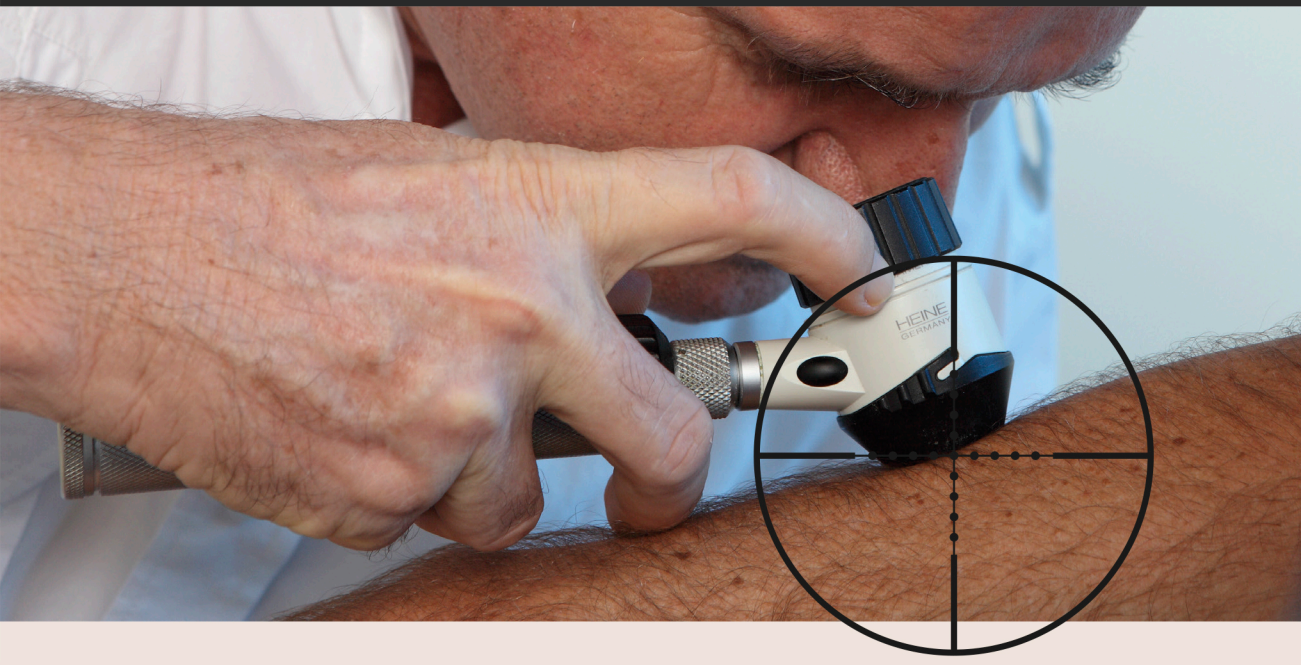
DERMATOSCOPY AND SKIN CANCER

A HANDBOOK FOR HUNTERS OF SKIN CANCER AND MELANOMA



CLIFF ROSENDAHL and AKSANA MAROZAVA

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Preface

Fifty years ago when I entered my first year of medical studies in 1969, the same year that Neil Armstrong stepped onto the moon, dermatoscopy as we know it was science fiction. Much has changed. Dermatoscopy is now standard of care in the management of skin cancer and melanoma.

My interest in this novel science became focused after a family member, Graham, developed metastatic melanoma. Graham did not blame the GP who dismissed a lesion of concern on his thigh a couple of years earlier, and he made the point to me that GPs were not prepared for this challenge in their training, a challenge that was thrust on them due to a rising incidence of melanoma and an inexplicable shortage of dermatologists in Australia. Graham's GP looked after him well. Right up to the moment of his death, a death which was predictably terrible, aggravated by multi-organ metastases and finally necrotising fasciitis.

My journey since then, commencing with a PhD expertly supervised by David Wilkinson and Peter Soyer and focused on improving skin cancer management in Australia, has been a very steep learning curve. I have been mentored by men of undoubted genius: Harald Kittler and David Weedon, men whose genius was only matched by their generosity. I have been assisted by exceptional colleagues: Ian McColl, Iris Zalaudek, Alan Cameron, Jeff Keir, Greg Canning, Phil Tschandl, Agata Bulinska, Simon Clark and Nisa Akay. I am particularly grateful to Harald Kittler, Stephen Hayes and Jeff Keir for their critical review of the book and to Simon Clark for reviewing and correcting the dermatopathology chapter.

This book would never have been possible without my co-author Aksana Marozava. Aksana worked with me for two years, taught me how to do a skin examination and dispelled any delusions of grandeur by repeatedly discovering significant lesions I had passed over. Her diligence and skill in collating my image collection for the book and preparing all of the graphics has hopefully made this book the masterpiece we wanted to produce.

The hunting metaphor is no accident. Hunting and gathering (Aksana insists that she is a gatherer) are as natural to *Homo sapiens* as is falling in love. The romance and thrill of the hunt elevates what we do to more than the drudgery of repetitive work, and the satisfaction of every success motivates further effort.

Finally, I am indebted to my wife Debbie for putting up with me through this journey and for effectively managing our practice and business affairs so I could focus on hunting, research, teaching and writing.

To conclude, I quote Vice Admiral Horatio Nelson, hunter extraordinaire, speaking at the battle of Copenhagen in 1801:

"It is warm work; and this day may be the last to any of us at a moment. But mark you! I would not be elsewhere for thousands".

Cliff Rosendahl
Brisbane March 2019

Foreword

This new book is an important step forward in the developing art and science of dermatoscopy for skin lesion recognition. The debate as to whether the technique is any good is surely over, but more help as to how to best do it, and (vitally) to best teach it, is most welcome.

Over the last decade or so, Cliff Rosendahl, and more recently Aksana Marozava, have documented some 19,000 excised skin lesions in Cliff's clinic in Capalaba, Brisbane, and fed the data into the SCARD online database which he set up with Tobias Wilson. This book summarises the knowledge gained from the analysis of that histopathological data and the lesion images, plain and dermatoscopic. The sheer scale of the data behind this book gives it an authority that can't be ignored.

The book is built around two algorithms, 'Chaos and Clues' and 'Prediction without Pigment' which, as explained, may not always lead to a diagnosis, but to a safe decision as to whether excision is required. The selected colour images illustrate well the dermatoscopic features and terms set out in the text.

Cliff is fully committed to revised pattern analysis and the use of what he calls objective geometric terminology to describe dermatoscopic structures, building on the 'descriptive' terminology often associated with co-worker Harald Kittler of Vienna. There are no 'arborising' vessels here (if vessels are 'tree like', then what sort of tree?) but branched serpentine (admittedly, 'serpentine', i.e. snake-like, is still a metaphor, but a much more consistent one than tree-like). And it is further explained that the apparent sharp focus of such vessels in BCC is due to the superficial cutaneous vascular plexus being clarified by the translucent BCC stroma, rather than that vessel morphology being unique to BCC.

There is more basic science here than is usual in a book aimed at beginners, but the extra effort put into appreciating the embryology, anatomy and histopathology pays rewards, particularly with regard to dermatoscopic–pathological correlation. Recognising structures like blue clods and polarising-specific white lines is good, but understanding what they mean at the microanatomical level gives insight into the modus operandi of the target of the hunt: malignant tissue.

More recently described signs such as white circles in early invasive SCC and angulated lines and polygons in melanoma *in situ* are detailed. I have witnessed Cliff working in his clinic and I can say that the author has a zero tolerance approach to such lesions, with approximately 80% of the melanomas diagnosed in his clinic being pre-invasive.

Dermatoscopy and Skin Cancer is a more challenging read than some earlier textbooks on this subject, but builds on hard-won, audit-backed knowledge to take us to the next level of advanced pattern analysis. It can be commended to the beginner/improver and indeed expert, who is willing to put in some work to embrace the latest evidence-based approach and terminology, which seems likely to supersede the earlier algorithms based on metaphorical language. This may mean some effort for those of us who learned dermoscopy/dermatoscopy with terms like maple leaf, arborising, comedo-like, ovoid nests, etc., but the new approach makes sense

if for no other reasons than the need for translation and utility for international research, for dermatoscopy is now highly globalised.

Dr Stephen Hayes
Independent dermatoscopy educator
Associate Specialist in Dermatology, University Hospital Southampton
UK board member, International Dermoscopy Society

Abbreviations

AK	actinic keratosis
BCC	basal cell carcinoma
DF	dermatofibroma
DOPA	dihydroxyphenylalanine
EFG	elevated, firm and continuously growing
H&E	haematoxylin and eosin
KA	keratoacanthoma
LN	lymph nodes
LPLK	lichen planus-like keratosis
MHC	major histocompatibility complex
Naevus	melanocytic naevus
NMSC	non-melanoma skin cancer
PAM	primary acquired melanosis
pBCC	pigmented basal cell carcinoma
pIEC	pigmented intraepidermal carcinoma
pSCC	pigmented squamous cell carcinoma
RPA	revised pattern analysis
RPE	retinal pigmented epithelial
RR	relative risk
SCARD	skin cancer audit research database
SCC	squamous cell carcinoma
UV	ultraviolet

CHAPTER 1

Introduction to dermatoscopy

1.1 Why use a dermatoscope?

"Melanoma writes its message on the skin with its own ink and it is there for all to see. Unfortunately, some see but do not comprehend."

Neville Davis; Modern concepts of melanoma and its management; *Annals of Plastic Surgery*, 1978

Since Neville Davis made this statement the advent of dermatoscopy has facilitated earlier diagnosis of melanoma, as well as enhancing diagnostic accuracy for many dermatological conditions both benign and malignant[1]. The handheld dermatoscope is a recent innovation, having first become available in 1987, but there has been a rapid proliferation of research commensurate with the utility and efficacy of this relatively inexpensive instrument. Studies have demonstrated that dermatoscopy improves diagnostic accuracy for pigmented skin malignancies, both melanocytic[2] (naevus and melanoma) and non-melanocytic[3] (basal cell carcinoma (BCC) and squamous cell carcinoma (SCC)), to the extent that it is now standard of care in Australasia for any clinician treating pigmented skin lesions[4]. It has now also been shown that dermatoscopy improves diagnostic accuracy for non-pigmented skin lesions[5] and it is also being increasingly applied to the diagnosis of many inflammatory skin conditions. Not only is dermatoscopy useful for the diagnosis of skin conditions, but it has also been shown to be effective for application in skin cancer surgery, where surgical margins are significantly more likely to be adequate when dermatoscopy is utilised at preoperative marking[6]. The dermatoscope is an essential tool for dermatologists and, with skin conditions accounting for up to 14.8% of all consultations in general practice[7], there is a compelling argument that it is as applicable for general practitioners (GPs) as the stethoscope (*Figure 1.1*)[8].

1.1.1 The economic impact of dermatoscopy

An American study in 2016 found that the economic costs avoided by diagnosing melanoma 6 months earlier justified over 100 (170 when loss of earnings was considered) benign biopsies[9]. Anything that achieves the same rate of diagnosis and therefore prevention of delayed diagnosis, with greater specificity, will achieve these savings with a smaller investment.

An Australian primary care-based study found that generalist GPs performed 17 benign biopsies for each melanoma treated, whereas GPs subspecialised in skin cancer practice, who also had a high use of dermatoscopy, discovered one melanoma for every 8.5 biopsies[10]. This suggests that with respect to the management of melanoma alone, derma-

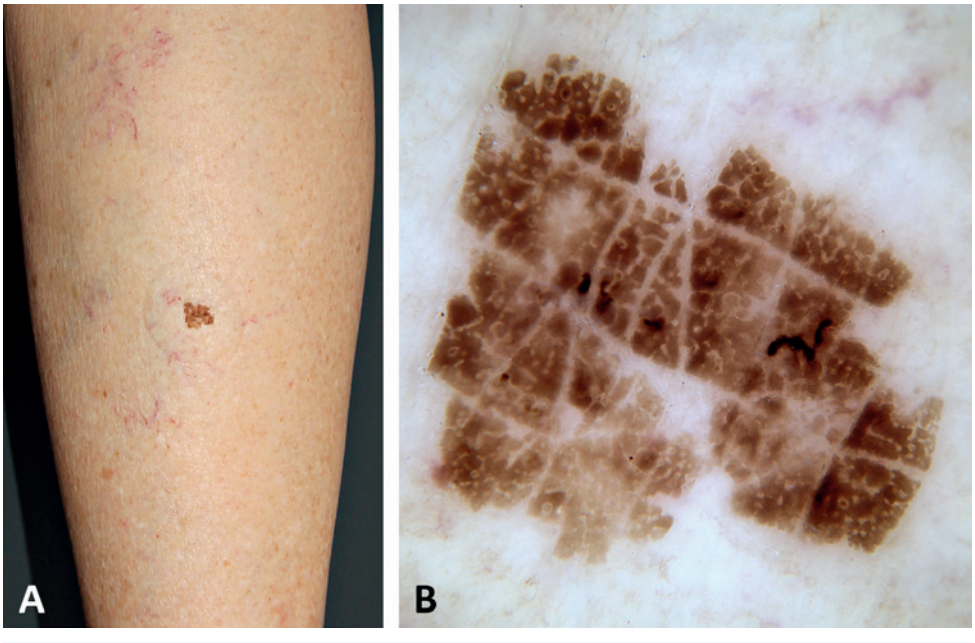

Figure 1.1: *Clinically (A) this irregular pigmented lesion is suspicious for malignancy, but dermatoscopically (B) it has the unequivocal morphology of a seborrhoeic keratosis (see Figure 9.80).*

toscopy could result in economic savings by earlier detection with fewer unnecessary excisions.

It is not unusual in current dermatology and primary care practice for a biopsy to precede many therapeutic surgical procedures for both pigmented and non-pigmented lesions. While suspected melanomas should have an initial excisional biopsy, we have found that with the advent of dermatoscopy and increased diagnostic confidence, a preliminary partial biopsy procedure is not necessary for the majority of suspected non-melanoma skin cancers (NMSC). Unpublished raw data from the skin cancer audit research database (SCARD) gives a snapshot of current practice in Australasia of 848 primary care doctors, either practising in dedicated skin cancer practices or in general practices with a special interest in skin cancer. Of 429,010 specimens of NMSC treated surgically, 316,339 (73.73%) were managed in a 1-step approach, without a preceding biopsy[11]. This suggests that a proportion of primary care doctors are already managing NMSC through a 1-step process in the majority of cases.

There are many advantages of proceeding directly to curative surgical management following a confident dermatoscopic diagnosis. These include the fact that margins are more likely to be more clearly definable without the inflammation that is expected after a partial biopsy. A single procedure is more convenient for the patient and, when the costs of one rather than two surgical episodes and dermatopathological assessments are considered, the economic saving is approximately 50%.

1.2 What is a dermatoscope?

A dermatoscope is essentially a magnifying glass which eliminates surface reflection from the skin by using either a fluid interface (non-polarising contact dermatoscopes) or polarising filters (polarising contact or non-contact dermatoscopes) (*Figure 1.2*). This

allows pigmented structures to be seen to the level of the deep dermis, up to 1mm into the skin, as well as blood vessels in the dermis when they are not obscured by pigment. A built-in light source allows the device to be used as a compact handheld instrument. Even the early dermatoscopes provided adequate visual information but initial studies were burdened by the need for expensive film photography. The advent of new dermatoscopes with even brighter optics, as well as with the option of polarised light sources, was paralleled by the availability of digital photography. This has facilitated the convenient forwarding of captured images for purposes including research and teledermatoscopy.

Although polarising dermatoscopes can be used without interface fluid, visualisation of structures can be improved with fluid and all the images displayed in this book are taken with fluid immersion, whether the dermatoscope was in polarised mode or not. Initially the interface fluid of choice was oil but that is rarely used now. Alcohol-based fluids (70% ethanol in water, isopropanol in water or alcohol hand gel) are just as effective and have the advantage of having an antiseptic effect as well as of drying very quickly. Ultrasound gel is useful with thicker lesions such as keratoacanthoma (KA) or when examining complex curved surfaces such as the nail unit. Even the use of a sterile alcohol wipe can be effective. Whatever fluid is used should be wiped from the dermatoscope footplate after use for hygienic purposes as well as to protect the footplate from a build-up of residue.

It has been claimed that polarised dermatoscopy provides a superior view of vessel structures – we have found that to be related to footplate pressure rather than to polarisation. Of course, when polarised dermatoscopes are used in non-contact mode vessels will not be compressed. The same can be achieved in contact mode with non-polarised or polarised dermatoscopy if less footplate pressure is applied to the lesion. Sometimes the use of thicker contact fluid such as hand gel or ultrasound gel may facilitate this.

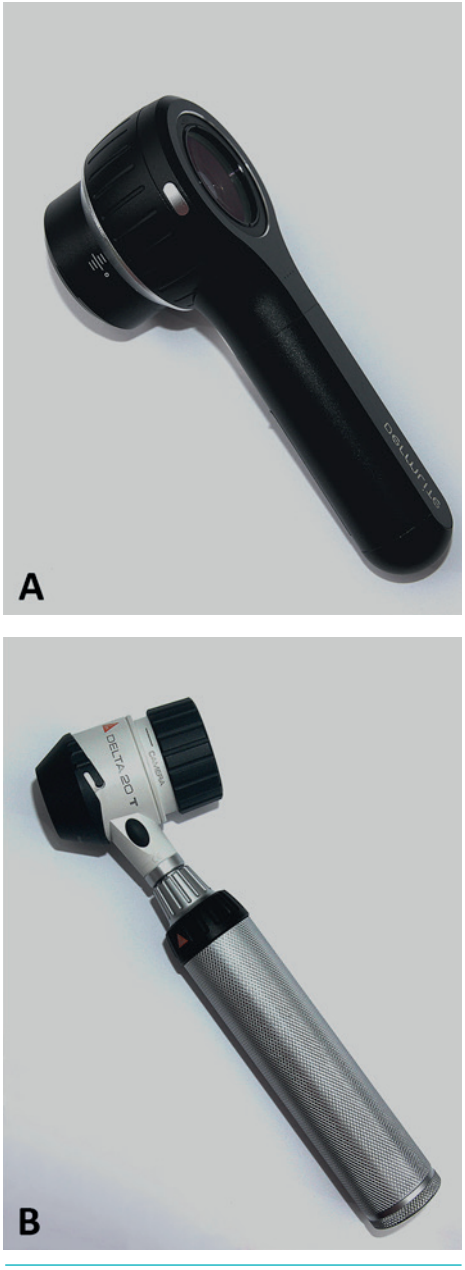

Figure 1.2: *Dermatoscopes are available from a variety of companies. (A) The DermLite DL4 (3Gen) and (B) the Heine delta 20T (Heine Corporation) both default to polarised mode but can easily be switched to non-polarised mode.*

Melanin

The main pigment influencing the colour of fair skin is haem. In people with darker skin