Skin Cancer Screening Focusing on Melanoma Yields More Selective Attendance

Michette J. M. de Rooij, MD; Frans H. J. Rampen, PhD; Leo J. Schouten, MD; H. A. Martino Neumann, PhD

**Background:** Screening theoretically reduces death and morbidity from malignant melanoma. The rationale of screening for nonmelanoma skin cancer is more debatable, since mortality is very low.

**Methods:** We organized a screening campaign in Southern Limburg, the Netherlands, in 1993. Press releases and public announcements referred only to melanoma. The results were compared with similar campaigns in Arnhem and Eindhoven, the Netherlands, in 1990; these, however, addressed skin cancer in general.

**Results:** There were 4146 people attending the 1993 screenings, compared with 2463 in 1990. The proportion of screenees with lesions suggestive of melanoma increased from 1.1% in 1990 to 1.7% during the 1993 campaign (P=.04). The proportion of dysplastic nevi rose from 2.1% to 7.7% (P<.001). Nonmelanoma skin cancers were less often encountered (3.7% in 1990 vs 2.6% in 1993; P=.009). Actinic keratoses were also less numerous (6.3% vs 1.5%; P<.001).

**Conclusion:** Screening concentrating on melanoma increases the rates of lesions suggestive of melanoma and dysplastic nevi, whereas the proportions of basal and squamous cell carcinomas and actinic keratoses decrease. These findings may have important implications with regard to the cost-effectiveness of skin cancer screening efforts.


**Prognosis of Malignant Melanoma**

Mortality from nonmelanoma skin cancer is low. In terms of health strategy priorities, these skin lesions are insignificant. One may argue that skin cancer screening should be confined to malignant melanoma. We studied the proportions of melanomas, dysplastic nevi, and other pigmented skin lesions and nonmelanoma skin cancers, after a screening program with media attention focusing on melanoma only.

**Results**

In Arnhem and Eindhoven in 1990, a total of 2463 participants had been registered. The campaign in Southern Limburg in 1993 attracted 4146 participants. There was no marked difference in the sex ratio between the 1990 and 1993 exercises. In Arnhem and Eindhoven, 47% of the screenees were younger than 50 years, compared with 66% in Southern Limburg. The shift toward younger participants was highly significant (P<.001).

**Table 1** summarizes the demographic profile of the attendees at both campaigns.

**Table 2** shows the most relevant

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MATERIALS AND METHODS

In June 1993, free melanoma detection clinics were conducted in Southern Limburg, the Netherlands, under the auspices of the Dutch Academy of Dermatology and Venerology and the Comprehensive Cancer Centers IKL (Maastricht, the Netherlands) and IKO (Nijmegen, the Netherlands). The area encompasses approximately 650,000 inhabitants. All dermatologists in the region participated in the study. The screenings were examined at six hospital locations on a first-come, first-served basis. The program was announced in the regional newspapers, on the regional radio and television stations, and by posters in waiting rooms of general practitioners and pharmacies and public libraries. Special emphasis was placed on the risk factors and symptoms of early malignant melanoma and its precursor lesions. No reference was made to the nonmelanoma skin cancers and their risk denominators.

Because of the large turnout, skin examinations were confined to specific lesions the attendants were worried about. Systematic examination of the entire skin was performed only on those who intentionally opted for a complete skin check and on those who showed a special skin mark that was suggestive of dysplastic nevius or melanoma. These factors were the same ones used in the 1990 programs. When more than one clinical diagnosis was considered, only the single worst diagnosis was recorded. No biopsies or therapeutic interventions were performed during the screenings.

The participant received a letter of referral with the proposed line of management to his or her family physician when a cancerous or precancerous lesion was suspected. Persons with borderline lesions or minimal extent of precursor states were not referred so as to avoid undue concern and medical treatment. Four months after the campaign, persons with a positive screen result were contacted for follow-up. Those who did not respond were approached again after 10 months.

The results of the Southern Limburg campaign were compared with those of two earlier campaigns in Arnhem in June 1990 and in Eindhoven in October 1990. The screenings in Arnhem and Eindhoven had been planned and executed in a similar way, but the precampaign public releases had emphasized skin cancer in general instead of melanoma in particular. To test for differences between the two populations, the χ² statistic was used.

findings related to skin malignant neoplasms. The proportion of screenees with lesions clinically suggestive of melanoma was higher in 1993 than during the campaigns in Arnhem and Eindhoven. Together, melanoma and lentigo maligna were suspected in 1.7% of the screenees in 1993, compared with only in 1.1% in 1990 (P=.04). Lesions suggestive of nonmelanoma skin cancer were less numerous in 1993. The proportion of persons with presumptive nonmelanoma skin cancer (basal and squamous cell carcinoma and Bowen’s disease) decreased from 3.7% in 1990 to 2.6% in 1993 (P=.009).

Data pertaining to precursor lesions and benign skin conditions are presented in Table 3. At two of six clinics in the Arnhem region, no presumed diagnoses had been recorded, apart from skin malignant neoplasms. The total number of attendees with evaluable data for precursor lesions and benign skin marks in 1990 was 1817. The proportion of dysplastic nevi had increased substantially in 1993 as compared with 1990. Also, common and congenital nevocytic nevi were more frequently encountered in 1993. However, the proportion of freckles and solar lentigines had slightly decreased. Actinic keratoses were distinctly more numerous in 1990 than in 1993. Finally, clinically benign lesions and generalized skin conditions, such as seborrheic keratoses, dermatofibromas, angiomas, viral warts, eczema, psoriasis, and fungal infections, were less often seen during the last screening, all at a statistically significant level.
Follow-up of the persons with presumed skin malignant neoplasms seen in 1990 was only achieved in the region of Arnhem, with 1961 participants; no follow-up data were available for the clinic held in Eindhoven, with 502 screenees. In 1993, follow-up was accomplished at all clinics in Southern Limburg. The proportion of melanomas confirmed by pathologic examination was similar in both groups (0.3%). Six melanomas were diagnosed in Arnhem and 13 in Southern Limburg. Most melanomas diagnosed in Southern Limburg were early lesions: only one patient had a melanoma 1 mm thick or more. In Arnhem, tumor microstage was documented in five of six cases; three of these were 1 mm thick or more. This shift to thinner lesions was statistically significant (P=.04, Mann-Whitney test). The proportion of screenees with nonmelanoma skin cancer confirmed by pathologic examination was larger in Arnhem than in Southern Limburg (2.1% and 1.0%, respectively; P=.001). Table 4 gives an overview of the malignant neoplasms confirmed by pathologic examination at follow-up.

The difference in age distribution of both study populations prompted us to perform a logistic regression analysis, including sex and age in the model. For all nevocellular lesions (common nevi, congenital nevi, dysplastic nevi, and melanoma), the odds ratios were statistically significantly increased in the Southern Limburg screening as compared with the Arnhem screening. The odds ratio for melanoma, including lentigo maligna, was 1.84 (95% confidence interval, 1.16 to 2.92).

**Table 4. Numbers of Malignant Neoplasms Confirmed by Pathologic Examination**

<table>
<thead>
<tr>
<th></th>
<th>1990* (n=1817)</th>
<th>1993† (n=4146)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanomas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentigo maligna</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Melanoma in situ</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Invasive melanomas &lt;1 mm thick</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>&gt;1 mm thick</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Thickness unknown</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total§</td>
<td>6/6 (0.3)</td>
<td>13/13 (0.3)</td>
<td>.04$</td>
</tr>
<tr>
<td>Nonmelanoma skin cancers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal cell carcinoma</td>
<td>40</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bowen's disease</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total$</td>
<td>45/41 (2.1)</td>
<td>44/42 (1.0)</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Arnhem and Eindhoven, the Netherlands.  
†Southern Limburg, the Netherlands.  
§Mann-Whitney U test, considering lesion thickness.
melanoma diagnoses were followed up. The total of 13 confirmed melanomas seems rather low. There were 72 potential melanomas diagnosed, including 17 lentigo malignas, in 69 persons. Sixty-eight tumors were adequately followed up. This gives a positive predictive value of only 19%. This low test performance probably results from the inclusion of many pigmented lesions with low clinical suspicion among the presumptive melanoma diagnoses.

The yield of histologically confirmed dysplastic nevi was 48. In Arnhem only 10 dysplastic nevi were histopathologically confirmed. Despite the incomplete follow-up of persons with presumed dysplastic nevi in both screening exercises, and the rather subjective interpretation of diagnostic minutiae of dysplastic nevi by individual dermatologists and histopathologists, we are confident that the true rate of dysplastic nevi was substantially higher in the recent campaign.

The peak occurrence of cutaneous melanoma is at 40 to 50 years of age. Nonmelanoma skin cancer generally afflicts the elderly. Our 1990 campaigns exhibited a relative excess of elderly persons with peak attendance rates between 40 and 70 years. The 1993 series showed a preponderance of adult screenees, with peak attendance rates between 20 and 50 years. The shift toward a younger cohort is encouraging. In this respect, age is probably not a confounder. Nevertheless, we executed a multivariate analysis, which disclosed screening location to be an independent risk variable. In Southern Limburg, significantly more melanomas were clinically diagnosed than in Arnhem.

Attendees of skin cancer and melanoma screening programs differ from the general population in their risk profile.

On the other hand, the proper value of self-examination and self-selection as a screening tool has been questioned. To maximize the yield of screening, it is imperative to tailor programs to attract those persons at highest risk. Our survey demonstrates that precampaign publicity messages must focus on melanoma.

A most promising finding of our project is the decreased proportion of nonmelanoma skin cancers and certain precancerous states of low or negligible clinical and epidemiologic concern: basal and squamous cell carcinomas and actinic keratoses. It is questionable whether screening procedures can alter the natural course of nonmelanoma skin cancer in a significant proportion of those screened. One of the major drawbacks of the rather unfocused screening efforts on skin cancer conducted so far in the United States and in the Netherlands is the initiation of insignificant and borderline cases into the medical circuit. Screening only for melanoma may provide a means of increasing the detection rate of an important and potentially lethal disease. Selective screening for melanoma may improve cost-effectiveness. It also may decrease the risk of overtreatment of a great number of persons with minor or questionable disease.

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REFERENCES