As the years passed, it became apparent that the screening program was performing exactly as intended—not a single patient who returned for regular screening died of MM nor any other skin cancer. In contrast, other patients presented to the practice on their initial visit with MMs in more advanced stages, and some of these did not survive.

The results of the screening program, while very gratifying, raised a most profound question: At a time when major health policy organizations cannot agree if skin screening is even of value,3,4 how was it possible for this program to be so successful? The remainder of this paper reviews the details of the program, analyzes the effects of various components, and identifies those measures that contributed to its success.

**METHODS**

This review was based on data from patient records, recall program records, and superbill forms (charge sheets for provided services) from the private dermatology practice of Ronald N. Shore, MD PA, Rockville, Maryland (Dr. Shore, Ms. Shore, Ms. Monahan): Department of Dermatology, Johns Hopkins University, Baltimore, Maryland (Dr. Shore), and GenPath, Clarksburg, Maryland (Dr. Sundeen); †Deceased

**Objective:** To determine the effectiveness of a serial screening program in achieving early detection and preventing death in patients at increased risk for melanoma.

**Design:** Retrospective study.

**Setting:** Private dermatology practice.

**Patients:** The study included all patients at increased risk for melanoma who were screened in the program during the 17-year period, July 1, 1992–June 30, 2009 (≤1108 patients per year).

**Main Outcome Measures:** Survival and indicators of early detection.

**Results:** All melanomas that developed in program participants during the 17-year period were detected early and there were no deaths, metastases, recurrences, nor need for sentinel node biopsies. An analysis of melanoma cases seen in five recent years revealed additional evidence of consistent early detection: 80 percent of the lesions were in situ, no lesions were greater than 0.15 mm in Breslow depth, and all lesions were in the radial growth phase, a stage almost always associated with cure. Four measures, often absent in mass screening programs, contributed to very early detection and cure: thorough serial examinations, biopsying suspicious lesions (particularly pigmented lesions that were highly irregular and/or approaching black in color), recalling patients every six months to detect all melanomas in the radial growth phase, and educating patients on the need to return.

**Conclusion:** An office-based surveillance program that includes serial full skin examinations and ongoing recalls appears capable of detecting melanoma at a very early stage when cures can be realized in almost every case. Therefore, when patients present with recognized risk factors for melanoma, dermatologists should seriously consider recommending and performing such serial screening procedures.

**ABSTRACT**

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Shore, M.D. for the 17-year period of July 1, 1992–June 30, 2009, and has received IRB approval from Johns Hopkins Medicine. The practice, which is located in the Washington D.C. suburbs, serves a population that is above average in both level of education and income. Approximately half the patients are in the Medicare age group.

Therefore, when patients present with recognized risk factors for MM, we strongly encourage dermatologists to be more proactive and to consider recommending, performing, and promoting serial screening procedures.

In addition to obtaining survival-related data for the entire period, a detailed analysis was performed on all cases of MM diagnosed in a recent five-year period (i.e., July 1, 2001 to June 30, 2006) with patients designated as being in one of two groups. Those patients who were known to be at increased risk of MM, as described below, and had at least one prior FSE with no evidence of the disease were termed “program patients.” The remaining patients whose MMs were discovered on their first FSE or first visit were termed “non-program patients.” This group included not only patients who presented with lesions they believed were significant and which turned out to be MMs, but also patients who presented for other reasons and were found to have an MM when an FSE was recommended and performed by the physician.

Data from the non-program group was intended to provide some indication of the incidence and stage of MMs in the non-previously screened patient population. It is emphasized that this group was not a control group for the program group, but simply served to provide information for comparison.

Initially most patients were physician-selected based on their increased risk of MM and other skin cancers due to presence of various recognized risk factors such as significant sun exposure (by history and/or evidence of actinic damage), personal and/or family history of MM, history of basal cell carcinoma, squamous cell carcinoma, or actinic keratoses and numerous and/or irregular nevi (particularly lesions with asymmetry and variations in color).

In more recent years, increasing numbers of patients came into the program by requesting FSEs based on their own perceived risk of skin cancer. Some were relatives or friends of patients already in the program. Some suspected they were at increased risk based on exposure to information in the media. Those who had significant risk factors based on history and/or examination were entered into the program. All program patients who were diagnosed with an MM in the five-year period were included in the analysis. All additional patients who were diagnosed with MM in the five-year period and had not had a prior FSE performed in this practice were included in the analysis as non-program patients. Almost all of these patients were new to the practice.

All FSEs began by asking patients to point out lesions of concern, if any. Lesions of concern were addressed, and then a complete skin examination was performed. Findings on examination were verbalized by the examiner as he or she proceeded, which allowed an assistant to document findings and patients to become educated about their lesions. Significant lesions that required biopsy were noted on a diagram. Such lesions included possible skin cancers, neoplasms of uncertain behavior (NUBs), and highly dysplastic nevi, i.e., nevi which were very irregular and/or approaching black in color. A family and personal history regarding moles and skin cancer were also reviewed. Full skin photography and dermoscopy were not employed.

Lesions considered significant, as defined above, were excised by deep shave excision (saucerization) and occasionally by scalpel excision if highly suspicious of MM. All biopsies were microscopically examined with routine H&E sections and when necessary with additional immunohistochemical stains for melanocyte localization and confirmation. The diagnosis of MM was established using the criteria of Clark and Ackerman. The distinction of RGP from vertical growth phase (VGP) employed the criteria established by Clark and Breslow measurements were established by ocular micrometer. All cases initially diagnosed as MM were internally peer reviewed under the supervision of the fourth author and subsequently referred to an independent dermatopathologist for an additional opinion. Only cases with total concordance of opinion were diagnosed as MM.

Lesions confirmed as MMs were widely excised and sentinel node biopsies performed following guidelines that were recommended at the time, (i.e. Breslow depth of 0.75 mm or greater in early years, and 1.00 mm or greater in more recent years).

The value of early detection and ongoing surveillance every six months was discussed with all patients and re-emphasized on follow-up visits. Typical features of MM were discussed along with demonstration of common skin lesions when present on the patient. All patients were recalled by mail every six months for reexamination. If patients did not return within six months of being notified, they were again notified by mail, and then by telephone.

Non-program and program patients with MM were compared with regard to gender and age, if a previous FSE had been per-
formed and in such cases, how much time had elapsed before the patient returned, the presumptive diagnosis, the location of the MM, who first detected the MM, Breslow depth of the lesion, growth phase, if a sentinel node study was performed, if metastases developed and if the patient died due to the MM.

RESULTS

No deaths have occurred from any MMs that developed in program patients screened during the 17-year period. Furthermore, there have been no recurrences, metastases, nor need for sentinel node biopsies in this group. In addition, rather interestingly, no nodular or other rapidly growing lesions have been encountered in any of these patients. In the non-program group during the same time period, nodular lesions, recurrences, metastases, positive sentinel node biopsies and death all occurred, reflecting diagnoses at a more advanced stage.

Since 1992, the number of patients screened each year has more than doubled. As would be expected, a minority of patients have been lost for various reasons such as changes in insurance coverage and relocation. While no data are available regarding lost-to-follow up rates, we know of no instances where patients were found to have an MM after dropping out of the program. In 2008, 1,108 patients were examined, including 50 with a history of one or more past MMs. Almost all of these MMs had been discovered during prior visits to the office.

Years 10–14 were subject to a detailed analysis to assess which factors were most important in achieving early detection and patient survival. During these five years, 26 new MMs were discovered, 10 in program patients and 16 in non-program patients. It is estimated that an average of about 650 patients were screened each year during this period so that MMs were discovered in approximately 4 percent of screened patients during the study period. The number of biopsies performed for each diagnosis of MM could not be determined accurately as biopsies were also employed to assess other skin cancers and entities. The most common scenario by far when skin examinations were performed, however, was that no biopsies were taken. Furthermore, when biopsies were performed, only a small number were done to assess pigmented lesions. In summary, very few biopsies were necessary to achieve the results reported.

Table 1 compares data for the two groups. In the program group, nine of the 10 MMs were detected by the dermatologist and all were in the RGP, which was one of the goals of the program. No lesions had Breslow depths over 0.15 mm. Men over 50, who are recognized as being at greatest risk for developing and dying of MM, accounted for seven of the MMs in this group. Not one of these patients was aware of his MM when it was detected by the dermatologist. Three MMs (cases D, E and J) were detected less than six months after the previous FSE when patients came in for unrelated problems and the dermatologist noted a suspicious lesion. In the non-program group, all six MMs detected by the dermatologist were in the RGP and in situ. In contrast, six of the 10 MMs detected by patients in this group had advanced to the VGP and two had metastasized. Males comprised eight of the 10 program patients who developed MMs (80%) and 12 of the 16 non-program patients who developed MMs (75%). In contrast, only 51 percent of all program patients and 47 percent of all patients in the practice were males.

Table 2 summarizes data combined from both patient groups to demonstrate the major differences between patient- and dermatologist-detected MMs. Using either Breslow depth or growth phase (RGP or VGP), it is apparent that lesions were detected at a much earlier stage by the dermatologist. Perhaps most important, however, was that all lesions detected by the dermatologist were in the RGP when cure was almost a certainty. In contrast, more than half the lesions detected by patients were in the VGP.

DISCUSSION

At the present time over 8,000 Americans11 and 48,000 persons worldwide12 die each year due to MM. Until highly effective therapies become available for advanced disease, the best hope for significantly reducing mortality would appear to be early detection and surgical excision of lesions while they are still very thin.13 However, attempts at early detection through various screening procedures have often been ineffective at reducing the median thickness of MMs,14–17 and even more significantly, have generally failed to demonstrate any major reduction in mortality. This raises the first question:

Why Haven't Screening Programs Been More Effective?

The effectiveness of screening programs to a large degree will depend on who is performing the screening and how they are done. A number of studies have demonstrated that physicians are more competent than patients at recognizing early MMs18,19 and this is clearly supported by our own data (Table 2). As would be expected, dermatologists, because of their training and experience, are much better than other physicians.20 In many programs screening has been a one-time event and/or there has been inadequate follow up so the long-term effects of screening, including whether some lesions were missed or if some patients later died, is not known. Furthermore, since almost all such programs have lacked a control group and/or some other long-term basis to evaluate efficacy, several major health policy organizations have been reluctant to recommend routine screening for MM detection.4

Screening programs that included biopsies of suspicious lesions and long-term follow up have not necessarily had posi-
TABLE 1.
Comparison of Two Patient Groups in Which MMs Were Discovered Between July 1, 2001 and June 30, 2006

<table>
<thead>
<tr>
<th>Case</th>
<th>M/F</th>
<th>Patient Age</th>
<th>Prior Skin Exam</th>
<th>Presumptive Diagnosis</th>
<th>Location of MM</th>
<th>Detected By</th>
<th>Breslow Depth (mm)</th>
<th>Growth Phase</th>
<th>Sentinel Node Study</th>
<th>Mets</th>
<th>Death From MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>F</td>
<td>76</td>
<td>9 mos.</td>
<td>APL</td>
<td>Nose</td>
<td>Pt.</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>M</td>
<td>85</td>
<td>9 mos.</td>
<td>APL</td>
<td>Cheek</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>M</td>
<td>75</td>
<td>7 mos.</td>
<td>APL</td>
<td>Chest</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>M</td>
<td>59</td>
<td>4 mos. 1 mon.</td>
<td>APL</td>
<td>Back</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>E</td>
<td>F</td>
<td>66</td>
<td>16 mos.</td>
<td>Atyp. ker. r/o other</td>
<td>Chest</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>F</td>
<td>M</td>
<td>76</td>
<td>24 mos.</td>
<td>APL</td>
<td>Back</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>G</td>
<td>M</td>
<td>76</td>
<td>6 mos.</td>
<td>R/o SCC</td>
<td>Arm</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>H</td>
<td>M</td>
<td>75</td>
<td>7 mos.</td>
<td>APL</td>
<td>Back</td>
<td>Dr. S</td>
<td>0.15</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>J</td>
<td>M</td>
<td>48</td>
<td>5 mos.</td>
<td>APL</td>
<td>Abdomen</td>
<td>Dr. S</td>
<td>0.15</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Non-program Patients (First FSE or First Visit)

<table>
<thead>
<tr>
<th>Case</th>
<th>M/F</th>
<th>Patient Age</th>
<th>Prior Skin Exam</th>
<th>Presumptive Diagnosis</th>
<th>Location of MM</th>
<th>Detected By</th>
<th>Breslow Depth (mm)</th>
<th>Growth Phase</th>
<th>Sentinel Node Study</th>
<th>Mets</th>
<th>Death From MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>M</td>
<td>64</td>
<td>No</td>
<td>APL</td>
<td>Abdomen</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>L</td>
<td>M</td>
<td>51</td>
<td>No</td>
<td>APL</td>
<td>Arm</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>M</td>
<td>M</td>
<td>36</td>
<td>No</td>
<td>APL vs. dys. nevus</td>
<td>Chest</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>N</td>
<td>M</td>
<td>64</td>
<td>No</td>
<td>R/o melanoma</td>
<td>Back</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>O</td>
<td>F</td>
<td>28</td>
<td>No</td>
<td>Verrucous lesion</td>
<td>Arm</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>P</td>
<td>M</td>
<td>39</td>
<td>No</td>
<td>APL</td>
<td>Leg</td>
<td>Dr. S</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Q</td>
<td>M</td>
<td>47</td>
<td>No</td>
<td>R/o melanoma</td>
<td>Back</td>
<td>Pt.</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>R</td>
<td>F</td>
<td>88</td>
<td>No</td>
<td>APL</td>
<td>Ear</td>
<td>Pt.</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>S</td>
<td>M</td>
<td>56</td>
<td>No</td>
<td>APL</td>
<td>Shoulder</td>
<td>Pt.</td>
<td>In situ</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>T</td>
<td>M</td>
<td>44</td>
<td>No</td>
<td>APL</td>
<td>Leg</td>
<td>Pt.</td>
<td>0.25</td>
<td>Radial</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>U</td>
<td>M</td>
<td>39</td>
<td>No</td>
<td>APL</td>
<td>Foot</td>
<td>Pt.</td>
<td>0.60</td>
<td>Vertical</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>V</td>
<td>M</td>
<td>70</td>
<td>No</td>
<td>Cyst vs. dys. nevus</td>
<td>Back</td>
<td>Pt.</td>
<td>0.74</td>
<td>Vertical</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>W</td>
<td>F</td>
<td>51</td>
<td>No</td>
<td>APL</td>
<td>Leg</td>
<td>Pt.</td>
<td>0.77</td>
<td>Vertical</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>X</td>
<td>M</td>
<td>89</td>
<td>No</td>
<td>APL</td>
<td>Arm</td>
<td>Pt.</td>
<td>1.80</td>
<td>Vertical</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Y</td>
<td>F</td>
<td>74</td>
<td>No</td>
<td>R/o melanoma</td>
<td>Foot</td>
<td>Pt.</td>
<td>2.00</td>
<td>Vertical</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Z</td>
<td>M</td>
<td>36</td>
<td>No</td>
<td>Granulation-like tiss.</td>
<td>Foot</td>
<td>Pt.</td>
<td>4.50</td>
<td>Vertical</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

APL, atypical pigmented lesion; Atyp. ker., atypical keratosis; dys. nevus, dysplastic nevus; FSE, full skin examination; Mets, metastases; M/F, male/female; MMs, malignant melanomas; mon., month; mos., months; Pt., patient; R/o, rule out; Dr. S, Dr. Ronald N. Shore; SCC, squamous cell carcinoma; tiss., tissue.
For a screening program to be highly effective so that all or most MMs are detected in their early stages, patients have to be examined not only by a competent examiner, but also while lesions are still in their early stages. One possible way to accomplish this is to do serial screening where skin examinations are repeated at intervals equal to or less than the period MMs remain thin and localized. This raises the next question:

**How Effective is Serial Screening in Detecting MM in Its Early Stages?**
The information presented in this paper and in a few others to be described suggests that screening for MM when performed in a well-organized, serial manner by dermatologists, or under their supervision, can detect almost all MMs in their early stages with resulting survival approaching or equaling 100 percent. This is a result far exceeding other currently widely available “approved” screening measures such as mammography, PSA test, Pap smears, and others.

There are at least two other papers that have reported 100 percent survival of patients at increased risk for MM who were subject to serial screening. Rigel et al. reported on 452 patients with dysplastic nevi who were screened every three to 12 months with an average follow up of 27 months. Two-thirds of their 18 diagnosed MMs were in situ and none were 1 mm or greater in Breslow depth. Total body photography was used as an aid in both studies and dermoscopy was also employed in the second.

In comparing these two studies and our own, it is noteworthy that each employed a slightly different methodology and had a somewhat different make up of patients at increased risk. However, due to serial screening, no metastases nor deaths occurred in any cases because every MM was detected while it was still very thin. These two studies in combination with data from the program group for the five-year period represent well over 1,300 patients at increased risk, 66 cases of MM that developed, and yet 100 percent survival from the disease.

It needs to be stated that the studies just mentioned suffer from several limitations (e.g. no control groups, lack of five-year follow up for some patients). Yet, the overall results—consistent early detection and survival from MM in every instance—are highly suggestive that well-executed, serial skin cancer screenings can lead to a marked decrease in morbidity and mortality. Hopefully, additional studies will confirm the extraordinary efficacy of screening when employed in this manner.

**Why Has the Screening Program Focused More on the RGP Than on Breslow Depth?**
Most dermatologists and pathologists concur that Breslow depth is the best indicator of survival from MM. In the 1970s Breslow reported that no metastases occurred in any patients whose lesions were in situ or <0.76 mm in depth. It is now known from additional experience, larger series and longer follow up that about 1–5 percent of cases that are <0.76 mm in depth will be fatal. and in some series, particularly when regression was evident, that figure has been in the range of 20 percent. Thus Breslow depth alone does not provide an accurate prognosis for some of the very thin MMs that are now being seen. Fortunately, the observations and studies of Wallace H. Clark have provided additional valuable insight.

Clark, who was a pathologist with a special interest in the biology of cancer and in MM in particular, used the term “radial growth phase” to describe the earliest stage of MM. He described two variants of this stage—the in situ form where cells were confined to the epidermis and the invasive form where cells were also present in the superficial dermis. He felt cells in the in situ form lacked the ability to metastasize and cells in the invasive form almost never metastasized and this was later confirmed by others. Guerry et al. followed 161 patients with invasive RGP melanoma for at least 10 years and saw no cases of metastases. Thus, it now appears that virtually all MMs that are detected in the RGP should be curable although very rare exceptions have been described.

---

**TABLE 2.**

<table>
<thead>
<tr>
<th>Breslow Depth in MMs and Growth Phase of the 26 MMs Detected by Patients or Dermatologist (Data From Program and Non-program Groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant Melanomas</td>
</tr>
<tr>
<td>In situ</td>
</tr>
<tr>
<td>Detected by patient</td>
</tr>
<tr>
<td>Detected by dermatologist</td>
</tr>
</tbody>
</table>

Forty-two percent of their 38 diagnosed MMs were in situ and none were 1 mm or greater in Breslow depth.
Clark believed all cancers including MM undergo a process of evolution from stage to stage, and described a second more advanced stage of MM which he termed the “vertical growth phase.” In this stage, cells not only tended to spread through the dermis but also developed new properties including the ability to metastasize. Histopathologically, this phase was characterized by larger and more atypical cells, and absence of chronic inflammation.

Since Clark's original descriptions, at least 10 separate studies involving melanoma gene expression and progression, have further distinguished the RGP and VGP. Perhaps of particular importance, as noted in a recent review by Miller and Mihm in the New England Journal of Medicine, were multiple studies that indicate progression from the RGP to the VGP is marked by the loss of E-cadherin and the expression of N-cadherin. The significance of this finding is that N-cadherin is a characteristic of invasive carcinomas and enables metastatic spread by permitting cells to interact with other N-cadherin expressing cells such as dermal fibroblasts and vascular endothelium. Together, all of these papers including several just recently published strongly support the belief there are significant genetic, immunologic and functional changes underlying the differences in morphology observed in the two growth phases, and that these differences have important clinical implications.

Over the years, the terms RGP and VGP have lost the favor of some pathologists and are not always included in pathology reports of melanoma cases. In view of the numerous basic studies just cited, however, as well as the clinical results reported by both Guerry et al. and ourselves in this paper, we believe there justifiably deserves to be a renewed interest and expanded use of these terms, particularly because of their important prognostic implications.

Based on his extensive studies, Clark estimated that the RGP of superficial spreading melanoma, the most common type, was six months to five years, but could be considerably longer in some cases. It was this impression that led us to adopt the six month recall policy in our screening program. Since our goal was to prevent death in all cases of newly developing MM, it was theorized that if thorough examinations were performed every six months, and a patient developed an MM at any point, even immediately after a normal examination, the MM should still be discovered in the RGP at the next visit. Because of this concept, it was felt important to continue to do examinations every six months on an ongoing basis.

Since July 1, 2001 we have kept records of the growth phase of all MMs seen in the practice. It is of interest as well as in support of the significance of the RGP concept that the consistent survival from MM in patients in the program group has been associated with consistent detection of lesions in the RGP.

Could the high percentage of tumors detected in the RGP in our practice, particularly in the program group (i.e., 100%), be in part related to the fact that about half of our patients are in the Medicare age group and our practice is weighted towards an older population? The mean and median ages of program patients with MMs were 71.3 and 75.5 years (range 48–85), while the mean and median ages of non-program patients with MMs were 54.8 and 51.0 years (range 36–89) respectively. Certain MMs, particularly lentigo maligna, are not only more common in older patients but generally occur on exposed areas such as the face and might be more likely to be detected while in the RGP. This type of melanoma, however, accounted for only three of the 26 cases seen during the five-year period. Furthermore, it is well recognized that older patients, particularly men, who made up 70 percent of our program cases, tend to have their MMs detected at a much later stage and consequently have the highest death rates based on gender and age. This tendency towards later detection would logically appear to correlate with reduced percentages of cases detected in the RGP. It is our belief that the consistent detection of melanomas in the RGP in all program patients of any age or gender is a function of the soundness of the program, and a key reason why we suspect other dermatologists who adopt its basic measures will encounter similar success.

Which Measures Contributed to the Program’s Success?

The strategy to prevent death was to detect and excise all developing MMs at an early, curable stage by using serial screening in a program based on an understanding of the developmental biology and chronology of the neoplasm. Five separate measures were employed in an attempt to accomplish this. These were: (1) performing thorough skin examinations on a serial basis, (2) biopsying suspicious lesions, (3) recalling patients every six months to detect all lesions in the RGP, (4) educating patients on why they should return when recalled and (5) familiarizing patients with the clinical features of the neoplasm so that they might discover lesions by themselves.

The data previously presented indicate we were highly successful at implementing the first two measures. All MMs were detected at a very early stage and while still in the RGP. Our practice of biopsying NUBs enabled us to detect all amelanotic, verrucous, and other atypical MMs when they occurred. This practice also resulted in discovery of a few MMs that presented as non-specific red papules, though we have seen this presentation far more commonly with basal cell and squamous cell carcinoma. It is conceivable, though by no means proven, that these popular MMs were in fact precursors of nodular melanomas, but discovered before they underwent rapid expansion. The third and fourth measures did not always result in patients returning as early as we would have preferred. Most patients, however, did return at or close to six months and the four that

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returned between nine and 24 months still had early lesions, which were cured without difficulty (Table 1). As most MMs remain in the RGP for several years, these results were not particularly surprising. It should be recalled that the screening program was designed to detect all MMs at a curable stage even in the face of unfavorable scenarios. Thus, if a patient did not return precisely at six months, or if a lesion had evolved rapidly, or if a patient presented with an incipient “featureless” MM and the diagnosis was not made until the next visit, it would still be probable that the lesion would be detected while curable. There appear to be sufficient safeguards in the program to attain favorable outcomes in the vast majority of circumstances, and this appears to be a key factor in the remarkable degree of efficacy achieved. If multiple adverse events had occurred simultaneously (e.g., a patient developed a rapidly growing lesion, was not aware of it and failed to respond to multiple recalls), the results could have been much different. Unfavorable outcomes also could have occurred if patients had been advised to return on a much less frequent schedule. In such circumstances, more rapidly evolving MMs could potentially pass right through the RGP and well into the VGP before being seen.

While we continue to encourage program participants to return at six-month intervals, the observation that no patients returning in two years or less have demonstrated VGP pathology has led us recently to question whether recalls done somewhat less frequently, i.e., at 12 month intervals, might achieve similar efficacy. Such a change, if as effective, would cut the number of visits in half, reduce costs, make it more convenient for patients, and allow additional patients to be evaluated. We will continue to monitor data from our own practice, and from other sources, if it becomes available, to help determine if a change is advisable.

What was most surprising in our review was that the fifth measure, educating patients on the classic features of MM, was so unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. Only one of the 10 program patients was aware of his/her MM when we detected it. A previous study whose unproductive. 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An interesting and potentially insightful observation made on overview of our data was the relatively small number of MM cases in the program group compared to other similar studies, though long term follow up indicates no cases were missed. While this observation may simply reflect that our patients could have been at lower risk than other studied groups, it also raises an additional possibility. That is, our practice of excising highly dysplastic nevi to rule out MM could have had the additional effect of removing some neoplasms that would have later become MMs. Thus, this practice to some degree may have functioned as a form of primary prevention much like the practice of removing actinic keratoses prevents squamous cell carcinomas. While it is recognized that removal of dysplastic nevi in general is not a worthwhile endeavor, we have encountered some anecdotal evidence that excision of highly dysplastic nevi may have reduced the occurrence of MMs in our program group. One of our patients who presented with a highly dysplastic nevus asked us to monitor the lesion rather than excise it as we had recommended. Over a year later, the lesion increased 1 mm in diameter and biopsy revealed an early MM arising from the dysplastic nevus. If the lesion had been excised on the earlier visit, it appears likely no MM would have been observed. To determine if excising highly dysplastic nevi has a significant therapeutic benefit would, of course, require additional study.

Was the Screening Program Cost Effective?
The program was clearly effective in detecting all skin cancers at a stage when cure was virtually a certainty. While the value of lives saved should not be measured simply in dollars and cents, a number of studies have already addressed the issue of costs, and concluded that MM screening compares favorably with established screening measures and is cost productive in certain defined groups. These studies generally used theoretical survival rates and were not aware that serial screening for MM could be as effective as we now believe it can be (i.e., equal or close to 100%). Thus, screening may be more cost productive than estimated, and this doesn’t even take into account other corollary benefits of screening such as early detection of other skin problems.

It is known that performing a sentinel node biopsy can cost over $12,000 and that the cost of treating an advanced case of MM is more than 30 times as high as treating an early case. Therefore, in programs such as ours where MMs are detected early so that sentinel node biopsies, extensive and repeated scanning, chemotherapy and possible hospitalization are all unnecessary, considerable savings are incurred in affected cases. This will offset a considerable portion of the costs of screening and performing biopsies in those who haven’t developed an MM. Finally and significantly, in terms of value for funds spent, it should not be forgotten that it now appears that almost everyone participating in serial screening will survive, whereas this is far from true for patients being treated for advanced disease.

What Implications Does This Review Have For Dermatologists?
Year after year thousands of individuals die because MM is first diagnosed at a late, incurable stage. The results reported in this paper, however, suggest that adoption of the measures we have described may offer a means to substantially prevent this tragedy.

While it remains to be seen if the results of our office-based surveillance program are generalizable, we believe a high de-
gree of success is likely and recommend other dermatologists institute similar programs, monitor data, and present their findings. It would be very interesting to know if programs similar to ours will not only achieve exceptionally high cure rates, but will also detect all or most lesions in the radial growth phase, totally or largely eliminate the need for sentinel node biopsies and observe few if any nodular lesions. In addition, for purposes of determining the ideal time interval between visits, it would be of considerable interest to know if any patients returning at 12-month intervals or less were found to have lesions in the VGP.

This experience indicates that it is neither difficult nor time-consuming to arrange or perform serial FSEs if one uses assistants for administrative details, appropriate scheduling, and a practice management system to simplify recalls. In addition, in those practices that employ dermoscopy and/or total body photography and/or other auxiliary measures, these can be readily added to the program for potential additional benefit.

The authors believe the screening measures we have advocated and have used since 1992 could be incorporated into most dermatology practices with minimal disruption, particularly if the above steps are addressed. Based on feedback we have received from patients new to our area and who have seen other dermatologists previously, many practices are now performing screening procedures regularly, and most are at least seeing patients on an ongoing basis for various sequelae of prior ultraviolet light exposure. Where warranted, some or all of the measures we have reported could be added to such visits.

The results of this review, as well as the literature, suggest that reliance on patients alone to detect significant lesions in a timely manner will frequently be unsuccessful, particularly when such individuals are older adults. Professional screening as we have described, however, can be extremely effective in detecting such lesions at an early, curable stage. Therefore, when patients present with recognized risk factors for MM, we strongly encourage dermatologists to be more proactive and to consider recommending, performing, and promoting serial screening procedures.

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In Memory of Paula Shore.

Paula Shore, who managed the recall program, died of lung cancer for which no generally accepted screening program now exists. A new blood test to screen for lung cancer, and named in her honor, the Protein Assays Using Lung cancer Antigens (PAULAs Test) is now in the late stages of testing by 20/20 GeneSystems, Inc.

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DISCLOSURES

The authors have no relevant conflicts of interest to disclose.

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