What if we could cut skin cancer death rates in half?

Skin cancer kills approximately 2,500 people every year in the UK.[1] (see Box 1). Moreover, more men than women die of malignant melanoma; men aged 30–34 have a 1.5 fold higher risk of dying compared to similarly aged women, and this rate increases to 1.7 fold for those aged between 55 to 64 years.[1] There is a considerable economic burden on the NHS for treating malignant melanoma; costs were estimated to be over £105 million in 2008–2009 and are projected to exceed £180 million by 2020.[5]

> "Melanoma is the fifth most common type of cancer in the UK."

- What if we could cut melanoma mortality rates in half?
- What if we could reduce the suffering of patients and their families?
- What if we could reduce this cancer's financial burden on the NHS and society as a whole?

Currently, the healthcare systems in most countries, including the UK, often struggle to recognise and diagnose early-stage melanoma, when it can be more easily and cost-effectively treated. Many patients with suspicious lesions do not present to the GP until it is too late, and only about 67% of malignant melanomas are recognised by GPs.[6] Studies have shown that early detection and diagnosis can cut the death rate by around 50% (47% in men and 49% in women).[7]

Successful early screening requires two key elements:

- an awareness campaign to capture a significantly higher number of suspicious lesions at an early stage
- more efficient diagnosis.

Box 1. Melanoma incidence in the UK

Melanoma is the fifth most common type of cancer in the UK and is even more common than lung and bowel cancer in patients in their mid-20s, 30s and 40s.[2–4]

In the UK, the incidence of melanoma is on the rise – in 2013 alone there were over 14,500 new cases of melanoma.[1] In fact, in 2014 – and for the first time in the UK – more than 10,000 people aged 55 and over were diagnosed with malignant melanoma, which is more than three times the number of cases diagnosed 20 years ago.[2]

Box 2. Dermoscopy and other diagnostic tools

In recent years, the use of dermoscopy has improved diagnostic capabilities in primary care, but it is highly user dependent. Users who do not have adequate training often miss the diagnosis or misdiagnose.[6] Recent advances have led to new diagnostic technologies.[8]

The focus of these technologies is often to improve performance in the primary care system with tools that are expensive and require extensive training, forcing the GP to spend extra time and resources.

An awareness campaign, however, could lead to a significant increase in patient consultations and could further encumber a system that is already under stress in many places. How can this be addressed?

This article discusses new methods of efficient and cost-effective screening for skin cancer, which could lead to a significant reduction in mortality while at the same time reducing pressure on both GPs and dermatologists.

Access to diagnosis and treatment

Even though current diagnostic capabilities have been improved by the use of dermoscopy (see Box 2), the need for early diagnosis in patients is critical to ensure better long-term prognosis, a higher quality of life for patients and a reduced impact on the cost to the NHS.[9,10] A report by the Department of Health investigated the impact of early cancer diagnosis on costs and benefits to the NHS and showed that malignant melanoma treatment costs for each patient increased from £1,373 for stage I to £5,302 for stage IV disease (this figure includes only direct costs to the NHS and does not take into account quality of life estimates or the use of expensive drugs – see below). The economic model on which the findings of the report were based suggested that earlier detection and diagnosis could result in a population benefit of 22,000 life years gained, and an average expenditure of just £31 per life saved – hence early treatment is highly cost-effective.[9]

Currently, individuals with late-stage melanoma have access to biological therapy, including targeted treatments such as, Zelboraf® (vemurafenib) and Tafinlar® (dabrafenib) and immunotherapies such as, Yervoy® (ipilimumab), Opdivo® (nivolumab) and Keytruda® (pembrolizumab). However, one study reports that 55% of those taking the combination of ipilimumab and nivolumab experienced side effects, such as diarrhoea and bowel inflammation.[11] Another important consideration is that both ipilimumab and nivolumab are expensive – a typical course of combined treatment is estimated to cost more than $200,000 (around £160,000).[11]

Early diagnosis in a system that is cost effective and works

As discussed before, early screening requires two main elements: an effective awareness campaign plus an efficient way to diagnose. The increased flow of patients arising from such a campaign needs to be mirrored with a simple cost effective system in order to minimise the burden on GPs, while at the same time reducing unnecessary referrals.

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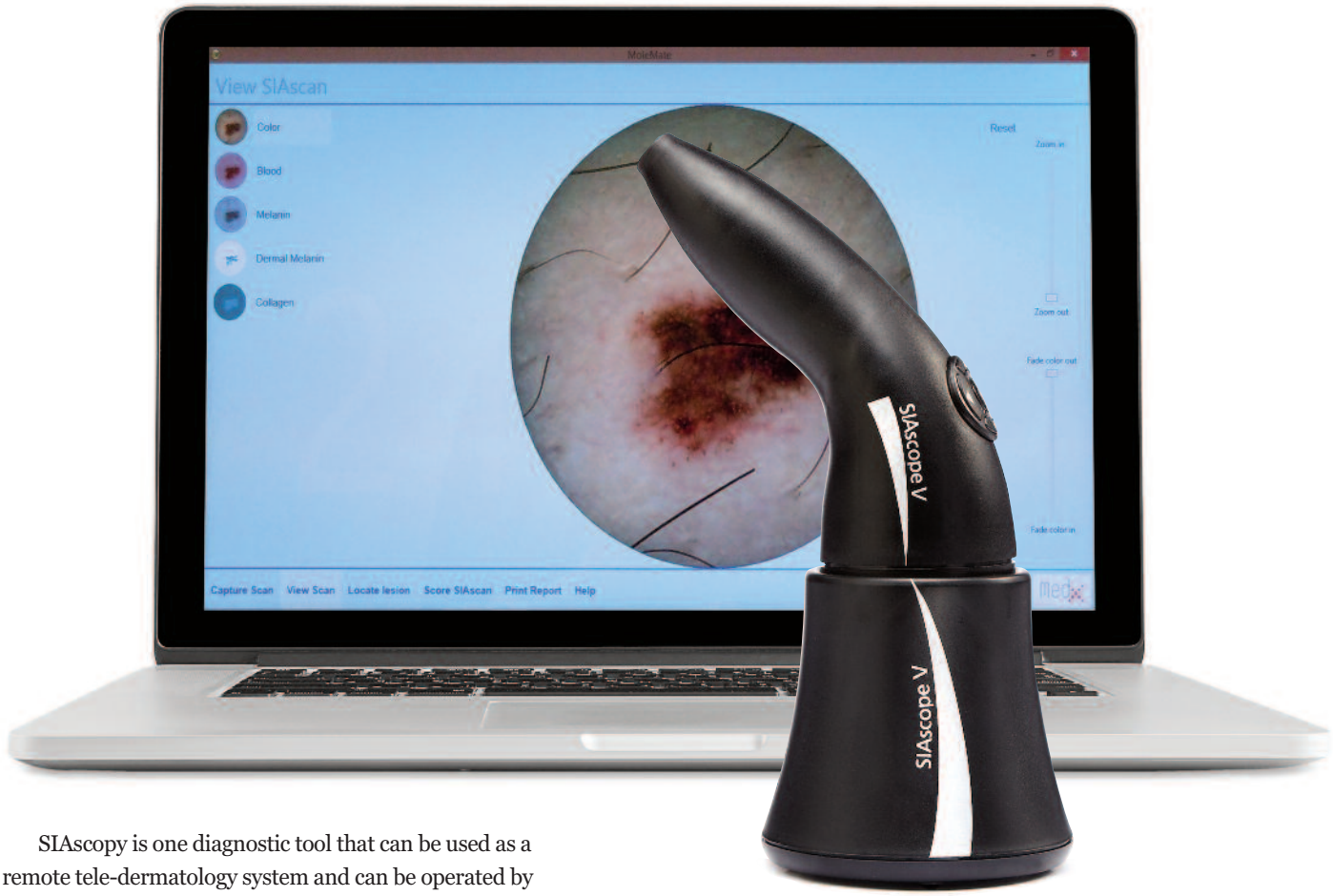


SIAscopy is one diagnostic tool that can be used as a remote tele-dermatology system and can be operated by a GP, nurse, pharmacist or technician.

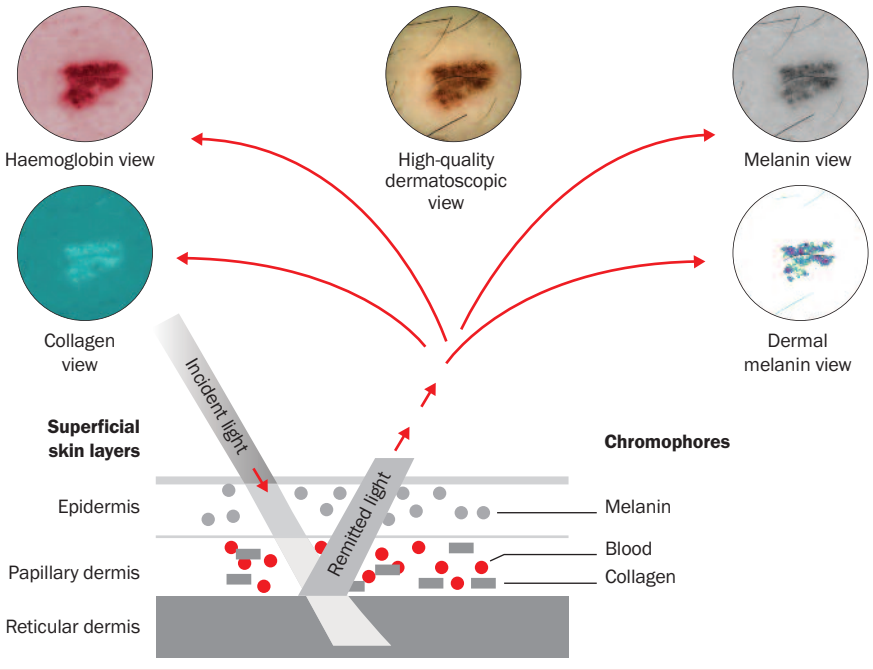
SIAscopy – a viable solution

The SIMSYS-MoleMate™ skin-imaging system is a non-invasive skin-screening procedure for moles and lesions that employs spectrophotometric intracutaneous analysis (SIAscopy). The system makes use of an easy to use hand-held device that rapidly provides accurate images of the melanin, blood and collagen below the mole or lesion in order to aid diagnosis (see Figure 1).[12] The training required to use this system is simple and straightforward.

SIAscopy is the only technology that can look 2 mm beneath the skin's surface to provide five distinct images that can aid diagnosis:[12]

1. **Dermatoscopic view:** provides a clear and magnified view of the mole as it appears on the

Figure 1. Principles of using SIAscopy to aid diagnosis[13]



Principles of using SIAscopy to aid diagnosis.[13] Light striking the skin penetrates the superficial layers; some frequencies are absorbed by organic elements in the various layers, some are reflected back or scattered directly from the skin's surface and others are sent back (remitted) by various organic elements in the skin's layers. This remitted light can be measured using a technique called SIAscopy chromophore mapping. A chromophore is a part of the structure of an organic molecule that gives the molecule its colour. By measuring the light remitted from skin layers, SIAscopy can image various organic components within.

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surface of the patient's skin, helping healthcare professionals identify important features.

2. **Melanin view:** confirms that the mole is a pigmented lesion.
3. **Dermal melanin view:** establishes the presence and distribution of pigment in the deeper layers of the skin; this may be important in differentiating a suspicious from a non-suspicious mole or lesion.
4. **Blood supply view:** shows changes in blood supply that can be early indicators of suspicious moles or lesions.
5. **Collagen view:** helps assess damage to the lower layers of the skin by providing more information, thus further helping identify suspicious moles and lesions.

Benefits of tele-SIAscopy

Experienced dermatologists can typically make a very accurate diagnosis using a dermatoscope. However, remotely transmitted two-dimensional dermatoscopic images often lack sufficient information for triage purposes and can result in reduced sensitivity for this technique. Tele-SIAscopy provides more comprehensive information, facilitating remote diagnosis, and has the additional benefit of being able to display accessible information for communication with patients who desire reassurance (see Box 3).

Prior studies have shown that SIAscopy demonstrates cost-effectiveness in the NHS, as defined in a health economic model in which the main driver is health gain associated with early diagnosis.[14] However, this economic analysis does not take into account the new, much more streamlined, proposed process of using tele-dermatology, which leverages the skills of dermatologists without over-involving the GP and should allow for even higher cost savings, which will be the subject of a future study.

A number of scenarios can be envisioned that highlight the benefits of such a system to current clinical practice:

- The GP could mark suspicious lesions quickly and send the patient to a dedicated nurse or technician, who would then take images and transmit them electronically along with detailed information to a centrally located dermatologist for triage.
- Alternatively, the patient could go directly to a pharmacy equipped with such capabilities, who then transmit images to a dermatologist for triage.
- Only relevant cases as assessed remotely by the dermatologist (based on MedX's experience, this is around 10%) would require accelerated referral for an in-person visit to a dermatologist.

This system could allow for a high throughput, significantly reducing the number of referrals to the dermatologist (allowing the dermatologist to see many more relevant cases), while minimising additional time with the GP. Tele-SIAscopy and subsequent remote transmission could also conceivably lead to savings in the melanoma treatment pathway by identifying lesions at an earlier stage and potentially preventing the high costs associated with treating advanced disease.

> "The in-depth images give me more information than a dermato-scopic view alone"

Box 3. Clinician perspective: Joseph Walls, Plastic surgeon

I am using tele-SIAscopy for remote diagnosis of skin cancer, arriving for triage through Boots Pharmacies. The in-depth images give me more information than a dermatoscopic view alone and I feel confident in making a fast and efficient remote assessment.

Additionally, increased self-awareness of skin cancer and early diagnosis of melanoma is in the best interest of patients, as it is thought that low cancer awareness may contribute to a delayed diagnosis and, as a consequence, impact cancer survival [10,15] ■

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To understand more about the maintenance and calibration process or to discuss upgrading your existing unit(s), please contact Ivana Krznaric (**Ivana.Krznaric@medxhealth.com**) and state the reference code DIP23.1

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