosed with DCIS in 1995–2005, by period of follow-up, Australia**

Period of follow-up (years since DCIS diagnosis)	Number of women in DCIS cohort who could be observed for part or all of this period	Number of women		Relative risk (O/E)	95% confidence interval for relative risk
		in DCIS cohort expected to develop invasive breast cancer during this period (E)	in DCIS cohort who did develop invasive breast cancer during this period (O)		
Less than 5	13,749	141.9	510	3.6	3.3–3.9
5 to less than 11	6,126	37.1	196	5.3	4.5–6.0
<b>Less than 11</b>	<b>13,749</b>	<b>179.0</b>	<b>706</b>	<b>3.9</b>	<b>3.6–4.2</b>

Source: AIHW analysis of data supplied by state and territory cancer registries.

## 5 Tumour size and nodal status

Breast cancers have many characteristics that influence treatment requirements and prognosis. Two such characteristics available for this study were tumour size and whether there was evidence of cancer spread to regional lymph nodes. In this chapter, these characteristics are described for invasive breast cancers occurring in women in the DCIS cohort and compared with corresponding characteristics in all Australian women diagnosed with invasive breast cancer (that is, irrespective of whether there was a previous DCIS diagnosis).

Following treatment for DCIS, women are generally advised to be placed under closer medical surveillance than women without a DCIS or invasive breast cancer history. Under such surveillance, it might be predicted that invasive cancers would be detected at an earlier stage than might otherwise occur, with smaller sizes and with potentially less evidence of nodal spread. Therefore it is expected that the sizes of the tumours that developed in the women in the DCIS cohort would tend to be smaller than those in the general population and that fewer of the cancers would have spread to nearby lymph nodes.

### Brief description of data and method

When an invasive breast cancer is removed, the surgeon usually removes at least one regional lymph node to check for cancer. If cancer is found, the tumour is said to have *positive nodal status* or to be *node-positive*. Otherwise the tumour is regarded as *node-negative*. The nodal status may be recorded as unknown if no nodes are examined or if the pathologist's analysis is inconclusive. The excised tumour is also studied in a pathology laboratory to determine its diameter and other prognostic characteristics.

In this study, the tumour size and nodal status of invasive breast cancers in the DCIS cohort were compared with corresponding characteristics of all invasive breast cancers diagnosed in Australian women in 1997. The 1997 data had been collected as part of a previous study of breast cancers in Australian women (AIHW & NBCC 2001; AIHW & NBCC 2007). For the purposes of the present study, tumours that were of unknown size were excluded from comparisons of size and those of unknown nodal status were excluded from comparisons of nodal status.

The distributions of tumour sizes in the cohort of all Australian women diagnosed with invasive breast cancer in 1997 are shown by age in Table 5.1. Applying these distributions to the DCIS cohort yielded the numbers of cancers of each size that would be expected in the DCIS cohort if the same size distributions were to apply as in the 1997 cohort (Table 5.2). The actual distributions of sizes observed in the DCIS cohort are shown in Table 5.3. The statistically significant differences between the observed and expected numbers are shown in Table 5.4. The statistical test used to detect differences is explained in the appendix.

Tables 5.5 to 5.8 show the analogous data for nodal status.

## Results

As predicted, tumour sizes tended to be smaller for the invasive breast cancers in the DCIS cohort than in the 1997 cohort of all invasive breast cancer cases (Table 5.4). There were more tumours in the smallest size category (10 mm or less) and fewer in the larger size categories than would have been expected from the 1997 cohort. This trend was the same in all the age groups though not as pronounced in women under 40 years of age.

Also as predicted, there were considerably fewer node-positive cancers in the women in the DCIS cohort compared to the 1997 cohort. A separate analysis for each age group (Table 5.8) showed that this finding was statistically significant for two of the age groups, namely women aged 40 to 49 years and women aged 70 years and over. Only a small difference was seen for women under 40 years of age.

The analysis in this chapter confirmed the prediction that invasive breast cancers in the DCIS cohort tended to be found at an earlier stage, when a better prognosis would be expected. Both diameter and nodal status are well-established predictors of survival. In the 1997 cohort of all Australian women diagnosed with invasive breast cancer, better 5-year relative survivals were found for women with smaller tumours and for those whose tumours were node-negative (AIHW & NBCC 2007).

**Table 5.1: Observed distribution of tumour sizes for new cases of invasive breast cancer in Australian women for whom tumour size was known, 1997**

Size of tumour	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
0–10 mm	123	19.8	344	19.6	587	25.5	511	26.0	413	18.0	1,978
11–15 mm	132	21.3	405	23.1	585	25.4	510	25.9	516	22.4	2,148
16–19 mm	86	13.9	199	11.3	270	11.7	218	11.1	289	12.6	1,062
20–29 mm	145	23.4	454	25.9	469	20.4	433	22.0	591	25.7	2,092
30+ mm	134	21.6	353	20.1	391	17.0	294	15.0	490	21.3	1,662
<b>Total</b>	<b>620</b>	<b>100</b>	<b>1,755</b>	<b>100</b>	<b>2,302</b>	<b>100</b>	<b>1,966</b>	<b>100</b>	<b>2,299</b>	<b>100</b>	<b>8,942</b>

### Notes

1. Tumour sizes are rounded to the nearest millimetre.
2. The DCIS status of women in this cohort was unknown.
3. Excluded from the table and percentages are 1,075 women with unknown tumour size. There were 59 aged under 40 years, 153 aged 40–49, 172 aged 50–59, 163 aged 60–69 and 528 aged 70 years or over.

Source: AIHW & NBCC 2007.



**Table 5.2: Expected distribution of tumour sizes for those women in the DCIS cohort who developed invasive breast cancer and had known tumour size, based on the 1997 distribution**

Size of tumour	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
0–10 mm	6.0	19.8	19.8	19.6	31.9	25.5	32.2	26.0	14.4	18.0	104.2
11–15 mm	6.4	21.3	23.3	23.1	31.8	25.4	32.2	25.9	18.0	22.4	111.6
16–19 mm	4.2	13.9	11.5	11.3	14.7	11.7	13.7	11.1	10.1	12.6	54.1
20–29 mm	7.0	23.4	26.1	25.9	25.5	20.4	27.3	22.0	20.6	25.7	106.5
30+ mm	6.5	21.6	20.3	20.1	21.2	17.0	18.5	15.0	17.1	21.3	83.6
<b>Total</b>	<b>30</b>	<b>100</b>	<b>101</b>	<b>100</b>	<b>125</b>	<b>100</b>	<b>124</b>	<b>100</b>	<b>80</b>	<b>100</b>	<b>460</b>

*Notes*

1. Tumour sizes are rounded to the nearest millimetre.
2. Excluded from the table and percentages are 246 women with unknown tumour size. There were 20 aged under 40 years, 50 aged 40–49, 61 aged 50–59, 58 aged 60–69 and 57 aged 70 years or over.

Source: AIHW analysis of data supplied by state and territory cancer registries.

**Table 5.3: Observed distribution of tumour sizes for those women in the DCIS cohort who developed invasive breast cancer and for whom tumour size was known**

Size of tumour	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
0–10 mm	12	40.0	47	46.5	52	41.6	51	41.1	32	40.0	194
11–15 mm	4	13.3	23	22.8	34	27.2	31	25.0	15	18.8	107
16–19 mm	3	10.0	8	7.9	11	8.8	8	6.5	5	6.3	35
20–29 mm	6	20.0	10	9.9	18	14.4	18	14.5	14	17.5	66
30+ mm	5	16.7	13	12.9	10	8.0	16	12.9	14	17.5	58
<b>Total</b>	<b>30</b>	<b>100</b>	<b>101</b>	<b>100</b>	<b>125</b>	<b>100</b>	<b>124</b>	<b>100</b>	<b>80</b>	<b>100</b>	<b>460</b>

*Notes*

1. Tumour sizes are rounded to the nearest millimetre.
2. Excluded from the table and percentages are 246 women with unknown tumour size. There were 20 aged under 40 years, 50 aged 40–49, 61 aged 50–59, 58 aged 60–69 and 57 aged 70 years or over.

Source: AIHW analysis of data supplied by state and territory cancer registries.

**Table 5.4: Statistically significant differences in observed versus expected number of invasive breast cancers, by age and tumour size, for the women in the DCIS cohort who developed invasive breast cancer**

Size of tumour	Age at diagnosis (years)				
	Under 40	40–49	50–59	60–69	70+
0–10 mm	Higher	Higher	Higher	Higher	Higher
11–15 mm					
16–19 mm					Lower
20–29 mm		Lower	Lower	Lower	Lower
30+ mm		Lower	Lower		

*Notes*

1. Tumour sizes are rounded to the nearest millimetre.
2. 'Higher' (respectively 'Lower') means that the number of observed invasive cancers was statistically significantly higher (respectively lower) than the number expected, using a 5% level of significance. A blank entry means that there was no statistically significant difference between observed and expected numbers. The method used to test for a difference is explained in the appendix.

**Table 5.5: Observed distribution of nodal status for all new cases of invasive breast cancer in Australian women for whom nodal status was known, 1997**

Nodal status	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
Positive	275	48.2	736	45.9	799	38.2	591	35.0	600	36.3	3,001
Negative	295	51.8	869	54.1	1,295	61.8	1,099	65.0	1,054	63.7	4,612
<b>Total</b>	<b>570</b>	<b>100</b>	<b>1,605</b>	<b>100</b>	<b>2,094</b>	<b>100</b>	<b>1,690</b>	<b>100</b>	<b>1,654</b>	<b>100</b>	<b>7,613</b>

*Notes*

1. The DCIS status of women in this cohort was unknown. Some of them would have had a prior diagnosis of DCIS.
2. Excluded from the table and percentages are 2,404 women with unknown nodal status. There were 109 aged under 40 years, 303 aged 40–49, 380 aged 50–59, 439 aged 60–69 and 1,173 aged 70 years and over.

Source: AIHW & NBCC 2007.

**Table 5.6: Expected distribution of nodal status for those women in the DCIS cohort who developed invasive breast cancer and had known nodal status, based on the 1997 distribution**

Nodal status	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
Positive	8.2	48.2	30.3	45.9	34.3	38.2	31.5	35.0	15.6	36.3	119.9
Negative	8.8	51.8	35.7	54.1	55.7	61.8	58.5	65.0	27.4	63.7	186.1
<b>Total</b>	<b>17</b>	<b>100</b>	<b>66</b>	<b>100</b>	<b>90</b>	<b>100</b>	<b>90</b>	<b>100</b>	<b>43</b>	<b>100</b>	<b>306</b>

Note: Excluded from the table and percentages are 400 women with unknown nodal status. There were 33 aged under 40 years, 85 aged 40–49, 96 aged 50–59, 92 aged 60–69 and 94 aged 70 years and over.

Source: AIHW analysis of data supplied by state and territory cancer registries.

**Table 5.7: Observed distribution of nodal status for those women in the DCIS cohort who developed invasive breast cancer and for whom nodal status was known**

Nodal status	Age at diagnosis (years)										Total number
	Under 40		40–49		50–59		60–69		70+		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
Positive	7	41.2	21	31.8	27	30.0	27	30.0	10	23.3	92
Negative	10	58.8	45	68.2	63	70.0	63	70.0	33	76.7	214
<b>Total</b>	<b>17</b>	<b>100</b>	<b>66</b>	<b>100</b>	<b>90</b>	<b>100</b>	<b>90</b>	<b>100</b>	<b>43</b>	<b>100</b>	<b>306</b>

*Note:* Excluded from the table and percentages are 400 women with unknown nodal status. There were 33 aged under 40 years, 85 aged 40–49, 96 aged 50–59, 92 aged 60–69 and 94 aged 70 years and over.

*Source:* AIHW analysis of data supplied by state and territory cancer registries.

**Table 5.8: Statistically significant differences in observed versus expected number of invasive breast cancers, by age and nodal status, for the women in the DCIS cohort who developed invasive breast cancer**

Size of tumour	Age at diagnosis (years)				
	Under 40	40–49	50–59	60–69	70+
Positive		Lower			Lower
Negative		Higher			Higher

*Note:* 'Higher' (respectively 'Lower') means that the number of observed invasive cancers was statistically significantly higher (respectively lower) than the number expected, using a 5% level of significance. A blank entry means that there was no statistically significant difference between observed and expected numbers. The method used to test for a difference is explained in the appendix.