Special reports

Who is being screened for melanoma/skin cancer?

Characteristics of persons screened in Massachusetts

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We conducted a survey of persons who voluntarily attended melanoma/skin cancer screenings in Massachusetts in 1987. Of 1219 persons asked to fill out a questionnaire, 1116 (92%) completed it. Our study demonstrates that persons attending the melanoma/skin cancer screening program were, for the most part, at risk for the disease and appropriately selected themselves to be screened. Most were women, well educated (with college or advanced degrees), and white. More than 86% had at least one risk factor for melanoma/skin cancer whereas 78% had at least two risk factors. Future studies are necessary to determine whether our experience can be verified. Additional efforts should try to attract those who are at risk but perhaps are less willing to attend screening programs—men and those of lower socioeconomic status. These efforts can help target screening to those at highest risk and maximize the yield of these public health efforts. (J AM ACAD DERMATOL 1991;24:271-7.)

Since 1985, more than 260,000 Americans have been screened for melanoma/skin cancer in annual efforts sponsored by the American Academy of Dermatology (AAD). Those appearing for screening were self-selected and attended voluntarily. However, little information is available about those who appear for screening and particularly whether they are an appropriate population, that is, at increased risk for melanoma/skin cancer.

We surveyed persons who appeared for melanoma/skin cancer screening in Massachusetts in 1987 to profile their socioeconomic and demographic background, determine how they heard about the screening, elicit their reasons for attendance, and assess their risk of melanoma/skin cancer. We specifically tested the hypotheses that persons screened were more likely than the general population to (1) be at increased risk for skin cancer, (2) have a regular doctor or dermatologist, and (3) demonstrate preventive health behavior.

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METHODS

In 1987, in conjunction with the AAD, 14 centers in Massachusetts offered free melanoma/skin cancer screening to the general public. The screening was promoted through public service announcements on radio and television, posters, and newspaper advertisements during the month before the screening. One thousand three hundred seventy-two persons voluntarily attended these screening sessions. At the time of screening, participants were asked to complete a brief self-administered questionnaire, modified from one piloted in a hospital-based program in 1986[1]; two centers, with 153 participants, did not distribute questionnaires. The questionnaire addressed (1) demographics (age, sex, race, and level of education and income), (2) publicity channels (e.g., newspaper, television, radio, poster, or word of mouth) that led to participation in the screening program, (3) reasons for attending, (4) skin cancer risk factors, (5) existing levels of dermatologic and other medical care, and (6) preventive health practices.

We tabulated the frequencies of responses to all questionnaire items, cross-stratified them by sex, age, and other study variables, and tested notable differences by chi-square analysis. In the results, we present only those differences with p values equal to or less than 0.05. For purposes of comparison, the demographic factors were then trichotomized as follows: age: 40 years or younger, 40 to 59 years, and 60 years or older; highest level of education: elementary or high school, college, and advanced

Table I. Demographic characteristics of persons screened for melanoma/skin cancer, Massachusetts residents, and melanoma cases in Massachusetts

	Persons screened		Massachusetts residents*	Melanoma cases†
	No.	%	(%)	(%)
Sex				
Women	739	66	52	49
Men	376	34	48	51
Unknown	1	—	—	—
Age (yr)				
<20	31	3	32	1
20-29	139	13	18	7
30-39	211	19	14	13
40-49	144	13	9	15
50-59	177	16	11	20
60-69	239	22	9	21
70-79	131	12	5	16
≥80	27	2	2	8
Unknown	17	—	—	—
Race				
White	1054	98	93	
Nonwhite	25	2	7	
Unknown	37	—	—	
Education				
Elementary	49	5	9	
High school	481	44	63	
College	387	35	21	
Advanced degree	181	16	7	
Unknown	18	—	—	
Household income				
<$10,000	103	13	17	
$10,000-$19,999	155	20	17	
$20,000-$29,999	204	26	15	
$30,000-$39,999	141	18	16	
≥$40,000	185	24	35	
Unknown	328	—	—	

*Based on number of Massachusetts residents (5,800,000) in the 1980 census (income from 1987 statistics).
†Based on 2716 cases of cutaneous melanoma diagnosed from 1982 through 1986 and recorded in the Massachusetts Cancer Registry.

degree; annual household income: less than $20,000, $20,000 to $39,999, and $40,000 or more.

We compared our results with corresponding published data about (1) Massachusetts residents from the 1980 census (with the use of 1987 income data), (2) cases of melanoma from the Massachusetts Cancer Registry diagnosed between 1982 and 1986, (3) control subjects interviewed in U.S. and Canadian case-control studies of melanoma, and (4) participants of four national surveys on medical care and health practices: the 1985 National Health Interview Survey,[2] the 1987 AAD Gallup Survey,[3] the 1986 National Access to Health Care Survey by the Robert Wood Johnson Foundation,[4] and the National Health Interview Survey Supplement on Cancer Control.[5] Comparison rates were adjusted to the sex and age distribution of the screened population whenever possible.

RESULTS

Of the 1219 persons asked to participate, 1116 (92%) completed questionnaires. Demographic characteristics of this group, characteristics of Massachusetts residents from the 1980 census, and characteristics of melanoma cases reported to the state cancer registry are presented in Table I. The ages of participants ranged from 9 to 88 years (median 53 years). For adults (>20 years of age), the age distribution was similar to that of Massachusetts residents overall.

Nearly two thirds of those who appeared for screening were women. Ninety-eight percent were white, compared with a statewide proportion of 93%. In comparison with Massachusetts 1980 census data, those screened tended to have more education (51% vs 28% had completed college or held a graduate degree) but in comparison to a 1987 Massachusetts income survey, those screened had slightly less income (42% vs 51% with household income of at least $30,000). Younger persons (< 40 years) were more likely than older persons (≥ 60 years) to have attended college or have an advanced degree (69% vs 31%). Younger persons (< 40 years) were also more likely than older persons (≥ 60 years) to report a household income of $40,000 or more (30% vs 7%).

Publicity channels and reasons for attendance

Persons screened learned about the program most often from television (37%), which consisted only of a three-part series on skin cancer on one station, and from the newspaper (30%) (Table II). Little difference was observed between men and women in publicity channels used. Older persons (≥60 years) were more likely to learn of the screening program from the newspaper (41%), whereas adults younger than 40 years most often heard of it from television (45%). Persons with less education and lower income tended to learn of the program more often from newspaper (37% of those with no more than high school education and 35% of those with an annual income less than $20,000) and radio (6% and 8%, respectively).

Participants were asked for reasons that contrib-

Table II. Reported frequency of publicity channels and reasons for attendance

	All persons screened	Women	Men	Age (yr)		
				<40	40-59	≥60
Publicity channel						
Television	37	37	38	45	38	29
Newspaper	30	31	29	21	30	41
Radio	5	4	6	3	4	7
Poster	9	9	8	11	7	7
Word of mouth	10	9	11	11	11	7
Other	10	10	9	9	10	9
Reasons for attendance*						
Check specific mark on skin	73	75	69	73	73	74
Overall skin checkup	43	42	44	42	43	43
To learn about skin cancer	25	26	24	29	25	22
To learn how to reduce skin cancer risk	24	23	26	25	24	24
Convinced by others to attend	7	6	10	7	6	7
Other	4	5	3	4	4	5
Previous skin cancer screening	7	7	7	4	5	11

Data expressed as percent.
*Total percentage exceeds 100% because more than one reason was given by many participants.

uted to their decision to attend (Table II). Most came to have a specific lesion checked (73%). Other reasons commonly cited included an overall skin checkup (43%), learning more about the symptoms of skin cancer (25%), and learning how to reduce the chances of developing skin cancer (24%).

There was little variation in reasons for attendance by sex, age, or other demographic variables with one exception: men and women with an advanced degree were more likely to have come for an overall skin cancer screening.

Risk factors for melanoma skin cancer

Those screened were asked about the presence of major risk factors for melanoma/skin cancer (Table III). More than 80% reported burning before or instead of tanning after sun exposure (type I or II skin); 12% indicated that they burned and never tanned. A tendency to burn with sun exposure was reported more frequently by women than men (83% vs 77%) and by younger (<40 years) persons than older (≥60 years) (86% vs 76%). Slightly more than 40% of all persons screened reported having blistering sunburns as a child; this risk factor was also more common among women than men (44% vs 35%).

Eleven percent reported a personal history of skin cancer, and 3% ($n = 33$) reported a previous melanoma. Among those at least 60 years of age, 22% had a history of skin cancer; 7% had a history of melanoma. Of the 33 persons reporting a previous melanoma, 26 were at least 60 years old. More than one third (36%) said they had a changing mole; women reported a changing mole more often than men (42% vs 25%).

Twenty-two percent indicated a history of skin cancer in their families. Although some did not know whether or not the skin cancer was melanoma, 5% ($n = 53$) reported a family history of melanoma. Skin cancer in a family member was reported more often by women (26% vs 15%), persons younger than 40 years (25% vs 15% in those at least 60 years of age), and those with college and advanced degrees (26% vs 17%). Of the 53 persons reporting a family history of melanoma, 45 were female. Twenty-three percent said that a family member had "funny moles"; this risk factor was also reported more often by women (28% vs 14%) and by persons younger than 40 years (31% vs 17%). The youngest people screened, in the age group up to 29 years, were more likely than those in other age groups to report a family history of melanoma; of the 170 participants in that group, 16 had a family history of melanoma.

More than 86% reported at least one of the risk factors shown in Table III; 78% had at least two of the leading risk factors. Only 14% had none of the leading risk factors.

Table III. Reported frequency of melanoma/skin cancer risk factors

	All persons screened	Women	Men	Age (yr)		
				<40	40-59	≥60
Sun sensitivity						
Burn, never tan	12	14	8	8	14	15
Burn, then tan	69	69	69	78	67	61
Tan, then burn	3	2	3	2	4	2
Tan, never burn	17	15	20	12	15	23
Personal history						
Blistering sunburn*	41	44	35	35	45	43
Skin cancer	11	11	12	2	9	22
Melanoma	3	3	4	0	2	7
Changing mole	36	42	25	40	33	35
Family history						
Skin cancer	22	26	15	25	26	15
Melanoma	5	7	2	6	6	4
"Funny" moles	23	28	14	31	21	17

Data expressed as percent. Proportion among those with known status; those screened with unknown status were excluded.
*As a child.

Medical care utilization and preventive health practices

Nearly three fourths (73%) of those in attendance had a physician for regular medical care, and 15% had a regular dermatologist (Table IV). Persons screened reported an average of 2.3 visits per year to their regular medical doctor. In comparison, national health-care surveys[2-5] indicate that 81% (females, 86%) have a regular medical doctor and that persons in the general population reported an average of 4.5 visits per year in 1986 to that doctor. In these surveys, 13% have a regular dermatologist.[3] Sixty-eight percent of those screened with personal history of previous melanoma did not have a regular dermatologist and 12% did not have a regular doctor.

Participants were asked about several preventive health practices (Table IV). Sixty-two percent reported that they exercised regularly, compared with a national health survey estimate of 36%.[2,4,5] Routine blood pressure checks were reported by 70% of those screened, somewhat less than 85% estimated for the general U.S. population.[2,4,5] Among women who were screened, 44% had routine mammograms, 61% performed routine breast self-examination, and 75% had routine Pap tests.

DISCUSSION

The 1987 Massachusetts AAD-sponsored Melanoma/Skin Cancer Screening Program attracted men and women of all ages and social strata. Our analysis characterizes attendees in terms of population standards. The results suggest that attendees differ from the general population in risk profile by sex and socioeconomic status (education and income). These findings imply that future publicity and screening programs can be tailored to attract persons from specific subgroups at high risk.

Although the age distribution of those screened was similar to that of the adult population of Massachusetts, participants tended more often to be women, white, and well educated. These characteristics are often found among participants of screening and elective health services.[6] Additional efforts should try to attract those who are at risk but perhaps less willing to attend screening programs—men and those of lower socioeconomic status.

Part of the program's success in attracting such a diverse group of participants can be attributed to the multimedia promotional campaign. Our results indicate that persons attended in response to publicity from all channels used in the campaign. Television advertising was particularly important, although it consisted of only a three-part series on one station. The visual nature of melanoma/skin cancer may explain its particular appeal on television. However, our results and those of others[1,7,8] suggest that other publicity channels, particularly the newspaper, may be more effective in informing potential participants who are older and have lower income or less education.

We tested the hypothesis that persons selecting

Table IV. Reported frequency of medical care utilization and preventive health practices

All persons screened	Survey estimates	Persons screened	Gender		Age (yr)		
			Women	Men	<40	40-59	≥60
Regular medical care	81*	73	77	64	61	71	84
Regular dermatologist	13†	15	16	12	9	15	18
Exercise regularly	36‡	62	59	69	68	52	66
Routine blood pressure check	85‡	70	70	72	56	67	86
Routine mammogram§	31‖	44	44	—	18	63	53
Routine breast self-exam§	72‖	61	61	—	68	52	60
Routine Pap test§	76‡	75	75	—	84	79	59

Percentages are standardized to the distribution of gender and age among the persons screened (except for routine mammograms and routine breast self-examinations).
*From the 1985 National Access Survey.[4]
†From the 1987 American Academy of Dermatology Gallup Survey.[3]
‡From the 1985 National Health Interview Survey.[2]
§Data apply to women only.
‖ From the 1987 National Health Interview Survey Supplement on Cancer Control.[5]

themselves to be screened have a higher risk[9] for skin cancer than the general population. Ideally, we would have compared the prevalence of risk factors in participants to the estimated prevalence of these risk factors in the general population. Because the latter data are not available, we used instead comparison information from case-control studies of melanoma in the United States and Canada, with attention to the prevalence of risk factors among the control subjects, admitting that we could not adjust for factors such as sex and age because of potential selection bias.

Our data seem consistent with the aforementioned hypothesis because 3% of persons screened reported a previous melanoma compared with an estimated prevalence of melanoma of 0.8% from the Connecticut Tumor Registry.[10] In addition, 22% reported a family history of any skin cancer,[11] including 5% who indicated that a relative had melanoma. These proportions are almost certainly underestimated because respondents may not have included skin cancer in deceased relatives in their answer. Nevertheless, these numbers are higher than the 2.5% of control subjects reporting a family history of melanoma, from a case-control study that used similar questions.[12]

Of the other risk factors, more than 80% of those screened reported sun sensitivity (as defined by burning before or instead of tanning after sun exposure [type I or II skin]), compared with 30% of control subjects in a Canadian case-control study.[13] More than 40% indicated they had a history of blistering sunburn compared with 30% of control subjects in a study by Lew et al.[14]

In addition, 73% of participants expressed concern about a specific mark on the skin and more than one third (36%) reported a changing mole. These figures in all probability are higher than in the general population.

When we further analyzed the prevalence of these risk factors according to sex, age, and other demographic variables, we observed several trends. In comparison with men, women more frequently reported a family history of melanoma, skin cancer, or "funny" moles, a history of blistering sunburn, sun sensitivity, and a changing mole. These findings suggest that women may be more conscious of their own risk factors[15] and more likely to act on their concern, such as calling a suspect mark on the skin to medical attention. Alternatively, these findings may also suggest that the publicity failed to engage the concern of men at high risk.

With respect to age, the correlation between older age and lower income suggests that many retired or semiretired persons attend screenings. In addition, persons younger than 40 years reported higher-than-anticipated proportions of sun sensitivity, changing moles, and family history of skin cancer or "funny" moles. As the risk of basal cell carcinoma and squamous cell carcinoma among persons younger than 40 years is rather small, melanoma poses the greatest threat to this group. For these younger persons, the factors of family or personal history of skin cancer or a worrisome mole arouse concern. These findings suggest an important age distinction: younger persons, who also tended to have more education and higher income, were more likely to come for screening because of an awareness of

their own risk (e.g., sun sensitivity and family history), whereas older persons (60 years) appeared to attend because of a higher personal prevalence of skin cancer or precancerous lesions.

Our study did not indicate that attendees were more likely than the general population to have a regular doctor or dermatologist. In comparison to national health-care survey data, similar proportions of those screened reported they had a regular medical doctor and a regular dermatologist. Because many persons who were screened were already obtaining routine health care, we can only conjecture why they might attend a screening program. However, as only one of seven persons reported seeing a dermatologist regularly, a screening program such as this may provide an opportunity to see an "expert" at no cost and with a brief wait. As persons in screening programs appear to make fewer visits to medical doctors than does the general population, the availability of such a screening program affords them the opportunity to have a particular lesion evaluated between routine visits. For persons without a regular dermatologist, a screening program appears to serve as an important adjunct to regular medical care. It is of concern that 68% of participants with a personal history of previous melanoma did not have a regular dermatologist (although most had a regular doctor).

Many screening efforts are thought to attract a disproportionate number of the "worried well."[6] However, our study did not support the hypothesis that persons screened tend to demonstrate more preventive health behavior than does the general population. More participants exercised regularly and received mammograms, but fewer practiced breast self-examination or had regular blood pressure checks.

In summary, our population-based survey demonstrates that many persons attending the melanoma/skin cancer screening program reported elevated risk for the disease and, for the most part, have appropriately chosen to be screened. Although risk was determined by self-reported data only, our conclusion is supported by the relatively high yield of confirmed melanomas (9 of 2560 cases in Massachusetts[16] and 14 of 2239 cases in New York City[17]) found in the only follow-up studies in AAD melanoma/skin cancer screening to date; these high yields, however, may only represent "harvesting" of prevalent cases and therefore must be verified by more data in these areas and across the country. As with almost all public screening programs, most attendees were women, well educated, and white. Although those who came were at appropriately high risk, future screenings should consider means of attracting at-risk persons who are less likely to attend. Location of screening sites in less affluent communities may be desirable.

Our findings are of interest particularly because some studies in other cancer screening efforts show that those at highest risk for the cancer are least likely to be screened.[18] Our results need to be substantiated by more data to determine whether the experience in Massachusetts is generalizable. Such studies are ongoing in Rhode Island (M. Weinstock, personal communication, June 1989) and other states. Future studies should clarify what publicity messages arouse concern among those at high risk and what intensity of concern convinces them to be screened. A better understanding of the prevalence rates of melanoma/skin cancer risk factors in the general population would aid future comparisons of attendees. Finally, targeting screening to those at highest risk[19] should further attract the appropriate population and maximize the yield of these public health efforts.

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Tanning salons: An area survey of proprietors' knowledge of risks and precautions

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An area survey of tanning salon proprietors was conducted in a medium-sized midwestern city. Proprietors reported they were in compliance with federal safety regulations, but not all had age, frequency, or duration restrictions. Similarly, proprietors were not uniformly informing patrons of potential tanning hazards, including the possibility of skin cancer, and were not knowledgeable about the risk and benefits of tanning. Some establishments reported selling psoralens to patrons to enhance tanning. More explicit guidelines regarding the use of tanning equipment and more accurate consumer information are needed. (J AM ACAD DERMATOL 1991;24:277-82.)

Five hundred thousand new cases of skin cancer are diagnosed each year, and most are the result of UV radiation[1,2]; however, Americans continue to sunbathe. A popular source of UV radiation is tanning beds. Proponents of artificial tanning contend that tanning units with primarily UVA radiation are safer than tanning in the sun, which contains "harmful" UVB radiation. UVA radiation has been promoted as safer than UVB radiation because it can initiate melanogenesis at suberythema-producing doses in the absence of UVB. However, the UV radiation found in tanning beds is known to cause erythema, allergic reactions, corneal burns, retinal damage, and cataracts.[2-8] Tanning units can pro-

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