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Shedding the Scalpel – Emergence of Non-Invasive Diagnostic Modalities in Dermatology

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The importance of making an accurate diagnosis in clinical medicine is perhaps best exemplified by the specialty of dermatology. The myriad and diverse clinical presentations with significant overlap of lesional morphology often render diagnosis of skin disorders difficult despite the popular perception of Dermatology being a diagnostic non-challenge that apparently stems from its uniqueness of being 'visual medicine'. The specialty of Dermatology has seen a rapid and immense evolution over the past two decades, especially with respect to the discovery or detailing of new dermatoses. Although the primary diagnosis of a skin condition still largely relies on the time-tested protocol of thorough history and physical examination, the final diagnosis relies on confirmation by diagnostic techniques, invasive or non-invasive. Use of diagnostic techniques even in a clinically apparent 'clear-cut' condition becomes prudent for planning optimal management. The rising trend of health-awareness amongst the new generation of web-savvy patients is an additional contributor to the need for such techniques. Although histopathology from a skin biopsy, remains the gold standard invasive technique for dermatological diagnosis, a whole array of non-invasive approaches to cutaneous diagnosis are now available and being further explored [1]. Indeed, in this decade, the field has expanded not only from a technical viewpoint, i.e. new equipment but also in new applications of existing technology developed to investigate specific areas of "transferred" technology (i.e., from biochemistry or molecular biology) to noninvasively detect and quantify molecules in superficial skin layers to monitor skin reactions.

Dermoscopy (syn: dermatoscopy) is now well-established as a very versatile non-invasive diagnostic technique for dermatologists. It not only allows for easier and more confident diagnosis, but aids in diagnostic confirmation in various ways [2]. The availability of various handy and affordable models is one of the biggest advantages of this must-have instrument. The basics of this technique shall be discussed in the review article on dermoscopy in this issue of the journal.

In vivo

reflectance confocal microscopy (RCM) is a relatively new technique that allows real time, non-invasive microscopical imaging of the entire epidermis down to the level of superficial dermis. The technique offers a cellular-level resolution close to conventional histopathology. The operational technology involves light reflection according to the different reflectance indexes of the different skin structures [3]. RCM provides real time and non-invasive "virtual" punch biopsy ranging from 2 to 8 mm in horizontal dimension and 250–300 μm in vertical dimension [4]. RCM has been already successfully tested for the evaluation of several neoplastic, inflammatory, pigmentary as well as scalp disorders.

Optical coherence tomography (OCT) is an interferometric imaging method in which infrared

light is coupled into optical fibers and split into a reference and a probe beam. The probe beam is focused onto the skin, backscattered, and compared with the reference beam [5]. The matching of both the beams within the coherence length of the light is essential for the occurrence of interference. The coherence length therefore determines the axial resolution, whereas the lateral resolution depends on the focusing objective [6]. OCT has the potential to become widespread as a complimentary tool to histology, dermoscopy, and confocal laser microscopy in dermatology as well as general clinical practice.

In this editorial, we have just mentioned three of the plethora of non-invasive investigations available for cutaneous diagnosis and skin analysis. We hope to dissert on other modalities in future issues of Dermatology International.

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