

Ethnicity and Birthplace in Relation to Tumor Size and Stage in Asian American Women With Breast Cancer

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ABSTRACT

Objectives. This study examined whether Asian American women with breast cancer have tumor characteristics associated with delayed detection of their disease.

Methods. Breast cancer size and stage were examined in relation to subjects' ethnic group and birthplace, on the basis of Surveillance, Epidemiology, and End Results program data.

Results. Asian-born Asian American women with breast cancer had a greater proportion of tumors larger than 1 cm at diagnosis (79%) than did US White women (70%) ($P < .001$). In contrast, the proportion of tumors larger than 1 cm among Asian American women born in the United States (67%) did not differ significantly from that among US White women.

Conclusions. Lower utilization of breast cancer screening by Asian-born Asian American women is probably responsible for their greater proportion of tumors larger than 1 cm relative to US White women in the study population. Interventional measures should be taken to increase the use of mammographic screening by first-generation Asian American women. (*Am J Public Health*. 1999;89:1248-1252)

Asian Americans make up almost 3% of the US population and are the fastest-growing ethnic group in the United States.¹ Among Asian American women, breast cancer is the most common malignancy and the second leading cause of cancer mortality.^{2,3} Because screening mammography increases early breast cancer detection and significantly reduces breast cancer mortality,⁴⁻⁶ the finding that Asian American women less often report using mammography than do women in the general US population is a matter of concern.^{2,7-14}

We conducted a study to determine whether Asian American women with breast cancer had tumors of larger size or disease of a later stage at diagnosis, as indicators of delayed tumor detection relative to that among US White women. We further assessed whether these tumor characteristics varied by racial/ethnic group and by place of birth (Asia vs the United States), as an indicator of acculturation.

Methods

Study Subjects and Data Collection

The study subjects were Asian American women in 5 cancer Surveillance, Epidemiology, and End Results (SEER)¹⁵ program regions, in whom a diagnosis of incident primary in situ or invasive breast cancer had been made at 40 years or older between 1988 and 1994. Non-Hispanic White women meeting these criteria were used as a comparison group. The SEER program regions used in the study were the Seattle/Puget Sound, Hawaii, San Francisco/Oakland, San Jose/Monterey, and Los Angeles regions, because they have the largest Asian American populations.

The regional SEER registries obtain case information primarily through abstraction of hospital and pathology-laboratory records.¹⁵ Further data are obtained from death certificates.

We categorized Asian American women into the 6 ethnic categories of Chinese, Japanese, Filipino, Korean, Southeast Asian, and Asian Indian/Pakistani, and into the 2 birthplace categories of the United States and Asia. Because of the small number of subjects in the SEER program who belonged to

each of the respective subgroups, we combined Vietnamese, Laotian, Hmong, and Cambodian women into the single category of Southeast Asian women.

Statistical Analysis

We examined 2 outcomes: tumor size, categorized as less than 1 cm vs greater than 1 cm, and disease stage at diagnosis, classified as in situ/localized (early stage) vs regional/distant (advanced stage). Data on tumor size were missing for 12.0% of White and 12.8% of Asian American women, and data on disease stage were missing for 2.3% of White and 1.6% of Asian American women. These women were excluded from the respective analyses.

Logistic regression analysis was used¹⁶ to evaluate the relationship of ethnicity and/or birthplace to breast cancer tumor size and stage at diagnosis. The odds ratios were adjusted for age at diagnosis (40-49, 50-59, 60-69, 70-79, ≥ 80 years of age), year of diagnosis (1988-1990, 1991-1992, 1993-1994), and SEER registry region.

Results

We identified 4485 Asian American women and 33 225 non-Hispanic White women who met the study criteria. Ethnic and demographic data for the study subjects are presented in Table 1. White and Japanese American subjects tended to be older than women of other ethnicities. The majority of Japanese American women were born in the United States, while women of other Asian ethnicities were more likely to have been born in Asia.

Table 2 gives the proportions and odds ratios (ORs) and confidence intervals (CIs), by race and ethnicity, for breast cancer tumor

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TABLE 1—Characteristics of Study Subjects by Race/Ethnicity

	White	Asian ^a	Chinese	Japanese	Filipino	Korean	Southeast Asian	Indian/Pakistani
Number	33 225	4485	1068	1896	1165	155	113	88
SEER region, %								
San Francisco	36.0	30.8	57.2	10.6	39.7	14.8	35.4	52.3
Hawaii	3.6	44.9	22.4	72.2	29.4	37.4	3.5	4.6
Seattle/Puget Sound	38.4	7.6	4.9	6.4	9.4	18.1	15.9	11.4
San Jose/Monterey	5.1	3.6	3.1	1.9	4.4	4.5	20.4	11.4
Los Angeles	16.9	13.1	12.5	9.0	17.2	25.2	24.8	20.5
Year of diagnosis, %								
1988–1990	32.3	32.4	32.3	35.6	30.1	26.5	14.2	29.6
1991–1992	33.7	33.4	32.6	32.7	35.4	34.8	30.1	33.0
1993–1994	34.0	34.3	35.1	31.8	34.5	38.7	55.8	37.5
Age at diagnosis, %								
40–49 y	20.0	26.3	27.1	17.0	35.5	47.7	46.9	34.1
50–59 y	20.5	23.9	22.5	21.2	28.1	30.3	30.1	26.1
60–69 y	25.7	26.9	24.0	33.7	22.2	13.6	15.0	19.3
70–79 y	22.6	18.0	19.3	22.7	11.5	7.1	7.1	20.5
≥ 80 y	11.3	4.8	7.2	5.5	2.8	1.3	0.9	0.0
Place of birth, % ^b								
United States		38.5	24.9	68.3	11.8	14.8	2.7	4.6
Asia		36.5	39.4	11.8	65.7	54.2	77.9	61.4
Other		0.8	1.2	0.5	0.7	1.3	0.9	2.3
Unknown		24.2	34.5	19.5	21.9	29.7	18.6	31.8

^aAll Asian Americans combined.

^bWhites were not classified by place of birth.

size larger than 1 cm and for advanced-stage disease (regional/distant) among all study subjects for whom these data were available. Asian American women as a group, and women belonging to the Chinese, Filipino, and Korean subgroups, were more likely than White women to have tumors larger than 1 cm (OR [95% CI] = 1.24 [1.13, 1.35], 1.39 [1.19, 1.62], 1.52 [1.30, 1.76], and 2.38 [1.49, 3.80], respectively). Japanese American women were less likely than White women to have advanced-stage disease (OR = 0.79, 95% CI = 0.70, 0.90).

Table 3 presents comparisons of breast cancer tumor size and stage at diagnosis by race/ethnicity and birthplace. Because Asian American women born outside of the United States and Asia or of unknown birthplace were not included in these analyses, the number of subjects in each ethnic group was smaller than in the inclusive analyses and the odds ratios varied somewhat from those in the latter analyses. After stratification by birthplace, the odds ratio for tumor size greater than 1 cm was significantly increased for all Asian-born first-generation US women combined relative to US White women (OR = 1.60, 95% CI = 1.40, 1.83). This was not true, however, for US-born Asian women of later generations relative to US White women. Asian-born women in each ethnic group except the Japanese and Southeast Asian groups also had a greater odds of having tumors larger than 1 cm relative to US White women. Among US-born Asian Americans, only US-born Filipino women had a

greater odds of having tumors larger than 1 cm relative to White women (OR = 1.56, 95% CI = 1.00, 2.44).

The odds ratio for advanced-stage disease was increased, with borderline statistical significance, for all Asian-born women combined relative to US White women (OR = 1.10, 95% CI = 0.99, 1.23), but not for US-born Asian American women relative to US White women (Table 3). The odds ratio for advanced-stage disease was also increased for US-born Filipino women (OR = 1.47, 95% CI = 1.02, 2.11) and US-born Korean women (OR = 2.31, 95% CI = 1.01, 5.29). US-born Japanese women were the only ethnic/birthplace group with a decreased risk of advanced-stage disease relative to that of US White women (OR = 0.85, 95% CI = 0.73, 1.00).

Discussion

To our knowledge, this is the first study of breast cancer tumor size and disease stage at diagnosis among Asian American women to have been stratified both by ethnic group and by place of birth. We used a tumor size of greater than 1 cm as an indicator of delayed detection because tumors smaller than 1 cm are primarily found by screening mammography, whereas larger tumors are often detected by additional modalities such as symptoms or clinical examination.^{17–19} Tumors larger than 1 cm are associated with a significantly increased risk of disease recurrence

and decreased survival and generally require more aggressive and costly therapy, with fewer treatment options.^{20–24} We examined disease stage as a measure of the extent of disease at diagnosis, which is the major predictor of survival. The stage at which breast cancer is diagnosed can be affected by use of medical care, including mammographic screening and timeliness in seeking diagnosis or treatment for symptoms as well as by environmental and genetic factors that influence tumor biology and breast cancer progression.

The likelihood of breast cancer being diagnosed at a tumor size greater than 1 cm was significantly increased for all Asian American women combined, and for the Chinese, Filipino, and Korean American subgroups, than it was for US White women (Table 2). This suggests that women in these ethnic groups experience a relative delay in the diagnosis of breast cancer. Studies in California showed that Chinese, Filipino, Korean, and Vietnamese women were much less likely to report ever having had a mammogram than were women in the general population.^{2,7–13} Therefore, these other studies found lower utilization of mammography by women in the same ethnic groups that had an increased odds ratio for tumor size greater than 1 cm in our study, with the exception of Vietnamese/Southeast Asian women. This suggests that lower utilization of mammography by these ethnic groups may be correlated with delayed breast cancer detection and greater tumor size at diagnosis.

TABLE 2—Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Tumor Size Greater Than 1 cm and Advanced-Stage Disease^a by Race/Ethnicity Among Asian American and US White Women With Breast Cancer

Race/Ethnicity	Tumor Size			Tumor Stage		
	n	% >1cm	Adjusted OR ^b (95% CI)	n	% advanced	Adjusted OR ^b (95% CI)
White	29 690	70.0	1.00 ^c	32 949	29.8	1.00 ^c
Asian American, all	3950	72.4	1.24 (1.13, 1.35)	4460	28.4	0.96 (0.89, 1.04)
Chinese	940	76.0	1.39 (1.19, 1.62)	1060	29.3	0.98 (0.85, 1.12)
Japanese	1658	66.0	0.92 (0.81, 1.04)	1888	24.3	0.79 (0.70, 0.90)
Filipino	1034	77.5	1.52 (1.30, 1.76)	1159	32.5	1.10 (0.97, 1.25)
Korean	137	84.7	2.38 (1.49, 3.80)	153	33.3	1.09 (0.78, 1.53)
Southeast Asian	104	73.1	1.14 (0.73, 1.76)	112	33.9	1.13 (0.76, 1.67)
Indian/Pakistani	77	76.6	1.42 (0.84, 2.42)	88	34.1	1.18 (0.76, 1.83)

^aRegional/distant vs in situ/localized.

^bOdds ratios adjusted for SEER region, year of diagnosis, and age at diagnosis.

^cReference category.

Perhaps most interesting is that, after we stratified the ethnic groups by birthplace, we found that the risk for tumor size greater than 1 cm was higher among first-generation Asian American women born in Asia than among US White women, while the risk for tumor size greater than 1 cm was similar for US-born Asian American women compared to US White women (Table 3). This was the case for all Asian American women combined and for most ethnic groups. This finding suggests that Asian American women born in Asia have a reduced timeliness of diagnosis, which is most likely due to lower utilization of screening mammography among these women relative to US-born Asian American women or US White women. A woman's birthplace and level of acculturation or assimilation may influence her beliefs and behaviors with regard to medical care.

In the California studies cited earlier, risk factors associated with low utilization of mammography among Asian American women included a lower educational level, lower household income, limited English language proficiency, lack of health insurance coverage, shorter duration of US residency, limited knowledge of guidelines for seeking mammography, and lack of a physician's recommendation for mammographic screening.^{2,7-13} These factors, largely related to lower socioeconomic status and lower levels of acculturation, tend to be more prevalent among first-generation immigrants to the United States than among their US-born descendants.^{1,7,10} The same factors associated with utilization of mammography among Asian American women in the California studies may therefore have contributed to the intergenerational differences in breast cancer tumor size found in our study.

Our findings with regard to advanced tumor stage at diagnosis showed some similarities to those for tumor size greater 1 cm, although the odds ratios tended to be closer to

1 (Table 3). Our results for tumor stage were generally similar to those reported by others; i.e., Japanese American women tend to have a lower proportion of advanced-stage tumors than US White women, while Asian American women in other ethnic groups tend to have an equivalent or slightly higher proportion of advanced stage tumors than US White women.^{12,25-28} The mechanisms underlying racial/ethnic differences in the extent of breast cancer at diagnosis may include differences in tumor biology related to environmental, histopathologic, and/or genetic factors; and differences between ethnic groups in screening practices or in seeking treatment for symptoms.²⁷⁻³¹

The findings for breast cancer tumor size or stage in some of the ethnic groups in our study were unique. Japanese American women with breast cancer, in contrast to women in the other ethnic groups, had a lower risk of having advanced-stage disease than did White women (Tables 2 and 3). After examining disease stage within different strata of tumor size (<1, 1.1-2.0, 2.1-3.0, and >3.0 cm), we further found that for tumors within each size stratum, the proportion of Japanese women with advanced-stage disease was lower than that of White women (data not shown). This suggests that independent of tumor size or timeliness of diagnosis, the Japanese American women had less aggressive disease than did their White counterparts. This is consistent with the finding in studies in Hawaii of earlier-stage disease and slower tumor growth in Japanese than in White women.²⁶⁻²⁸

Unique also among ethnic groups in our study was the finding of an equally elevated risk for tumor size greater than 1 cm among both Asian-born and US-born Filipino women compared to US White women. The risk of having advanced-stage disease was also greater for US born Filipino women than for US White women. Census data show that sec-

ond-generation Filipino Americans have a higher high school dropout rate and lower college enrollment rate than do members of other Asian ethnic groups, even though a high percentage of their parents obtained college and professional degrees before immigration.³² Studies have also found that even educated and professional Filipino Americans tend to have subordinate occupational positions.³³⁻³⁴ These findings suggest that educational and economic factors associated with low rates of mammographic screening are more prevalent in the Filipino American population than in other Asian American ethnic groups.

Our study had several limitations. Because of the heterogeneity and diversity among Asian American ethnic groups, the study focused primarily on the individual subgroups.^{12,35,36} However, several ethnic groups were represented by relatively small numbers of subjects, which limited the study's statistical power to detect differences in outcome.

Of further concern was missing information for some variables. In particular, place of birth was unknown for 24.2% of the Asian American women in the study. Although there were only small differences in tumor size or stage between Asian American women for whom birthplace data were available (73.0% >1 cm and 29.6% regional/distant) and all Asian American women in the study (72.4% >1 cm and 28.4% regional/distant), selection bias could have occurred if both the birthplace and outcome of the women in the study jointly influenced which data were missing in the SEER registry.

In summary, we found that Asian American women with breast cancer in several ethnic groups in the study had a greater proportion of tumors larger than 1 cm compared to US White women with breast cancer. This increase in size was seen primarily in the first-generation Asian American women born in Asia (all Asian American women combined and Chinese American, Filipino

TABLE 3—Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Tumor Size Greater Than 1 cm and Advanced-Stage Disease^a by Race/Ethnicity and Birthplace Among Asian American and US White Women With Breast Cancer

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	n	% >1 cm	Adjusted OR ^b (95% CI)	n	% Advanced	Adjusted OR ^b (95% CI)
White	29 690	70.0	1.00 ^c	32 949	29.8	1.00 ^c
Asian American, all						
United States	1 517	67.3	0.97 (0.84, 1.12)	1 724	26.7	0.94 (0.81, 1.08)
Asia	1 452	78.9	1.60 (1.40, 1.83)	1 624	32.8	1.10 (0.99, 1.23)
Chinese						
United States	241	72.2	1.18 (0.88, 1.59)	265	28.7	1.01 (0.77, 1.34)
Asia	367	80.7	1.76 (1.35, 2.28)	417	32.9	1.12 (0.91, 1.37)
Japanese						
United States	1 132	65.6	0.90 (0.77, 1.06)	1 292	24.8	0.85 (0.73, 1.00)
Asia	195	71.8	1.10 (0.80, 1.51)	220	28.2	0.92 (0.68, 1.24)
Filipino						
United States	115	76.5	1.56 (1.00, 2.44)	137	37.2	1.47 (1.02, 2.11)
Asia	689	78.8	1.60 (1.33, 1.93)	762	33.6	1.14 (0.98, 1.33)
Korean						
United States	22	63.6	0.81 (0.34, 1.95)	23	47.8	2.31 (1.01, 5.29)
Asia	73	89.0	3.37 (1.61, 7.05)	83	28.9	0.86 (0.53, 1.39)
Southeast Asian						
United States	3	33.3	NA ^d	3	33.3	NA ^d
Asia	81	76.5	1.37 (0.81, 2.29)	88	36.4	1.25 (0.81, 1.93)
Indian/Pakistani						
United States	4	50.0	NA ^d	4	25.0	NA ^d
Asia	47	85.1	2.49 (1.11, 5.57)	54	38.9	1.46 (0.84, 2.52)

Note. NA = not applicable.

^aRegional/distant vs in situ/localized.

^bOdds ratios adjusted for SEER region, year of diagnosis, and age at diagnosis.

^cReference category.

^dOdds ratio not computed owing to small numbers of subjects.

American, Korean American, and Indian/Pakistani American women) and not in the later-generation Asian American women born in the United States. These findings, in conjunction with survey data on use of mammography,^{2,7-13} suggest that first-generation Asian American women have less timely diagnosis of breast cancer than do either later-generation Asian American or US White women. It is therefore important that primary care providers and cancer screening programs target efforts to improve the utilization of mammography among first-generation Asian American women. Earlier detection of breast cancer in this population would allow greater flexibility in treating the disease and could increase long-term survival.^{19,23,37} □

Contributors

A. N. Hedeem planned the study, analyzed the data, and wrote the paper. E. White and V. Taylor assisted with the study design, supervised the data analysis, and contributed to the writing of the paper.

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A B S T R A C T

Objectives. Three filters were tested for in situ efficacy in reducing bacterial contamination associated with injection drug use.

Methods. In a self-matched control design with blinded laboratory testing, injection drug users were asked to use 3 filters in random succession when loading their syringes with drug solute.

Results. The 0.22- μ m filter proved significantly better than both the cigarette filter (relative risk [RR] = 18.0) and the 20- μ m filter (RR = 4.5) in rendering syringes bacteria-free.

Conclusions. The 15- to 20- μ m syringe filter currently provided injection drug users in Switzerland does not significantly reduce contamination associated with common bacterial infections among users. Filters with pore width 1/100th as large are recommended. (*Am J Public Health.* 1999; 89:1252-1254)

The Role of Syringe Filters in Harm Reduction Among Injection Drug Users

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It has been well established that injection of illicit drugs is associated with excess morbidity and mortality, owing not only to drug reactions (e.g., overdose) but also to hygienic conditions and sharing behaviors surrounding syringes and needles. That injection drug use carries tremendous risk for the transmission of infectious agents has been evidenced most dramatically by the devastating impact of HIV among injection drug users (IDUs) worldwide.

In many areas a variety of harm reduction policies have been adopted, although they are controversial, as a humane, appropriate, and effective way to curb the negative health consequences associated with illicit drug use. Switzerland has been home to several unique harm reduction policies related to drug use—for example, Needle Park, “shooting rooms,” public syringe vending machines, heroin prescription programs, and needle exchange in prisons. In September 1997, authorities in several Swiss cantons officially added sterile 15- μ m syringe filters to the materials normally made available to IDUs at low-threshold sites (i.e., sites with no entry criteria and no requirement for registration or

continued participation). The introduction of similar filters in cities in the Netherlands and Germany is currently being discussed.

In-depth studies on drug injection behavior have pointed out the possible risk of infection at practically all steps of the drug injection procedure.¹ Even when new needles and syringes are used, bacterial and viral infections can be spread by contaminated spoons, water, solvent, filters, or injection sites. In Switzerland, practically all IDUs use cigarette butts to filter the dissolved drug solution into the syringe. At most, cigarette filters prevent large particles from entering the syringe; however, they are neither sterile nor effective against small

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