

Correlation between optical super high magnification dermoscopy and Line-field confocal optical coherence tomography (LC-OCT): preliminary observations

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Introduction

Optical Super High Magnification Dermoscopy (OSHMD) is an innovative tool that allows the observation of skin lesions at up to 400× magnification, revealing structures invisible or barely visible under standard 20× magnification. Line-field Confocal Optical Coherence Tomography (LC-OCT), developed for in vivo imaging, offers deep tissue penetration and 3D cellular resolution.

Objectives

To identify and describe the correlation between OSHMD findings and LC-OCT features.

Materials and methods

A descriptive, retrospective study was conducted at the Hospital Clínic of Barcelona to identify the 3D LC-OCT features associated with OSHMD findings in five histologically confirmed cutaneous lesions: one melanoma, one atypical nevus, one basal cell carcinoma (BCC), one vulvar melanotic macule, and one squamous cell carcinoma (SCC). LC-OCT images were obtained using a CE-marked LC-OCT device (DeepLive, DAMAE Medical, Paris, France). All OSHMD images were captured using the Medicam 1000 with the D-Scope III lens (Fotofinder System, Bad Birnbach, Germany).

Results

We describe the findings of each lesion in OSHMD and LC-OCT:

- **BCC:** Multiple arborizing vessels, pigment dots, and blue globules composed of rounded cells invisible under standard dermoscopy (blueberry pattern) were identified. At LC-OCT, the rounded cells corresponded to bright cells in the papillary dermis, later identified as melanophages in histological sections.
- **Invasive SCC:** Multiple structureless milky-red areas with glomerular vessels were observed. These vessels were not visible in conventional dermoscopy, and no loose cells were detected. LC-OCT revealed hyperkeratosis, acanthosis with keratinocytic dysplasia and glomerular vessels.
- **Melanotic Macule:** Multiple gray pigment dots with small glomerular vessels and irregularly shaped gray cells in focus were noted, alongside a zone with pigment arranged in a parallel pattern with focused gray cells. In LC-OCT, monomorphic pigmented cells at the basal layer were observed.
- **Nevus with Atypia:** Multiple pigmented cells arranged in sheets with focused round and dendritic cells were observed. LC-OCT revealed numerous bright dendritic and rounded cells. Histology confirmed a junctional nevus with moderate atypia and spitzoid features.
- **Melanoma:** Disruption of the ring pattern with dendritic cells in focus and areas of reticular thickening were identified. LC-OCT showed bright dendritic and roundish cells at different levels of the epidermis. Histopathology confirmed melanoma in situ.

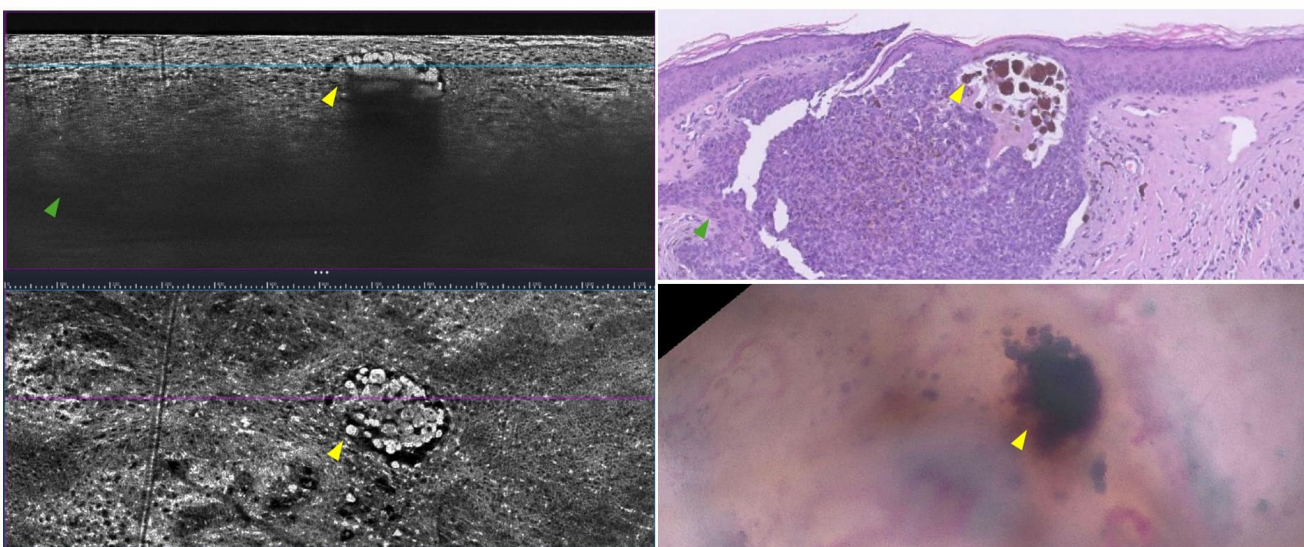


Fig 1. Presence of melanophages' nests at the top of the BCC lobule. On LC-OCT images, it appears as a compact bright nest of cells without discernable nuclei both on the vertical view and on the horizontal view. It is located at the top of a BCC lobule appended to the epidermis. On the OSHMD images, it seems to appear as a dark/grey « globule » where cells are discernable at the edge of the globule.

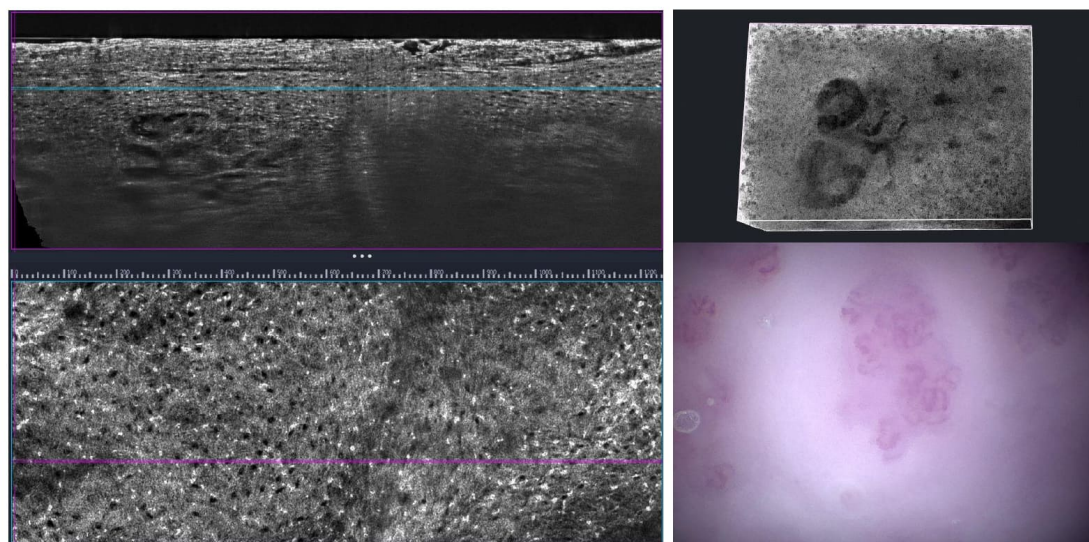


Fig 2. Invasive SCC. LC-OCT enables visualizing the hyperkeratosis, the irregular network of cells nuclei and the presence of atypical keratinocytes in the epidermis. The dermo epidermal junction (DEJ) is disrupted and on the dermal part, some dark tortuous structures are visible and correspond to glomerular vessels. Their structure can be highlighted with helps of the maximum 3D projection view (upper right image).

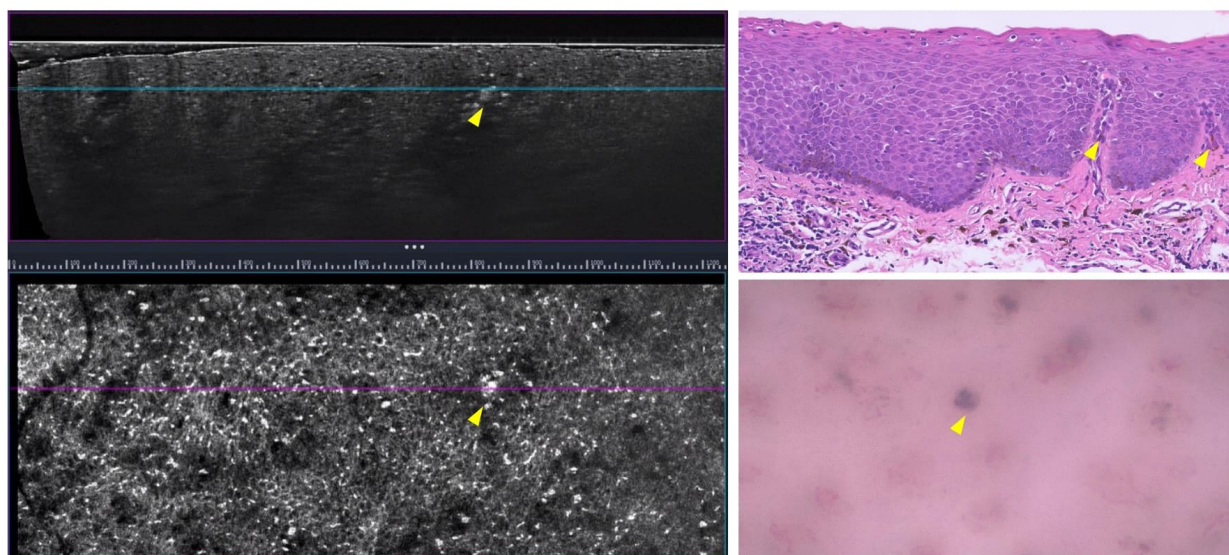


Fig 3. Melanotic macule. Melanophages in the papillae and dendritic cells at the DEJ. Some melanophages are visible within the papillae on the LC-OCT images and appear as grey structures in the OSHMD images. Some dendritic cells are visualized in the epidermis close to the DEJ on the LC-OCT image.

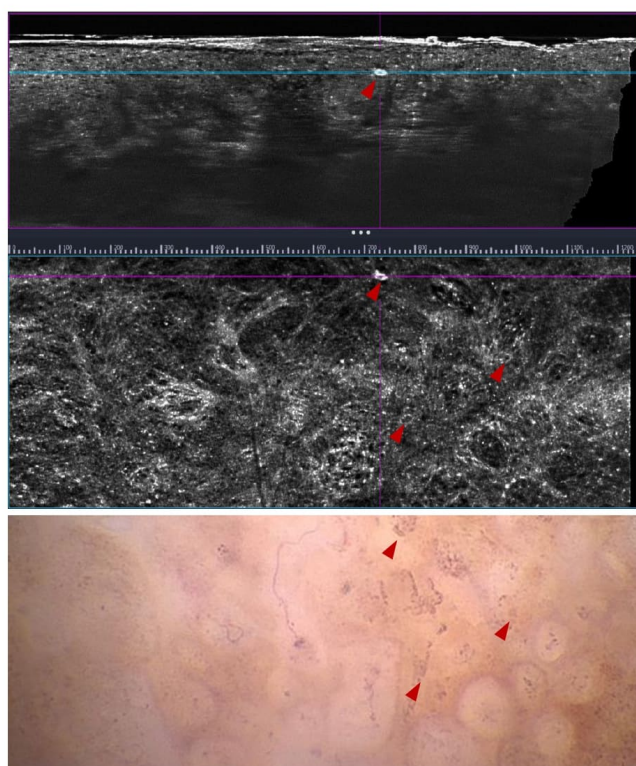


Fig 5. Melanoma in situ. Atypical cells in the epidermis. Some atypical cells pigmented cells are visualized in the epidermis. They appear as bright structures with roundish shapes and clear dark nuclei on LC-OCT images and the vertical view helps to evaluate their position within the epidermis. They appear as light brown structure on OSHMD images.

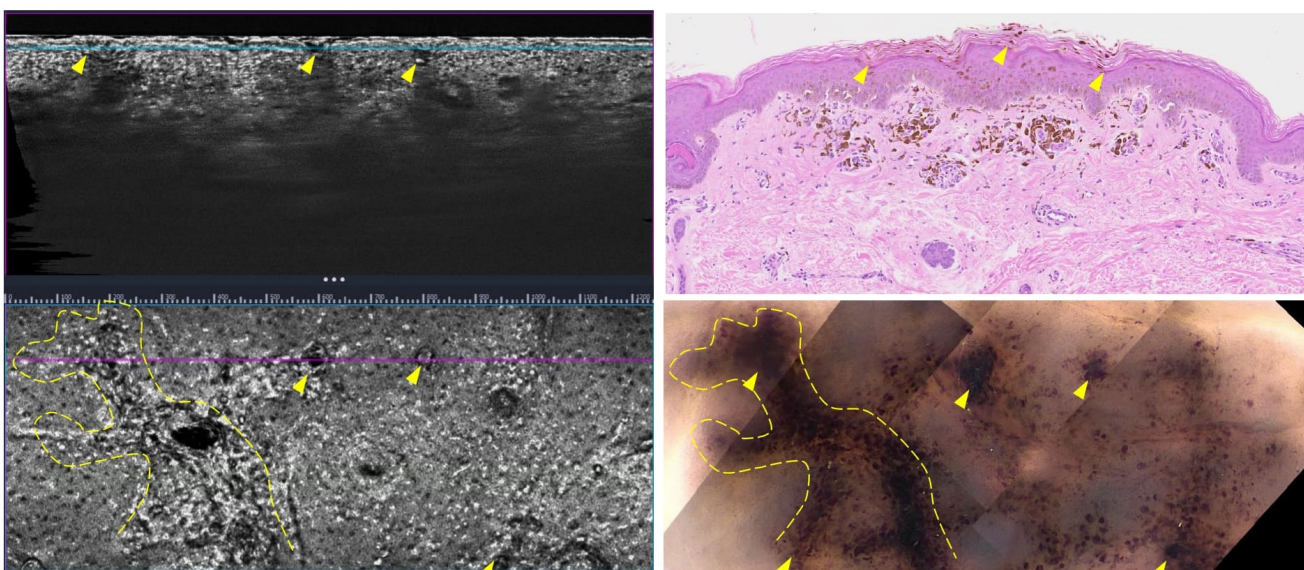


Fig 4. Junctional nevus with moderate atypia and spitzoid features. Pigment ascension on the stratum corneum. The brown structures observed on the OSHMD images seem to correlate well with pseudocysts and pigment ascension in the stratum corneum visualized on the LC-OCT images. On the histological images, we can retrieve well the pigment that is contained in the stratum corneum.

Conclusion

The combined use of LC-OCT and OSHMD may offer deeper insights into the in vivo histology of skin lesions, particularly pigmented ones. However, a limitation of OSHMD is that it requires considerable expertise and familiarity with the equipment. Further studies on the diagnostic performance of this dermoscopic technique and additional research into the correlation between LC-OCT and OSHMD are ongoing.