

# Multiple myeloma among Blacks and Whites in the United States: role of cigarettes and alcoholic beverages

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*(Received 23 October 1996; accepted in revised form 3 January 1997)*

In the United States, the incidence rates of multiple myeloma in Blacks are more than twice those in Whites, but the etiology of this cancer is poorly understood. A population-based case-control interview study of 571 subjects (365 White, 206 Black) with multiple myeloma and 2,122 controls (1,155 White, 967 Black) living in three areas of the United States (Georgia, Michigan, New Jersey) offered the opportunity to investigate the relationship with smoking and alcohol drinking and to evaluate whether these factors might contribute to the excess risk of multiple myeloma in Blacks. For Blacks and Whites of either gender, there were no significantly elevated risks associated with ever use of cigarettes or alcoholic beverages and no consistent patterns with either intensity or duration of use. These data support previous studies indicating that smoking and drinking are not related causally to the risk of multiple myeloma, and thus cannot account for the racial disparity in incidence rates. *Cancer Causes and Control* 1997, 8, 610-614

*Key words:* Alcohol, esophagus, multiple myeloma, smoking, race, United States.

## Introduction

Incidence rates for multiple myeloma in the United States are more than two times higher among Blacks compared with Whites,<sup>1</sup> but the etiology of this cancer is poorly understood. To investigate risk factors for multiple myeloma, as well as reasons for the racial differences in

incidence, we conducted a population-based case-control study among Blacks and Whites in three areas of the United States. In previous analyses, chronic antigenic stimulation was not found to be related causally to the risk of multiple myeloma in either Blacks or Whites,<sup>2</sup> but

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it was suggested that an increase in the frequency of the human leukocyte antigen (HLA)-Cw2 among male cases compared with male controls might contribute to the higher incidence among Blacks.<sup>3</sup> The purpose of this paper is to evaluate the possible role of cigarette smoking and alcohol drinking in the etiology of multiple myeloma in Blacks and Whites.

## Materials and methods

Concurrent population-based case-control interview studies were conducted for multiple myeloma and cancers of the esophagus, pancreas, and prostate during 1986-89 in three areas (Georgia, Michigan, New Jersey) of the United States. For efficiency, one large general-population control group was used for all four types of cancer that are known to have a higher incidence among Blacks than Whites.

Included in the study were all cases of multiple myeloma newly diagnosed between 1 August 1986 and 30 April 1989 among White and Black men and women aged 30 to 79 years. Cases were residents of geographic areas covered by three population-based cancer registries: the Georgia Center for Cancer Statistics (DeKalb or Fulton counties); the Metropolitan Detroit Cancer Surveillance System (Macomb, Oakland, or Wayne counties), Michigan; and the New Jersey State Cancer Registry (10 counties). A rapid reporting system was set up to ascertain and interview patients within three months of diagnosis. Cases were identified from pathology, hematology, outpatient, and tumor registry records at hospitals in the catchment areas.

For each geographic area, registry data from prior years were used to estimate the race and age-specific (five-year age groups) numbers of cases anticipated in order to construct a sampling frame for controls. Control selection utilized two sources: random-digit dialing (RDD) techniques<sup>4</sup> for controls aged 30 to 64, and random sampling from computerized listings of Medicare recipients provided by the Health Care Financing Administration (HCFA) for controls aged 65 to 79 years. The controls were frequency-matched to the age, race, gender, and area distribution of the cases with all four types of cancer combined.

In-person interviews with the cases and controls were conducted by trained interviewers. Detailed information was obtained on the use of alcohol and tobacco, usual adult diet, lifetime occupation, medical history, and sociodemographic factors.

### Statistical analysis

Data were analyzed using unconditional logistic regression.<sup>5</sup> Race-gender-specific adjusted odds ratios (OR) and 95 percent confidence intervals (CI) were obtained using

the BMDPLR procedure.<sup>6</sup> All models included the matching factors of age (< 65, 65+) and geographic area (Atlanta, Detroit, New Jersey), and the potential confounding factor of educational status (less than high school graduate, high school graduate, more than high school graduate).

Cigarette smokers were defined as subjects who reported smoking at least one cigarette per day for six months or longer. Information was ascertained on the age at first and last use, and the number of years and usual amount smoked.

Alcohol drinkers were defined as subjects who reported drinking at least one drink of beer, wine, or hard liquor per month for at least six months. Information obtained for each type of beverage included age started and stopped drinking, number of years drank, and usual weekly consumption. The number of drinks of alcoholic beverages consumed was estimated by summing the number of drinks of beer, wine, and liquor, where one drink was equivalent to 12 ounces of beer, four ounces of wine, and one and one-half ounces of hard liquor.

## Results

Of the 581 White and 309 Black individuals identified with multiple myeloma, interviews were completed for 367 White cases (193 males [62.5 percent] and 174 females [64 percent]) and 208 Black cases (92 males [60.1 percent] and 116 females [74.4 percent]). Reasons for nonresponse included death (21 percent), illness (seven percent), and refusal (six percent). Interviews were completed with 926 (75 percent) of the 1,232 HCFA controls selected and 1,227 (78 percent) of the 1,568 eligible RDD controls. The response rate at the household screening phase for the RDD controls was 86 percent. Among all controls, refusal to be interviewed was the most common reason for nonresponse (16 percent), followed by too ill or deceased (four percent). Two cases and seven controls were excluded from the analysis due to unreliable questionnaire responses as assessed by the interviewer. Also excluded were the 15 White controls aged 30 to 34 years because there were no comparably aged White cases, and two White cases and nine White controls with missing data on educational status. The final study group for this analysis consisted of 365 White cases (192 male, 173 female), 206 Black cases (91 male, 115 female), 1,155 White controls (736 male, 419 female), and 967 Black controls (614 male, 353 female).

A history of cigarette smoking (OR = 0.9, CI = 0.7-1.1) was reported by 54.5 percent of the cases (53.7 percent of Whites, 55.8 percent of Blacks) and 60.6 percent of the controls (61.6 percent of Whites, 59.6 percent of Blacks). Race-gender-specific ORs according to cigarette smoking characteristics are presented in Table 1. For Whites, there

Table 1. Risk of multiple myeloma by race and gender according to cigarette smoking characteristics<sup>a,b,c</sup>

	White males			Black males			White females			Black females		
	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>
Never smoked cigarettes	62	228	1.0	24	187	1.0	106	216	1.0	67	204	1.0
Smoked cigarettes	130	508	0.9 (0.6-1.3)	67	427	1.3 (0.8-2.1)	66	203	0.7 (0.5-1.0)	48	149	1.0 (0.6-1.5)
Cigarettes smoked per day												
<20	33	124	0.9 (0.5-1.5)	32	189	1.4 (0.8-2.4)	30	103	0.6 (0.4-1.0)	32	104	0.9 (0.6-1.5)
20-39	63	265	0.9 (0.6-1.3)	27	195	1.1 (0.6-2.0)	33	78	0.8 (0.5-1.2)	12	44	1.1 (0.6-2.1)
40+	34	117	1.0 (0.6-1.7)	8	42	1.5 (0.6-3.5)	3	22	0.8 (0.5-1.2)	4	1	1.1 (0.6-2.1)
Number of years smoked cigarettes												
<20	45	216	0.9 (0.5-1.3)	26	137	1.5 (0.8-2.8)	26	94	0.6 (0.4-1.0)	23	50	1.5 (0.8-2.7)
20-39	31	121	1.0 (0.6-1.6)	17	94	1.4 (0.7-2.7)	13	57	0.5 (0.3-1.0)	11	35	1.0 (0.5-2.1)
40+	53	156	1.0 (0.6-1.5)	24	182	1.1 (0.6-2.1)	26	50	1.0 (0.6-1.7)	13	62	0.6 (0.3-1.2)
Smoking status												
Current smoker	44	197	0.8 (0.5-1.3)	28	236	0.9 (0.5-1.7)	31	92	0.7 (0.4-1.2)	96	96	0.8 (0.5-1.4)
Past smoker	86	311	0.9 (0.6-1.4)	39	191	1.7 (1.0-2.9)	35	111	0.7 (0.4-1.1)	52	52	1.3 (0.7-2.3)

<sup>a</sup> All odds ratios (OR) relative to risk for subjects who never smoked cigarettes.

<sup>b</sup> All odds ratios (OR) adjusted for age, study area and education.

<sup>c</sup> Excludes subjects with missing data.

<sup>d</sup> CI = 95% confidence interval.

Table 2. Risk of multiple myeloma by race and gender according to use of alcoholic beverage<sup>a,b,c</sup>

	White males			Black males			White females			Black females		
	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>	Cases	Controls	OR (CI) <sup>d</sup>
Never drank alcohol	55	153	1.0	24	139	1.0	112	221	1.0	75	230	1.0
Drank alcohol	137	583	0.6 (0.4-0.9)	67	475	0.8 (0.5-1.3)	61	198	0.7 (0.5-1.0)	40	123	1.0 (0.6-1.6)
Number of drinks of alcoholic beverage per week												
< 8	55	215	0.7 (0.5-1.1)	18	132	0.8 (0.4-1.5)	38	136	0.6 (0.4-1.0)	23	68	1.0 (0.6-1.8)
8-21	42	200	0.6 (0.3-0.9)	22	171	0.7 (0.4-1.3)	14	55	0.6 (0.3-1.2)	12	36	1.1 (0.5-2.2)
22-56	31	131	0.6 (0.4-1.1)	21	123	0.9 (0.5-1.8)	8	6	2.8 (0.9-8.2)	2	13	0.6 (0.2-2.0)
57+	9	37	0.6 (0.3-1.3)	6	48	0.7 (0.3-1.8)	0	1	—	2	6	—
Number of years drank any alcoholic beverage												
<30	26	142	0.6 (0.4-1.1)	21	141	0.8 (0.4-1.5)	20	78	0.6 (0.4-1.1)	19	62	1.0 (0.5-1.7)
30-39	43	165	0.9 (0.5-1.4)	20	131	0.8 (0.4-1.5)	21	57	0.8 (0.4-1.5)	10	33	1.0 (0.4-2.1)
40+	65	250	0.5 (0.3-0.8)	25	184	0.8 (0.4-1.5)	19	63	0.6 (0.3-1.1)	9	25	1.0 (0.5-2.4)
Type of alcoholic beverage												
Drank liquor	96	405	0.7 (0.4-1.0)	53	391	0.8 (0.4-1.3)	36	128	0.7 (0.4-1.1)	19	77	0.8 (0.4-1.4)
Drank beer	110	465	0.6 (0.4-0.9)	49	362	0.7 (0.4-1.3)	25	65	0.8 (0.4-1.3)	28	81	1.0 (0.6-1.8)
Drank wine	58	252	0.6 (0.4-1.0)	13	115	0.6 (0.3-1.3)	33	120	0.7 (0.4-1.2)	9	28	1.0 (0.4-1.6)

<sup>a</sup> All odds ratios (OR) relative to risk for subjects who never drank any alcoholic beverage.

<sup>b</sup> All odds ratios (OR) adjusted for age, study area and education.

<sup>c</sup> Excludes subjects with missing data.

<sup>d</sup> CI = 95% confidence interval.

were no elevations in risk associated with any smoking characteristic. For Black men, a nonsignificantly elevated OR was seen for those who had ever smoked cigarettes (OR = 1.3). Risks for this group also were elevated nonsignificantly for two of the three dose-categories involving both intensity and duration of cigarette use, but no consistent gradients in risk were seen. An elevated risk associated with past smoking among Black men (OR = 1.7) was of borderline significance, but no gradient was seen with increasing intensity or duration of use (data not shown) and no excess risk was detected for current smokers (OR = 0.9). Risks associated with smoking among Black women were generally around 1.0 or lower except for nonsignificantly elevated risks for the lowest intensity category (OR = 1.5) and for past smokers (OR = 1.3). Elimination of the education variable from the logistic models did not affect the results.

Use of alcoholic beverage (OR = 0.7, CI = 0.6-0.9) was reported by 53.4 percent of the cases (54.2 percent of Whites, 51.9 percent of Blacks) and 65.0 percent of the controls (67.6 percent of Whites, 61.8 percent of Blacks). Risks were not elevated for any race-gender group for subjects who drank any type of alcoholic beverage or for those who drank liquor, beer, or wine (Table 2). In addition, no significant positive or negative gradients in risk were seen with either increasing intensity or duration of alcoholic beverage use. A nonsignificantly elevated OR (OR = 2.8) was seen for White females who drank 22 or more drinks of alcoholic beverages per week, but no corresponding increases in risk were seen for any other race-gender group.

## Discussion

Our population-based case-control interview study evaluates the risk of multiple myeloma associated with the use of cigarettes and alcoholic beverages for Blacks and Whites separately. We found little evidence linking smoking or drinking to multiple myeloma overall or for any of the four race-gender groups. For most epidemiologic studies of multiple myeloma, no association with cigarette smoking has been reported.<sup>7-15</sup> However, significantly elevated risks were noted in a cohort of Seventh-day Adventists,<sup>16</sup> among women in the Third National Cancer Survey (US),<sup>17</sup> and for ex-smokers in a Swedish case-control study.<sup>18</sup> We did find a slight, nonsignificant elevated risk (OR = 1.3) for Black men, apparently due to an increased risk (OR = 1.7) of borderline significance for past smokers. This finding is probably a chance event since it was not evident in any other race-gender group and there were no consistent risk gradients associated with intensity or duration of smoking among past smokers.

Previous studies of multiple myeloma generally have reported no excess risk associated with alcohol intake,<sup>7,11</sup>

although nonsignificant increases in risk have been occasionally noted.<sup>14,17,19</sup> We found no elevation in risk for any race-gender group in relation to any type of alcoholic beverage, supporting the notion that alcohol does not contribute to the etiology of multiple myeloma. The nonsignificantly elevated risk (OR = 2.8) seen for White women who drank 22 or more drinks per week was not observed for any other race-gender group.

A possible factor contributing to our negative findings may be selection bias. As in most case-control studies, smoking and drinking history were not ascertained for nonrespondents. If survival status were related to either smoking or drinking status among our cases, smokers and/or drinkers would be underrepresented in our analysis group, and thus could account for the observed null associations. It seems unlikely, however, that selection bias played a major role because our results are consistent for both men and women and confirm earlier investigations using a variety of methodologic approaches. Our RDD technique is another potential source of bias. Telephone surveys exclude individuals, generally the less affluent, who do not have phones. However, for our study areas, telephone coverage was estimated to be greater than 90 percent,<sup>20</sup> and removal of the cases aged 64 years and younger without telephones (three Whites and eight Blacks) did not change the results. The HCFA Medicare files, on the other hand, were estimated to cover approximately 98 percent of the US population aged 65 years and older.<sup>20</sup> It is also possible that some of the positive associations noted were due to chance since our analysis involved multiple comparisons. In our study, the potential for recall bias should be minimal because all subjects were interviewed directly and neither subjects nor interviewers were familiar with the hypotheses under investigation. Differential misclassification could have occurred if the cases – because of guilt that their illness might be related to their smoking or drinking habits – underreported use. We have no way to evaluate that possibility, but results from the three case-control studies conducted concurrently found elevated risks for smoking for cancers of the esophagus and pancreas; for drinking, risks were elevated for cancers of the esophagus, pancreas, and prostate.

In summary, the results of our population-based case-control study is consistent with previous reports indicating that smoking and drinking are not related causally to the risk of multiple myeloma. The lack of association was seen in Blacks and Whites of both genders, indicating that smoking and drinking practices do not contribute to the higher incidence among Blacks than Whites in the US.

**Acknowledgments** — The authors thank Ruth Thomson of Westat, Inc. for her assistance in study management and coordination; Roy Van Dusen of

Information Management Systems, for computer support; study coordinators, interviewers, and support staff in each study area for their diligent work; and the many physicians, hospitals, and study participants who cooperated in this study.

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