Factors Associated With Colorectal Cancer Screening Among the US Urban Japanese Population

Keiko Honda, PhD, MPH

Objectives. The author examined the prevalence and predictors of colorectal cancer screening among the urban Japanese population of the United States.

Methods. A sample of Japanese residents of major US metropolitan areas completed a self-administered mailed survey.

Results. Physician recommendation, acculturation, and perceived psychological costs were consistent predictors of screening for colorectal cancer. Gender and marital status were related to screening via fecal occult blood testing; age, susceptibility, and health insurance were related to sigmoidoscopy/colonoscopy screening.

Conclusions. Colorectal cancer screening among the urban Japanese population could be increased with interventions seeking to promote physician recommendations for screening, alleviate perceived psychological costs among patients, and improve physician–patient communication. (*Am J Public Health.* 2004;94:815–822)

How should disease prevention strategies be organized in a heterogeneous society in which disease incidence rates vary among different groups? How are factors associated with screening among specific ethnic groups in the United States different from those among the broader population identified in the literature? In this article, I examine these questions with respect to colorectal cancer (CRC) and CRC screening among Japanese Americans.

The incidence of CRC among Japanese Americans exceeds the rate among non-Hispanic Whites[1]; US Japanese men rank after only Alaska Native men in terms of age-adjusted race- and gender-specific CRC incidence rates, and US Japanese women rank third, after Alaska Native and African American women.[2] CRC rates have also increased in Japan, which now has an incidence equivalent to that of the United States.[3,4]

Several epidemiological studies suggest that the higher genetic predisposition to CRC among the US Japanese population—through, for example, the fast acetylator genotype coupled with Western dietary patterns, including a diet high in red meat—may explain in part the increased CRC incidence rates in Japanese immigrants and their descendants.[5,6] There is growing evidence linking other factors such as socioeconomic status (SES) and screening access to the differing rates of CRC among multiethnic US populations,[7–9] but the mechanism by which different factors interact to increase risk is unknown.

Stage at diagnosis is one of the most important prognostic factors for CRC survival; administering appropriate screening tests is important for improved cancer outcomes.[1] Despite the elevated CRC incidence among Japanese Americans, no published information is available regarding CRC screening behavior in this group, which now represents 0.3% of the US population.[10] Results gathered from the 1997 Behavioral Risk Factor Surveillance System (BRFSS)[11] questionnaire indicated that Asian American/Pacific Islanders (AAPIs) 50 years and older were half as likely as non-Hispanic White respondents to have had a fecal occult blood test (FOBT) during the preceding year (11.5% vs 20.1%). Similarly, after adjustment for SES and other health care indicators, a multiethnic population study showed underuse of CRC screening among AAPIs aged 50 to 64 years.[12]

Lee-Feldstein et al[13] examined factors related to CRC mortality in a group of 1329 multiethnic Medicare patients from a single geographic area and found that AAPIs experienced significantly greater CRC mortality than did White patients after adjustment for stage at diagnosis, tumor location, hospital type, type of health insurance, and sociodemographic indicators. These authors did not discuss differences in genetic predisposition to CRC or rates of CRC screening among AAPIs, and thus unmeasured cultural attributes may have contributed to the increased risks observed.

Few cross-sectional studies[14–17] have attempted to disentangle the underlying attributes accounting for differences in CRC screening rates among certain Asian subgroups, but some have indicated that greater acculturation, increased physician recommendation, and higher SES are significantly associated with increased screening rates. However, results are difficult to interpret because these studies have relied on different measures of acculturation and CRC screening behavior. Given the great diversity within AAPI communities with respect to historical, cultural, linguistic, and socioeconomic characteristics,[18] it is unknown whether these findings can be generalized to Japanese Americans. Furthermore, the fact that CRC incidence rates among Japanese men and women between the ages of 30 and 54 years have been shown to be 18% and 42% higher, respectively, than rates among US non-Hispanic White men and women[1] in the same age group suggests that health education and community outreach efforts should be extended to younger age groups.

Andersen's model of health care utilization[19,20] has been widely used to identify priority areas of intervention for improving the use of CRC screening. For example, some studies have examined the effects of health insurance or urban/rural residence on detection of CRC and linked lack of insurance or rural area of residence to late-stage diagnosis.[21,22] Andersen included measures of individual health risks as well as a range of other measures that influence health behavior[23–26] and grouped these factors into 3 categories: predisposing, enabling, and need related. In some of the cross-sectional studies[27–29] explicitly applying Andersen's model, the pattern of

results has been consistent: health insurance coverage, urban/rural residence, regular access to care, and availability of medical providers appear to be important predictors of various cancer screening behaviors and access to primary care.

Whether investigated in isolation or as part of a behavioral theory (i.e., the Health Belief Model [HBM][30] or other models of behavioral change), some health beliefs, such as perceived susceptibility to CRC and perceived barriers to CRC screening, have shown consistent correlations with CRC screening participation or intention.[31–37] The same is true of physician recommendations to undergo screening. In this study, I drew on Andersen's model to evaluate associations between probable correlates of screening and CRC screening participation among US Japanese residents 30 years and older.

METHODS

Sample and Design

I conducted a cross-sectional survey study by mail between June and August 2001 using 2-stage equal size cluster sampling to obtain a random sample of US Japanese residents, more than 90% of whom live in urban areas.[38] The sample used was obtained from a commercially available mailing list of Japanese residents in which information on state, city, and zip code of residence, but not gender, was available for extraction. Another publicly available Asian American household database[39] was used to supplement estimations of numbers of Japanese residents according to age group, state, county, and zip code.

To reduce the effect of certain unmeasured environmental factors, including Japanese community sizes by metropolitan area and state,[39] state-level managed care penetration rates in 1996,[40] and state-specific prevalence rates of CRC screening in 1997,[41] I focused on major metropolitan areas in 4 states: Illinois, Massachusetts, New Jersey, and Washington. These 4 states were similar in terms of the environmental factors just mentioned. In the primary stage of sampling, I selected a random sample of 20 zip codes from the selected metropolitan areas. Then from this randomly selected sample, I selected 800 names of individuals based on a targeted sample size of 360, an expected return rate of 50%, and 5% sampling error.[42]

Eligible participants were those 30 years and older who could read and comprehend Japanese and/or English and had never been diagnosed with CRC. My use of the total design survey method[43] allowed participation to be completely anonymous and voluntary. The survey instrument was developed in English, translated into Japanese, back-translated, reconciled, and pilot tested for refinement. Accompanying the bilingual questionnaire was a self-addressed, stamped return envelope; an introductory letter; and a prestamped postcard with an identification number linked to the respondent's name. A reminder postcard was sent to all recipients of the original mailing 1 week later. Second and third follow-up mailings were sent to nonrespondents 3 weeks and 7 weeks after the original mailing.

Variables of Interest

The dependent variables assessed were 2 types of CRC screening practices—fecal occult blood tests (FOBTs) and sigmoidoscopy/colonoscopy—concordant with the current clinical practice guidelines of the American Cancer Society (ACS).[44] These variables were modeled on similar variables used in the 1999 BRFSS questionnaire.[45] The independent variables included were selected because of their congruence with the models used (i.e., the HBM[30] and Andersen's model of health care utilization[19,20]) and because previous research had related them to CRC screening behaviors among members of ethnic minority groups.[46] These variables were grouped into the following components: predisposing, enabling, and need related.

The predisposing component includes sociodemographic characteristics and health beliefs, factors that exist before the onset of an illness or need for health care.[19,20] The predisposing factors assessed in this study were age, gender, education, marital status, acculturation status (as measured via self-estimated English-language skills on a 5-point Likert scale), family history of CRC, perceived susceptibility, perceived benefits of screening, and perceived psychological costs of screening (fear, embarrassment, and concerns about discomfort).

While measures of acculturation that focus only on communication resources appear to have an advantage over broader measures of acculturation,[47–49] I favored the selection of English-language skills as a single measure of acculturation, given the strong linear relationship in the present sample between this attribute and length of residence in the United States (Pearson $r=.73$, $P<.01$). I adapted items concerning health beliefs from the Health Belief Scales[50–52] and modified them to measure perceived susceptibility to, benefits of, and psychological costs of CRC screening.

The enabling component reflects an individual's means for securing needed health services through personal and/or community resources.[19,20] I included, in this category, health insurance coverage, usual source of care, and social support. I adapted items concerning social support from a single-dimension social support scale[53] that had previously been used in a study of breast cancer screening behavior.[54]

The presence of predisposing and enabling determinants is a necessary condition for the use of health services, but their presence is not sufficient absent a perceived or evaluated need.[19,20] The need-related factors assessed in the present study were self-rated presence and intensity of gastrointestinal symptoms (according to the index described in Table 1) and physician recommendation for CRC screening.

STATISTICAL ANALYSIS

Bivariate χ^2 analyses and odds ratios were used to document the crude relationship between each independent variable and CRC screening tests. Multiple logistic regression in combination with maximum likelihood estimation was used to model the association between each independent variable and outcome measure. The modeling strategy included estimation of a full model including the 2-way interaction terms between variables with bivariate significance, stepwise removal of nonsignificant terms, and examination of differences in the log-likelihood ratio test for the logistic models.

Standard diagnostic techniques were used to test for multicollinearity, and the model

TABLE 1—Characteristics of the Study Sample (n = 305)

Characteristic	No. or Mean (% or SD)	1990 census[a] %
State		
Massachusetts	64 (20.9)	
New Jersey	80 (26.1)	
Illinois	77 (25.2)	
Washington	85 (27.8)	
Gender		
Male	188 (61.4)	41.8
Female	118 (38.6)	57.4
Age, y, mean	52.3 (±15.3)	
Age group, y		
30–39	72 (23.5)	32.0
40–49	78 (25.5)	25.4
50–59	61 (29.9)	12.3
60–69	45 (14.7)	16.4
70–79	27 (8.8)	9.8
≥80	23 (7.5)	3.3
Marital status		
Married/cohabiting	216 (70.6)	62.3
Other	90 (29.4)	38.7
Type of health insurance		
Medicare/Medicare-HMO	51 (16.7)	
Medicaid	5 (1.6)	
HMO/commercial plan	231 (75.5)	
No insurance or self-pay	19 (6.2)	
Language proficiency		
Speaks Japanese only	12 (3.9)	
Speaks Japanese better than English	179 (58.5)	
Speaks Japanese and English equally well	65 (21.2)	
Speaks English better than Japanese	29 (9.5)	
Speaks English only	21 (6.9)	
Educational level		
High school or less	69 (22.5)	62.1
Associate degree	34 (11.1)	7.4
Bachelor's degree	131 (42.8)	22.1
Master's/doctoral degree	72 (23.5)	6.6
Family history of CRC		
Yes	32 (10.5)	
No	274 (89.5)	
Frequency of gastrointestinal symptoms[b]		
Every day	3 (1.0)	
Most but not all days	8 (2.6)	
Occasionally, but not most days	46 (15.0)	
Rarely	142 (46.4)	
Never	107 (35.0)	
Usual source of care		
Yes	253 (83.7)	
No	53 (17.3)	
Language spoken at usual source of care		
Mostly Japanese	95 (37.5)	
Mostly English	158 (62.5)	
Social support rating[c]		
Strongly disagree	11 (3.6)	
Disagree	24 (7.8)	
Neither agree nor disagree	47 (15.4)	
Agree	98 (32.0)	
Strongly agree	126 (41.2)	
Length of US residence, y		
Less than 8	67 (21.9)	
9–16	77 (25.5)	
17–24	39 (12.7)	
25–36	44 (14.4)	
More than 37	78 (25.5)	
FOBT in past 2 years		
Yes	113 (36.9)	
No	193 (63.1)	
Reason for FOBT		
Screening	102 (91.1)	
Diagnostic	7 (6.3)	
Other	3 (2.7)	
SIG/COL in past 5 years		
Yes	80 (26.1)	
No	226 (73.9)	
Reason for SIG/COL		
Screening	60 (75.0)	
Diagnostic	20 (25.0)	
Physician advised screening		
Yes	69 (22.6)	
No	236 (77.4)	

Note. Physician recommendation information was missing for 1 person. FOBT = fecal occult blood test; SIG/COL = sigmoidoscopy/colonoscopy; CRC = colorectal cancer.
[a]Selected sociodemographic data for a 1% national random sample of the Japanese population 30 years and older were extracted from the Integrated Public Use Microdata Series (IPUMS-98).
[b]An additive approach was used to construct the summary index for gastrointestinal symptoms. Gastrointestinal symptoms were assessed by measuring 3 different symptoms (bloating and/or fullness, changes in bowel patterns, and abdominal pain) on 5-point ordinal scales ranging from never (1) to every day (5), summing responses for each symptom, and dividing by number of items answered to obtain a summary score (ranging from 1 to 5).
[c]On the basis of pilot testing, a 1-item social support measure was selected for this study, given the high alpha coefficient (0.94) for the social support scale consisting of 3 items with 5-point Likert scale responses (1 = strongly disagree, 5 = strongly agree). Social support was measured with the following item: "I have someone with whom I can consult about everyday concerns."

performed favorably. Missing data for some demographic and composite measures were imputed with the median value, given that fewer than 2% of cases involved such missing data. Assessments of the influence of cluster sampling illustrated that the intraclass correlation coefficient for the main dependent variable (i.e., CRC screening) was small (0.015), indicating that adjustment of the analyses for within-cluster correlation would not add new information.[55]

RESULTS

Of the 800 surveys originally mailed, 82 (10%) were returned as undeliverable; 318 completed surveys were returned (a 44% response rate), of which 12 (4%) were deemed unusable because they did not meet inclusion criteria. Of the 318 individuals who returned completed surveys, 177 (56%) had an increased risk of developing CRC as a consequence of their age or medical risks (as defined by ACS[44]). The demographic distribution of the study sample was similar to the distribution of a 1% national random sample of the US Japanese population 30 years and older[38] in terms of age and marital status but not gender and education. In comparison with this random sample, the present sample included more men and was better educated (Table 1).

Screening Prevalence and Bivariate Analyses

Overall, 37% of the sample reported having undergone an FOBT in the past 2 years, and 26% reported having undergone a sigmoidoscopy/colonoscopy in the past 5 years. About 90% of FOBT and 75% of sigmoidoscopy/colonoscopy visits were reported as screening rather than diagnostic events. In the case of both types of screening, prevalence rates by age group sharply increased after 60 years but decreased after 80 years (Table 2).

The bivariate analysis focusing on FOBT showed that respondents who were older, male, and married; those who spoke English only; those who had a family history of CRC; those who perceived the least psychological cost of screening; those who had Medicare coverage and had a regular source of care; and those who had received a physician rec-

TABLE 2—Percentages of Participants Undergoing Colorectal Cancer (CRC) Screening and Bivariate Relationships of Participant Characteristics With Screening Participation (n = 305)

Characteristic	FOBT in Past 2 Years %	FOBT in Past 2 Years Unadjusted OR (95% CI)	SIG/COL in Past 5 Years %	SIG/COL in Past 5 Years Unadjusted OR (95% CI)
Predisposing characteristics				
Age, y				
30–39	23.6**	Reference	2.8**	Reference
40–49	26.9	1.2 (0.6, 2.5)	12.8	5.1 (1.1, 24.4)
50–59	32.8	1.6 (0.7, 3.4)	29.5	14.6 (3.2, 66.3)
60–69	64.4	5.9 (2.6, 13.3)	57.8	47.9 (10.4, 220.0)
70–79	63.0	5.5 (2.1, 14.2)	66.7	70.0 (14.0, 352.7)
≥80	39.1	2.1 (0.8, 5.6)	26.1	12.4 (2.3, 66.6)
Gender				
Male	44.7**	2.5 (1.5, 4.1)	29.8	1.7 (1.0, 2.9)
Female	24.6	Reference	20.3	Reference
Marital status				
Married/cohabiting	42.1*	2.3 (1.3, 3.9)	25.5	0.9 (0.5, 1.5)
Other	24.4	Reference	27.8	Reference
Educational level				
High school or less	34.8	Reference	34.8	Reference
Associate degree	29.4	0.8 (0.3, 1.9)	26.5	0.7 (0.3, 1.7)
Bachelor's degree	34.4	1.0 (0.5, 1.8)	19.1	0.4 (0.2, 0.9)
Master's/doctoral degree	47.2	1.7 (0.8, 3.3)	30.6	0.8 (0.4, 1.7)
Language proficiency				
Speaks Japanese only	25.0*	Reference	8.3**	Reference
Speaks Japanese better than English	32.4	1.4 (0.4, 5.5)	20.1	2.7 (0.3, 21.8)
Speaks Japanese and English equally well	32.3	1.4 (0.4, 5.8)	23.1	3.3 (0.4, 27.1)
Speaks English better than Japanese	58.6	4.3 (0.9, 19.1)	44.8	8.8 (1.0, 77.1)
Speaks English only	66.7	6.0 (1.2, 29.4)	71.4	27.2 (2.9, 257.4)
Family history of CRC				
Yes	62.5*	3.2 (1.6, 6.9)	50.0*	3.3 (1.6, 6.9)
No	33.9	Reference	23.4	Reference
Perceived susceptibility rating[a]				
Strongly disagree	25.0	Reference	22.7*	Reference
Disagree	34.4	1.6 (0.7, 3.7)	20.3	0.9 (0.3, 2.2)
Neither agree nor disagree	38.2	1.9 (0.9, 3.9)	22.9	1.0 (0.5, 2.2)
Agree	46.9	2.6 (1.0, 7.0)	46.9	3.0 (1.1, 8.1)
Strongly agree	50.0	3.0 (0.6, 14.1)	62.5	5.7 (1.1, 27.9)
Perceived benefits rating[a]				
Strongly disagree	50.0	Reference	50.0	Reference
Disagree	25.0	0.3 (0.0, 6.7)	25.0	0.3 (0.0, 6.7)
Neither agree nor disagree	26.7	0.4 (0.0, 3.5)	20.0	0.3 (0.0, 2.6)
Agree	28.3	0.4 (0.0, 2.9)	18.5	0.2 (0.0, 1.7)
Strongly agree	42.1	0.7 (0.1, 5.3)	30.0	0.4 (0.1, 3.1)
Perceived costs rating[a]				
Strongly disagree	60.0*	5.5 (1.2, 26.0)	70.0**	14.0 (2.5, 77.9)
Disagree	57.9	5.0 (1.7, 15.3)	50.0	6.0 (1.7, 20.6)

Continued

ommendation exhibited higher rates of screening. In the case of sigmoidoscopy/colonoscopy, the gender and marital status variables did not reach statistical significance; however, perceived susceptibility and psychological costs, English-language proficiency, and physician recommendation produced larger effects on sigmoidoscopy/colonoscopy screening than on FOBT screening (Table 2).

To allow a more meaningful generalization, I regrouped English-language proficiency (as measured on the self-rated 5-point Likert scale) into 2 categories (speaks English only or speaks English more proficiently than Japanese vs speaks limited English) and entered this variable in the multivariate model. Health belief variables (perceived susceptibility, perceived benefits, and perceived costs), as measured again on a self-rated 5-point Likert scale, were regrouped into 3 categories—low (a rating of strongly disagree or disagree), medium (neither agree nor disagree), and high (strongly agree or agree)—and entered in the multivariate model.

Multivariate Analyses

The results of the final multiple logistic regression analysis (n=305) are presented in Tables 3 and 4. Physician recommendation, greater acculturation levels, and low perceived costs had independent effects on participation in both FOBT and sigmoidoscopy/colonoscopy screening in multivariate analyses; however, the magnitudes of these effects were larger for sigmoidoscopy/colonoscopy than for FOBT.

In addition, the final multivariate analyses revealed different determinants of FOBT and sigmoidoscopy/colonoscopy, and these determinants explained about 34% and 56% of the variation in each test, respectively. In the case of FOBT, those who were male and those who were married were more likely to have been screened. In the case of sigmoidoscopy/colonoscopy, those who were older and those who perceived they were most susceptible to CRC were more likely to have been screened. Other than health insurance, none of the enabling variables were significantly related to CRC screening. Respondents who had commercial health insurance coverage were more likely than those with other forms of insurance or Medicare coverage to have

TABLE 2—*Continued*

Neither agree nor disagree	37.0	2.2 (0.8, 5.7)	26.0	2.1 (0.7, 6.5)
Agree	31.7	1.7 (0.6, 4.6)	15.8	1.1 (0.3, 3.7)
Strongly agree	21.4	Reference	14.3	Reference
Enabling characteristics				
Type of health insurance				
Medicare/Medicare-HMO	52.9*	9.5 (2.0, 45.5)	45.1*	7.0 (1.5, 33.2)
Medicaid	20.0	2.1 (0.2, 29.5)	40.0	5.6 (0.6, 57.0)
HMO/commercial plan	35.8	4.7 (1.1, 20.1)	23.1	2.6 (0.6, 11.4)
Self-pay or no insurance	10.5	Reference	10.5	Reference
Usual source of care				
Yes	40.3*	2.6 (1.3, 5.2)	29.6*	4.0 (1.5, 10.6)
No	20.8	Reference	9.4	Reference
Social support rating[a]				
Strongly disagree	45.5	Reference	36.4	Reference
Disagree	12.5	0.2 (0.0, 0.9)	20.8	0.5 (0.1, 2.2)
Neither agree nor disagree	40.4	0.8 (0.2, 3.1)	29.8	0.7 (0.2, 2.9)
Agree	38.9	0.7 (0.2, 2.6)	16.3	0.3 (0.1, 1.3)
Strongly agree	38.9	0.7 (0.2, 2.6)	32.5	0.8 (0.2, 3.0)
Need-related characteristics				
Physician recommendation				
Yes	66.7**	5.0 (2.8, 9.0)	71.0**	16.8 (8.8, 32.1)
No	28.4	Reference	12.7	Reference
Frequency of gastrointestinal symptoms				
Every day	66.7	2.6 (0.2, 29)	66.7	4.9 (0.4, 56.1)
Most but not all days	62.5	2.1 (0.5, 9.4)	50.0	2.5 (0.6, 10.4)
Occasionally, but not most days	28.3	0.5 (0.2, 1.1)	19.6	0.6 (0.3, 1.4)
Rarely	31.9	0.6 (0.4, 1.0)	23.2	0.7 (0.4, 1.3)
Never	43.9	Reference	29.0	Reference

Note. Physician recommendation information was missing for 1 person. FOBT = fecal occult blood test; SIG/COL = sigmoidoscopy/colonoscopy; OR = odds ratio; CI = confidence interval; HMO = health maintenance organization.
[a]On a 5-point Likert scale.
*$P < .01$(χ^2 analysis); **$P < .001$ (χ^2 analysis for the association between undergoing CRC screening during the indicated period and the characteristic in question).

TABLE 3—Adjusted Odds Ratios for Past Fecal Occult Blood Test Screening (n = 305)

	Adjusted Odds Ratio[a]	95% Confidence Interval	*P*
Age	1.02	1.00, 1.04	.07
Gender (reference: female)	2.0	1.1, 3.6	.02
Married/cohabiting (reference: no)	3.0	1.5, 6.1	<.01
Language proficiency (reference: limited English proficiency)	2.9	1.3, 6.4	<.01
Perceived costs			
Low	2.8	1.3, 6.1	.01
Medium	1.5	0.8, 2.7	.20
High	Reference		
Physician recommendation (reference: no)	3.6	1.8, 6.9	<.001

[a]Adjusted odds ratios were derived from a simultaneous logistic regression equation including age, gender, marital/living status, health insurance, English-language proficiency, education, family history of colorectal cancer, perceived susceptibility, perceived benefits, perceived costs, usual source of care, social support, physician recommendation, and gastrointestinal symptom index.

undergone sigmoidoscopy/colonoscopy screening.

DISCUSSION

This study provides the first population-based estimates and independent correlates of CRC screening behavior among Japanese residents of the United States. On balance, the present findings are consistent with some of the results of previous research focusing on CRC screening behavior, supporting the inclusion of key elements from the HBM[30] and Andersen's model.[19,20] A strong relationship between physician recommendation and CRC screening behavior was evident in this population, in agreement with other studies describing the substantial explanatory power of physician recommendation.[31,33,34] While the strikingly large effect of physician recommendation on CRC screening behavior supports physician persuasion as the most effective means of promoting screening among this population, the question of what can be done to maximize opportunities for physician recommendation needs careful examination.

The subgroup analysis of respondents with elevated risk of CRC (n = 177) as a consequence of older age or personal medical history revealed that the majority (63%) reported never having received advice from a physician, even though an overwhelming majority (84%) of the sample had regular access to medical care. This result demonstrates that regular access to a physician among high-risk individuals does not ensure a screening recommendation from that physician. A study of English-speaking patients with CRC[56] showed poor communication regarding familial CRC risk and need for screening not only between physicians and patients but also between patients and their at-risk relatives, substantiating the need for innovative efforts in communicating personal risks, particularly among higher risk populations.

Communication between physicians and patients regarding cancer risk is often shaped by individual cultural norms. A cross-national study[57] showed that 80% of US physicians and patients agreed that doctors should inform their patients of their cancer diagnosis and should allow them to decide whether their family should be told, whereas high percentages of Japanese physicians (80%) and Japanese patients (65%) agreed that doctors should inform patients'

TABLE 4—Adjusted Odds Ratios for Past Sigmoidoscopy/Colonoscopy Screening (n = 305)

	Adjusted Odds Ratio[a]	95% Confidence Interval	P
Age	1.07	1.03, 1.11	<.001
Language proficiency (reference: limited English proficiency)	3.7	1.3, 10.1	.01
Perceived susceptibility			
Low	Reference		
Medium	0.9	0.4, 2.1	.88
High	4.3	1.3, 14.1	.01
Perceived costs			
Low	14.1	4.9, 40.3	<.001
Medium	2.8	1.1, 6.6	.02
High	Reference		
Insurance coverage			
Medicare/ Medicare–HMO	Reference		
Medicaid	0.06	0.003, 1.7	.09
HMO/commercial plan	4.0	1.2, 13.2	.02
No insurance or self-pay	2.9	0.4, 20.8	.29
Physician recommendation (reference: no)	13.7	6.1, 30.6	<.001

HMO - health maintenance organization.
[a]Adjusted odds ratios were derived from a simultaneous logistic regression equation including age, gender, marital/living status, health insurance, English-language proficiency, education, family history of colorectal cancer, perceived susceptibility, perceived benefits, perceived costs, usual source of care, social support, physician recommendation, and gastrointestinal symptom index.

family members of the diagnosis and should allow them to decide whether the patients themselves should be told. Similarly, a cross-cultural survey involving Japanese American and Japanese respondents[58] documented the importance of family involvement in health care decisionmaking irrespective of acculturation status. To encourage effective physician recommendation in this population, cultural aspects of communication about cancer need to be considered.

Acculturation status was also consistently associated with both FOBT and sigmoidoscopy/colonoscopy screening after demographic factors, SES, health insurance coverage, and CRC-specific health beliefs had been controlled (as mentioned earlier, this variable had a larger impact on sigmoidoscopy/colonoscopy screening than on the FOBT). One could speculate that those who speak English proficiently might be more skilled in seeking health information and using the medical system than those who speak limited English, given that a decision to undergo sigmoidoscopy/colonoscopy screening may involve more intensive communication with medical and insurance personnel.

Moreover, as indicated in a prospective cohort study conducted by Tu et al.,[59] underuse of cancer screening among AAPIs may be due more to linguistic and attitudinal barriers related to acculturation than to financial barriers. Inability or hesitancy to discuss health concerns in one's nonnative tongue may arguably perpetuate racial/ethnic disparities in CRC screening behavior. It would be helpful not only to make sensitive translations of existing health education materials available for those at a low level of English-language proficiency but also to explore with such individuals ways to overcome perceived barriers to making an informed screening decision. Thus, interventions leading health care providers to communicate more effectively with nonnative speakers alone could result in a substantial increase in CRC screening compliance rates among immigrant or less acculturated populations.

In terms of outreach efforts, language training for immigrants as well as assertiveness training in regard to medical communication on the part of the patient should be an important public health priority. Additional studies are needed to explore clinical and community resources and policies that might improve communication and accessibility of CRC screening among the Japanese community.

This study also sheds light on the cognitive issues involved in CRC screening behavior. Perceived susceptibility and psychological costs were strongly associated with sigmoidoscopy/colonoscopy screening in the adjusted model. Given the better accuracy and more invasive nature of sigmoidoscopy/colonoscopy relative to FOBT, it is plausible that the decision to undergo sigmoidoscopy/colonoscopy screening is prompted by lower psychological costs and greater perceived susceptibility. Such a suggestion is concordant with the results of other studies involving the use of HBM, in which perceived costs were the most reliable predictor of preventive health behavior, followed by perceived susceptibility.[60,61]

Among the US Japanese population, failure to undergo screening is probably in part a function of psychological barriers, including fear of discovering cancer, embarrassment, and concerns about discomfort. High levels of psychological distress, including fear and anxiety regarding cancer, have often been found to be associated with avoidance of other types of cancer screening,[62,63] and such beliefs, if not altered, can potentially have far-reaching negative consequences in terms of screening compliance. Further studies assessing the relevance of psychological barriers to CRC screening among underserved populations may prove useful.

Finally, this study also revealed a positive association between commercial health insurance coverage and participation in sigmoidoscopy/colonoscopy screening, suggesting that this type of coverage may increase endoscopic examination rates among the Japanese American population. Although the explanation for this finding is uncertain and merits further exploration, previous studies have suggested that individuals with commercial health insurance coverage are more likely to undergo cancer screening.[12,21]

Several limitations of this study should be considered when interpreting the present results. First, the use of a Japanese mailing list as a sampling frame may have produced a biased sample, including limited coverage of the female population. However, given that the US Japanese population is small and geographically dispersed, other options were less practical and more costly.

Second, this study's reliance on self-reported data may have produced bias. However, a study focusing on concordance between patient self-reports and medical records showed that self-reports of CRC screening behavior were accurate irrespective of age, gender, ethnicity, or family history of CRC.[64] Third, the data used in this research were cross sectional, and thus it is beyond the present scope to establish causality.

Finally, the 44% response rate raises the issue of nonrespondents' viewpoints. The distribution of educational background in the present sample indicated self-selection into the survey and an upward bias in education relative to 1990 census data for the Japanese American population as a whole.[38] Thus, there is a need for further replication of the findings to verify the associations observed.

In conclusion, strategies aimed at influencing CRC screening among Japanese Americans should include efforts to alter this population's attitudinal and linguistic barriers in regard to screening, but they must also target primary care physicians and public health educators to identify and address resistance and potential barriers to making screening recommendations. CRC screening rates among members of the present sample who were 50 years and older were much higher than might be expected for AAPIs[11] and somewhat similar to the reported rate range for White populations (40%–50%).[34,46,65] While such screening rates appear to meet national goals,[66] the much higher incidence of CRC among Japanese Americans than among the White population[1]—particularly in the case of US-born Japanese men, whose rate is about 60% higher than that of US-born White men[6]—suggests the need for more targeted and aggressive screening strategies for this group.

Active efforts focusing on physician recommendation are likely to have the greatest impact on rates of CRC among Japanese residents of the United States. Improving communication between providers and patients, especially less acculturated patients, would go a long way toward increasing adherence and alleviating potential barriers such as fear and embarrassment or misunderstanding owing to limited English-language proficiency. As our society becomes more diverse, cultural competency will have an increasing impact on CRC screening usage and outcomes. ■

About the Author

The author is with the Department of Epidemiology, Columbia University, New York City.

Requests for reprints should be sent to Keiko Honda, PhD, MPH, Columbia University, 722 E 168th St, Room 719, New York, NY 10032 (e-mail: kh2086@columbia.edu).

This article was accepted April 8, 2003.

Acknowledgments

The author is supported by a post-doctoral fellowship from the National Cancer Institute (CA09529). In-kind funding support for this study came in part from the Department of Health Studies of New York University.

The author acknowledges the Japanese respondents, Dr Vivian Clarke, Dr Robert Malgady, Dr Ethel Mitty, and Dr Victor Rodwin of New York University; Dr Mary Foley of Mount Sinai School of Medicine; Dr Akiko Hosler of the State of New York; and Dr Sherri Sheinfeld Gorin of Columbia University.

Human Participant Protection

Ethical clearance for this study was obtained from the institutional review board at New York University. The study design ensured anonymity, and tacit consent was provided by all participants.

References

1. Ries LAG, Kosary CL, Hankey BF, Miller BA, Clegg LX, Edwards BK, eds. *SEER Cancer Statistics Review, 1973–1996.* Bethesda, Md: National Cancer Institute; 1999. NIH publication 99-2789.

2. Baquet CR, Commiskey P. Colorectal cancer epidemiology in minorities: a review. *J Assoc Acad Minor Phys.* 1999;10:51–58.

3. National Cancer Center. The office report. Available at: http://www.ncc.go.jp/en/statistics/2001/tables.html. Accessed June 11, 2002.

4. Tamura K, Ishiguro S, Munakata A, Yoshida Y, Nakaji S, Sugawara K. Annual changes in colorectal carcinoma incidence in Japan: analysis of survey data on incidence in Aomori Prefecture. *Cancer.* 1996;78:1187–1194.

5. Marchand LL. Combined influence of genetic and dietary factors on colorectal cancer incidence in Japanese Americans. *J Natl Cancer Inst Monogr.* 1999;26:101–105.

6. Flood DM, Weiss NS, Cook LS, Emerson JC, Schwartz SM, Potter JD. Colorectal cancer incidence in Asian migrants to the United States and their descendants. *Cancer Causes Control.* 2000;11:403–411.

7. Krieger N, Quesenberry C Jr, Peng T, et al. Social class, race/ethnicity, and incidence of breast, cervix, colon, lung, and prostate cancer among Asian, black, Hispanic, and white residents of the San Francisco Bay Area, 1988–92. *Cancer Causes Control.* 1999;10:525–537.

8. Slattery ML, Edwards SL, Ma KN, Friedman GD. Colon cancer screening, lifestyle, and risk of colon cancer. *Cancer Causes Control.* 2000;11:555–563.

9. Cress RD, Morris CR, Wolfe BM. Cancer of the colon and rectum in California: trends in incidence by race/ethnicity, stage, and subsite. *Prev Med.* 2000;31:447–453.

10. US Bureau of the Census. The demographic profile report. Available at: http://www.census.gov/main/www/cen2000.html. Accessed June 11, 2002.

11. Centers for Disease Control and Prevention. Screening for colorectal cancer—United States, 1997. *MMWR Morb Mortal Wkly Rep.* 1999;48:116–121.

12. Hsia J, Kemper E, Kiefe C, et al. The importance of health insurance as a determinant of cancer screening: evidence from the Women's Health Initiative. *Prev Med.* 2000;31:261–270.

13. Lee-Feldstein A, Feldstein PJ, Buchmueller T. Health care factors related to stage at diagnosis and survival among Medicare patients with colorectal cancer. *Med Care.* 2002;40:362–374.

14. Jenkins CN, Le T, McPhee SJ, Stewart S, Ha NT. Health care access and preventive care among Vietnamese immigrants: do traditional beliefs and practices pose barriers? *Soc Sci Med.* 1996;43:1049–1056.

15. Kim K, Yu ES, Chen EH, Kim J, Brintnall RA. Colorectal cancer screening: knowledge and practices among Korean Americans. *Cancer Pract.* 1998;6:167–175.

16. Maxwell AE, Bastani R, Warda US. Demographic predictors of cancer screening among Filipino and Korean immigrants in the United States. *Am J Prev Med.* 2000;18:62–68.

17. Tang TS, Solomon LJ, McCracken LM. Barriers to fecal occult blood testing and sigmoidoscopy among older Chinese-American women. *Cancer Pract.* 2001;9:277–282.

18. Yee BWK, Mokuau N, Kim S, et al. *Developing Cultural Competence in Asian-American and Pacific Islander Communities: Opportunities in Primary Health Care and Substance Abuse Prevention.* Washington, DC: Office of Minority Health, US Dept of Health and Human Services; 1999. DHHS publication SMA98-3193.

19. Andersen RM. *Behavioral Model of Families' Use of Health Services.* Chicago, Ill: Center for Health Administration Studies, University of Chicago; 1968.

20. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav.* 1995;36:1–10.

21. Roetzheim RG, Pal N, Tennant C, et al. Effects of health insurance and race on early detection of cancer. *J Natl Cancer Inst.* 1999;91:1409–1415.

22. Campbell NC, Elliott AM, Sharp L, Ritchie LD, Cassidy J, Little J. Rural and urban differences in stage at diagnosis of colorectal and lung cancers. *Br J Cancer.* 2001;84:910–914.

23. Mandelblatt JS, Yabroff KR, Kerner JF. Equitable access to cancer services: a review of barriers to quality care. *Cancer.* 1999;86:2378–2390.

24. Gresenz CR, Stockdale SE, Wells KB. Community effects on access to behavioral health care. *Health Serv Res.* 2000;35:293–306.

25. Giuliano AR, Mokuau N, Hughes C, et al. Participation of minorities in cancer research: the influence of structural, cultural, and linguistic factors. *Ann Epidemiol.* 2000;10:S22–S34.

26. Phillips KA, Morrison KR, Andersen R, Aday LA. Understanding the context of healthcare utilization: assessing environmental and provider-related variables in the behavioral model of utilization. *Health Serv Res.* 1998;33:571–596.

27. Broyless RW, Narine L, Brandt EN, Biard-Holmes D. Health risks, ability to pay, and use of primary care: is the distribution of service effective and equitable? *Prev Med.* 2000;30:453–462.

28. Cunningham PJ, Cornelius LJ. Access to ambulatory care for American Indians and Alaska Natives: the relative importance of personal and community resources. *Soc Sci Med.* 1995;40:393–407.

29. Champion V, Usha M. Predicting mammography and breast self-examination in African American women. *Cancer Nurs.* 1997;20:315–322.

30. Rosenstock IM. The health belief model: expanding health behavior through experience. In: Glanz K, Lewins FM, Rimer BK, eds. *Health Behavior and Health Education: Theory, Research, and Practice.* San Francisco, Calif: Jossey-Bass Publishers; 1990:39–62.

31. Brenes GA, Paskett ED. Predictors of stage of adoption for colorectal cancer screening. *Prev Med.* 2000;31:410–416.

32. Codori AM, Petersen GM, Miglioretti DL, Boyd P. Health beliefs and endoscopic screening for colorectal cancer: potential for cancer prevention. *Prev Med.* 2001;33:128–136.

33. Friedman LC, Webb JA, Richards CS, Plon SE. Psychological and behavioral factors associated with colorectal cancer screening among Ashkenazim. *Prev Med.* 1999;29:119–125.

34. Mandelson MT, Curry SJ, Anderson LA, et al. Colorectal cancer screening participation by older women. *Am J Prev Med.* 2000;19:149–154.

35. Myers RE, Vernon SW, Tilley BC, Lu M, Watts BG. Intention to obtain screening for colorectal cancer among white male employees. *Prev Med.* 1998;27:279–287.

36. Wolf RL, Zybert P, Brouse CH, et al. Knowledge, beliefs, and barriers relevant to colorectal cancer screening in an urban population: a pilot study. *Fam Community Health.* 2001;24:34–47.

37. Wardle J, Sutton S, Williamson S, et al. Psychosocial influences on older adults' interest in participating in bowel cancer screening. *Prev Med.* 2000;31:323–334.

38. University of Minnesota. Integrated public use microdata series–1998. Available at: http://www.ipums.org. Accessed June 2001.

39. Segment Data Management Inc. Asian American consumer database household counts. Available at: http://www.segmentdata.com/main_new.htm. Accessed May 2001.

40. *Trends and Indicators in the Changing Health Care Marketplace.* Menlo Park, Calif: Kaiser Family Foundation; 1998.

41. Bolen JC, Rhodes L, Powell-Griner EE, Bland SD, Holtzman D. State-specific prevalence of selected health behaviors, by race and ethnicity–Behavioral Risk Factor Surveillance System, 1997. *MMWR Morb Mortal Wkly Rep.* 2000;49(SS-2):1–60.

42. Frary RB. A brief guide to questionnaire development. Available at: http://ericae.net/ft/tamu/vpiques3.htm. Accessed May 2001.

43. Dillman D. *Mail and Telephone Surveys: The Total Design Method.* New York, NY: John Wiley & Sons Inc; 1978.

44. Smith RA, von Eschenbach AC, Wender R, et al. American Cancer Society guidelines for the early detection of cancer: update of early detection guidelines for prostate, colorectal, and endometrial cancers and update 2001. *CA Cancer J Clin.* 2001;51:38–75.

45. Centers for Disease Control and Prevention. Trends in screening for colorectal cancer–United States, 1997 and 1999. *MMWR Morb Mortal Wkly Rep.* 2001;50:162–166.

46. Vernon SW. Participation in colorectal cancer screening: a review. *J Natl Cancer Inst.* 1997;89:1406–1422.

47. O'Malley AS, Kerner J, Johnson AE, Mandelblatt J. Acculturation and breast cancer screening among Hispanic women in New York. *Am J Public Health.* 1999;89:219–227.

48. Stein JA, Fox SA. Language preference as an indication of mammography use among Hispanic women. *J Natl Cancer Inst.* 1990;82:1715–1716.

49. Dawson EJ, Crano WD, Burgoon M. Refining the meaning and measurement of acculturation: revisiting a novel methodological approach. *Int J Intercultural Relations.* 1996;20:97–114.

50. Champion VL. Instrument refinement for breast cancer screening behavior. *Nurs Res.* 1993;42:139–143.

51. Champion VL. Development of a benefits and barriers scale for mammography utilization. *Cancer Nurs.* 1995;18:53–59.

52. Champion VL. Revised susceptibility, benefits, and barriers scale for mammography screening. *Res Nurs Health.* 1999;22:341–348.

53. Orth-Gomer K, Rosengren A, Wilhelmsen J. Lack of social support and incidence of coronary heart disease in middle-aged Swedish men. *Psychosom Med.* 1993;55:37–43.

54. Lagerlund M, Hedin A, Sparen P, Thurfjell E, Lambe M. Attitudes, beliefs, and knowledge as predictors of nonattendance in a Swedish population-based mammography screening program. *Prev Med.* 2000;31:417–428.

55. Heck RH, Thomas SL. *An Introduction to Multilevel Modeling Techniques.* Mahwah, NJ: Lawrence Erlbaum Associates; 2000.

56. Pho K, Geller A, Schroy PC III. Lack of communication about familial colorectal cancer risk associated with colorectal adenomas (United States). *Cancer Causes Control.* 2000;11:543–546.

57. Ruhnke GW, Wilson SR, Akamatsu T, et al. Ethical decision making and patient autonomy. *Chest.* 2000;118:1172–1182.

58. Matsumura S, Bito S, Liu H, et al. Acculturation of attitudes toward end-of-life care. *J Gen Intern Med.* 2002;17:531–539.

59. Tu SP, Taplin SH, Barlow WE, Boyko EJ. Breast cancer screening by Asian-American women in a managed care environment. *Am J Prev Med.* 1999;17:55–61.

60. Jans N, Becker MH. The health belief model: a decade later. *Health Educ Q.* 1984;11:1–47.

61. Tsubono Y, Fukao A, Hisamichi S, Sugawara N, Hosokawa T. Chiili iga kenshin no jushin koudou no shinrigakuteki kiteiyouinn [Health belief model and attendance at screenings for gastric cancer in a population in Miyagi, Japan]. *Nihon Kousyuu Eisei Shi.* 1996;40:255–263.

62. Kash KM, Dabney MK. Psychological aspects of cancer screening in high-risk populations. *Med Pediatr Oncol.* 2001;36:519–524.

63. Macrae FA, Hill DJ, St. John DJB. Predicting colon cancer screening behavior from health beliefs. *Prev Med.* 1984;13:115–126.

64. Baier M, Calonge N, Cutter G, et al. Validity of self-reported colorectal cancer screening behavior. *Cancer Epidemiol Biomarkers Prev.* 2000;9:229–232.

65. Perez-Stable EJ, Otero-Sabogal R, Sabogal F, McPhee SJ, Hiatt RA. Self-reported use of cancer screening tests among Latinos and Anglos in a prepaid health plan. *Arch Intern Med.* 1994;154:1073–1081.

66. *Healthy People 2000.* Washington, DC: US Dept of Human and Health Services; 1991. DHHS publication PHS91-50213.