

A novel imaging technique for the improved management of non-melanoma skin cancer

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Introduction

Non-melanoma skin cancer (NMSC) is the commonest form of tumour and thereby demands efficient recognition and treatment. Clinical diagnosis, even for experts, is often challenging and results in numerous unnecessary excisions or even false negative diagnoses. Although treatment is usually by surgical excision, less invasive options are available for superficial tumours, the diagnosis of which usually depends on a biopsy of the lesion.

We investigated the role of Spectrophotometric Intracutaneous Analysis (SIAscopy) in the diagnosis of NMSC and its subtypes. The SIAscope emits and receives light via a hand-held unit, using software to calculate the quantity of light being absorbed at various wavelengths. Within seconds images are displayed on a computer screen, showing the presence of any melanin, blood or collagen changes in the area of concern.

Method

Full ethical approval for the study was granted. Two hundred and twenty two consecutive patients had SIAscopic images taken of their cutaneous lesions prior to incision or excision biopsy. Images were then compared to histological findings to identify any features diagnostic of NMSC.

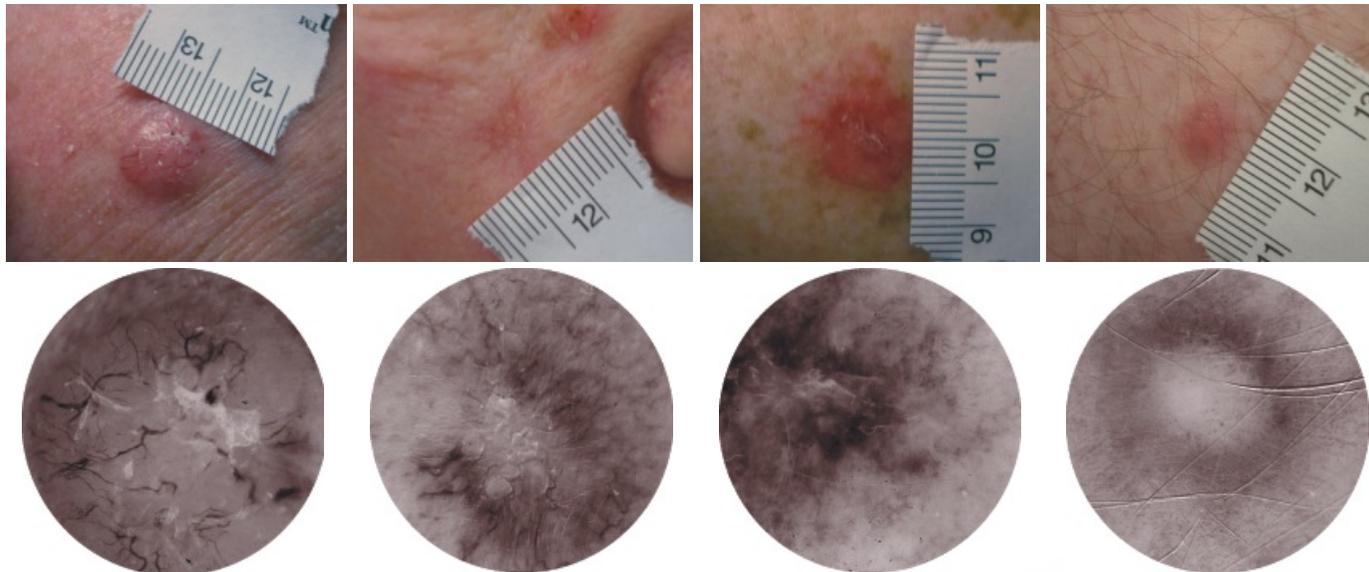


Figure1- A nodular basal cell carcinoma. The SIAscope blood image (bottom) displays numerous dilated, branched vessels leading into the lesion.

Figure2- A morphoeic basal cell carcinoma. Although clinical appearance can be misleading (left), the SIAscope image (bottom) clearly shows dilated branched vessels, making BCC diagnosis highly likely.

Figure3- A superficial basal cell carcinoma. The angry 'flare' appearance throughout the lesion (bottom) contrasts against the unaffected skin.

Figure4- A dermatofibroma. Note the absence of dilated branched vessels or central flare, a common finding in benign lesions.

Results

Of the 222 excised lesions, there were 87 basal cell carcinomas, 4 squamous cell carcinomas, 10 actinic keratoses, and 121 various benign lesions.

The presence of intralesional dilated, branched vessels (Figs 1 and 2) produced 91% sensitivity and 97% specificity for NMSC diagnosis. When the presence of central vascular 'flare' (Fig 3) is also accounted for the sensitivity improved to 97%, with specificity of 95%. The presence of 'flare' in isolation indicated a superficial malignant or pre-malignant lesion, amenable to non-surgical treatment. Conversely, the absence of dilated branched vessels or central flare indicated a benign lesion (Fig 4).

Conclusions

This study indicates that the SIAscope, an easily mastered office-based tool, could radically improve the diagnosis and management of NMSC with vast implications for clinicians, patients and the healthcare system. Further work is currently being undertaken to investigate the role of the SIAscope in NMSC detection.

Optical model of skin

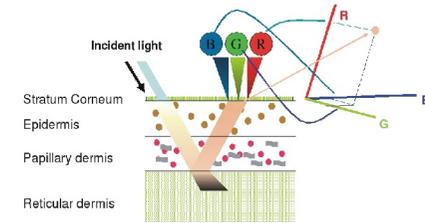


Figure 5 - An optical and mathematical model of light propagation in tissue forms the basis of SIAscopy



Figure 6 - A SIAscope packaged in a travel case