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Patterns of axillary lymph node metastases and recurrent disease in grade 1 breast cancer in a New Zealand cohort: Does ethnicity matter?

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ABSTRACT

Background: In New Zealand, Māori and Pacific women are more likely than New Zealand/European women to present at a younger age with larger tumours and metastatic disease. Survival rates are also differential by ethnicity. Many factors are believed to be responsible for this including differences in comorbidities, delays to presentation and delays in treatment. It is unclear whether these differences exist amongst women with grade 1 cancer in New Zealand. Therefore, we examined patterns of axillary nodal involvement, recurrent disease and mortality in grade 1 breast cancer in New Zealand women, and whether ethnicity was an important predictor for any of these outcomes.

Method: Data was retrieved from the Auckland Breast Cancer Registry (ABCR) and the Waikato Breast Cancer Registry (WBCR) which are prospective, population-based databases. All women newly diagnosed with grade 1 primary invasive breast cancer between 1 June 2000 and 31 May 2013 were identified from the two registries.

Results: There were 2857 grade 1 breast cancers diagnosed over this time period. Axillary lymph nodes were involved in 19.0% of women, and 5.1% developed recurrent disease (locoregional or distant). Pacific and Māori women were more likely than NZ European women to have larger tumours and lymphovascular invasion (LVI). Predictors for axillary node involvement were tumour size greater than 10 mm, LVI and non-screen detected cancers. Tumour size greater than 10 mm, lobular carcinoma and BCS without radiotherapy were predictive of recurrent and or metastatic disease. Ethnicity was not observed to be an independent predictor for axillary nodal involvement, recurrent and/or metastatic disease, or breast cancer specific mortality amongst New Zealand women with grade 1 breast cancer.

Conclusion: Ethnicity was not a predictor of axillary node involvement, recurrent disease or mortality in grade 1 breast cancer in our population.

1. Background

Breast cancer is the most common cancer amongst New Zealand women and the second most common cause of cancer death. There are four main ethnic groups in New Zealand: (1.) NZ European (2.) Māori (3) people from the islands in the Pacific region, and (4.) a substantial Asian ethnic group. By the 2006 census, the New Zealand population was just over 4 million with 65% NZ European, 14% Māori, 7% Pacific, 9% Asian and around 11% identifying with other ethnic groups [1]. Previous analyses have shown that Māori and Pacific women have a disproportionate burden of poorly differentiated invasive breast cancer compared to NZ European women and are more likely to be younger, have larger tumours and distant disease [2,3]. Adjusting for these factors attenuates differences in survival between Pacific and NZ European women but it does not improve the disparity between Māori and NZ European women [2].

Axillary lymph node status is the single most important prognostic factor in breast cancer [4,5]. The underlying pathways of lymph node involvement remain unclear but predictors of axillary lymph node involvement in early breast cancer include increasing tumour size, higher grade, lymphovascular invasion (LVI), younger age, multifocality, and retro-areolar or lateral tumour location [6–8]. Whilst there is a substantial body of literature looking at node involvement in early breast cancer, these are largely based on size criteria [9,10]. However, whereas size is

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representative of tumour chronology, that is, how long it has been present, inherent tumour biology is also an important factor [11]. It has been suggested that ethnic differences in tumour biology may contribute towards ethnic disparities in disease presentation and outcome [12]; and there is a small body of literature that supports this [13–16].

In the United States, black women are twice as likely to die from early stage breast cancer than non-hispanic white women, and this is attributed to biological differences [16]. To our knowledge, there is no work looking at ethnic differences in the behaviour of low grade breast cancers in New Zealand, and specifically, whether ethnicity is a predictor of poor outcome in grade 1 disease. Survival rates in low-grade breast cancer are excellent and therefore any differences in outcome might suggest biological differences. grade 1 breast cancer makes up nearly 40% of screen detected cancers in New Zealand and 19% of non-screen detected cancers [17]. Screening coverage is variable between ethnicities with rates of uptake ranging from 54% to 79% for Māori across NZ [18] whilst NZ European women have achieved target coverage of 70% since 2010 [19]. Lower rates of screen detected breast cancer amongst Māori women is an important contributor to more advanced disease at diagnosis and lower survival rates than their NZ European counterparts [20]. In addition to this, recent work has reported that Māori and Pacific women in New Zealand are less likely to adhere to their adjuvant hormonal therapy and more likely to have significant delays to adjuvant radiotherapy [21,22]. It is unclear whether these important differences in presentation and outcome exist amongst women with grade 1 breast cancer in New Zealand.

The major aims of our study were to: (i) analyse disease characteristics by ethnicity for women in NZ presenting with grade 1 breast cancer, (ii) identify predictive factors for axillary lymph node involvement and recurrent disease in grade 1 breast cancer amongst NZ women, (iii) identify predictive factors for breast cancer specific mortality in grade 1 breast cancer amongst New Zealand women.

2. Method

2.1. Study population

Data were retrieved from the Auckland Breast Cancer Registry (ABCR) and the Waikato Breast Cancer Registry (WBCR) which are prospective, population-based databases. All women newly diagnosed with grade 1 primary invasive breast cancer between 1 June 2000 and 31 May 2013 were identified from the two registries. The WBCR commenced in 1999 and the ABCR in 2000. Coverage for the WBCR data is complete for 98% of all cancers within the Waikato region [20]. Prior to 2012, inclusion of women in the ABCR required patient consent and this was not achieved in less than 10% of new breast cancers. Following approval by the regional ethics committee, inclusion of all women within the Auckland region is automatic and coverage has reached 99%. The database contains patient demographics, risk factors, preoperative scans and pathology, surgical data, histopathology, treatment details, an annual update of outcome data (local/regional recurrence, metastasis and disease-free survival), cause and date of death.

2.2. Study covariates

Patient ethnicity was identified from the respective registry, which records self-assigned ethnicity; this is collected as per the Ministry of Health ethnicity data protocols [23]. Previous work has demonstrated that misclassification of ethnicity on the cancer registry resulted in an undercount of nearly a third for Māori cancer registrants (compared to census ethnicity), and this dropped to a 15% undercount by 2004 [24]. Ethnicity was categorized into Māori, Pacific, Asian, NZ European, other and unknown.

Cancer stage at diagnosis was defined according to the tumour, node, and metastasis (TNM) staging system [25]. Oestrogen (ER) and progesterone (PR) receptor status was determined based on the results of immunohistochemistry tests and classified as positive or negative. Human epidermal growth factor receptor 2

Table 1
Distribution of biological characteristics by ethnicity amongst women with grade 1 breast cancer.

Characteristic		NZ European		Māori		Pacific		Asian		
		n	%	*n*	%	*n*	%	*n*	%	*p*
Size	<10 mm	856	39.7%	74	31.2%	39	30.2%	79	39.3%	<0.001
	10–20 mm	884	41.0%	99	41.8%	43	33.3%	80	39.8%	
	20–50 mm	367	17.0%	51	21.5%	33	25.6%	36	17.9%	
	>50 mm	50	2.3%	13	5.5%	14	10.9%	6	3.0%	
LN	N0	1640	79.6%	166	73.5%	93	74.4%	160	83.3%	0.101
	N1	339	16.4%	50	22.1%	24	19.2%	27	14.1%	
	N2	72	3.5%	6	2.7%	8	6.4%	4	2.1%	
	N3	10	0.5%	4	1.8%	0	0.0%	1	0.5%	
	Unknown	99		12		5		10		
ER/PR	Negative	2100	97.9%	232	98.3%	125	99.2%	197	98.5%	0.134
	Positive	45	2.1%	4	1.7%	1	0.8%	3	1.5%	
	Unknown	15		2		4		2		
HER-2	Negative	1505	94.6%	192	96.0%	101	97.1%	162	97.6%	0.001
	Equivocal	45	2.8%	3	1.5%	0	0.0%	1	0.6%	
	Positive	41	2.6%	5	2.5%	3	2.9%	3	1.8%	
	Unknown	569		38		26		36		
LVI	Negative	1996	92.4%	208	87.4%	113	86.9%	185	91.6%	0.011
	Positive	164	7.6%	30	12.6%	17	13.1%	17	8.4%	

LN—lymph nodes; ER/PR—oestrogen and progesteron receptor status; HER-2—human epidermal growth factor receptor 2; LVI—lymphovascular invasion.