Enhancing Skin Cancer Diagnosis with Dermoscopy

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KEYWORDS

• Dermoscopy • Dermatoscopy • Keratinocyte carcinomas • Diagnostic accuracy • Sensitivity • Specificity • Odds ratio • Melanoma

KEY POINTS

- Dermoscopy increases diagnostic accuracy and sensitivity for melanoma, and helps in the detection of thinner tumors.
- Multiple studies have established that dermoscopy is an aid for diagnosing basal cell carcinoma; the presence of dermoscopic criteria can predict the histopathological subtype of basal cell carcinoma.
- Although actinic keratosis, Bowen disease/squamous cell carcinoma in situ, invasive squamous cell carcinoma, and keratoacanthoma share common dermoscopic features, specific criteria can permit diagnostic discrimination.
- Dermoscopy novices can benefit from using diagnostic or triage algorithms to improve their diagnostic abilities and management decisions.

INTRODUCTION

Dermoscopy has been shown to increase sensitivity for skin cancer detection, decrease the benign-to-malignant biopsy ratio, and allow for the diagnosis of thinner melanomas compared with naked eye examination (NEE).[1–3] In 2009, a survey of academic dermatologists and chief residents in US dermatology training programs demonstrated that 84% of attending dermatologists used dermoscopy in daily practice and 90.2% of chief dermatology residents received dermoscopy training as part of their curricula.[4] These findings represented a significant increase in training and use of dermoscopy compared with a similar survey performed 10 years before.[5] The use of dermoscopy has also increased among nondermatologist physicians who actively participate in skin cancer management, such as family physicians.[6–8]

Despite the growing number of practitioners incorporating dermoscopy into their daily practices, there remain significant barriers, such as lack of training resources, preventing its widespread adoption.[4] Dermoscopic teaching methodologies, which include pattern analysis, diagnostic algorithms, and simplified triage algorithms, continue to emerge.

Funding: This research was funded in part through the NIH/NCI Cancer Center Support Grant P30 CA008748.
Conflict of Interest: The authors have no conflicts of interest to declare.
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Dermatol Clin ■ (2017) ■–■
http://dx.doi.org/10.1016/j.det.2017.06.003

They aim to provide an entry point in educating beginners in dermoscopy. Here, the authors review the diagnostic utility of dermoscopy for detection of melanoma and keratinocyte carcinomas (KC; also known as nonmelanoma skin cancers) and outline the specific dermoscopic features that can help discriminate these cancers from benign lesions. A review of dermoscopic teaching methodologies, including triage algorithms, is also provided.

DERMOSCOPY FOR THE DIAGNOSIS AND MANAGEMENT OF CUTANEOUS MELANOMA

In 2001, the first meta-analysis of the diagnostic power of dermoscopy found dermoscopy to be more accurate than NEE alone for the diagnosis of cutaneous melanoma.[9] Two additional meta-analyses have since reinforced these findings.[2,10] The most recent, by Vestergaard and colleagues,[2] included only prospective studies performed in a clinical setting and thus more accurately reflected everyday dermoscopy use. In total, 8487 suspicious pigmented and nonpigmented lesions were included, and melanoma prevalence ranged from 0.5% to 21.1% with a Breslow thickness that ranged from 0.35 to 0.95 mm.[2] Dermoscopic and clinical accuracy were evaluated through the diagnostic odds ratio (DOR), which considers both sensitivity and specificity and their respective tradeoffs.[2] The DOR for dermoscopy was 15.6 (confidence interval [CI]: 2.9–83.7, $P = .016$) times higher for dermoscopy than NEE. A summary estimate of sensitivity was higher with dermoscopy (0.90, CI: 0.80–0.95) than for NEE (0.71, CI: 0.59–82, $P = .002$)[2]; although specificity was higher for dermoscopy (0.90, CI: 0.57–98) than NEE (0.81, CI: 0.48–0.95, $P = .18$), it was not statistically significant.[2]

In all 3 meta-analyses, diagnostic accuracy was dependent upon the experience of the examiner.[2,9,10] However, inexperienced users, after a 2-hour course, had an improved sensitivity without compromising their specificity.[2] Terushkin and colleagues[11] found, through assessment of the benign-to-malignant biopsy ratio (BMR), that a single dermatologist newly adopting dermoscopy experienced a learning curve. Initially, the BMR of the dermatologist increased compared with NEE, but with time and experience, the BMR dropped below the baseline value with NEE alone and approached the level of pigmented lesion specialists. Several studies have demonstrated that short training modules can improve the diagnostic performance of inexperienced dermatologists, general practitioners, and even medical students.[6,12,13] However, the training modalities have varied widely among studies, and the ideal teaching method for beginners remains to be standardized.

The BMR (which is directly related to positive predictive value), although not a surrogate, is impacted by the sensitivity and specificity of dermoscopy. Improvements in this ratio suggest that the increased sensitivity seen with dermoscopy does not entail an increase in the number of unnecessary biopsies and thus an increase in morbidity. Carli and colleagues[1] retrospectively examined 2 users before and after the introduction of dermoscopy and 4 nonusers. Analysis demonstrated a significant improvement in the BMR over a 4-year study period in the dermoscopy arm (18:1–4.3:1, $P = .037$). The BMR for nonusers had no significant difference at the beginning and the end of the study (11.8:1–14.8:1).[1] In a randomized controlled trial comparing one-time evaluations of equivocal pigmented lesions with dermoscopy or NEE, 9% of patients followed with dermoscopy were referred for biopsy or excision compared with 15.6% with NEE ($P = .013$). The reduction in surgical morbidity was not hindered by a decreased ability to diagnose melanoma.[14] Finally, a multicenter survey over 10 years showed that the BMR at sites dedicated to skin cancer treatment improved from 12.8 to 6.8 ($P<.001$) and remained unchanged in sites not dedicated to screening for skin cancer. The investigators of that study argue that the introduction of dermoscopy was largely responsible for the observed improvement in the BMR.[15]

Dermoscopy and dermoscopic screening allow for the earlier detection of melanoma and improved clinical management. Several studies have shown that dermoscopic monitoring of lesions enables the detection of thin, featureless melanomas.[3,16] In a meta-analysis with a mean follow-up of 30 months, Salerni and colleagues[3] showed dermoscopy users to detect a greater number of thinner melanomas compared with NEE (mean Breslow depth 0.77 mm vs 1.43 mm, $P<.05$). Haenssle and colleagues[16] found that participation in specialized dermoscopic screening programs and dermoscopic examinations at the time of diagnosis were also significantly associated with thinner melanomas ($P<.01$). Dermoscopy users have identified melanoma-specific dermoscopic features that have enabled them to recognize melanoma with the sensitivity and specificity described. The following sections expand upon these melanoma-specific dermoscopic features and other features for basal cell carcinoma (BCC) and keratinizing carcinomas.