

## **New investigative tools applied to the nail**

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Nail disorders can be very annoying for the patient and diagnostically challenging to the dermatologist. New investigative and noninvasive tools might be very useful in the diagnosis of nail disorders to reduce the number of nail biopsies and for follow up.

Reflectance confocal microscopy is a high-resolution emerging imaging technique, with resolution at a cellular level, that can be used to explore the entire body surface, including skin, mucosa, hair and nails. Using the “VivaStack” function, the nail plate can be scanned from the surface to the transition of the plate to the underlying nail bed in horizontal images. According to the intensity of the reflection, three different layers can be differentiated with reflectance confocal microscopy.

The superficial layer shows a brighter reflection, followed by a zone with slightly poorer signal, again followed by a brighter zone in the depth. The transition to the underlying nail bed is clearly visible only in thin nails (<500  $\mu\text{m}$ ) and displayed in wave-like structures, which are directed towards the fingertip. Reflectance confocal microscopy is able to display single corneocytes and the integrity of their borders.

Optical Coherence Tomography is a non-invasive optical imaging technique that has the advantage of incredibly high spatial resolution compared to other clinically available methods. It provides images of the nail plate, the nail bed and the matrix up to a depth of 2 mm and a width of 6 mm, with a lateral resolution better than 7.5  $\mu\text{m}$  and axial resolution better than 5  $\mu\text{m}$ .

The combination of these two investigative and noninvasive tools play an important role in the diagnosis and follow up of nail disorders such as onychomycosis, leukonychia, nail psoriasis and lichen planus. Moreover, they help to distinguish between benign and malignant causes of nail pigmentation.