

Screening program reduced melanoma mortality at the Lawrence Livermore National Laboratory, 1984 to 1996

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Background: Worldwide incidence of cutaneous malignant melanoma has increased substantially, and no screening program has yet shown reduction in mortality. We evaluated results of an educational campaign designed to promote self-examination and targeted screening at the Lawrence Livermore National Laboratory (LLNL).

Methods: Thickness and crude incidence of melanomas detected during 3 phases of increasing melanoma surveillance were studied. These periods were: (1) preawareness (1969-1975), (2) early awareness of increased melanoma risk (1976-1984); and (3) screening program (1984-1996). Melanoma mortality was derived from data recorded in the National Death Index search. The expected annual number of deaths from melanoma among LLNL employees was calculated by using California mortality data matched by age, sex, and race/ethnicity and adjusted to exclude deaths from melanoma diagnosed before the program began or before employment at LLNL.

Results: Crude incidence of melanomas thicker than 0.75 mm decreased during the 3 periods from 22.1 to 15.13 to 4.62 cases per 100,000 person-years ($P = .001$ by chi-square for trend) with the larger decrease from the active screening program. The crude incidence of melanoma measuring less than 0.75 mm in thickness increased and then decreased slightly without a significant linear trend, and crude incidence of in situ melanoma increased substantially. No eligible melanoma deaths occurred among LLNL employees during the screening period, whereas the expected number of deaths was calculated to be 3.39 deaths ($P = .034$).

Limitations: The study design was not randomized or controlled. The methodology for adjusting expected mortality for the exclusion of employees diagnosed with melanoma before the screening period was devised for this study.

Discussion: Increasing community awareness of melanoma was associated with a progressive decreasing incidence of thicker melanoma. The education, self-examination, and selective program generated the larger reduction in incidence of melanoma thicker than 0.75 mm. This campaign decreased the melanoma-related mortality to zero. The statistically significant decrease in mortality persisted for at least 3 years after employees retired or otherwise left the laboratory. (J Am Acad Dermatol 2008;58:741-9.)

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Research support, including travel, was provided by the US Department of Energy, which had no role in the study design.

The Kaiser Foundation Research Institute provided a grant 139-9858 for partial salary support from 1994 to 1997.

Conflicts of interest: None declared.

Accepted for publication October 28, 2007.

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Published online December 10, 2007.

0190-9622/\$34.00

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doi:10.1016/j.jaad.2007.10.648

In the United States from 1975 to 2001, melanoma incidence increased 137%, and mortality increased 29%.¹ Many early-detection campaigns were undertaken to reduce melanoma mortality. Most consisted of brief, no-charge skin screenings or publicity campaigns; these efforts showed increased numbers of thin tumors but did not evaluate mortality.² Population-based time series in England,³ Scotland,^{4,5} and Trentino, Italy,^{6,7} involved education campaigns to teach identification of suggestive lesions to the local populations and medical community, encouraging people to be examined by medical personnel and helping to expedite referral and diagnosis. The English study³ showed an increase

Abbreviations used:

LLNL: Lawrence Livermore National Laboratory
 NIH: National Institutes of Health
 NDI: National Death Index
 SEER: Surveillance, Epidemiology, and End Results

in thin tumors and no effect on mortality. The Italian program showed an increase in the proportion of thin tumors⁶ and suggested a possible reduction in mortality.⁷ The Scottish study showed a temporary reduction in thick tumors and a stabilization of mortality among women and men.^{4,5} A large, randomized controlled trial of melanoma screening in Australia is in its preliminary stage.⁸

In 1981, a 3- to 4-fold excess incidence of melanoma during the period 1972 to 1977 was reported among the approximately 5100 persons then employed at the Lawrence Livermore National Laboratory (LLNL) in Northern California. In response, a secondary melanoma prevention campaign began in 1984. This campaign consists of employee education, self-examination, and targeted onsite screening conducted by a dermatologist.

We evaluated the LLNL melanoma screening and education program by investigating the thickness of diagnosed melanoma from 1969 through 1996 and deaths from melanoma among LLNL employees and former employees from July 1984 through 1996.

METHODS

Melanoma education and screening program

In 1976 a preliminary study by the medical director of LLNL suggested an increased incidence of melanoma from 1969 through 1975, which is considered the preawareness period. The early awareness period from 1976 to June 1984 was effected by the publicity surrounding this announcement and other studies^{9,10} confirming the 3- to 4-fold increased incidence. This led to the LLNL education and screening program, which began in July 1984 with instructions to employees about sun protection, signs of melanoma, and melanoma risk factors. This information was disseminated by direct mailings, worksite news articles, meetings, and lectures to employees and local physicians. The local news media responded with articles about the program. Employees were encouraged to examine themselves for suggestive lesions; if self-examination showed a suggestive lesion, a visit was arranged to the onsite screening facility for full-body examination, dermoscopy, and biopsy if indicated. Alternatively, personnel could be examined by their personal

physicians, in which case the employees were encouraged to report results to the LLNL medical staff. All employees were also sent a form to report their mole counts at the outset of the program, and new employees received this form as part of their new-employee orientation at LLNL. Program participants who counted 5 or more moles greater than or equal to 5 mm in diameter or a single mole greater than or equal to 18 mm in diameter were offered a screening examination.¹¹ The two most unusual dysplastic nevi were considered for pathologic confirmation even if melanoma was not suggested; in this regard, evaluators followed recommendations promulgated at the October 1983 National Institutes of Health (NIH) Consensus Conference, published online as Precursors to Malignant Melanoma.¹² After the January 1992 NIH Consensus Conference,¹³ new guidelines were followed with biopsy performed only on atypical lesions to evaluate for melanoma. All examinations were performed by one of the authors (J. S. S.) or by fellows from the University of California San Francisco Melanoma Clinic. During the study period, virtually all melanoma in LLNL employees was diagnosed in the onsite screening program. After dermatologic evaluation, employees with melanoma (invasive or in situ), dysplastic nevi, 50 or more moles, or family history of melanoma were offered full-body periodic examination every 3 to 24 months, often with full-body photography and dermoscopy, according to level of melanoma risk.¹⁴

Melanoma thickness and crude incidence data

Institutional review board approval was obtained for all aspects of the study. Biopsy specimens obtained by the screening program at LLNL were evaluated at the University of California San Francisco Melanoma Center, and the thickness of each diagnosed melanoma was recorded. Any employees who reported an outside diagnosis of melanoma had their slides reviewed at University of California San Francisco. Crude incidence of melanoma was calculated for the preawareness, early awareness, and screening periods stratified into 4 thickness categories: in situ, less than or equal to 0.75 mm, 0.75 to 1.50 mm, and greater than 1.50 mm. The preawareness period was January 1969 through December 1975, the early awareness period was from January 1976 to June 1984, and the screening campaign was July 1984 through December 1996. The denominator was the number of people employed at LLNL during the respective time periods.

Mortality data models and statistical analysis

A roster was compiled listing all LLNL employees with at least 6 months' tenure who worked at LLNL

sometime during the period July 1984 through 1996. Roster information about employees and former employees—full name, date of birth, sex, and US Social Security number—was sent to the National Center for Health Statistics for matching with records in the National Death Index (NDI), a computerized database of records from the vital statistics offices of all US states and territories. Matches were confirmed independently using LLNL records. The NDI provided the coded cause of death for each probable match.

Annual California melanoma mortality for 1989 through 1996 was obtained online from Expert Health Data Programming Inc.¹⁵ Because the number of deaths in each subcategory was small, the annual melanoma-related mortality was highly variable when subcategorized by sex, race, and 5-year age subgroups. The mortality was smoothed, using a Poisson regression model, before being applied to population at-risk data. Mortality was extrapolated back from 1989 through 1984 using the same model. The smoothed deaths based on the smoothed mortality showed good agreement with the observed mortality (chi-square for fit = 33.8 with 33 degrees of freedom $P = .43$).

Total number of melanoma deaths expected for the LLNL population was obtained by summing the products of calendar year/sex/race/age group-smoothed mortality and multiplying this product by the LLNL employee population. This calculation is shown mathematically by the equation:

$$\text{LLNL melanoma deaths} = \sum_x R_x P_x$$

where R_x represents the calendar year/sex/race/age group-smoothed mortality and P_x represents the corresponding calendar year/sex/race/age group-specific employee populations at LLNL. The summation includes all calendar year/sex/race/age groups.

We calculated cumulative mortality,³ which excluded deaths among patients given the diagnosis before July 1984 or new hires who developed melanoma before employment at LLNL, because they could not have benefited from the screening program. To account for this exclusion of pre-1984 case deaths in the study group, we adjusted the expected number of deaths by subtracting those likely to occur among patients given the diagnosis before 1984. This adjustment was based on observed melanoma mortality for the 5 San Francisco-Oakland Bay area counties as reported to the Surveillance, Epidemiology, and End Results (SEER) program. Table I shows the adjustment percentages for each year of the study. We did not need to correct for new hires after 1984, who were given a diagnosis of melanoma, before employment at LLNL. Assuming

Table I. Distribution of deaths from melanoma (1984-1996) in 5 San Francisco Bay area counties stratified by diagnosis date before July 1984

Year	Total deaths, No.	Deaths in cases diagnosed before July 1984	
		No. (%)	Smoothed percentage*
1984	79	70 (89)	88%
1985	71	48 (68)	66%
1986	61	27 (44)	50%
1987	71	27 (38)	38%
1988	72	26 (36)	30%
1989	80	10 (13)	24%
1990	81	19 (23)	20%
1991	98	20 (20)	16%
1992	73	10 (14)	14%
1993	92	7 (8)	13%
1994	83	9 (11)	11%
1995	89	4 (4)	10%
1996	104	14 (13)	10%

*Used to calculate number of deaths expected in Lawrence Livermore National Laboratory employees diagnosed with melanoma before July 1984.

a stable population, one would expect the number of persons who left the laboratory who had melanoma would be the same or more (because the laboratory incidence rate was higher than the community rate) than the new employees. Because all employees who left LLNL were followed up for melanoma mortality and would have been included in observed mortality, we excluded from observed mortality any hires after 1984 who died from melanoma diagnosed before employment.

We computed a second number of expected deaths on the basis of extending the number of person-years for LLNL employees 3 years beyond these employees' periods of LLNL employment or until 1996. In this computation, a number of years of risk beyond termination of LLNL employment was added for each employee. Employees and former employees who died from any cause were not included in the at-risk population beyond the year of the death.

Because the observed numbers of melanoma-related deaths can be considered rare events, these numbers can be expected to follow a Poisson distribution when compared with the adjusted expected number of melanoma-related deaths. The probability that 0 events are observed is equal to $e^{-\lambda}$ when λ events are expected. This probability is approximately .05 when $\lambda = 3$.

RESULTS

Decreased incidence of high-risk melanoma

From January 1969 through December 1975 14 melanomas were diagnosed; of these 9 (64%)

Table II. Number and crude incidence of melanoma during preawareness (1969-1975), early awareness (1976-1984), and education and screening program (1984-1996) at Lawrence Livermore National Laboratory

Year	Thickness category			
	In situ	≤ 0.75 mm	>0.75-1.50 mm	>1.50 mm
	No. of lesions			
1969-1975	0	5	5	4
1976-1984	7	18	7	2
1984	3	0	2	0
1985	4	2	1	0
1986	1	3	0	0
1987	1	1	1	0
1988	1	1	0	0
1989	3	3	1	0
1990	1	2	0	0
1991	4	2	0	0
1992	1	2	0	0
1993	2	2	0	0
1994	1	1	0	0
1995	1	0	0	0
1996	3	4	0	0
1984-1996	26	23	5	0
	Incidence/100,000 person-years			
1969-1975	0.0	12.28	12.28	9.83
1976-1984	11.77	30.27	11.77	3.36
1984-1996 (linear trend)	24.01 ($P = .0003$)	21.24 ($P = .32$)	4.62 ($P = .04$)	0.00 ($P = .001$)

measured greater than 0.75-mm thick. From January 1976 through June 1984, 34 melanomas were diagnosed; of these, 9 (26%) measured greater than 0.75-mm thick. From these results, we calculated the crude incidence of these high-risk lesions to be 22.11 and 15.13 lesions per 100,000 person-years for the 1969 to 1975 and 1976 to 1984 periods, respectively. The reduction is 32%. From July 1984 through December 1996, 54 melanoma lesions were diagnosed, 5 (9%) of which measured greater than 0.75-mm thick; these results yielded a crude incidence of 4.62 lesions per 100,000 person-years (Table II). This is a 69% reduction from the 1976 to 1984 rate. This series showed that the number of higher-risk melanomas (>0.75 mm) decreased markedly during the time period 1969 to 1996 and particularly markedly after screening began in July 1984 ($P = .001$ by chi-square test for trend in crude rate over the entire observation period and $P = .024$ by chi-square test for the last two time periods). We noted with particular interest that 3 of the 5 lesions thicker than 0.75 mm were diagnosed during the first year and that the other two lesions were diagnosed by the sixth year of the 12-year screening campaign (Table II). The crude incidence of melanoma measuring less than 0.75 mm in thickness increased and then decreased slightly without a significant linear trend. We observed a large increase in number of "in situ" melanoma with the increasing common use of the term in the late 1970s.

Decreased mortality from melanoma

A search of the NDI showed 3 melanoma-related deaths, all in people known to have the disease before either July 1984 or their date of being hired at LLNL. Therefore, the eligible mortality was zero with an upper 95% limit of 2.6 deaths.

Table III shows employee population by year and expected numbers of melanoma-related deaths among LLNL employees by sex, race, and year. During this period, no melanoma-related deaths were observed among LLNL employees who were not already given a diagnosis of melanoma before July 1984; and the probability of observing zero deaths is $P = .034$ when 3.39 deaths are expected.

Long-term effect of screening campaign

The original study plan was to extend the analysis year-by-year beyond termination of LLNL employment. This was to account for possible melanoma deaths among LLNL employees who terminated their employment because of illness from melanoma. Secondly this allowed for the analysis of possible decay of the education effect as terminees escaped LLNL melanoma-prevention methods. This employee awareness might not diminish among terminees who retired with benefits from LLNL and continued to receive LLNL publications. However, no such melanoma deaths were observed, and terminees survived remarkably well from all causes

Table III. Population and expected deaths from melanoma at Lawrence Livermore National Laboratory (1984-1996)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Population total	8097	8300	8363	9139	9197	9217	9130	9077	9250	8910	8530	8456	8056
White	7072	7198	7206	7816	7813	7784	7668	7573	7668	7328	6958	6867	6511
Male	5748	5778	5695	6090	5986	5889	5757	5618	5605	5301	5009	4923	4678
Female	1324	1420	1511	1726	1827	1895	1911	1955	2063	2027	1949	1944	1833
Asian	349	381	408	471	498	521	535	553	585	585	581	590	575
Hispanic	366	391	407	463	482	496	504	517	544	543	539	543	526
Black	310	329	342	389	404	415	421	432	453	454	451	456	443
Expected deaths													
White	0.340	0.348	0.355	0.384	0.387	0.395	0.395	0.389	0.393	0.363	0.333	0.336	0.326
Male	0.309	0.314	0.318	0.342	0.342	0.347	0.346	0.339	0.340	0.312	0.285	0.287	0.279
Female	0.031	0.034	0.037	0.042	0.045	0.048	0.049	0.050	0.053	0.051	0.048	0.049	0.047
Asian	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.002	0.002	0.002	0.002
Hispanic	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Black	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Total	0.344	0.353	0.360	0.389	0.394	0.401	0.401	0.396	0.400	0.370	0.341	0.342	0.333
Adjusted total	0.041	0.120	0.180	0.240	0.276	0.305	0.322	0.331	0.344	0.324	0.302	0.307	0.300

during the study period. We, therefore, calculated the effect on *P* value of 3 additional years of survival into retirement or until 1996. This calculation method increased the number of person-years under study from 113,715 to 149,474. Because no melanoma deaths were observed and the expected number of melanoma deaths was 5.26, the probability of chance being an explanation was reduced to *P* = .005.

DISCUSSION

The study confirmed a reduction in melanoma mortality in the LLNL workforce from July 1984 through December 1996 with 3.39 deaths expected from the California mortality data and no eligible cases observed. This result was markedly different from the high, but not significant, increase in deaths noted in a previous national death certificate search at LLNL from 1964 through 1979, when 6 deaths were observed and 4 deaths were expected.¹⁰

Several potential limitations of this study were associated with its design and with the relatively small occupational setting. Ideally, intervention would have been evaluated by a randomized controlled study. Individual randomization within LLNL was impossible given the goals of the program; and although comparison with outside sites was considered, no satisfactory comparable site was found. Therefore, California, with a very large population base that can provide stable mortality and the local SEER San Francisco-Oakland Bay area incidence records, was used for comparison with the LLNL data. Possible sources of error include failure to detect a melanoma death, comparability of the LLNL

workforce with the local SEER and general California population, difficulty of properly adjusting for exclusion of the pre-July 1984 melanoma cases, small number of expected melanoma deaths, and inclusion of LLNL terminees.

Failure to detect a melanoma death because of an error in matching the LLNL employee roster with the NDI was unlikely. The matching algorithm was robust using a best-fit analysis in case no exact match existed for name, sex, date of birth, and social security number. Moreover, all known patients at LLNL given a diagnosis of melanoma during the study period have received follow-up, and none of these employees have died from melanoma. The number of melanoma cases shown in an all-cancer incidence study conducted among LLNL employees in cooperation with the local SEER registry was similar to the number of melanoma cases shown by our study.¹⁶ This finding makes remote the possibility of an undiscovered melanoma death in an LLNL employee given the diagnosis of melanoma during the study period.

In the absence of a matched or randomized control group, we used age-, sex-, and race-specific mortality for California as reasonable comparison data for analyzing mortality among LLNL employees. The large size of the California database provided much more stable mortality, especially for the low-risk groups. The local SEER database, which might have been more comparable, had a higher mortality, so using the state data would not have unfairly increased the significance of the result. Some risk factors for melanoma—number and type of nevi along with family and personal history of melanoma

and other types of skin cancer—could not be assessed, because these data were unavailable; however, we were able to make some estimates on ultraviolet light exposure and social class.¹⁷ Sun exposure among LLNL employees is probably similar to exposure among the general California population, given that most LLNL employees live in the sunny north-central section of the state, where the climate resembles the climate found in most of the heavily populated areas of the state.

Socioeconomic status and proportion of doctor of philosophy awardees and college graduates in the LLNL workforce is much higher than in the general California population. Socioeconomic status and education are strong risk factors for melanoma incidence. Two population-based studies^{18,19} showed a 2- to 4-fold effect of socioeconomic status on incidence of melanoma. The effect on melanoma mortality is smaller. One study¹⁸ showed that highly educated persons had a 55% higher melanoma-related mortality than did persons with less education. The high education level and high socioeconomic status among LLNL employees would produce a higher melanoma-related mortality than expected from age-, sex-, and race-based mortality in the general California population. This difference makes the achieved mortality reduction more impressive.

To ensure inclusion of workers who terminated their LLNL employment because of metastatic melanoma, surveillance of melanoma-related deaths included all persons who had terminated their LLNL employment until the end of the study period in 1996. In our calculation of expected mortality among retirees we used 3 years of follow-up only. Because screening-derived benefit may be lost after employment, we initially planned to watch for an increase in mortality in the years after termination from LLNL; however, no additional deaths were observed in all the NDI data. We chose a limited postemployment period to calculate additional expected deaths, because we initially predicted that the effect of screening would not be long lasting. This 3-year point makes only a conservative increase in person-years of follow-up and is useful because more than 90% of mortality from systemically metastatic melanoma would probably occur by that point.²⁰ Inclusion of LLNL workforce terminees strengthens the comprehensiveness of our study. The extended follow-up added person-years to the study and thus added statistical significance to the reduction in mortality. Moreover, the statistical significance of the result would persist even if one death had occurred in the screened population during the study. This fact makes the result more robust, even with the small number of expected deaths.

The spike of melanoma cases, which prompted creation of the screening program, might have caused a decline in number of melanoma cases as an after-effect. Instead, cases of melanoma (in situ plus invasive) continued to be diagnosed at a variable, but somewhat increasing rate during the 3 periods, while showing the striking reduction in thicker lesions (Table II). The striking and persistent reduction in the number of thick lesions with higher potential mortality^{21,22} during the screening program provides the strongest support for concluding that the program resulted in real reduction of melanoma mortality. This conclusion contrasts with other studies³⁻⁵ of melanoma screening, which did not show any decrease in the absolute number of lesions thicker than 0.75 mm. These studies report a decreased percentage of thick tumors, because of the even larger increase in thin tumors. Unfortunately, without a decrease in thick tumors, mortality would not be expected to change. Furthermore, two studies using SEER melanoma incidence data by thickness category, one from the San Francisco Bay area²³ 1976 through 1987 and the other using national SEER data²⁴ from 1988 through 1994 show the LLNL decrease in the rate of thick tumors was a marked contrast to the community pattern. Both SEER studies showed an increased incidence rate in all thickness categories more than 0.75 mm. Among men who make up more than 70% of the laboratory, the San Francisco Bay study showed a 36% increase in tumors thicker than 0.75 mm from 1976 through 1987 and the national study showed a similar increase from 1988 through 1994. This is consistent with the increased melanoma mortality in men seen during this period. In women, who increased from 20% to 30% of the workforce during the study, the trend of increasing tumor thickness was similar, but smaller, except at the end of the 1988 to 1994 study there was a decrease in thick tumors. This more recent change in female melanoma would have only had a small effect on the overall dramatic decrease in thick lesions at the laboratory and was controlled for in the mortality study.

There was an increase in nonwhite workers from 12% to 19% during the time period of the LLNL study. Although more darkly pigmented races have a lower melanoma incidence, their increased proportion of the workforce would have been expected to produce the opposite effect in terms of tumor thickness. A recent study of Hispanics in California²⁵ showed tumors greater than 1.5 mm increased significantly from 1988 to 2001 at a rate of 11.6% per year. Nationally, from 1992 to 2002 melanomas in darkly pigmented ethnic groups had a significantly increased median thickness and other high-risk factors such as Clark level IV and tumor ulceration

compared with whites.²⁶ This again makes our reduction in thick tumors more notable and should not have had an effect on the mortality study, where race was taken into account.

Another possible bias influencing decreased thick tumor and mortality could be possible changes and improvements in health care for LLNL employees. The LLNL health benefits were excellent, but no different from most employees at large firms or government workers. LLNL used the University of California benefits package. From 1974 to 1980 Kaiser Permanente, which cared for a large number of laboratory employees, compared dermatologic care for LLNL employees and a control group.²⁷ Both groups had equal access, but the number of visits to dermatologists and biopsies among LLNL employees were elevated with the biopsies significantly increased. Furthermore, the biopsy rate difference only became significant after 1976. This supports the concept that awareness and concern about melanoma was elevated at LLNL and increased after 1976. After 1984 virtually all melanomas were diagnosed on site as part of the screening program. We agree this easier access to care was a major factor in the reduced mortality.

One might also argue that the observed reduction in melanoma mortality was a result of elimination of an occupational cause of melanoma at LLNL. Intensive efforts were made before and during the study period to identify a causative agent, but no such agent was ever found,²⁸ and no preventive occupational measures (other than this surveillance program) were instituted. Perhaps most important is that our mortality comparison was applied to concurrent California mortality and not to earlier LLNL mortality.

At least 3 factors reduced the number of thick melanoma lesions: (1) prompt recognition and removal of melanoma lesions by the medical staff; (2) routine follow-up of several hundred employees who were at increased risk for melanoma; and (3) LLNL employees knowing the warning signs of melanoma, actively practicing skin awareness (eg, counting moles), and presenting themselves for examination after noting suggestive lesions. The importance of rapid recognition and biopsy of suggestive lesions is clear, and the pathology data confirm the success of this part of the program. Virtually all the melanoma diagnosed during the screening program was diagnosed by the onsite dermatologic staff. Close follow-up of families with dysplastic nevus and melanoma is well documented to reduce the thickness of newly diagnosed melanoma lesions²⁹ and should also be successful for routinely screened LLNL employees with moderately elevated risk. Because most of the LLNL workforce was not examined in the voluntary screening program and

because most of those who participated were seen only once, we conclude that the employees' own self-examination helped to prevent development of thicker, higher-risk melanoma lesions. This same effect may have occurred among retirees.

A large, population-based case-control study of melanoma suggested that self-examination reduced the relative risk of melanoma mortality by 63% and predicted a simultaneous 34% reduction of invasive melanoma incidence.³⁰ Most screening programs² and the early awareness second phase of the LLNL experience show a marked increased rate of invasive melanoma. Berwick's data predicts that a program with a marked mortality reduction would show a reduction in the mean thickness of cases and, surprisingly, a reduction in all invasive cases.³⁰ Our screening, education, and self-examination program showed a remarkably similar reduction of 43%—from 45 cases per 100,000 person-years during the early awareness phase II to 26 cases per 100,000 during the study. The study of Berwick et al³⁰ reported a mean Breslow thickness of 1.09 mm among patients with melanoma who performed self-examination compared with 1.65 mm among patients with melanoma who did not examine their skin. LLNL employees showed a similar difference in mean lesion thickness: 1.05 mm before the intervention and 0.59 mm during the study period. The quality of the dermatologic staff at LLNL was probably similar to that of the motivated practitioners in other studies, and screening by itself has not been successful in other studies; therefore, the similarity between Berwick's findings³⁰ and ours suggests that the high degree of melanoma awareness and self-examination was a major factor that led to the reduction in incidence of thick lesions and melanoma-related mortality. Achieving this level of interest in the general population—in which many diseases have higher incidence and mortality—may be difficult.

Worksites are different from the community at large, and LLNL is a particularly unusual occupational setting because of the specialized nature and high level of security of the high-energy physics research taking place there. Located on a compact campus, the highly educated population was well informed about critical events. Two factors—a 1976 report describing local increase in melanoma cases and publication of several studies—markedly increased employee anxiety and interest in melanoma. Even before the program began, workforce awareness and early diagnosis may have surpassed the levels observed in the surrounding community.^{31,32} At the outset of the study, which was accompanied by massive local publicity in 1984, 96% of LLNL employees reported having some knowledge

regarding melanoma. Throughout the study, the program staff performed almost 11,600 dermatologic examinations and received more than 7000 completed self-examination sheets. Providing this well-motivated, intelligent workforce with easily accessible, free-of-charge, onsite screening showed that melanoma-related mortality can be reduced through a program of education, self-examination, and limited screening.

The mortality reduction we observed probably resulted from a preventive strategy consisting of 3 components: hands-on examination of about half the employees being screened; long-term screening of a small, moderate-risk population; and sensitizing nearly all employees and their spouses and caregivers to the menace of melanoma and to the importance of noting suggestive lesions and counting moles. Our result emphasizes the usefulness of education at all levels in any future screening program. We look forward to larger, more broadly based, controlled studies to confirm this result.

Editorial assistance was provided by the Medical Editing Service of The Permanente Medical Group Physician Education and Development Department.

The authors thank Richard W. Sagebiel, MD, of the University of California, San Francisco Melanoma Center, who helped set up the screening program and evaluated almost all the pathology specimens and Robert A. Hiatt, MD, PhD, of the University of California, San Francisco, who reviewed the manuscript. The authors also thank Karen Martin, RN, who was the nurse coordinator for the project and the many University of California, San Francisco melanoma fellows who assisted in the clinical examinations.

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The editorial headquarters for the *Journal of the American Academy of Dermatology* will move from Worcester, Mass to Charleston, SC on May 31, 2008. Editor-elect Bruce Thiers, MD, will take the reins in Charleston on June 1, 2008.

Authors will continue to submit manuscripts and revisions online using Editorial Manager (<http://jaad.editorialmanager.com>), which can also be reached from the Journal's homepage at www.eblue.org.

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Melissa Derby will continue as managing editor.

Starting on June 1, 2008, new manuscripts will be handled by the new editorial team.