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Screening for Skin Cancer: An Update of the Evidence for the U.S. Preventive Services Task Force

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Structured Abstract

Background: Skin cancer is the most commonly diagnosed cancer in the United States. The majority of skin cancers are non-melanoma cancers, either basal cell cancer or squamous cell cancer. The incidence of both melanoma and non-melanoma skin cancer has been increasing over the last three decades.

Purpose: To examine the evidence of benefits and harms of screening for skin cancer in the general population.

Data Sources: MEDLINE and Cochrane Library searches, recent systematic reviews, reference lists of retrieved articles, and expert suggestions.

Study Selection: English language studies were selected to answer the following question: Does screening in asymptomatic persons with a whole body examination by a primary care clinician or by self examination reduce morbidity and mortality from skin cancer? The following study types were selected: randomized controlled trials and case-control studies of screening for skin cancer.

Data Extraction: All studies were reviewed, abstracted, and rated for quality using predefined USPSTF criteria.

Data Synthesis: No new evidence from controlled studies was found that addressed the benefit of screening for skin cancer with a whole body examination.

Limitations: There is a lack of direct evidence linking skin cancer screening to improved health outcomes. There is limited information on the accuracy of screening by physicians or patients using real patients and lesions.

Conclusions: The limited evidence prevents an accurate estimation of the benefits of screening for skin cancer in the general primary care population.

Introduction

Skin cancer is the most commonly diagnosed cancer in the United States.(1) The majority of skin cancers are non-melanoma cancers, either basal cell cancer or squamous cell cancer.(2) In the United States, melanoma of the skin is the sixth most common type of cancer in white men and women(3). The incidence of both melanoma and non-melanoma skin cancer has been increasing over the last three decades.(4) Several preventive strategies have been proposed by professional organizations, including routine screening.

Non-melanoma Skin Cancers

Basal cell carcinoma (BCC) is the most common type of skin cancer.(5) The majority of cases are in sun-exposed areas such as the head and neck.(6) BCC lesions grow slowly, but if left untreated they can spread to surrounding tissues; BCC rarely causes death.{Geller, 2007 #626; Kuijpers, 2002 #618} However, due to its high prevalence it results in the expenditure of a large amount of health care resources.

Squamous cell carcinoma (SCC) is most commonly found in fair-skinned individuals with high sun exposure.(4) SCC may arise in areas of previous actinic damage, including actinic keratoses, leukoplakia, and old scars.(2) The reported incidence of metastasis from SCC of the skin ranges from 0.5 to 16% (10, 11).

Available evidence suggests that childhood or occupational UV exposure, number of sunburns, actinic keratosis, organ transplantation, fair complexion including light-colored eyes and red or blonde hair, arsenic exposure, and a family history of skin cancer are risk factors for the development of non-melanoma skin cancer.(2, 5, 9, 12)

Melanoma of the Skin

Melanoma is less common than basal cell and squamous cell carcinoma but is much more likely to metastasize and be fatal.(13) The incidence of melanoma of the skin has steadily increased over the last three decades; the annual percent increase during 1992-2002 was 2.4%.(14) The lifetime risk of being diagnosed with melanoma in white males and white females is 2.56% and 1.73%, respectively, and in black males and black females is 0.07% and 0.09%, respectively.(15) The estimated number of new cases of melanoma of the skin for 2008 is 62,480, 34,950 for men, and 27,530 for women.(16) A study by Welch et al suggests that the increased melanoma incidence is primarily due to increased diagnostic surveillance.(17)

A large number of studies have examined risk factors for the development of melanoma. From these studies, there is evidence that blond and red hair, blue/green eyes, freckles, an inability to tan, a history of frequent sunburns, a family history of melanoma, and an increasing number of nevi and dysplastic nevi are risk factors for the development of melanoma.(1, 18-20)

The lifetime risk of dying from melanoma in white males and white females is 0.43% and 0.23%, respectively, and in black males and black females is 0.04% and 0.04%, respectively.(15) Mortality risk increases with age. During 2001-2005, the mortality rate in white men increased

from 5.3 per 100,000 at age 50-54 years to 27.3 per 100,000 at age 80-84. In white women, the mortality rate at age 50-54 years and 80-84 years was 2.8 per 100, 000 and 10.6 per 100,000, respectively.(15) The estimated number of deaths from melanoma of the skin for 2008 is 8,420, 5,400 for men, and 3,020 for women.(15)

The U.S. Preventive Services Task Force (USPSTF) last reviewed screening for skin cancer in 2001 and concluded that there was insufficient evidence to recommend for or against routine screening for skin cancer using a total-body skin examination for the early detection of cutaneous melanoma, basal cell cancer (BCC), or squamous cell cancer (SCC).(21) The USPSTF made this statement after reviewing the available evidence and identifying two major gaps: the lack of good quality evidence that links screening to improved health outcomes and limited information about the ability of primary care providers to perform adequate examinations in the context of usual care. To update its recommendation, the USPSTF determined that an update of the evidence would need to focus on these two issues. (22)

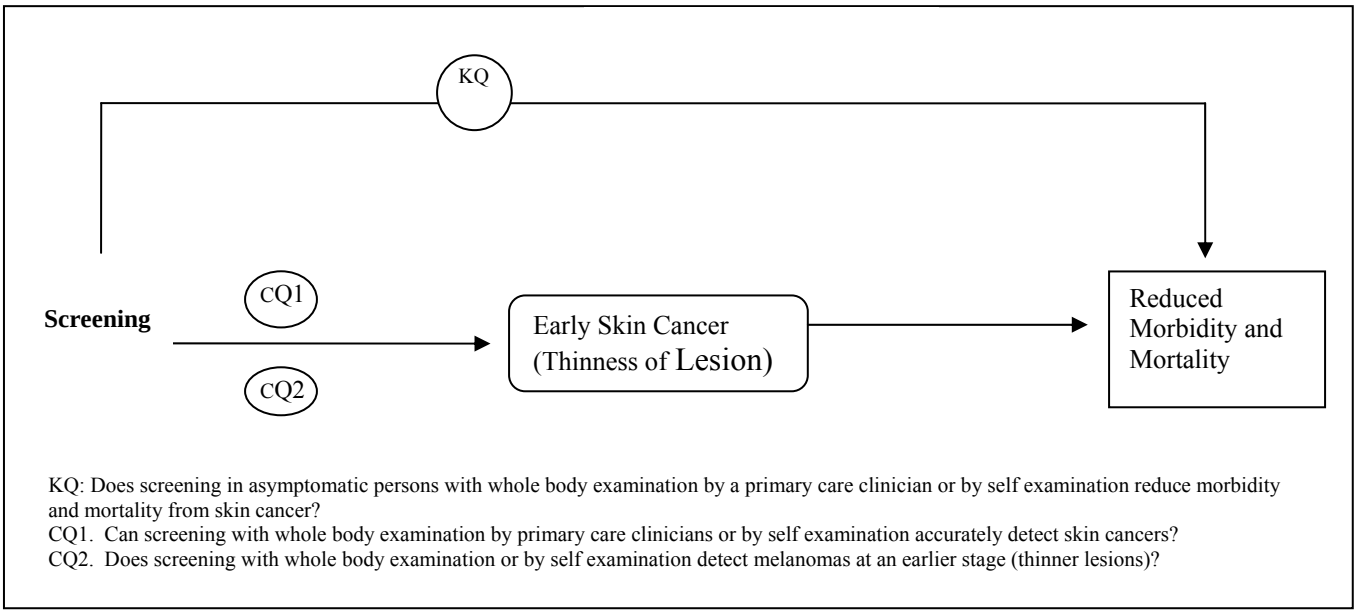
The 2001 review by Helfand et al for the USPSTF identified several studies that evaluated the accuracy of screening of people attending screening programs. Only one study followed subjects "to determine the false negative rate of a screening skin examination."(22) This study reported sensitivity and specificity of 94% and 98%, respectively. A well-designed study that included 63 Australian general practitioners (GPs) found a sensitivity of 72% and a positive predictive value (PPV) of 39% for whole body exam by GPs on live patients for the identification of suspicious lesions.(22) From several reviews on screening accuracy using photographs of lesions, Helfand et al found that dermatologists performed better than non-dermatologists. The overall sensitivity and specificity of the ABCDE criteria (Asymmetry, Border, Color, Diameter, Elevation/ Enlargement), in one review that evaluated studies of several methods and several types of physicians, was 50-97% and 96-99% respectively. In another review, internal medicine physicians were correct in identifying 52% of skin cancers (from photographs), family medicine physicians were correct in 70% of the cases, and dermatologists in 93% of the cases.

In 2001, a new systematic review concluded that sensitivity and specificity varied widely in both dermatologists and primary care physicians (PCPs). The authors reviewed 9 prospective studies that included data on 2,314 PCPs, and assessed the PCPs' ability to correctly diagnose a lesion from a slide or photograph. Six studies were reviewed that evaluated the biopsy/referral accuracy. The range of the sensitivity of the PCPs' diagnosis of melanoma was 42-100%; only one study reported specificity, 98%. The range for sensitivity for PCPs' biopsy or referral decision accuracy was 70-91%; the range for specificity was 51-87%.(23)

The USPSTF reviewed the evidence in 2001 on the association between screening and the identification of thinner lesions because thinness is an identified prognostic factor. The 2001 report by Helfand et al for the USPSTF reported inconsistent results on the association between thickness of melanoma and delay in diagnosis.(22) Berwick (1996) found a non-significant difference in Breslow depth between those who performed skin self examination (SSE) and those who did not perform SSE; the authors did not report the actual depths of the lesions in the two groups.(24) They did find a significant difference in Breslow depth between "rigorous" self-examiners (defined as using a mirror) and those who did not do a SSE (1.09 mm vs. 1.65 mm, p=0.014) Helfand et al reviewed the evidence on stages of cancer found in screening versus

usual practice.(22) They found conflicting results from ecological studies in Australia and the United Kingdom (U.K.) that evaluated the thickness of melanomas after public information campaigns.

Figure 1. Analytic Framework for Screening for Skin Cancer



KQ: Does screening in asymptomatic persons with whole body examination by a primary care clinician or by self examination reduce morbidity and mortality from skin cancer?
CQ1. Can screening with whole body examination by primary care clinicians or by self examination accurately detect skin cancers?
CQ2. Does screening with whole body examination or by self examination detect melanomas at an earlier stage (thinner lesions)?

Based on an analytic framework (Figure 1), the USPSTF determined that this evidence update would focus on a systematic review of the evidence of controlled trials on screening for skin cancer with morbidity and mortality outcomes to answer the Key Question (KQ): Does screening in asymptomatic persons with whole body examination by a primary care clinician or by self examination reduce morbidity and mortality from skin cancer?. In addition, the USPSTF asked for information concerning several contextual questions. The issues for this review that were identified as contextual questions are:
CQ1. Can screening with whole body examination by primary care clinicians or by self examination accurately detect skin cancers?
CQ2. Does screening with whole body examination or by self examination detect melanomas at an earlier stage (thinner lesions)?
The information gathered for these questions was not systematically reviewed and is discussed below in the Discussion section.

This review does not include evidence on counseling for skin cancer. The USPSTF has previously reviewed the evidence for counseling; the evidence review and recommendation can be found online at www.preventiveservices.ahrq.gov.

METHODS

Data Sources and Searches

We searched for English language literature in MEDLINE to identify randomized controlled trials or case-control trials published from June 1, 1999, to August 9, 2005, to answer the key

question: Can screening reduce morbidity and mortality from skin cancer? The following MeSH terms were used: *skin neoplasms, squamous cell neoplasms, basal cell neoplasms, melanoma, mass screening*. In addition to the MEDLINE search, we identified further literature by reviewing reference lists of review articles and editorials and by consulting with experts.

Study Selection

Two reviewers independently reviewed the title lists, abstracts and full articles. Studies were excluded if: they did not address skin cancer; there were no morbidity or mortality outcomes reported; they were editorials or review articles; there was no control group; or the study population included only subjects with rare skin cancer syndromes. Studies were also excluded if the intervention was not screening with whole body visual examination by a physician or by the patient; studies on interventions not performed in a primary care setting; and studies that focused on interventions to improve diagnostic ability (and not screening). Studies selected by fewer than two reviewers were discussed and selection was based on consensus. A third reviewer was consulted if necessary.

Data Extraction and Quality Assessment

For all citations that met the eligibility criteria, the full articles were reviewed, abstracted, and quality-rated independently by two reviewers. Consensus about article inclusion, content, and quality was achieved through discussion by the two reviewers; disagreements were resolved by the involvement of a third reviewer. Data on the following items were extracted from the included studies: identification of cases, case definition, selection of controls, comorbidities, sun exposures, demographics of cases and controls, definition of screening examination, exposure to screening, and rates of follow-up, results. Quality evaluations of articles for the key question were performed using standard USPSTF methodology on internal and external validity.(25) We evaluated the quality of RCTs and cohort studies on the following items: initial assembly of comparable groups, maintenance of comparable groups, important differential loss to follow-up or overall high loss to follow-up, measurements (equality, reliability, and validity of outcome measurements), clear definition of the interventions, and appropriateness of outcomes. The quality of case-control studies was evaluated on the following items: accurate ascertainment of cases, nonbiased selection of cases/controls with exclusion criteria applied equally to both, response rate, diagnostic testing procedures applied equally to each group, accurate measurement of exposure applied equally to each group, measurement of exposure accurate and applied equally to each group, and appropriate attention to potential confounding variables.

Data Synthesis and Analysis

Data from the included studies was synthesized qualitatively in a narrative format.

Role of the Funding Source

The general work of the USPSTF is supported by the Agency for Healthcare Research and Quality. This specific review did not receive separate funding.

RESULTS

Does screening in asymptomatic persons with whole body examination by a primary care clinician or by self examination reduce morbidity and mortality from skin cancer?

Summary of Results
In summary, we found no new evidence on the effectiveness of either skin examination by a physician or skin self examination (SSE) in reducing the morbidity or mortality of skin cancer. One study of fair quality, previously identified in the 2001 Helfand report for the USPSTF, provides limited but not sufficient evidence on the benefit of skin self-exam in the reduction of morbidity and mortality from melanoma.{Helfand et al, 2001, reference #17}

We discuss below two articles by Berwick and colleagues based on the same data, one a case-control study, and the other a follow-up study of the case-control study that reported on the cases. These articles provide non-randomized evidence about the associations between screening (clinical or self-exam) and morbidity and mortality outcomes. The case control study published in 1996 by Berwick et al (24), was previously identified in the 2001 systematic review on screening for skin cancer by Helfand et al for the USPSTF. (22) The second article. published in 2005 by Berwick, analyzed the association of skin self exam (SSE) and mortality from skin cancer. (26)

Study Characteristics
Data on cases for the 1996 and 2005 Berwick articles (n=650) were obtained from the Connecticut Tumor Registry (CTR), a National Cancer Institute Surveillance Epidemiology and End-Results (SEER) site. Controls (n=549) were identified from the general public through random-digit dialing, and were frequency-matched with respect to age and sex. After obtaining approval from the primary physician for each case, a trained nurse interviewed subjects with a structured questionnaire. The questionnaire included items about demographics, family history, sun exposures, and history of skin cancer screening. In addition to the questionnaire, the nurses performed a limited skin exam to count nevi on the backs and arms. Subjects were followed biannually for a mean of 5.4 years.

Identification of cases was probably fairly complete, because of a state reporting mandate and the research team's active monitoring of dermatopathology laboratories. The response rate for cases and controls was 75% and 70%, respectively. Also, because the research team used several sources to identify deaths of the subjects; the mortality tally was likely to be complete. Limitations of the research design include the following: (1) potential selection bias of cases and controls; (2) lack of information on the initial comparability of the cases and controls; (3) potential recall bias because information on many variables (including the history of any clinical screening) relied on patient report; and (4) lack of information on masking of the nurse or dermatologist to the case status.

Study Findings
The 1996 Berwick study was a fair quality case-control trial designed to answer the question whether early detection through skin self-examination is associated with a decreased risk of lethal melanoma (defined as organ metastases or death from melanoma). The analyses were adjusted for skin color, sun exposure, number of nevi, family history, tendency to burn, light eye color, light hair color, tendency to freckle before 25 years of age, and ever severely sunburned. Overall, 11% of subjects died from melanoma and 5% from other causes. Fifteen percent of subjects performed self skin-examination (SSE) as measured by a positive response to the question, "Prior to your biopsy (for case subjects), did you ever in your life carefully examine

your own skin? By this I mean actually check surfaces of your skin deliberately and purposely?"{Berwick, 1996 #407} Skin self-examination was associated with a reduced risk of melanoma diagnosis (adjusted Odds Ratio (aOR) = 0.66, 95% Confidence Interval (CI) = 0.44-0.99) and a reduced risk of lethal melanoma (aOR = 0.37, 95% CI=0.16-0.84). A comparison of the probability of survival among cases who performed SSE versus those who did not indicates that the benefit from SSE, analyzed using Kaplan-Meier curves, appears to plateau at approximately 3 years, while additional deaths continue to occur among the cases who did not perform SSE. The authors comment that this provides some evidence against significant lead-time bias.

The 2005 Berwick article, that used the data described above, analyzed only the cases and defined the outcome as all deaths due to melanoma. One hundred twelve cases were excluded from the original 650 cases: 26 because of diagnosis from node or organ metastases, 95 with a diagnosis of lentigo maligno melanoma, and one without follow-up. This analysis showed no significant associations between screening exam (SSE or by a physician) and death from melanoma in those with melanoma. On univariate analysis, the hazard ratio (HR) for SSE was 0.6 (95% CI 0.2-1.5) and for physician screening exam was 0.7 (95% CI 0.4-1.3); this is not greatly different from the 1996 analysis that had more subjects and a slightly broader definition of the outcome. The authors report a statistically significant association between "skin awareness" and death from melanoma, HR 0.5 (95% CI, 0.3-0.9) after controlling for other confounders. Skin awareness was defined as a positive response to, "Did you ever think about your skin, how it looked, whether there were any changes, or whether there were any abnormal marks?" (26)

DISCUSSION

Skin cancer is the most commonly diagnosed cancer. Most of the cases of skin cancer are BCC and SCC. Melanoma, while rarer, is a more common cause of significant morbidity and mortality. SEER data suggests that the incidence of early-stage (see Figure 1 and 2) melanoma is increasing, likely resulting from increased screening but there does not seem to be a resultant decrease in late stage diagnosis or mortality that one would expect if screening were effective. As displayed in Figure 2, the age-adjusted melanoma incidence increased from 12.7 per 100,000 to 18.7 per 1000,000 in 2001; while the age-adjusted melanoma mortality has not changed appreciably, 2.6 per 100,000 in 1985 to 2.7 per 100,000 in 2001. The proportion of melanomas diagnosed in the in-situ stage, as shown in Figure 3, more than tripled between 1978 and 1998, 9.5% and 35.5%, respectively.(27)

Figure 2. Melanoma incidence and mortality rate s in the U.S., 1975-2001.

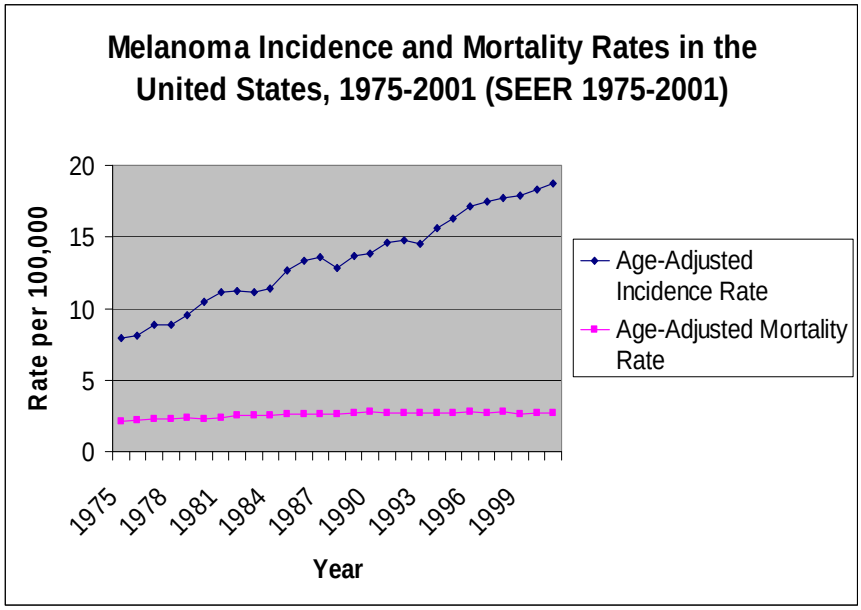
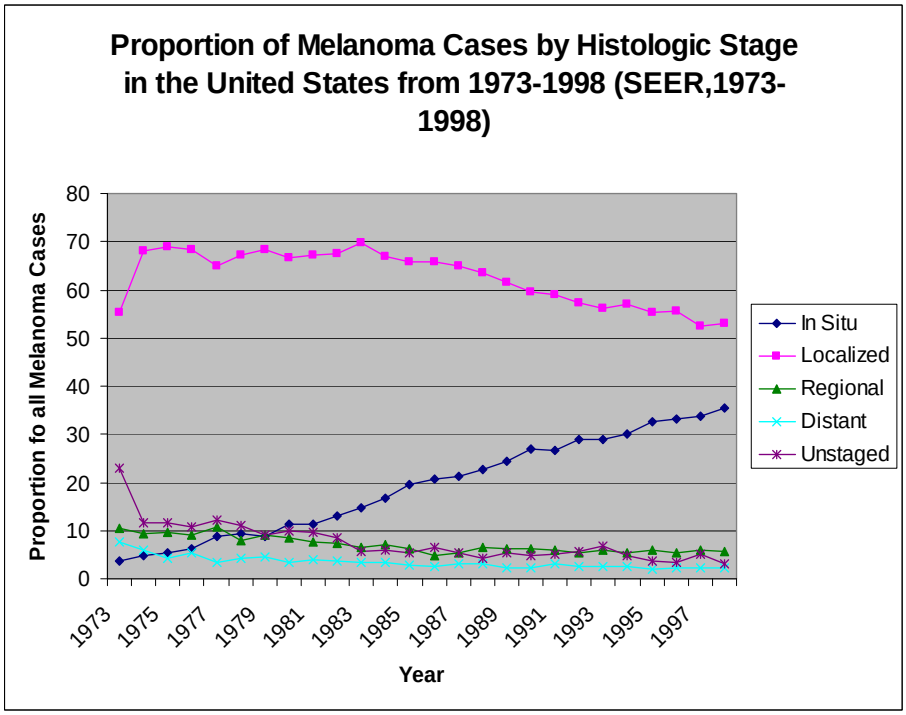


Figure 3. Proportion of melanoma cases by histologic stage in the U.S., 1973-1998.



The overall evidence to support the benefits of a screening examination by a physician or patient in reducing morbidity and mortality is poor. We reviewed one fair quality case-control study that had been previously identified in the 2001 report for the USPSTF. We found no new studies on the benefits of screening that met our inclusion/exclusion criteria and were of appropriate quality.

Accuracy of Screening

Accuracy of screening is an important link in the chain of evidence linking screening in asymptomatic persons with improved health outcomes. There is limited and inconsistent evidence for the accuracy of screening with a whole body examination by physicians or by patients. A recent systematic review using pictures of lesions reported a sensitivity that ranged from 42% to 100% and a specificity of 98%.{Chen, 2001 #178} The same systematic review reported a referral/biopsy sensitivity with a range of 70%-91% and a specificity with a range of 51%-87%. Studies on the accuracy of SSE reported sensitivity and specificity that ranged from 58-75% and 62-98%, respectively. The studies in physicians evaluated the accuracy of diagnosing pigmented lesions, not a screening examination, and many of the studies on self-examination were performed in selected patient populations. Therefore, these results may not be generalizable to a screening examination in the general population. In addition to the accuracy of a physician or patient examination there is the uncertainty of the pathologist's reading of the biopsy specimen. There is some evidence that there is moderate disagreement among pathologists in reading skin biopsies. (28, 29)

Several studies on diagnostic and referral accuracy of family physicians and general practitioners have been published since 2001; these studies evaluated accuracy before and after educational interventions and generally concluded that educational interventions improve the diagnostic accuracy of skin cancer examinations. A study from Belgium evaluated the diagnostic ability of 160 general practitioners (GPs), using color slides, before and after an educational course. Before the course, sensitivity in GPs was 72% and specificity was 71%; sensitivity and specificity after the course was 84% and 70%, respectively. Before the course GPs correctly identified the melanoma cases in approximately 50% of the cases; after the course the proportion correct increased to 76%.(30) A similar study from Italy evaluated the diagnostic accuracy of 41 family doctors using photographs of lesions before and after a formal training session. In addition, this study asked family doctors whether they would refer to a dermatologist for each lesion. Prior to the training, family doctors were correct in diagnosing 47% of melanomas and planned to refer 96% of the melanoma lesions. After the training, family doctors correctly diagnosed 76% of melanomas. While family doctors' intention to refer melanoma cases did not significantly change, their intention to refer the benign lesions decreased.(31)

In a study of family physicians, an educational video on skin cancer was given to a random sample of 52 family physicians. Physicians in the intervention and control groups were scored on their knowledge about skin cancer. There was no statistical difference in percent of malignant lesions biopsied between the intervention and control groups, either before or after the video instruction.(32)

A more recent community-based, randomized controlled trial of screening in Australia involving 16,383 whole-body skin examinations reported the specificity and PPV of screening by a PCP

for melanoma as 86% and 2.5%, respectively. The overall PPV for all types of skin cancer was 29%.(33) However, the researchers did not follow the subjects with negative results, and therefore could not report the number of true negatives or true specificity.

Three studies have been published that evaluated the accuracy of skin self-examination (SSE). They generally showed variable specificity and sensitivity that was higher with greater size increases in lesions and higher with the use of photographs. Two of these studies assessed the accuracy, after artificial change, in the study subjects' reports of the number or appearance of moles; and one study evaluated the accuracy of SSE before and after education about the ABCD criteria. In one study, 50 adult patients with dysplastic nevi seen at the Memorial Sloan-Kettering Center in New York were photographed after performing a SSE, and the photographs were given to the patients. The number and appearance of moles were altered using cosmetic eyeliner. Patients were then asked to perform SSE with and without access to the photographs; patients were asked to identify new moles or moles that had changed in appearance (including size). Without photographs, the sensitivity for the identification of new and changed moles was 60% and the specificity was 96%; the sensitivity and specificity increased to 72% and 98%, respectively, when subjects had access to the photographs.(34)

A study of 210 patients at high risk for melanoma who attended the Pigmented Lesion Clinic in Toronto evaluated whether the patients could detect a change in size of their moles. These patients had been previously taught how to do a SSE and had been doing a SSE for a year or more. Moles were artificially altered in size by 0, 2, and 4 mm in three different tests and patients were asked to perform a SSE and report whether the size of any of their moles had changed. The sensitivity of the 2 mm and 4 mm change was 58% (95% CI, 49%-68%) and 75% (95% CI, 66%-83%), respectively. The specificity was 62% (95% CI, 53%-72%). The ability to detect changes in size was not statistically significantly related to patient or family history of melanoma, sex, or self-perceived risk.(35)

Non-physicians' ability to classify pigmented lesions as benign or malignant was evaluated in a study of 120 laypersons. Subjects for the study were recruited from the Dermatology and Oncology Departments of a hospital in Sweden. In addition, a randomly selected population-based sample of healthy individuals was included. We report the results of the healthy population sample as this is most relevant when considering screening in the general population. Subjects were given 8 pictures of pigmented lesions and a corresponding plastic sheet with the lesion that they could place on their forearm to simulate the lesion on their skin. Subjects were then asked what they would do if they found the lesion on their skin. The available responses were: "do nothing," "keep an eye on it," "show someone else," "show doctor at next visit," or "show doctor immediately." The process was repeated after a short instruction on the ABCD criteria. A scoring system was created to score the appropriateness of action. The score for the healthy population group was 10.37 out of a maximum of 16 before the education, and 13.23 after the education.(36)

In summary, accuracy of screening for skin cancer by physicians and by patients has been studied using several different methods. Many studies measure accuracy through the use of photographs of lesions of known histopathology. Other studies measure accuracy by following the referral patterns and ultimate histopathology of lesions from real patients. There are obvious

problems with both of these methods. Using photographs of known lesions may test the accuracy of the diagnostic ability of a physician but does not necessarily assess the accuracy of a full body screening examination. The use of referral patterns and histopathology assumes that a dermatologist's assessment of the need for biopsy and the resultant histopathology constitute the gold standard. Without appropriate follow-up of patients, this method likely underestimates the number of false negatives.

Screening and Thinness of Melanoma Lesions

We did not find any RCTs that compared screened and unscreened subjects with respect to thickness of melanoma lesions. We identified one study that looked at a screened population to evaluate lesion thickness at detection. A large study of 639,835 subjects who were screened during the American Academy of Dermatology (AAD) Skin Cancer Screening Program from 1985 to 1999 compared the results of the AAD's screening efforts to the SEER registry. In the AAD program, screening examinations were performed by dermatologists and were free and open to the public. The study's authors compared thinness of lesions in those with a diagnosis of melanoma to the thinness of melanoma lesions found in the 1990 SEER registry. There was a higher percentage of lesions <1.50 mm in subjects who had received screening through the AAD program than in the SEER registry, 10% and 2%, respectively ($p<0.001$).(38) Conclusions are limited because of self-selection in the AAD program, the ecologic nature of the study, and problems with generalizing screening by a dermatologist to screening by primary care clinicians.

A study in Queensland, Australia, reviewed the characteristics of all histologically confirmed first melanomas in residents aged 20-75 years.(39) They found that the rate of thin lesions (<0.75 mm) detected by a physician (81%) was higher than the rate detected by non-physicians (62%).

There is evidence from retrospective studies of patients with diagnosed melanoma that, while most melanoma lesions are first noticed by someone other than a physician, lesions detected by a physician are thinner. A study of 471 newly diagnosed patients with melanoma (1995-1998) in New York found that 57% of patients first detected the melanoma lesion and another 15% were found by someone other than a physician (primarily a spouse). There was a significant association between physician detection and thickness ≤0.75 mm.(40) In an Italian study of 816 consecutive patients diagnosed with melanoma, 57% of lesions were identified by the patient, spouse, or a friend. After adjustment for sex, age, education, nevi, and region of Italy, identification by a dermatologist was associated with significantly thinner melanoma lesions than those identified by others (0.68 mm vs. 0.90 mm). ("Others" included family physicians, other physicians, and the patient, spouse, or a friend.) Interestingly, melanoma lesions in those subjects that performed SSE were also significantly thinner than in those who did not perform skin self-examination (0.77 mm vs. 0.95); however, the definition of SSE was not reported.(41, 42) A study of 102 patients seen at the Johns Hopkins Melanoma Center between June 1995 and June 1997 reported that the majority of lesions were detected by the patient. The mean lesion thickness was 0.23 mm for physician-detected and 0.9 mm for self-detected lesions. When compared to self- or other-detected lesions, physician-detected lesions were associated with a higher likelihood of thinner lesions (relative risk of 4.0 (95% CI, 1.08-14.3) for < 0.75 mm versus >0.75 mm).(43)

In summary, there is limited evidence as to whether screening by physicians or by patients identifies lesions that are thinner than those identified in usual care. Older ecological studies reported conflicting results as to the association of thickness of melanoma and screening. There is newer limited evidence from one large study of a self-selected screened population and from retrospective studies that physician examinations and self-examinations identify thinner melanoma lesions. However, the retrospective studies do not report whether the lesions were detected during a screening examination or coincidentally during an examination for other reasons. Therefore, there are problems with using this evidence to generalize about the ability of screening exams to identify thinner lesions in the general public. In addition, the majority of melanoma lesions are identified by the patient, friend, or spouse, and the question remains whether encouraging SSE would identify more lesions or lesions at an earlier stage than are currently being identified by non-physicians.

Research Gaps

There are several limitations of the literature on screening for skin cancer. A major limitation is the lack of direct evidence linking skin cancer screening to improved health outcomes. Due to the relatively low melanoma-related mortality in the United States, an adequately powered population-based randomized controlled trial of screening demonstrating mortality outcomes would require a study of approximately 800,000 subjects. (22, 44) However, the incidence of melanoma and mortality is higher in Australia, and a three-year randomized, controlled trial in 44 Australian communities (n=560,000 adults aged 30 years or more) had been planned by Aitken and colleagues. The intervention included the promotion of screening through skin self examination and physician examination. (45) Unfortunately, the study was only performed in 9 control and 9 intervention communities due to lack of funding. The preliminary results may help inform future recommendations on skin cancer screening.

Other limitations of the literature include a lack of large studies on accuracy of screening in the general population and a lack of information on whether screening in the general population would result in the identification of lesions at an earlier stage than regular care.

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