Diagnostic Dermoscopy
The Illustrated Guide

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Dermoscopic diagnosis – at a glance
Dermoscopy has been proven to improve diagnostic accuracy of dermatological lesions. This practical textbook – based on a road-tested training program in dermoscopy – introduces you to the basics of dermoscopy. Easy-to-view icons show the dermoscopic features of lesions. These are compared throughout the book with actual dermoscopic and clinical images to show the lesion in practice. Take a look at the example below.

The identification of global and local features of skin lesions through the dermoscope will help you incorporate dermoscopy into your everyday practice. The simple but effective visual approach to pattern recognition will enable you to teach yourself and your colleagues the power of dermoscopy.

Covering melanocytic lesions, melanomas, non-melanocytic lesions, special sites and general dermatological lesions, Diagnostic Dermoscopy gives you:

A guide to choosing and using the dermoscope most suited to your needs
An introduction to the dermoscopic alphabet
A visual guide to the global features of dermatological disease through the dermoscope
A more detailed look at the local structure of skin lesions for more accurate diagnosis

This proven approach to learning the language and skills of dermoscopy will enable you, as a dermatologist, plastic surgeon, family practitioner or dermatological nurse, to improve your diagnostic accuracy and clinical efficiency.

Further information on dermoscopy education including online courses can be found at www.dermoscopy.co.uk

Titles of related interest
Handbook of Dermatology: A Practical Manual
Dermatopathology: Diagnosis by First Impression
British Association of Dermatologists’ Management Guidelines

www.wiley.com/go/dermatology
Diagnostic Dermoscopy
This book is dedicated to Annabel, Daisy, Ted, Tabitha and Poppy. Two were there at the start, more arrived in the middle, and all were present and happy for the end of the book.
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Preface

Skin is a dynamic canvas upon which life paints its picture. Each individual has a unique ‘picture’ reflecting his or her age, skin phototype and UV exposure, as well as genetic and acquired influences. However, unlike a canvas hanging on the wall, this ‘picture’ is not static; it is biologically active and therefore changes and evolves through life.

Benign naevi dominate childhood and adulthood; however, this dominance is gradually replaced by seborrhoeic keratoses, which become more numerous later in life. Additionally, the accompanying increase in vascular lesions and potential for skin malignancy through life makes for a complex ‘picture’, rich in colours, shapes and textures.

To interpret the ‘picture’ accurately, one must understand not only the macro, the shape, size, colour and age of the canvas, but the micro, the brushstrokes used to create the detail in these patterns and colours. This micro detail is often obscured by light reflecting off the skin surface, which may explain why many different lesions look similar. By using dermoscopy, we can overcome this optical challenge, revealing the diagnostic detail within lesions – this is diagnostic dermoscopy.

Two important concepts are helpful in increasing diagnostic accuracy:

1. **Tumours grow – they do not appear.** We should therefore look for the diagnostic detail present in all lesions to find the small tumours.
2. **Tumours evolve – they are not static.** We should therefore accept that the detail seen may be influenced by many external and internal factors.

Increasing our understanding of the variety of ways in which tumours present will increase our diagnostic accuracy. This book therefore aims to illustrate the many ways in which different tumours present, complete with the diagnostic dermoscopic features to aid diagnosis.

Whenever possible, examples are shown for lesions that vary for size, shape, anatomical site, skin phototype and, when feasible, evolution with time. Hopefully, the diagnostic detail illustrated in this book will lead to improved skin lesion diagnosis and earlier diagnosis of skin cancer.

Since the introduction of dermoscopy into clinical practice in the 1990s, our understanding of this diagnostic technique has increased exponentially. Credit should be given to the dermoscopy pioneers, who reshaped the diagnostic world through research, education and innovation. Their endeavours have proven that dermoscopy is without doubt the gold standard in clinical diagnosis, a diagnostic technique practised in over 100 countries worldwide.

However, it is very important to remember that dermoscopy should not be practised in isolation. A clinical diagnosis is the summation of information gained from:

1. Clinical history
2. Clinical examination
3. Dermoscopic examination.

Diagnosis is in the detail; therefore, it is essential to combine all clinical skills and not use any in isolation. This book only provides information on one component of skin lesion diagnosis. We also know that tumours, especially melanoma, may take time to develop dermoscopic features, and may even mimic benign lesions. Additionally, in established tumours many dermoscopic features may be absent. Therefore, this book is aimed as a guide to be used in the clinical arena, to augment clinical decision-making and not to replace clinical judgement.

Jonathan Bowling

Further information and examples of conditions described in this book can be found at: www.dermoscopy.co.uk
1 Introduction to Dermoscopy

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Introduction

The ‘art’ of dermatological diagnosis is a complex process that requires many skills. If dermatologists were to be described in a single word, they would be ‘diagnosticians’; the ‘art’ of dermatological diagnosis requires all the skills of a physician in addition to the eyes of a hawk, for lesion diagnosis cannot be made by history alone.

Most lesions that from afar look indistinct become obviously benign or malign on closer inspection. However, there are plenty of lesions where close visual inspection is still not enough. How do we approach these lesions? Tools to aid diagnosis, such as the magnifying lens and bright light sources, can help or – failing that – a biopsy, whereby the diagnosis appears as a line on the histology report. However, simple adjustments to our clinical practice may be all that is required to improve our diagnostic ability.

To begin with, we should search for clues to diagnosis, the diagnostic detail in lesions, and not just rely upon rather crude data such as shape, size and colour for a diagnosis. Although these crude parameters are often all that is required for a diagnosis, relying solely upon them will limit your diagnostic accuracy. Imagine an art dealer investing in a painting based solely upon the shape, size, age and colour of the picture frame, without appreciating the detail in the brushstrokes of the canvas. These dermatological ‘brushstrokes’ are the morphological structures that comprise skin tumours, and unfortunately many of them are invisible to the naked eye.

Viewing the invisible world ...

Two barriers need to be overcome.

First, the rough surface of the stratum corneum causes light to scatter, reducing light penetration into the skin. This scattering of light impairs the view of the morphological structures hidden within a lesion. This can be illustrated by light reflecting off the surface of this rippled pool (a), distorting the detail seen of the tiles underneath. However, if the surface is calm (b), more light penetrates deeper into the pool before being reflected and greater detail can be seen:

This surface scattering of light can be overcome in the clinical arena by contact with the skin using an interface medium or by means of polarised light.

The second point to consider is magnification. The benefits of magnification to augment skin diagnosis have long been recognised. Although we believe our eyes to show all the detail required for diagnosis, the truth is that they are limited. To illustrate the point, the microprint in this banknote is invisible to the naked eye (c), but is clearly visible with magnification (d):
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The combination of increasing light penetration into a lesion and magnification is dermoscopy. Dermoscopy is now used in over a hundred countries worldwide, with unequivocal evidence to support its use in skin lesion diagnosis. The structures seen with dermoscopy equate to a histopathological correlate, and therefore an understanding of this relationship will help in diagnosis. Throughout this book, examples are provided to illustrate the spectrum of clinical presentation and the variability of morphological structures seen for any diagnosis.

**Instruments**

**Problem:** Why do most moles just look brown? The stratum corneum reflects light, reducing the ability to see detail of structures in the underlying skin. Thus most moles look brown, with relatively little detail. The detail exists; it is just not visible.

**Theory:** If we are able to overcome the refractive properties of the stratum corneum, greater detail in the underlying skin can be observed. This is the underlying concept upon which dermoscopy is based. This can be achieved by the simple application of an interface medium directly to the skin, such as alcohol gel. Any bright light source and magnification lens can then be used to see increased detail in the skin, including the morphological detail and pigment distribution within naevi. However, the use of gel and a simple magnifying lens is cumbersome and impractical when assessing multiple lesions.

**Solution:** Dermoscopy devices can simplify the previously described process by combining a bright illumination source and a strong magnification lens in one handheld device. Dermoscopy devices overcome the refractive properties of the stratum corneum either by the use of oil immersion with an interface medium such as alcohol gel or by cross-polarisation.

There are consequently three groups of devices:

- Oil immersion devices – which require contact with the skin and the use of an interface medium to reduce surface light scatter.
- Cross-polarised devices – which use cross-polarised light to reduce surface light scatter.
- Hybrid devices – which have the option to use either cross-polarised or oil immersion to reduce surface light scatter.

**Non-polarised devices (oil immersion/contact)**

Although a number of contact devices are currently available, the two main devices are the Heine Delta 20 and the DermLite II fluid. Both devices give a very bright image, although subtle optical differences between the two devices exist. The majority of images in this book have been taken with the Heine Delta 20.
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Polarised devices
The breakthrough in dermoscopy came with the introduction of the polarised devices. Now it was possible to examine multiple lesions with dermoscopy quickly, without the need to coat the patient in copious amounts of oil or interface fluid. The original DermLite devices, especially the DL100 — although groundbreaking when launched — were quickly surpassed in quality by newer DermLite devices making them less attractive as a device for clinical practice. The arrival of the DermLite II PRO HR saw a device at last able to compete with the established oil immersion devices, combining bright illumination with magnification to provide a very high quality image. The added versatility of non-contact enables multiple lesions to be quickly examined, making them the first choice device for many dermatologists.

Hybrid devices
Oil immersion and cross-polarisation devices differ in the images they produce, due to the refractive properties of morphological structures under polarising light. This has led to the development of devices that can produce images by both oil immersion and cross-polarisation. The first device to combine this increased functionality was the DermLite II Hybrid m. Although not as bright as either the Heine Delta 20 or the DermLite II PRO HR, it has nonetheless became a very popular device. However, the arrival of the brighter DermLite DL3 has effectively sealed the fate of the DermLite II Hybrid m, relegating it to the second division of hybrid devices. The DermLite DL3 has brighter imaging than the DermLite II PRO HR in the polarised mode and is comparable to the Heine Delta 20 in the non-polarised mode.

Which device is best?
The selection of a dermoscopy device is a personal choice, reflected by clinical practice. If the clinician is looking at one or a couple of lesions, then the device that delivers the best optical quality should be considered: this is currently the DermLite DL3, the DermLite II Fluid or the Heine Delta 20. If, however, the clinician is involved in screening multiple lesions, then a polarised device that allows quick visualisation of many lesions, such as the DermLite II PRO HR or the DermLite DL3, is the device to consider.
The Heine Delta 20 versus the DermLite II PRO HR

The DermLite range has the largest field of view of the standard dermoscopic devices, much more so than the Heine Delta 20:

Field-of-view measurement: (a) the Heine Delta 20 and (b) the DermLite II PRO HR that can have a clinical relevance if photographing a lesion that is more than 10 mm in size.

This 12 mm melanoma just fits into the field of view of the Heine Delta 20 (c), however, it is easily seen within the field of view of the DermLite II PRO HR (d).

Chrysalis structures

The polarising devices may show white scar-like structures in tumours with a dermal component, which appear as perpendicular white 'brush strokes' across the lesion. These are referred as 'chrysalis structures' or 'shiny white streaks' and are thought to reflect collagen bundles in the papillary dermis. Non-polarised devices will fail to illustrate this phenomenon:

This BCC illustrates chrysalis structures/shiny white streaks when viewed with the DermLite DL3 under polarising light (e), which are absent in the non-polarising mode (f).

**Device comparisons II**

**Comparisons of contact versus non-contact polarisation: structures in a seborrhoeic keratosis**

In addition to colour differences, some dermoscopic structures will have a different appearance depending on which device is used.

The milia-like cysts in this seborrhoeic keratosis are easily seen on the right of the image made using a non-polarising device (a); however, they are absent with a polarising device (b).

**Comparison of the polarising mode and the non-polarising mode – the DermLite II Hybrid m**

The DermLite II Hybrid m was the first combination device, which had the potential by clicking a button to change the illumination from polarising to non-polarising, allowing structures such as milia-like cysts to be seen.

The dermoscopic detail from the DermLite II Hybrid m in non-polarised mode is similar to, but not as bright as, that from the Heine Delta 20. The explanation for the differing views seen between the two types of dermoscopic devices is related to the refractive properties of the different structures within the lesion and their behaviour under polarising and non-polarising conditions.