The Royal New Zealand College of General Practitioners
Te Whare Tohu Rata o Aotearoa

Twenty-five practical recommendations in primary care dermoscopy

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ABSTRACT

Dermoscopy in primary care enhances clinical diagnoses and allows for risk stratifications. We have compiled 25 recommendations from our experience of dermoscopy in a wide range of clinical settings. The aim of this study is to enhance the application of dermoscopy by primary care clinicians. For primary care physicians commencing dermoscopy, we recommend understanding the aims of dermoscopy, having adequate training, purchasing dermoscopes with polarised and unpolarised views, performing regular maintenance on the equipment, seeking consent, applying contact and close non-contact dermoscopy, maintaining sterility, knowing one algorithm well and learning the rules for special regions such as the face, acral regions and nails. For clinicians already applying dermoscopy, we recommend establishing a platform for storing and retrieving clinical and dermoscopic images; shooting as uncompressed files; applying high magnifications and in-camera improvisations; explaining dermoscopic images to patients and their families; applying toggling; applying scopes with small probes for obscured lesions and lesions in body creases; applying far, non-contact dermoscopy; performing skin manipulations before and during dermoscopy; practising selective dermoscopy if experienced enough; and being aware of compound lesions. For clinicians in academic practice for whom dermatology and dermoscopy are special interests, we recommend acquiring the best hardware available with separate setups for clinical photography and dermoscopy; obtaining oral or written consent from patients for taking and publishing recognisable images; applying extremely high magnifications in search of novel dermoscopic features that are clinically important; applying dermoscopy immediately after local anaesthesia; and further augmenting images to incorporate messages beyond words to readers.

KEYWORDS: Basal cell carcinoma; epiluminescence; melanoma; skin cancer; skin microscopy; squamous cell carcinoma

Introduction

Dermoscopy is efficient in the early diagnosis of melanoma[1–3] and possibly efficient in diagnosing keratinocyte carcinomas.[4] We have previously reported novel applications of dermoscopy applied in primary care.[5–7] In line with investigators in secondary care,[8,9] we reported that dermoscopy enhances the diagnosis of vascular skin lesions,[10] infections[11] and infestations in primary care.[12]

We have pioneered dermoscope-guided surgical procedures performed in primary care.[13–15] We further reported a procedure-control study, providing evidence that dermoscope guidance lowers the risk of incomplete excision and obvious scars 6 months after the surgical procedures.[16]

The use of dermoscopy in primary care varies widely in different parts of the world.[17,18] We formulate here 25 recommendations from our experiences in various clinical settings. We aim to arouse the interests of primary care physicians in dermoscopy as an aid in making diagnoses and formulating plans of management.

WHAT GAP THIS FILLS

What is already known: Many primary care practitioners would like to apply dermoscopy for their patients, but there are not yet any systematic recommendations for these health-care practitioners specific for their stages of applying dermoscopy.

What this study adds: We compiled 25 practical recommendations for primary care practitioners; for clinicians contemplating using dermoscopy, for those already applying dermoscopy, and for clinicians with an academic interest in primary care dermoscopy. Most of our recommendations are original and, where possible, we substantiate our recommendations by demonstrating dermoscopic images.

Recommendations for primary care physicians commencing dermoscopy

1. Understand the aims of dermoscopy

Although melanoma makes up only 4% of all skin cancers, 80% of deaths from skin cancers are due to melanoma.[19] Predisposing factors are: genetics, family history, sun exposure and Familial Atypical Multiple-Mole Melanoma Syndrome.[20,21] Melanomas rarely arise from melanocytic naevi, but early stages of melanoma can resemble dysplastic naevi.[21] The principal aim of dermoscopy is therefore to detect and diagnose melanoma. It is not to monitor naevi to see whether they might become melanomas.[18]

Other aims of dermoscopy include: detecting keratinocyte carcinomas,[4] diagnosing other skin diseases,[5–12] facilitating biopsies[13–15] and complementing dermoscope-guided surgical procedures.[16]

2. Get yourself prepared first

Dermoscopy in the hands of inadequately trained clinicians can be dangerous. False-positive interpretations may lead to further unnecessary and invasive procedures. False-negative interpretations might delay definitive treatment.[18]

Participate in courses and join online societies in dermoscopy. Most courses have a clinical component in the examination. If you pass the examination, buy a scope and start using it.

3. Purchase a scope showing both unpolarised and polarised views

Dermoscopes with cross-polarisation have two polarising filters installed at 90° to each other. They obscure light reflected from skin surfaces, thus allowing for subsurface evaluations of lesions down to the papillary dermis. However, unpolarised dermoscopy is useful to evaluate skin surfaces for diseases such as scabies or seborrhoeic keratosis. The two views complement each other.

The left-hand dermoscope in Figure 1 delivers polarised views only. The other two scopes deliver both polarised and unpolarised modes. All of these models deliver clear images. The wireless dermoscope with a tablet in Figure 2 gives a live dermoscopic view of the lesion with image quality that is very near to the best in the present state of technology.

4. Maintain your equipment regularly and meticulously

Keep your hardware clean and fresh. Weak batteries, blurry lenses, opaque tissues, tissues with debris, blood and pus can obscure a good evaluation.

5. Seek consent

For medical procedures such as venepuncture, implicit consent is probably adequate as patients know what the procedure involves. However, many patients are unaware of the indications and limitations of dermoscopy. Informed oral consent usually

Figure 1. The dermoscope on the left delivers polarised non-contact dermoscopy only. The ones in the middle and the right deliver both polarised and unpolarised views with close-contact and non-contact dermoscopy. All provide clear images adequate for making clinical decisions by trained clinicians.

Figure 2. A wireless dermoscope (right) with a tablet computer. The qualities of unpolarised and polarised images are nearly unsurpassed in the present state of technology. Under expert hands, captured images may be publishable. The lesion shown is a reticular melanocytic naevus in active growth. It is symmetrical longitudinally. No clinical intervention is necessary.

suffices. For children and adolescents, Gillick competence[18,22] should be adequate.

6. Use contact and close non-contact dermoscopy

We pragmatically define *close non-contact dermoscopy* as dermoscopy, with the distance between the probe and the lesion being ≤3 cm. This requires stability of the lesion and your scope, but usually yields clear views. The dermoscope in the left of Figure 1*a* is designed for non-contact dermoscopy. All the scopes in Figures 1 and 2 allow for both.

7. Maintain a sterile field

For contact dermoscopy, we need protection not only from bacteria and fungi, but also from viruses such as extragenital variants of human papillomaviruses.[23] Simple sanitation measures such as applying alcohol swabs are therefore inadequate. We recommend placing a disposable glass slide between the probe and the skin.[24] Take extra care to prevent the sides of the slide from injuring the skin. Otherwise the vasculature will be attenuated.

8. Know one algorithm, and know it well

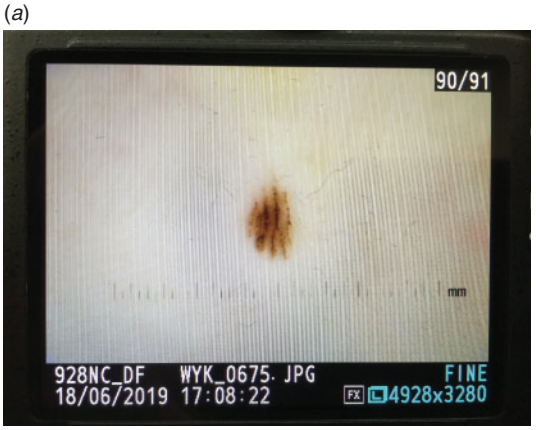
Multiple algorithms have been established and validated for the dermoscopic evaluation of skin cancers. Become familiar with them, but choose one that works for you. We advocate the *Chaos and Clues Algorithm* established and validated by Clues Algorithm[25–27] because this approach is simple, easy to learn and evidence-based. It is applicable to all pigmented skin lesions. The results will indicate whether a biopsy is required.

However, this algorithm does not provide an exact diagnosis. If you can ascertain if the lesion is a seborrhoeic keratosis, you can override the algorithm.[25–27] For adults, if a lesion is changing, nodular or with grey circles seen on the head and neck, we would excise and not apply the algorithm. If the pigmentation is patterned as parallel lines on the ridges of acral regions (palms and soles), we also recommend excision.

Your clinical experience and common sense are invaluable. If your clinical diagnosis is

Figure 3. (a) *An image of one camera shooting the back panel of another camera. A polarised dermoscopic image capturing a melanocytic lesion on acral skin (the soles here) is seen. Analysing and demonstrating such to the patient could be challenging.* (b) *In-camera digital magnification of the image in* (a). *The image is much more easily interpreted and explained to the patient than using* (a). *The narrower vertical strips represent the furrows (A). The wider vertical strips are the ridges (B). The eccrine sweat pores are seen on the ridges (C). The parallel hyperpigmentations are seen in the furrows (D). The lesion is symmetric in pattern and colours, and is compatible with a melanocytic naevus. Melanoma should be considered if the parallel hyperpigmentations are seen on the ridges.*

(*a*)



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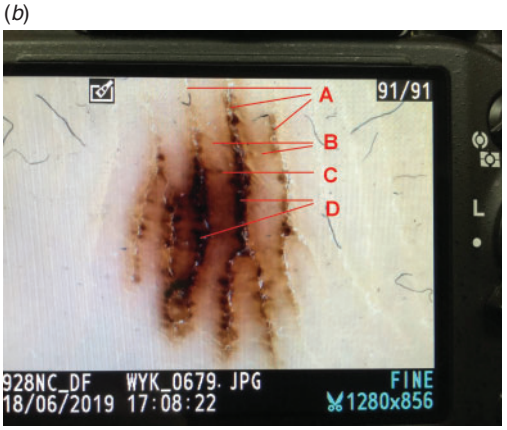


incompatible with the outcome suggested by the algorithm, apply other algorithms. For indeterminate lesions, it is best to biopsy.

9. Understand the rules for special regions

Apart from the trunk and limbs, there are special rules for interpreting dermoscopic images from the scalp, face, acral regions, nails, genitalia and mucosal surfaces. Understand these rules. You may later find that interpreting dermoscopic images from these special regions is actually *easier* than interpreting trunk and limb lesions.

Recommendations for primary care physicians already applying dermoscopy

10. Establish a platform for storing and retrieving images

Backup your clinical and dermoscopic images regularly, if not concomitantly. Your computer should allow you to retrieve images according to the dates and times the images were taken. You can then locate the clinical photos by the dates and times from your clinical records; the additional image files are your dermoscopic images for the same patient.

11. Shoot as raw files and keep these files

Always retain the original uncompressed images. This is important clinically and for medical–legal reasons. This is analogous to 'strikethrough', striking through wrongly written words in the clinical records, with the original words still being readable.

12. Apply high magnifications and other in-camera augmentations

Apply the highest magnification possible. Figure 3*a* is a camera shooting the back of another camera. A polarised dermoscopic image capturing a melanocytic lesion on the sole is seen. Figure 3*b* shows this image being magnified. The image is clearer, and interpretation is easier.

Apply other in-camera improvisations such as adjustments of contrast, hue and colour saturations. In experienced hands, augmented images can be much more easily interpreted.

13. Show augmented images to patients and their families

Whenever feasible, show augmented dermoscopic images to patients and their families. This will help them develop deeper understanding regarding the diseases and the treatment options.[18]

Figure 4. (a) *Dermoscopic image on the scalp of a girl with trichotillomania diagnosed clinically. The mother found it difficult to accept our diagnosis.* (b) *An augmented and annotated view of* (a)*. Comparison with other dermoscopic images confirmed the asymmetry of hair loss. Kinking and broken hairs at variable stages of hair growth are obvious (circled in red). An inflammatory background is present. No exclamation mark is seen. The mother thus accepted our diagnosis. These represent virtually pathognomonic dermoscopic evidence of trichotillomania (apart from* trichotillomania-by-proxy *as one of the manifestations of Munchausen Syndrome-by-proxy).*

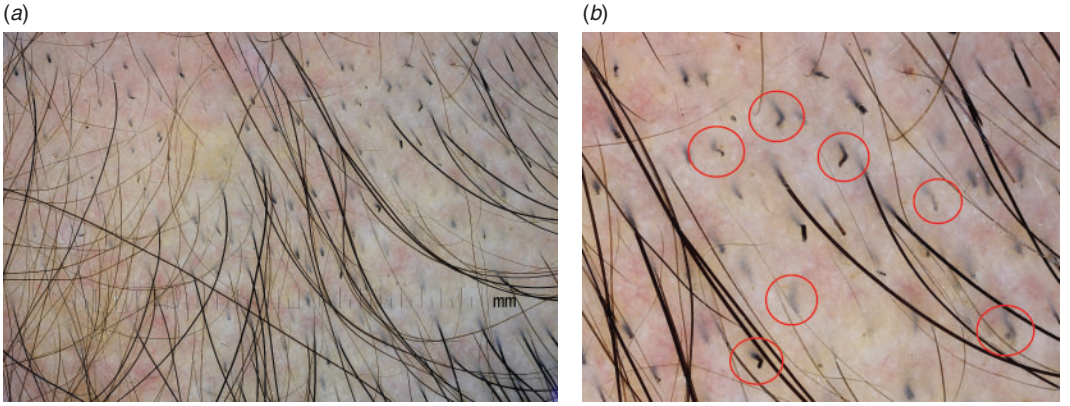
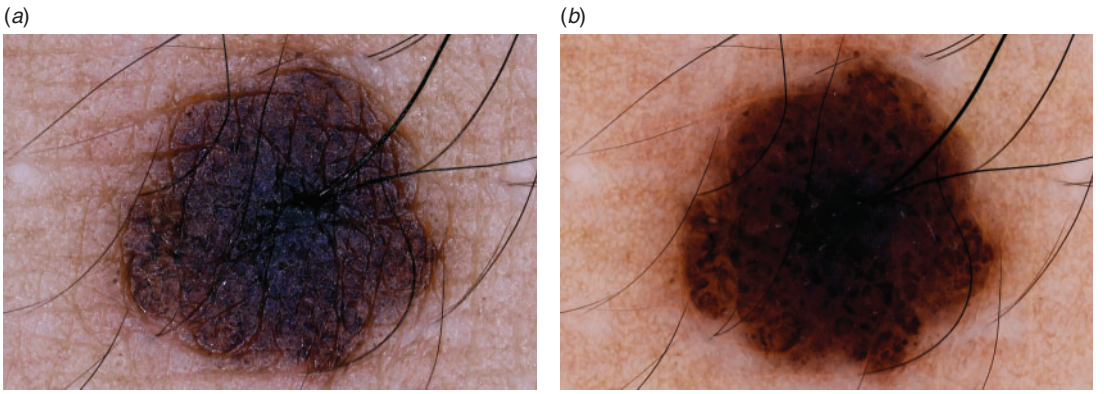


Figure 5. (a) *Dermoscopic image with no cross-polarisation for a globular melanocytic naevus.* (b) *Dermoscopic image with cross-polarisation for the naevus at the same position and magnification as* (a)*. Viewing* (a) *and* (b) *alternating at around one frame per second* (toggling) *would leave the clinician an enhanced impression for the three-dimensional architecture and parameters of the lesion.*



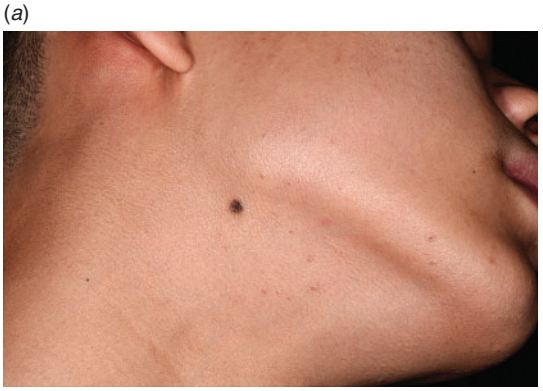
One example was a girl with a clinical diagnosis of trichotillomania. Despite detailed discussions, her mother found it difficult to accept the diagnosis. We captured polarised dermoscopic images, such as Figure 4*a*, where the features of trichotillomania are not obvious. When shown augmented images such as Figure 4*b*, with broken and kinking hairs at variable stages of hair growth, and an inflammatory background, but with no exclamation mark, the mother accepted our diagnosis. We then referred the girl for psychiatric assessments and kept providing primary care longitudinally for the family.

14. Practise toggling

Toggling means viewing dermoscopic images taken in the same position and magnification with and without cross-polarisation alternatively and repeatedly at one or two frames per second (Figure 5*a, b*).[18] Some clinicians find that this manoeuvre enhances their conceptualisation of

Figure 6. (a) *A pigmented lesion just inferior to the right mandibular angle. Focusing via our usual dermoscope failed, owing to the lesion being in a concave region of the body.* (b) *Application of another dermoscope with a smaller probe led to this polarised image of sufficient quality for making a diagnosis of globular melanocytic naevus with full symmetry for patterns and colours.*

(*a*)



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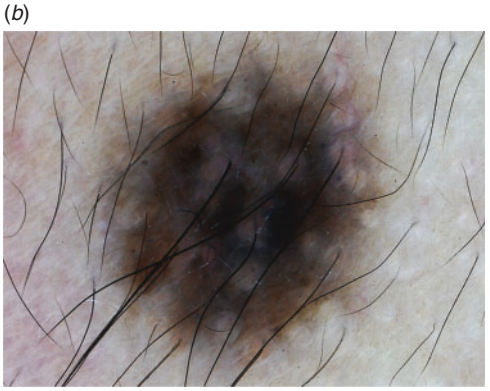


the three-dimensional architecture of lesions, thus facilitating diagnosis and plans for surgical procedures.

15. Use dermoscopes with small probes for obscured lesions and creases

Skin lesions in hair-bearing and concave areas such as interdigital sites and skin creases may not allow for proper focusing. In such sites, apply dermoscopes with small probes, such as the one in Figure 2. Figures 6*a* and 6*b* demonstrate the results.

16. Use far, non-contact dermoscopy

For lesions in skin creases, far (>3 cm), non-contact dermoscopy is another option, although minute movements of the patient or dermoscope will jeopardise the focus. Patients might therefore need to be lying down on an examination couch. The dermoscope would be secured by stands and clamps vertically and directly above the lesion, with the probe heading down. Far, non-contact dermoscopy is mandatory for performing dermoscope-guided surgical procedures.[13–16]

17. Manipulate the skin before and during dermoscopy

Stretching and contracting the skin may offer improved images for cysts, mucin-containing basal cell carcinomas, and vascular lesions. Compression of vascular lesions can help to distinguish vasculitis from simple telangiectasias. Better margin identification can also be discerned.

18. Practise selective dermoscopy appropriately

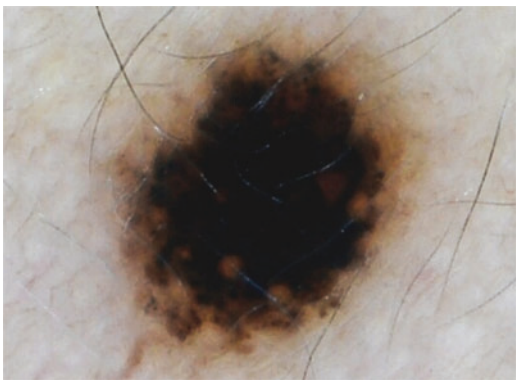
Acquired melanocytic naevi on an adult usually look alike. We can call them *signature naev*i (Figures 7*a* and 7*b*). For experienced clinicians, selective dermoscopy prevents unnecessary biopsies, particularly for patients with multiple atypical naevi.[28] This assists in identifying a worrisome lesion – the *ugly duckling* (such as Figure 7*c*).

19. Be aware of compound lesions

Figures 8*a* and 8*b* depict a melanocytic naevus on the face. The pattern is a *pseudo-network*, meaning that the pigmentation spares holes for small and dense hair follicles on the face. A viral wart, as multiple chambers with blood vessels seen inside, is extending from the right upper part to the centre of the naevus. This is therefore a compound lesion with two skin diseases bearing different aetiologies, presentations and management options. Look out for these multiple lesions in numerous combinations.

Figure 7. (a–c) *Most melanocytic naevi on one adult are usually similar. Both* (a) *and* (b) *are similar with peripheral globules. The naevus in* (c) *comes from for the same patient, with a peripheral network seen. This might thus be an* ugly duckling. *Fortunately, full symmetry in patterns and colours is seen, and biopsy is unnecessary.*

(*a*)



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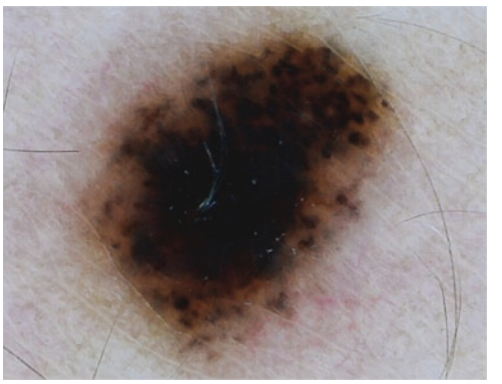


(*c*)

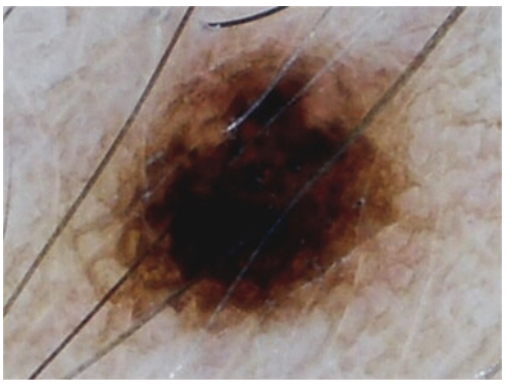
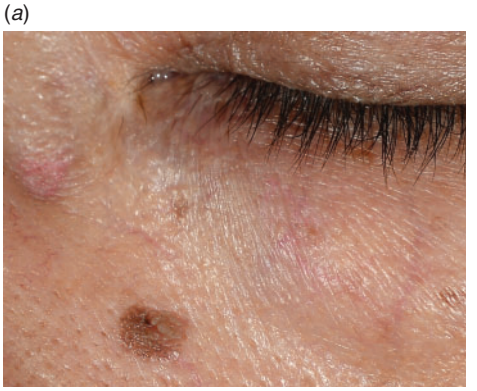


Figure 8. (a) *A melanocytic naevus inferior to the medial canthus of the left eye.* (b) *Polarised dermoscopic image of the lesion in* (a). *A pseudo-hyperpigmented network (commonly seen for lentigines and naevi on the face) is present. A warty growth is radiating from the right superior aspect of the naevus. This multi-pathological lesion might be missed by a casual examination of the facial skin.*

(*a*)



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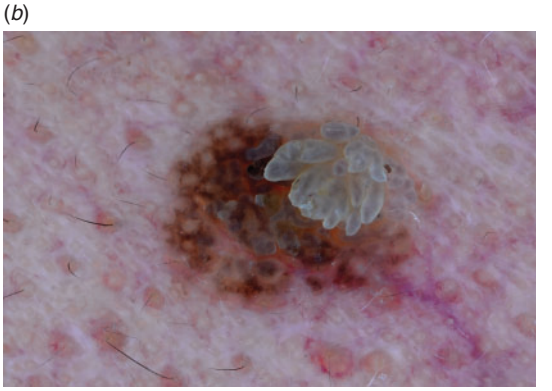


Recommendations for primary care physicians in academic practice with dermatology and dermoscopy as special interests

20. Use the best dermoscope models available

For taking publishable dermoscopic images, we suggest camera-lens-like dermoscopes (left, Figure 9).

21. Assemble separate sets of hardware for clinical photography and dermoscopy

For clinicians performing dermoscopy frequently, we recommend having two camera bodies – one for clinical photography (right, Figure 9) and the other for dermoscopy (left, Figure 9). This saves precious time otherwise spent on switching lenses, mounting adapters and other equipment, and modifying settings in the camera bodies. The risk of dust and fungal collection inside the cameras is also minimised.

22. Obtain written consent from patients for potentially publishable images

For all clinical and dermoscopic images with a possibility of future publication, especially images on the face or external genitalia, informed consent – preferably written – is necessary. For images of children and adolescents, we strongly advocate seeking informed written consent from the parents or legal guardians.

23. Apply magnification to the extremes

Dermatopathologists talk about 'nests' of melanocytes but what is a *nest*? Figure 10 demonstrates a polarised dermoscopic image for a lentigine on the scrotal wall. Each pigmented spot denotes one nest of melanocytes. Dermoscopic features of skin diseases seen in this order of magnification – if clinically significant – provide ample opportunities for clinical research.

Figure 9. Probably the best set of apparatus for clinical photography and dermoscopy in the present state of technology. Accessories such as lighting systems are not included. We have on the right a high-grade single lens reflex camera with fixed autofocus 105 mm 1:2.8 macro lens, with a set of wireless commander *(attached to the hot shoe) and remote flashlights attached to the right and left aspects of the lens. A circular filter is applied. On the left is the same camera body with a lens-shaped dermoscope mounted. A cable transmits the signal from the hot shoe to the dermoscope, leading to alternating captures of images with and without cross-polarisation upon each shutter release. The quality of images can be up to publishable standards.*

Figure 10. Polarised dermoscopy with extremely high magnification (~100×) captured images of lentigines on the scrotal wall. One spot represents one nest *of proliferating melanocytes. Many clinically significant dermoscopic features at such orders of magnification are likely not to have been published yet.*

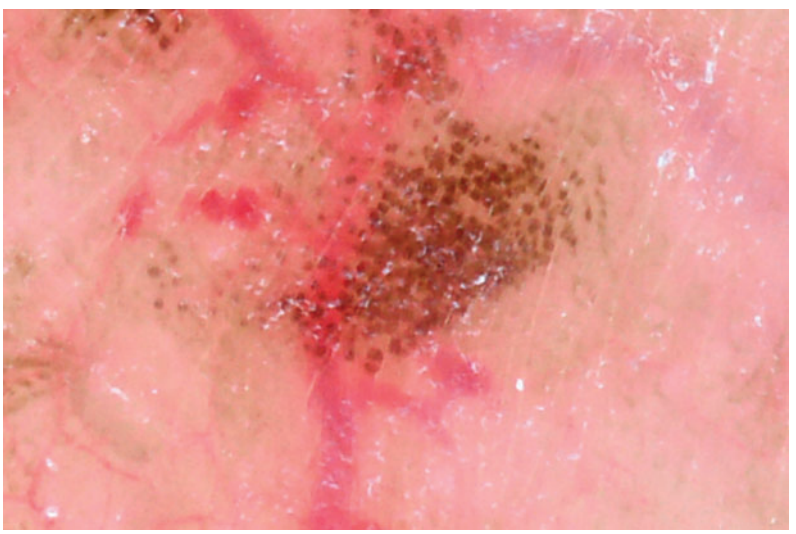
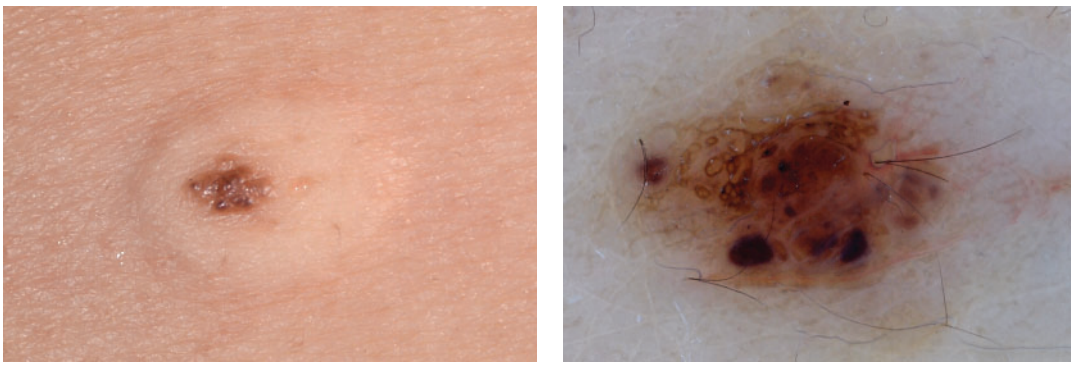


Figure 11. (a) *A melanocytic naevus with chaos to be excised for histopathology. Upon the administration of perilesional local anaesthesia, the lesion was lifted up.* (b) *Very clear polarised dermoscopic image taken immediately after local anaesthesia of the lesion in* (a).

(*a*) (*b*)



24. Apply dermoscopy after local anaesthesia

Take dermoscopic images immediately after the application of intralesional or perilesional anaesthesia. This can offer diagnostic clues of depth and vascular patterns.

Owing to the asymmetry of patterns and colours,[25–27] we decided to biopsy a melanocytic naevus. We applied perilesional anaesthesia, and the lesion 'floated' above the deeper tissues but was still attached (Figure 11*a*). The dermoscopic image (Figure 11*b*) is crisp and sharp, and of publishable quality.

Obviously, this could only be done after the decision to biopsy has been made. The value of this manoeuvre is that the architecture and parameters of lesions are more clearly perceived by clinicians before the surgery.

25. Augment, annotate and send a message

Figure 12*a* is a polarised dermoscopic image from a lesion of a patient with alopecia areata. Nothing is missing but a message. We magnified, cropped, augmented and annotated, resulting in Figure 12*b*. The message of exclamation marks is thus lucid beyond words.

Discussion

Skin cancer is globally on the rise. Early detection is a challenge, even in countries that have health-care systems with adequate economic resources and medical staff.[29] Campaigns to raise awareness and foster prevention have been ongoing for more than a decade.[30,31] Due to its superficial growth and natural course in preclinical stages, skin cancer is highly amenable to screening interventions with potential economical and health benefits.[32,33]

In many health-care systems, primary care physicians play an important role as the first contact person and a gatekeeper. They are usually aware of skin cancer risk factors such as family history and sun exposure, so they play a key role in the early detection of skin cancer.

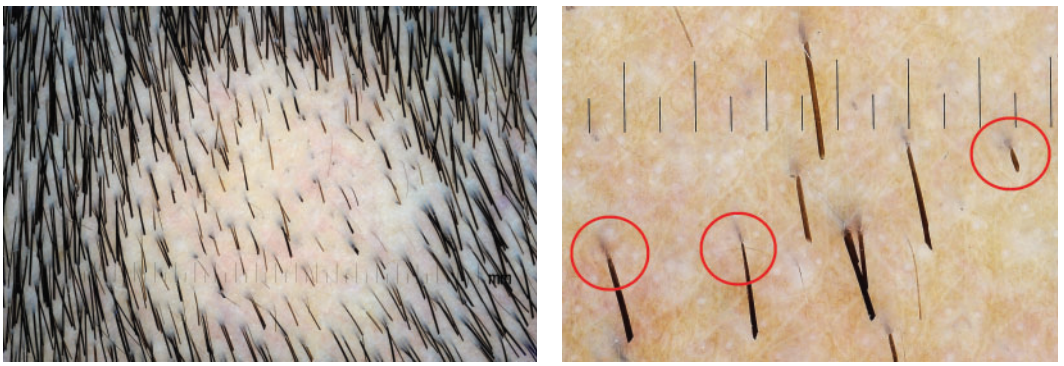
In a survey of 500 primary care clinicians,[17] 44.4% felt unsure in detecting potentially malignant lesions, and slightly more declared that they would refer all patients with suspicious skin lesions to dermatologists. In some health-care systems, the time-lags in referral actions are long. These delays can adversely affect prognoses.[18]

In contrast, as many as 79% of primary care practitioners expressed the wish for training in the early detection of skin cancer.[17] We thus advocate for more resources to train these clinicians in applying dermoscopy.

The 25 recommendations above are the results of our decades of experience performing dermoscopy in a wide range of clinical settings and in multiple parts of the world. Each one may not be applicable to all clinicians. An example is toggling – we

Figure 12. (a) *Dermoscopic image of an adolescent with alopecia areata. The figure is of high quality. However, there exists no message.* (b) *An augmented view of* (a)*. The steps are: (1) locate a suitable site; (2) magnify (crop) digitally; (3) adjust the brightness, contrast, hue and colour saturation; and (4) annotate with red circles. The message of hairs becoming thinner and thinner becomes clear. Atrophy of skin and skin appendages are seen. There is no background inflammation.*

(*a*) (*b*)



witnessed many clinicians performing such a manoeuvre frequently, while other clinicians found it to be of no impact at all both during the formations of clinical diagnoses and before biopsy. Yet, we would like to share our experience so that more investigators might report their experiences.

To the best of our knowledge, each of these 25 pieces of advice is our original idea or exemplification out of common sense, except for toggling, skin manipulation, selective dermoscopy, signature naevi and ugly ducklings. The toggling and skin manipulation are well-accepted practices. Unfortunately, despite an exhaustive search, we have not been able to find the original publications concerned; however, selective dermoscopy, signature naevi and ugly ducklings have been reported.[3,28]

Clinical medicine embraces the virtues of science, technology, art and craft. We believe that craftsmanship plays a predominate part in dermoscopy. Where possible, we substantiate some of the recommendations by dermoscopic images. As to the usefulness of some of our advice, only time can tell.

We thus conclude that our recommendations may enhance the diagnostic accuracy made by primary care physicians when confronted by skin cancer and other skin diseases. Taking into account the prominent role of primary care in most healthcare systems, we believe that these recommendations might facilitate the early diagnosis of skin cancer and other skin diseases in many parts of the world.

Competing interests

Apart from such sponsorship, we received no other benefit – financial or otherwise – from these two manufacturers (Dermlite, 3Gen Inc. San Juan Capistrano, CA, USA; and Firefly Global, Belmont, MA, USA). We strongly recommend readers to consider obtaining dermoscopes from all manufacturers, not only from these two brands.

Acknowledgements

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