Practice Gaps in Dermatology
Melanocytic Lesions and Melanoma

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KEYWORDS

• Dermoscopy • Digital dermoscopy • Sequential digital dermoscopy imaging • Early melanoma diagnosis • Melanoma • Nevi • Reflectance confocal microscopy • Total body photography

KEY POINTS

- Good practices for melanoma diagnosis include strategies to detect new or changing skin lesions.
- Dermoscopy, total body photography, sequential digital dermoscopy imaging, and reflectance confocal microscopy are at present most relevant to identifying and evaluating new or changing skin lesions.
- The use of these noninvasive imaging technologies is particularly useful when screening individuals with high melanocytic nevus counts and atypical/complex nevus phenotypes for melanoma.
- Barriers such as lack of training and confidence, personal beliefs, and economical and logistical constraints have prevented the widespread use of those tools.
- Patient-driven health care aided by technology and complemented by teledermatology will likely rapidly alter the landscape of melanoma screening within the next decade.

IMPORTANCE OF NEW OR CHANGING MELANOCYTIC LESIONS

Despite increased public awareness of skin cancer and of the harmful effects of ultraviolet radiation (UVR), cutaneous melanoma incidence and mortality continue to increase in the United States. In 2015, approximately 73,870 people will be diagnosed with and 9940 will die of invasive melanoma.[1] Although there have been recent improvements in the treatment of metastatic melanoma,[2] early detection remains the most important strategy to reduce mortality. Evidence supporting this approach includes the recent population-based screening efforts in Germany, with initial results in the state of Schleswig-Holstein suggesting a nearly 50% decrease in melanoma mortality associated with skin cancer screening through total body skin examinations (TBSEs).[3]

Many factors are recognized as important to the diagnosis of melanoma,[4] including the identification of new or changing lesions. In 2004, the letter "E" was appended to the ABCD (Asymmetry, irregular Borders, more than one or uneven distribution of Color, or a large [greater than 6 mm] Diameter) mnemonic to highlight the importance of change in a melanocytic lesion as an important diagnostic criterion of melanoma.[5,6] Similarly, the Glasgow 7-point checklist

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places significant importance on changes in size, shape, and color of skin lesions as major signs of melanoma.[7] The fact that most melanomas (~65%) arise de novo and are not contiguously associated with a melanocytic nevus underscores the importance of identifying new lesions in addition to changing lesions during TBSEs to maximize diagnostic sensitivity for melanoma. As the associated potential harms of skin cancer screening, in particular overdiagnosis, are increasingly recognized,[8,9] identification of truly dynamic lesions with real potential for progression to metastatic and fatal disease may have the greatest short-term potential to limit harvesting of indolent and/or nonprogressive cancers.

Emphasis on detection and subsequent biopsy of changing skin lesions, however, may lead to a decrease in diagnostic accuracy for melanoma. A surrogate marker of positive predictive value is number needed to excise (NNE), which is the number of benign melanocytic lesions removed for every confirmed melanoma. Estimates in Europe and the United States of the NNE in children and adolescents are reported to range from 594 to 696, which are attributed to relying on change alone as an indication for biopsy.[10–13] Nevogenesis is recognized as a highly dynamic process during life, with significant nevus volatility in younger individuals (ie, nevus growth, appearance, and disappearance).[14–16] Even in adults, change alone in a skin lesion is not specific for the diagnosis of melanoma, and the appearance of new nevi is relatively common.[13,17] Conditions such as body growth, weight gain, pregnancy, or UVR exposure can also lead to recognized benign changes in melanocytic lesions.[18,19]

CURRENT BEST PRACTICE

Good practices for melanoma diagnosis therefore include, but are not limited to, strategies to detect new and/or changing lesions and to determine if these findings warrant skin biopsy. The use of noninvasive imaging technologies, such as dermoscopy, total body photography (TBP), sequential digital dermoscopy imaging (SDDI), and reflectance confocal microscopy (RCM), are at present most relevant to identifying and evaluating new and changing skin lesions during screening examinations, particularly in individuals with high melanocytic nevus counts and atypical/complex nevus phenotypes.[20]

Use of TBP images by physicians and patients during TBSEs and skin self-examinations (SSEs), respectively, allow for identification of new lesions and macroscopic changes in existing skin lesions (**Fig. 1**). Physicians who routinely use TBP during skin examinations argue that its use improves sensitivity and specificity for melanoma detection.[21–24] Use of TBP images during SSEs has been shown to improve patients' confidence in performing SSEs[25–27] and to increase patients' sensitivity for detection of new or changing skin lesions compared with performance of SSE alone without access to TBP images.[26]

After recognition of a new or changing skin lesion with TBP, dermoscopic evaluation is the next most appropriate step in evaluation. Meta-analyses have demonstrated that the use of dermoscopy by trained evaluators improves diagnostic accuracy for melanoma detection.[28–30] Access to dermoscopy reduces unnecessary biopsies of skin lesions[31,32] because most pigmented lesions will conform to a recognized benign nevus pattern.[33] The predominant nevus pattern depends on age, skin type, and the interaction between genes and the environment, such as UVR exposure. In the context of patients with many nevi, use of the dermoscopic comparative examination and the ugly duckling concept will prevent unnecessary biopsies of nevi.[19,31,32,34] Lesions with features concerning for melanoma should undergo biopsy, whereas those with equivocal but not diagnostic features could undergo SDDI and/or interrogation with RCM.

SDDI involves capturing dermoscopic images of lesions over time in order to identify changes concerning for melanoma and can be used in 2 complementary ways. The first method involves repeating dermoscopic images of skin lesions at regular intervals for detailed comparative analysis, which when combined with TBP has been referred to as "digital follow-up"[35,36] and has been shown to enable recognition of melanomas that lack diagnostic clinical or dermoscopic features at baseline evaluation (**Fig. 2**).[37,38] SDDI can also be used as a second-level screening evaluation of specific lesions with borderline features. When used in this manner, SDDI dramatically reduces the number of biopsies of benign lesions compared with use of dermoscopy alone (**Fig. 3**).[39] Access to SDDI compared with dermoscopy alone has also been associated with a 35% reduction in the cost per melanoma excised in a 1-year retrospective observational study in Belgium.[40]

A 5-year prospective observation study of 311 patients in Australia at "extreme high risk" for melanoma demonstrates the complementary effectiveness of TBP, dermoscopy, and SDDI in the diagnosis of melanoma.[41] After a median follow-up of 3.5 years, 70 of 75 primary melanomas detected in this cohort were either in situ