MELANOMA IS NOT WHAT IT USED TO LOOK LIKE

Scott Menzies

University of Sydney
Sydney Melanoma Diagnostic Centre
Sydney Cancer Centre
Royal Prince Alfred Hospital
Email: scott.menzies@email.cs.nsw.gov.au

Abstract

Two relatively new methods have changed the way primary melanoma is diagnosed. Dermoscopy (surface microscopy, epiluminescence microscopy) is a technique that was introduced at the beginning of the 1990s with the advent of inexpensive hand-held instruments. Since then, the technique has been shown to increase the diagnosis of virtually all pigmented skin lesions. In practice, this is seen by reducing the benign to malignant ratio of excised pigmented lesions while improving the diagnostic sensitivity for melanoma. Digital dermoscopy monitoring was introduced at the beginning of the millennium. Here, melanocytic lesions are excised following morphological changes seen over time. Like dermoscopy, digital monitoring can reduce excision rates of suspicious melanocytic lesions. However, in addition to this, the technique allows the identification of dermoscopically featureless melanomas that can only be detected by visual changes in time. These lesions often have a very benign appearance. These diagnostic techniques and others showing early promise, are briefly reviewed.

Techniques in dermoscopy

This article will concentrate on two diagnostic techniques, dermoscopy and digital monitoring, which have transformed the way pigmented skin lesions are assessed in routine clinical practice. Dermoscopy has been used since the early 1990s when inexpensive hand-held devices were developed in Germany. Digital monitoring is a later phenomenon, with most of the literature providing guidance for clinical practice occurring at the beginning of the new millennium.

Dermoscopy (surface microscopy, oil epiluminescence microscopy) is a simple technique that utilises an incident light magnification system (usually x10) with the addition of a liquid at the skin-microscope interface. This liquid eliminates the normal scattering of light at the stratum corneum, thus allowing the epidermis to become translucent. The result is the identification of morphological features not seen with the naked eye.[1]

In both expert hands and those of trained general practitioners, there is a significant increase in diagnostic accuracy for melanoma using dermoscopy.[2,3] This increase in accuracy is reflected in a lower benign to melanoma excision ratio and decreased excision rates.[4,5] Currently, there is a suggested two stage procedure for the diagnosis of pigmented skin lesions using dermoscopy.[1,6,7] The first stage allows the differentiation of melanocytic lesions (mainly moles and melanoma) from non-melanocytic lesions (seborrheic keratoses, pigmented basal cell carcinoma (BCC) and haemangioma). Once a diagnosis of a melanocytic lesion has been made, then the second stage allows differentiation of melanoma from benign moles.

A number of methods for differentiating melanoma from benign melanocytic lesions have been compared. The dermoscopy scoring systems for melanoma have been designed to be used by inexperienced clinicians. Such systems include the ABCD method,[8] the Menzies' Method[1,9] and the 7-point checklist.[10] Among experts of dermoscopy, pattern analysis,[11] which avoids rigid rules of the previous methods, allows an overall impression of multiple dermoscopic patterns and is probably the most widely-used. In a direct comparison of these methods by experienced dermoscopists, pattern analysis gave a superior specificity (proportion of correctly diagnosed non-melanomas) and the Menzies' Method a superior sensitivity (proportion of correctly classified melanomas).[6,12]

To illustrate how a diagnosis is made using dermoscopy, the Menzies' Method utilises 11 dermoscopic morphological diagnostic features.[6,12] For a lesion to be diagnosed as melanoma two negative features cannot be found (symmetry of pattern or a single colour). If neither of these features are present then to diagnose melanoma at least one of nine positive features must be found. These positive features are radial streaming, pseudopods, blue-white veil, multiple brown dots, peripheral black dots or globules, scar-like depigmentation, multiple blue-gray dots, broadened network and multiple (five-six) colours.

Digital monitoring

Digital (computerised) monitoring devices are usually instruments that take digital dermoscopy images and allow tiling on the computer screen for comparison of melanocytic lesions for change over time. The technique can be divided into two forms: long-term and short-term monitoring.[1]

Long-term monitoring allows comparison of atypical nevi over standard surveillance periods (generally 12 months).[13-19] Such monitored nevi, while atypical, are not considered suspicious for melanoma at the time of imaging. This technique is generally restricted to patients with the dysplastic naevus syndrome. Four to five per cent of monitored pigmented lesions will show significant changes over the surveillance period. Of those changed lesions, around 12% will be melanoma.[15] In contrast to long-term monitoring, short-term monitoring over a three-month period is used to make a clinical judgment about suspicious melanocytic lesions that do not have conclusive dermoscopic features of melanoma.[20] In short-term monitoring, any morphological change over the three-month period requires excision of the lesion. Of those changed lesions, as in the case of long-term monitoring, 12% will be melanoma. Eighty-three per cent of monitored benign atypical nevi will not change over this time. It is believed that the sensitivity is 100%, ie. all melanomas will change.[20]

What is becoming clear is that digital monitoring, both long and short-term, is identifying banal appearing melanomas that can only be detected by morphological change. In a recent prospective study of patients with dysplastic nevus syndrome,

44% of melanomas detected were found exclusively using long-term digital monitoring.[17] None of these melanomas had diagnostic features using dermoscopy. These dermoscopy featureless melanomas are even better demonstrated with short-term monitoring.[20,21] It now seems clear that in the past melanomas were being identified at a later stage in tumor development, when dermoscopy or clinical ABCD features of melanoma (asymmetry, border irregularity, color variability and diameter greater than 6mm) became more apparent.

Future developments

The future in melanoma diagnosis probably resides heavily with automated diagnosis. Here, an instrument diagnoses a lesion without input from the clinician. Such technologies have been initially investigated in the early to mid 1990s and are now being released as clinical aids for diagnosis.[22 23] In general, studies are finding that automated diagnostic instruments have a diagnostic performance equivalent to specialist clinicians. However, to date, results of formal clinical trials are lacking. Nevertheless, it seems clear that such instruments will be a fundamental aid for diagnosis in the future.

Finally, in vivo confocal scanning laser microscopy is a technique that allows visualisation of single cells in the epidermis and upper dermis of lesions while on the patient's skin. While depth of penetration is a limiting factor with such instruments, melanoma in the epidermis seems to be visualised with gold standard histological accuracy. However, while holding much promise, such studies are in their infancy.[24]

References

1. Menzies SW, Crotty K, Ingvar C, McCarthy W. An atlas of surface microscopy of pigmented skin lesions – Dermoscopy. 2nd Edition & CDROM quiz. Sydney: McGraw-Hill Book Co., 2003. Menzies SW et al. Atlas de Microscopia de Superficie de Lesoes Pigmentadas da Pele: Dermoscopia. 2nd Edicao. Rio de Janeiro, Brasil: Dilivros, 2004.
2. Kittler H, Pehamberger H, Wolff K, Binder M. Diagnostic accuracy of dermoscopy. Lancet Oncol 2002;3:159-65
3. Westerhoff K, McCarthy W, Menzies SW. Increase in the sensitivity for melanoma diagnosis by primary care physicians using skin surface microscopy. Br J Dermatol 2000;143:1-6.
4. Carli P, de Giorgi V, Chiarugi A et al. Addition of dermoscopy to conventional naked-eye examination in melanoma screening: a randomized study. J Am Acad Dermatol 2004;50:683-9.
5. Carli P, De Giorgi V, Crocetti E et al. Improvement of malignant/benign ratio in excised melanocytic lesions in the 'dermoscopy era': a retrospective study 1997-2001. Br J Dermatol 2004;150:687-92.
6. Argenziano G, Soyer HP, Chimenti S et al. Dermoscopy of pigmented skin lesions: results of a consensus meeting via the Internet. J Am Acad Dermatol 2003;48:679-93.
7. Soyer H, Argenziano G, Chimenti S et al. (Eds) Dermoscopy of Pigmented Skin Lesions. Milan, Italy: Edra, 2001
8. Stolz W, Riemann A, Cognetta A. et al. ABCD rule of dermatoscopy: a new practical method for early recognition of malignant melanoma. Eur J Dermatol 1994;4:521-7.
9. Menzies SW, Ingvar C, Crotty K, McCarthy W. Frequency and morphologic characteristics of invasive melanomas lacking specific surface microscopic features. Arch Dermatol 1996;132:1178-82.
10. Argenziano G, Fabbrocini g, Carli P, De Giorgi V, Sammarco E, Delfino M. Epiluminescence microscopy for the diagnosis of doubtful melanocytic lesions: comparison of the ABCD rule of dermatoscopy and a new 7-point checklist based on pattern analysis. Arch Dermatol 1998;134:1563-70.
11. Pehamberger H, Binder M, Steiner A, Wolff K. In vivo epiluminescence microscopy: improvement of early diagnosis of melanoma. J Invest Dermatol 1993;100:356S-362S.
12. Blum A, Luedtke H, Ellwanger U, Schwabe R, Rassner G, and Garbe C. Digital image analysis for diagnosis of cutaneous melanoma. Development of a highly effective computer algorithm based on analysis of 837 melanocytic lesions. Br J Dermatol 2004:151:1029-38.
13. Stolz W, Schiffner R, Pillet L et al. Improvement of monitoring of melanocytic skin lesions with the use of a computerised acquisition and surveillance unit with a skin surface microscopic television camera. J Am Acad Dermatol 1996;35:202-7.
14. Kittler H, Seltenheim M, Dawid M, Pehamberger H, Wolff K, Binder M. Frequency and characteristics of enlarging common melanocytic nevi. Arch Dermatol 2000;136:316-20.
15. Kittler H, Pehamberger H, Wolff K, Binder M. Follow-up of melanocytic skin lesions with digital epiluminescence microscopy: patterns of modifications observed in early melanoma, atypical nevi, and common nevi. J Am Acad Dermatol 2000;43:467-76.
16. Robinson JK, Nickoloff BJ. Digital epiluminescence microscopy monitoring of high-risk patients. Arch Dermatol 2004;140:49-56.
17. Haenssle HA, Vente C, Bertsch HP et al. Results of a surveillance programme for patients at high risk of malignant melanoma using digital and conventional dermoscopy. Eur J Cancer Prev 2004;13:133-8.
18. Schiffner R, Schiffner-Rohe J, Landthaler M, Stolz W. Long-term dermoscopic follow-up of melanocytic naevi: clinical outcome and patient compliance. Br J Dermatol 2003;149:79-86.
19. Bauer J, Blum A, Strohhacker U, Garbe C. Surveillance of patients at high risk for cutaneous malignant melanoma using digital dermoscopy. Br J Dermatol 2005;152:87-92.
20. Menzies SW, Gutenev A, Avramidis M, Batrac A, McCarthy W. Short-term digital surface microscopy monitoring of atypical or changing melanocytic lesions. Arch Dermatol 2001;137:1583-89
21. Skvara H, Teban L, Fiebiger M, Binder M, Kittler H. Limitations of dermoscopy in the recognition of melanoma. Arch Dermatol 2005;141:155-60.
22. Menzies SW. Automated epiluminescence microscopy: human vs machine in the diagnosis of melanoma. Arch Dermatol. 1999;135:1538-40.
23. Rosado B, Menzies S, Harbauer A, Pehamberger H, Wolff K, Binder M, Kittler H. Accuracy of computer diagnosis of melanoma: a quantitative meta-analysis. Arch Dermatol. 2003;139:361-7
24. Marghoob AA, Halpern AC. Confocal scanning laser reflectance microscopy: why bother? Arch Dermatol. 2005;141:212-5.