Exploration of diagnostic techniques for malignant melanoma: an integrative review

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Authors’ objectives
To explore the various diagnostic techniques for melanoma and to assess their usefulness in the clinical practice of nurse practitioners.

Searching
HealthSTAR, MEDLINE, Cancerlit and CINAHL were searched from 1952 to 1999 using the keywords ‘melanoma’, ‘skin neoplasm’, ‘diagnosis’, ‘screening’ and ‘dermatoscope’. The searches were limited to studies published in the English language. In addition, the reference lists of all retrieved studies were examined.

Study selection

Specific interventions included in the review
Studies that examined diagnostic techniques to improve accuracy for melanoma detection were eligible for inclusion. Studies that were descriptions of equipment, or that compared the diagnostic accuracy (DA) of melanoma with another type of cancer, or were reports of first-time use of computer-aided equipment were excluded. The specific interventions included in the review were naked-eye clinical examination alone (6 studies), clinical examination with the aid of total-body photographs (2 studies), epiluminescence microscopy (ELM; 9 studies), digital ELM (2 studies), computer-assisted techniques (4 studies) and teledermatology (3 studies). COMPARED>> The reference standard test was histological examination after excision.

Reference standard test against which the new test was compared
The reference standard test was histological examination after excision.

Participants included in the review
The author did not state any specific inclusion criteria relating to the participants. The participants included in the review for each type of intervention were as follows.

Naked-eye clinical examination: 105 nondermatologists from 1st year residents to MDs and 48 dermatologists (1 study); 2 dermatologists with more than 10 years’ experience, 2 senior registrars with 3 to 5 years’ experience, and 6 registrars with 1 to 2 years’ experience (1 study); a dermatologist resident and a staff dermatologist (1 study); 7 medical students, 8 physician assistants, 22 nondermatology residents and 8 dermatology residents (1 study); a dermatologist with either up to 5 or more than 10 years’ experience (1 study); and dermatologists with unknown experience (1 study).

Clinical examination with total-body photographs: 452 participants with dysplastic nevi and at least 2 atypical nevi, and 278 adults each with more than 5 dysplastic nevi.

ELM: dermatologists (level of training or experience with ELM not specified).

Digital ELM: the participants were not stated.

Computer-aided techniques: 3 of the 4 studies included dermatologists, but their level of experience was unclear.

Teledermatology: physicians and dermatologists, either based on-site or receiving the images through digital images.

Outcomes assessed in the review
Studies assessing the DA or sensitivity and specificity were eligible for inclusion in the review. In practice, not all of the studies involved testing the DA or sensitivity and specificity.

How were decisions on the relevance of primary studies made?
The author alone selected the papers.

Assessment of study quality
The author did not state that they assessed validity.

Data extraction
The author did not state how the data was extracted for the review, or how many reviewers performed the data extraction. Data on the author and year, the participant or clinician characteristics, and the results were extracted and tabulated. The reviewer also added a field for ‘relevance to practice’ in the tables.

Methods of synthesis
How were the studies combined?
The studies were combined narratively, being grouped by the type of index test.

How were differences between studies investigated?
Differences between the results of the studies were explored to a limited extent in the text, in terms of the index text used and the experience of the operator.

Results of the review
Twenty-six DA studies were included. The number of included patients or lesions assessed was not reported in all of the studies. Where the data were clearly reported, 16,555 lesions were assessed by 'naked eye clinical exam', 124 by 'digital ELM' and 481 by 'computer aided techniques'.

Naked-eye clinical examination: the DA for a dermatologist with greater than 10 years' experience ranged from 72 to 80%. A dermatologist with 0 to 5 years' experience had a DA of 50 to 62%. In one study the DA was not calculated, but the nondermatologist and dermatologist were compared diagnosing 11 lesions with six melanomas. The results indicated a lack of ability of the nondermatologist to diagnose melanoma and dysplastic nevi. A further study included only physician assistants, medical students, and surgical and internal medicine residents. The mean scores of these participants were significantly less than the scores of the dermatology residents, even after participating in an intensive 4 week training on melanoma detection.

Clinical examination with total-body photographs: in both studies, the investigators found the use of photographs helpful in the early diagnosis of melanoma. The physician most often removed the lesions that were histologically confirmed as melanoma, based on changes in the photographs.

ELM: all of the studies reviewed showed an improvement in DA when using ELM. Where reported, the DA ranged from 46 to 78.75% for naked-eye examination, and from 80 to 91.25% for ELM. However, every study used dermatologists as the practitioners making the diagnosis and most of these were experts at ELM. Only one study involved the diagnosis of stage 1A melanomas. Changes in the lesions were not noticeable with the naked eye in 78.1% of the pigmented skin lesions, and only clinicians using ELM were able to detect them.

Digital ELM: neither of the studies report a DA figure, but the advantage of being able to enhance and magnify the image on the computer screen was reported in both studies.

Computer-assisted techniques: in 3 of the 4 studies that assessed computer-aided techniques, the results indicated that the computer identified lesions as well as, or better than the trained dermatologist.

Telemedicine: 3 studies assessed the use of telephonic transmission of digital images to a remote location. However,
each study focused on a different aspect of teledermatology. One study examined the concordance of diagnosis when using images from a projector and those on the Internet. The results indicated a high level of concordance between these two methods of image production. The second study confirmed the results of the first, by using two remote clinicians and comparing their diagnosis with an on-site dermatologist. Again a high level of concordance in the diagnosis was observed. The last study set up a teledermatology programme with rural sites, which were manned by physicians and nurse practitioners. The results indicated that after 10 to 12 months, the confidence levels, diagnostic ability and use of treatment plans increased significantly.

Authors' conclusions
Although this integrative review has led to recommendations for referrals to experienced dermatologists, the role of the nurse practitioner must still be emphasised. Skin assessment, detection of suspicious pigmented skin lesions, and referral are part of a critically important process. The nurse practitioner also has a role in educating patients about risk factors, prevention, signs and symptoms, and the treatment of melanoma. Since the studies reviewed showed a general lack of education about melanoma diagnosis among the health care professions, nurse practitioners must consider further training and the improvement of diagnostic skills a priority.

CRD commentary
The author addressed a well-defined review question in terms of the diagnostic tests, the outcome measures and the design of the studies that were to be included in the review. However, in practice, not all of the included studies involved testing DA or sensitivity and specificity as their outcome measures. Therefore, the specified inclusion criteria were not adhered to. The searches undertaken were of a relatively poor quality: although four databases were searched the search strategy was extremely limited. Furthermore, the searches were restricted to studies published in English. It is therefore possible that other relevant studies have been missed, as the author acknowledged. The author did not report how the studies were selected for inclusion, or whether any form of validity assessment was undertaken on the included studies. Poor reporting of the review process, and the apparent conduct of the review by a single investigator, makes it difficult to comment on whether bias could have been introduced in these stages.

Some details of the primary studies were tabulated, but these were insufficient to allow the reader to assess whether the author's results and conclusions are consistent with the evidence base reviewed. The author's use of a narrative summary of the results was appropriate, and there was some attempt to explore differences between the studies. Overall, this was a poorly reported review in which it was difficult to assess the review process. The author's conclusions appear largely speculative in nature since almost no data on the role of nurse practitioners, and none at all on any impact of patient education, were presented in the review. The author's results and conclusions should therefore be treated with caution.

Implications of the review for practice and research
Practice: The author stated that, based on the research citing poor nondermatologist diagnosis, increased DA with dermatologists experienced in ELM techniques and the critical need for early melanoma diagnosis, nurse practitioners who identify ABCDE changes in pigmented skin lesions should refer their patients to experienced dermatologists, preferably those who use ELM or digital ELM. Patients with multiple nevi or dysplastic nevi should also be referred to an experienced dermatologist when possible. If this is not possible, total-body photographs should be taken, and the patient should be followed up every 6 to 12 months to note changes. A copy of the photographs should be given to the patient for comparison at home.

Research: The author did not state any implications for further research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.