

# Technologies for the diagnosis of primary melanoma of the skin

Scott W Menzies

*There is now an inexpensive first-line approach for diagnosing pigmented skin lesions*

Over the past decade, the number of published reports on new technologies for diagnosing primary melanoma and other pigmented lesions of the skin has grown exponentially. However, there is still confusion about the relative merits of the various technologies and in which patient setting they are best used. The technologies discussed here are dermoscopy (also known as surface microscopy, epiluminescence microscopy, or dermatoscopy) and its digital modifications.

In dermoscopy, hand-held magnification devices (usually  $\times 10$  magnification), together with either application of liquid at the skin-microscope interface or the use of cross-polarising filters that require no liquid, allow the visualisation of morphological features not seen with the naked eye. This increases the accuracy of diagnosis for virtually all pigmented skin lesions, including melanoma.<sup>1,2</sup>

In a meta-analysis of 13 studies comparing dermoscopy with the naked-eye examination, the mean sensitivity for the diagnosis of melanoma (percentage of melanomas correctly diagnosed) increased by 19%, and the mean specificity (percentage of non-melanomas correctly diagnosed) increased by 6.2%.<sup>3</sup> While this analysis suggested that dermoscopy did not markedly increase specificity, other studies have shown it to have a dramatic effect on reducing biopsy rates. In a clinical trial of dermatologists randomly allocated to either naked-eye examination or naked-eye examination plus dermoscopy, there was a 42% reduction in the number of patients referred for biopsy in the dermoscopy arm of the trial.<sup>4</sup> This trial followed the observation that, for dermatologists trained in the use of dermoscopy, there was a significant reduction in the benign to malignant ratio of excised

melanocytic lesions — from 18 : 1 (pre-dermoscopy era) to 4 : 1 (post-dermoscopy era).<sup>5</sup>

The impact of dermoscopy has also been assessed in general practice. In a study of the diagnosis of melanoma using dermoscopy by Australian general practitioners, my colleagues and I reported a 39% improvement in sensitivity. No improvement was noted in specificity.<sup>6</sup> Our finding has been reproduced in a recent clinical trial of primary care providers in Europe.<sup>7</sup> The major endpoint of the trial was the result of re-evaluation by two participating specialists of lesions identified as suspicious. The percentage of suspicious lesions correctly detected (sensitivity) increased by 46% in the dermoscopy group. Again, the specificity remained unchanged. Furthermore, there was a significant improvement in the identification of malignant lesions by the dermoscopy group (although the trial lacked adequate power to detect differences in melanoma diagnosis).

Since 2000, there has been an increasing interest in digital dermoscopy sequential imaging.<sup>1,2</sup> Digital (computerised) dermoscopy monitoring devices take digital dermoscopy images and allow tiling on the computer screen for comparing change in melanocytic lesions over time. Such devices are used in two clinical settings. First, short-term digital monitoring over a 3-month period is used to monitor suspicious melanocytic lesions lacking features of melanoma on dermoscopy. Patients may present with changing common or mildly atypical naevi, or atypical naevi without an accompanying history of no change in their appearance. In contrast, patients with multiple atypical naevi are monitored for periods of 6–12 months (long-term monitoring). Both these monitoring techniques have been shown to detect dermoscopically featureless melanoma.<sup>2</sup> In a large series of 91 melanomas detected by sequential digital monitoring in Australia and Europe, more than half of the lesions were in situ and all were less than 1 mm thick, indicating the safety of monitoring lesions over time.<sup>8</sup> Recently, the impact of digital dermoscopy was demonstrated in a cohort of patients at high risk of primary melanoma; 34% of melanomas detected lacked dermoscopic features of melanoma and were exclusively detected by sequential digital dermoscopy monitoring.<sup>9</sup>

With the realisation that melanoma is a relatively uncommon presentation in general practice and may be suboptimally diagnosed even in a specialist setting, automated diagnostic instruments have been developed that require no diagnostic input by the operator. While many are commercially available, such devices are at various stages of development, so that attempting to compare their impact on diagnosis with that of any other technology in the field is difficult.<sup>2</sup> Nevertheless, comparisons can be made of the various instruments by contrasting ideal requirements, as outlined elsewhere.<sup>10</sup> While it is difficult to draw robust conclusions about the impact of such instruments in the absence of supporting clinical studies, such studies are being performed and their results are eagerly awaited.

In summary, dermoscopy has been shown to improve both the sensitivity and specificity of the diagnosis of melanoma by specialists and to improve the sensitivity of melanoma diagnosis by GPs. As it is an inexpensive technique, it should be recommended to all clinicians as a first-line approach for diagnosing pigmented skin lesions. Sequential digital dermoscopy monitoring devices are readily available and are restricted to diagnosing melanocytic lesions (naevi and melanoma). They have been shown to allow the detection of dermoscopically featureless melanoma in any patient presentation, but, to date, studies have

only been performed in a specialist setting. Such devices are more expensive and may currently be beyond the reach of general practice. Nevertheless, a clinical trial on the impact of dermoscopy and sequential digital dermoscopy monitoring on excision rates or patient referrals for biopsy by Australian GPs is due to be completed at the end of this year.

### Competing interests

I am a paid consultant for Polartechnics Ltd, a producer of an automated diagnostic instrument for the diagnosis of melanoma and a digital monitoring device.

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