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EPIC
European Photonics Industry Consortium

Line-field Optical Coherence Tomography (LC-OCT): a new tool for 3D skin analysis at cellular level

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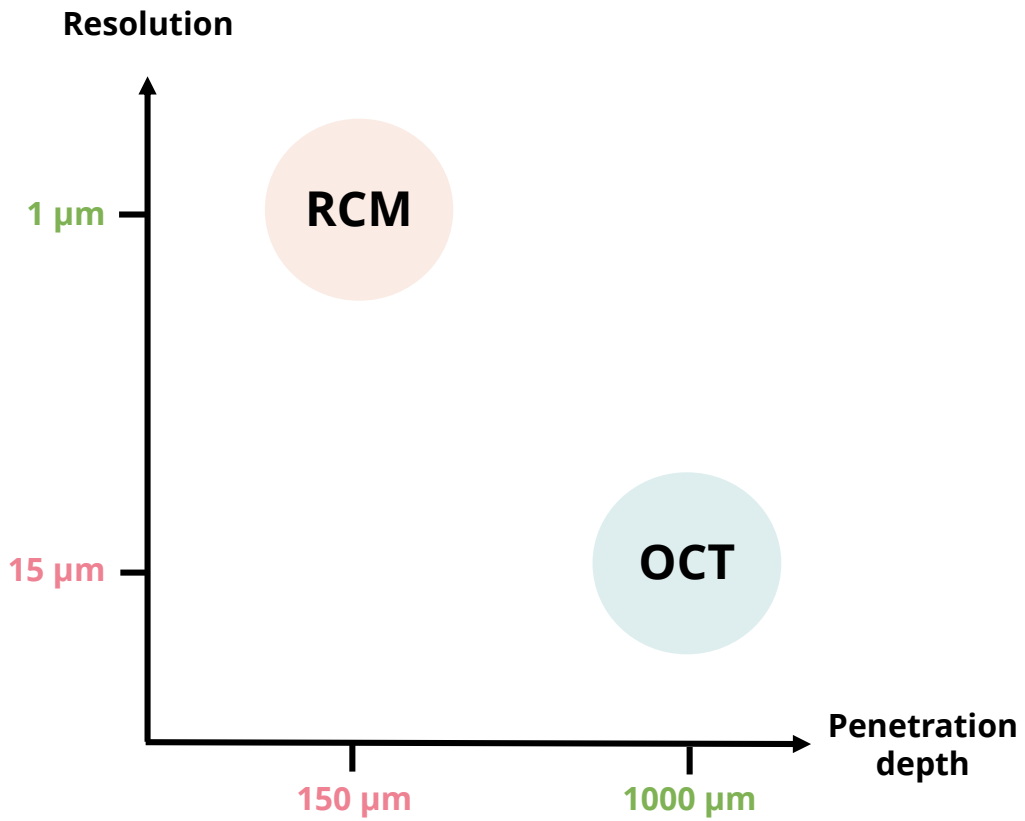
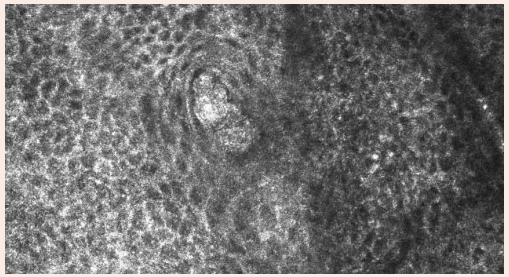
LC-OCT: Line-field Confocal Optical Coherence Tomography

Existing in vivo optical imaging technologies

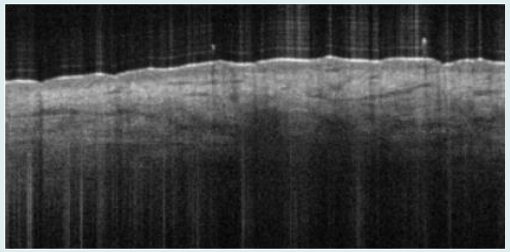


Reflectance Confocal Microscopy (RCM)



- En face (horizontal) imaging
- Cellular lateral resolution (~1 µm)
- Axial resolution of ~5 µm
- Limited penetration depth (~ 150 µm)

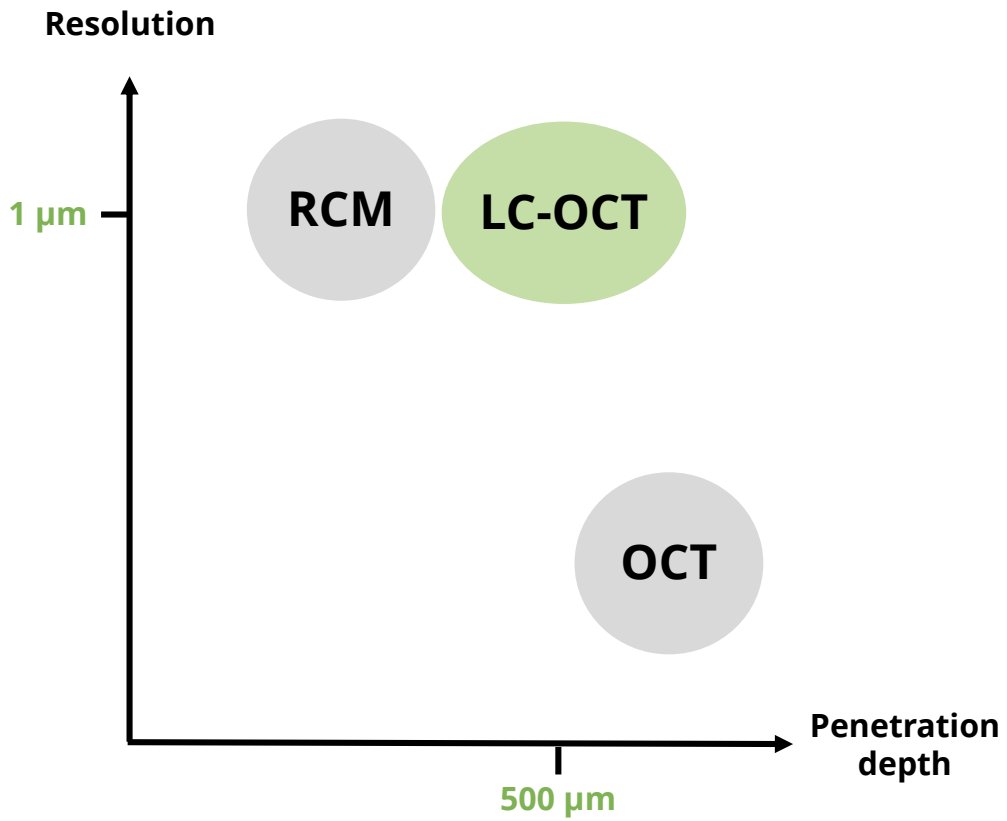
Optical Coherence Tomography (OCT)



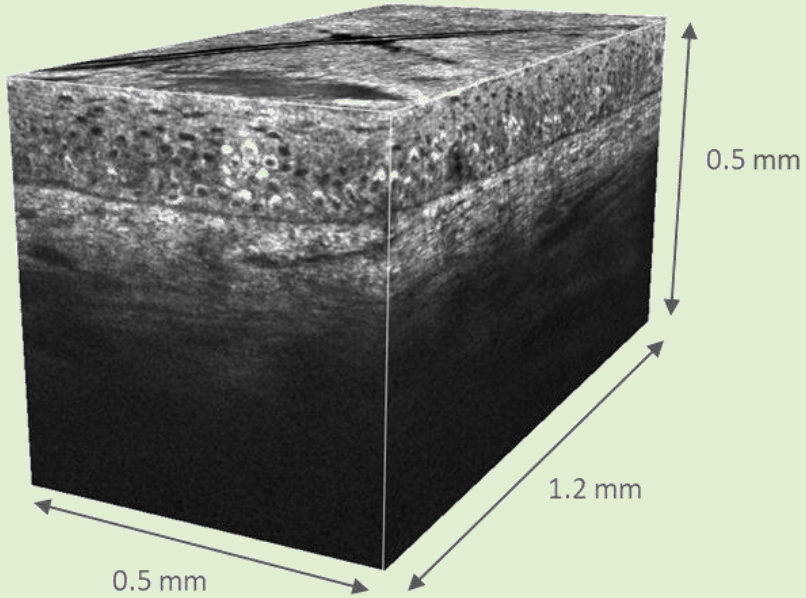
- Vertical-slice imaging (histology-like)
- No cellular resolution (~15 µm)
- ~1 mm penetration depth

LC-OCT: Line-field Confocal Optical Cohenrence Tomography

LC-OCT 3D – Combining the technical advantages of RCM and OCT



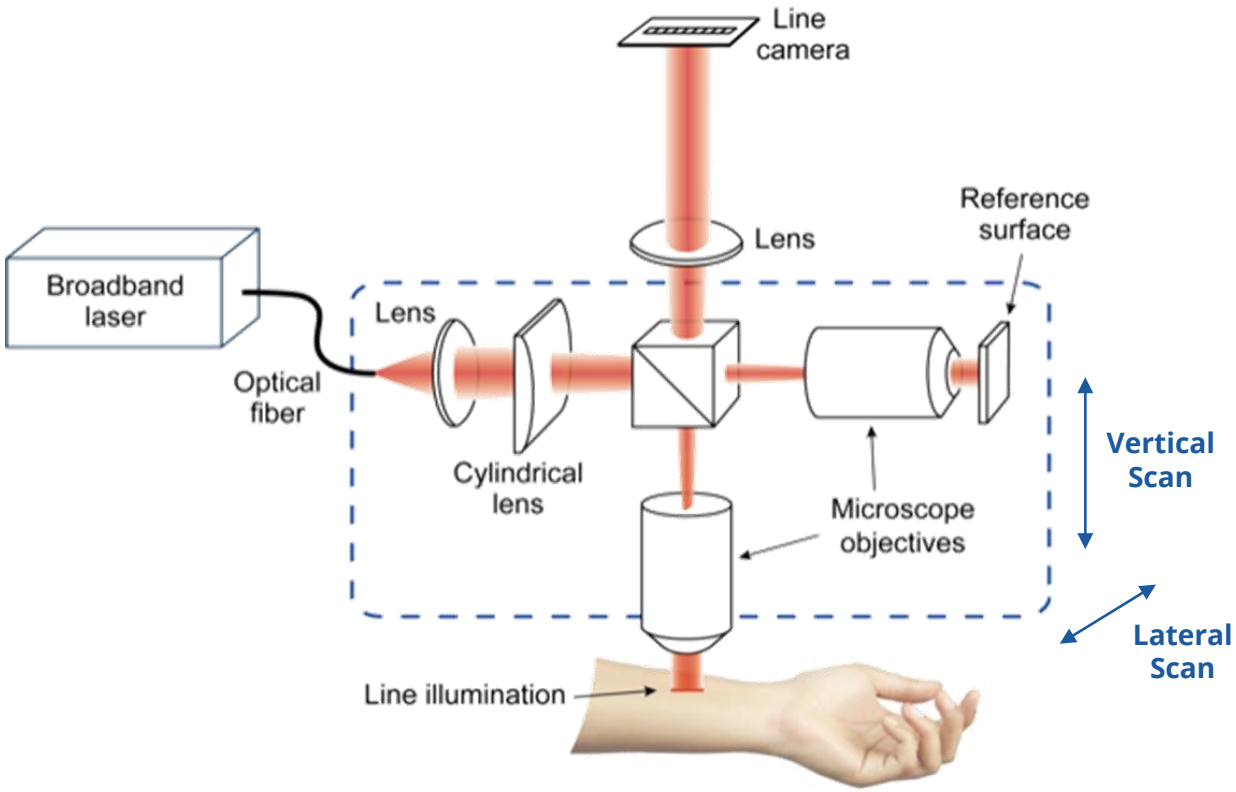
Line-field Confocal Optical Coherence Tomography 3D (LC-OCT 3D)



- Dubois A, *et al.* Line-field confocal optical coherence tomography for high-resolution noninvasive imaging of skin tumors. *J Biomed Opt* 2018;**23**:1–9.
- Ogien J, et al. Dual-mode line-field confocal optical coherence tomography for ultrahigh-resolution vertical and horizontal section imaging of human skin in vivo. *Biomed Opt Express* 2020;**11**:1327.

LC-OCT: Line-field Confocal Optical Cohenrence Tomography

Technology invented by Pr. Arnaud Dubois (CNRS, IOGS, UPSaclay), fully transferred to DAMAE Medical, founded in September 2014



- **Broadband laser**: high axial resolution *(OCT)*
- **Microscope objectives**: high lateral resolution (*CM*)
- **Line illumination and detection**: confocal filtering *(CM)*
- **Vertical scan**: vertical slice imaging *(OCT)*
- **Lateral scan**: en face imaging *(CM)*

- Dubois A, *et al.* Line-field confocal optical coherence tomography for high-resolution noninvasive imaging of skin tumors. *J Biomed Opt* 2018;**23**:1–9.
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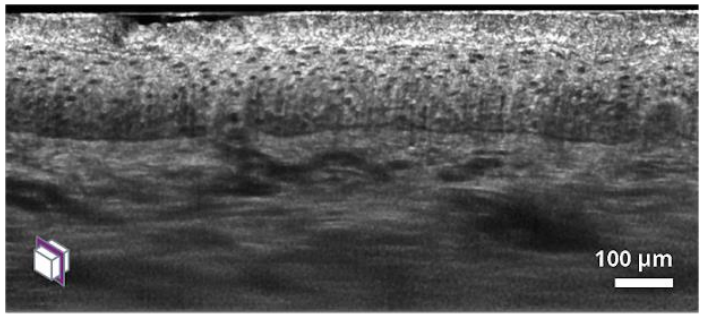
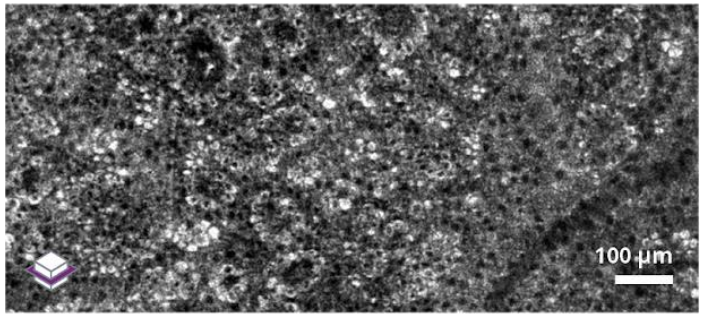
deepLive
by DAMAE MEDICAL

ULTRAHIGH-RESOLUTION IN 3D

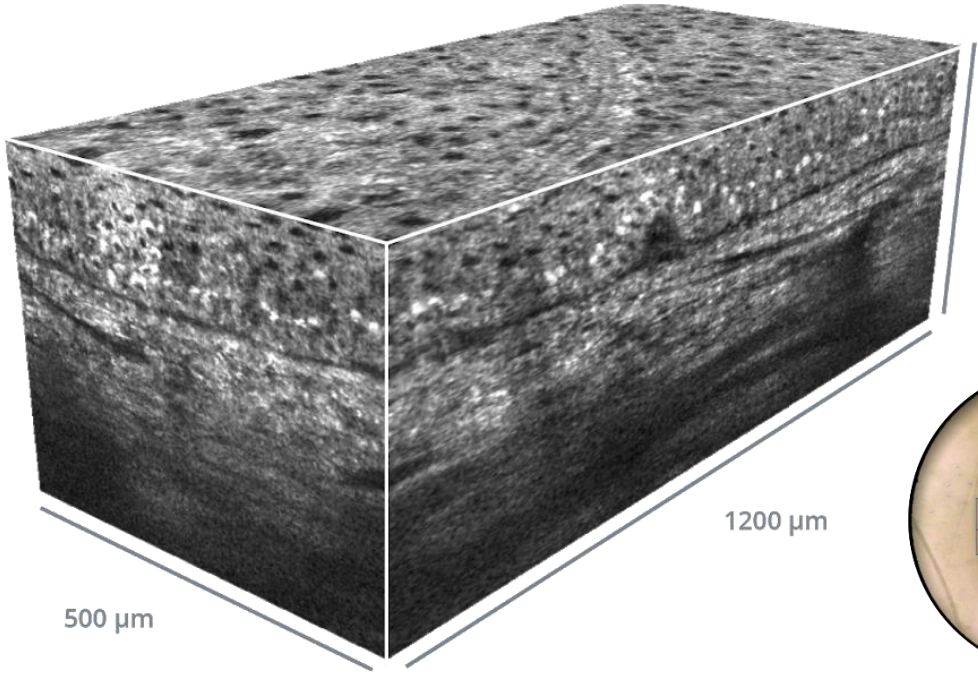
Vertical live mode

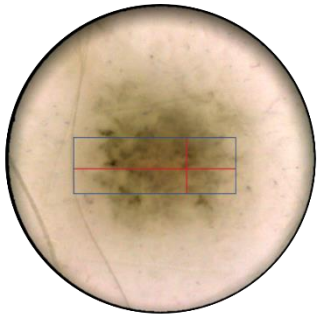


Horizontal live mode



3D stack with isotropic cellular resolution





LC-OCT vertical (top left), horizontal (bottom left) images and 3D stack (right) of healthy human skin in vivo

- Dual-mode line-field confocal optical coherence tomography for ultrahigh-resolution vertical and horizontal section imaging of human skin *in vivo. Biomedical Optics Express, J. Ogien et al. (2020),* DOI: 10.1364/BOE.385303
- Line-field confocal optical coherence tomography for three-dimensional skin imaging. *Frontiers of electronics, J. Ogien et al, (2020),* DOI: 10.1007/s12200-020-1096-x

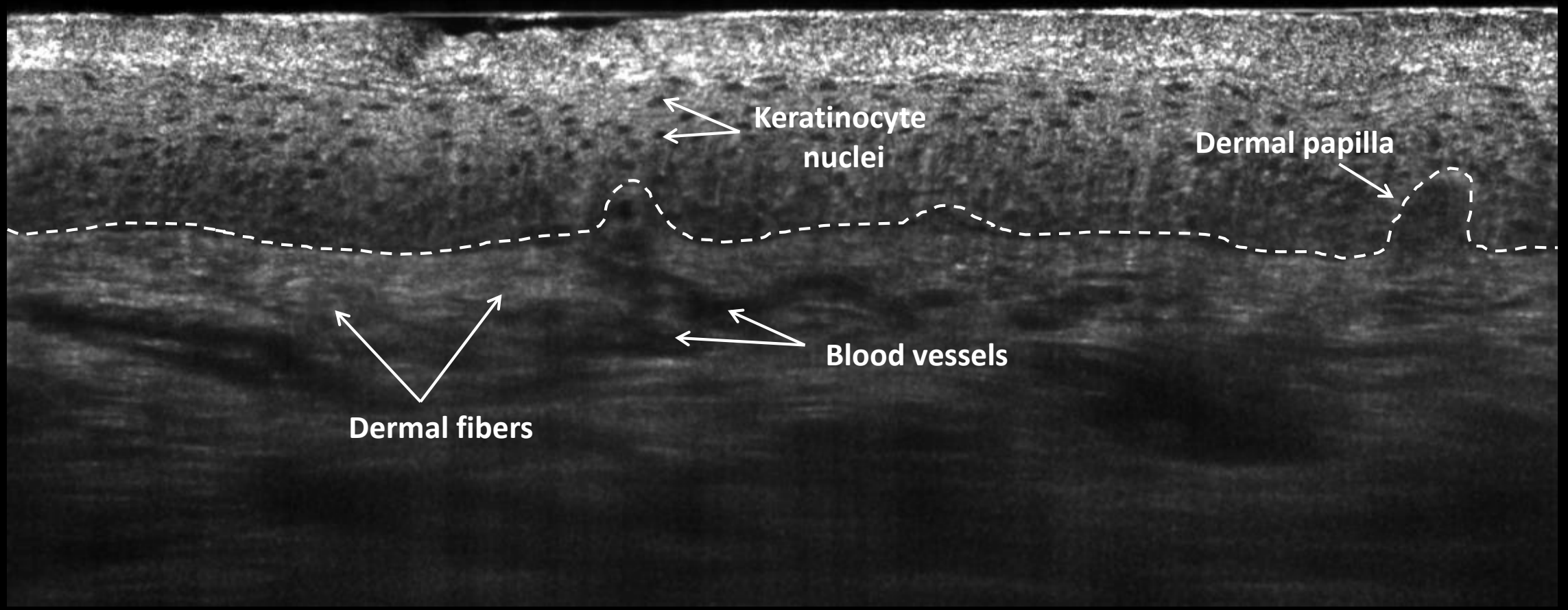
LIVE VERTICAL

LIVE HORIZONTAL

3D MODE

DERMOSCOPY

HEALTHY SKIN INNER STRUCTURES

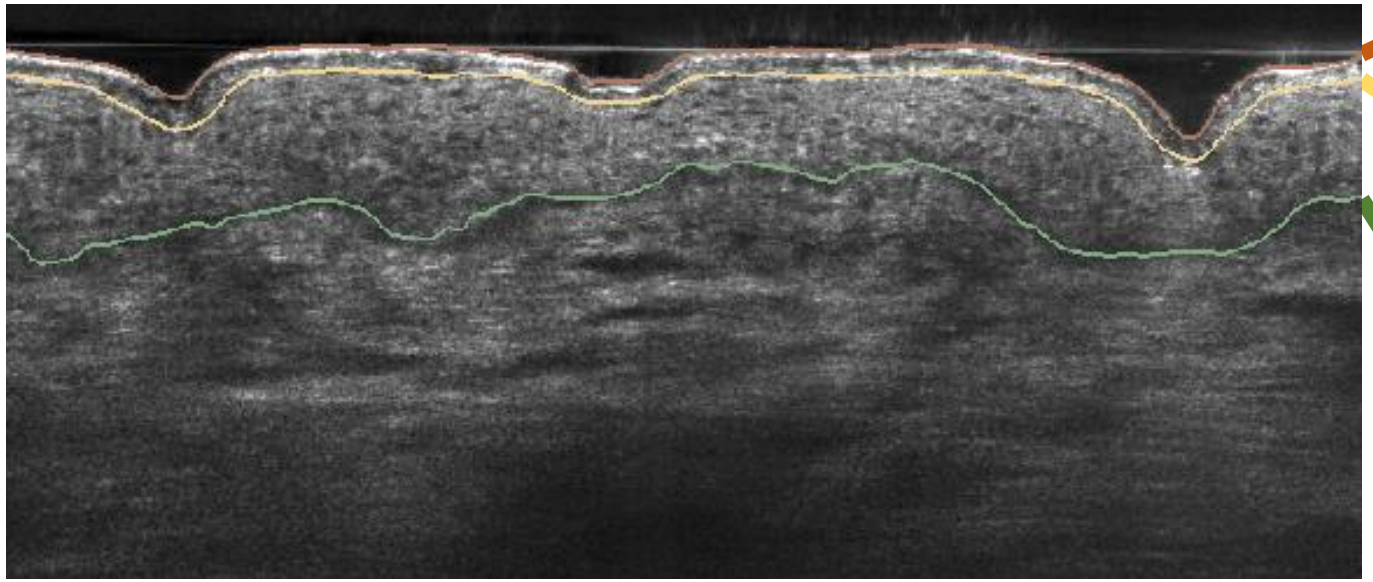


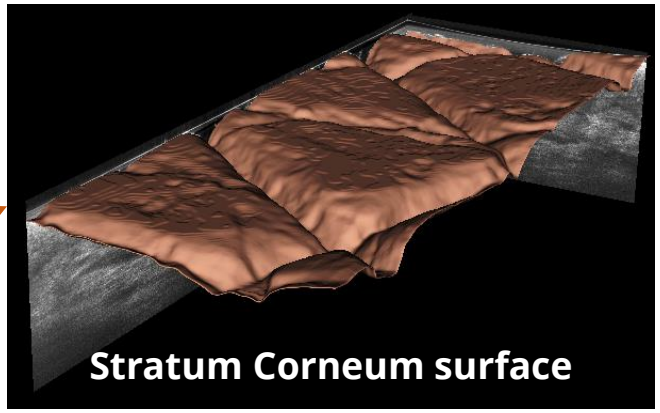
Body site: Back of hand

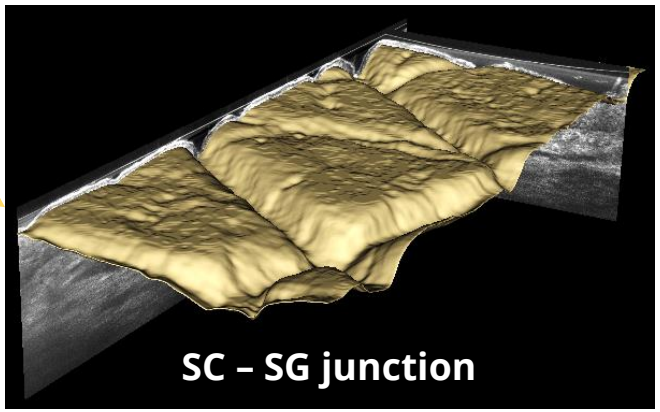
QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

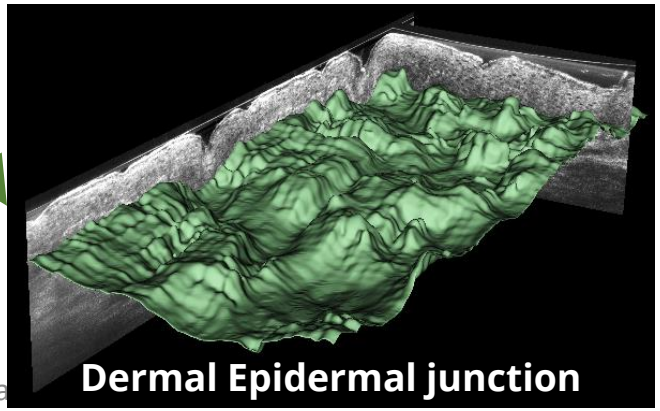
3D segmentation of skin layers

SKIN LAYERS & DEJ | **CELLULAR**







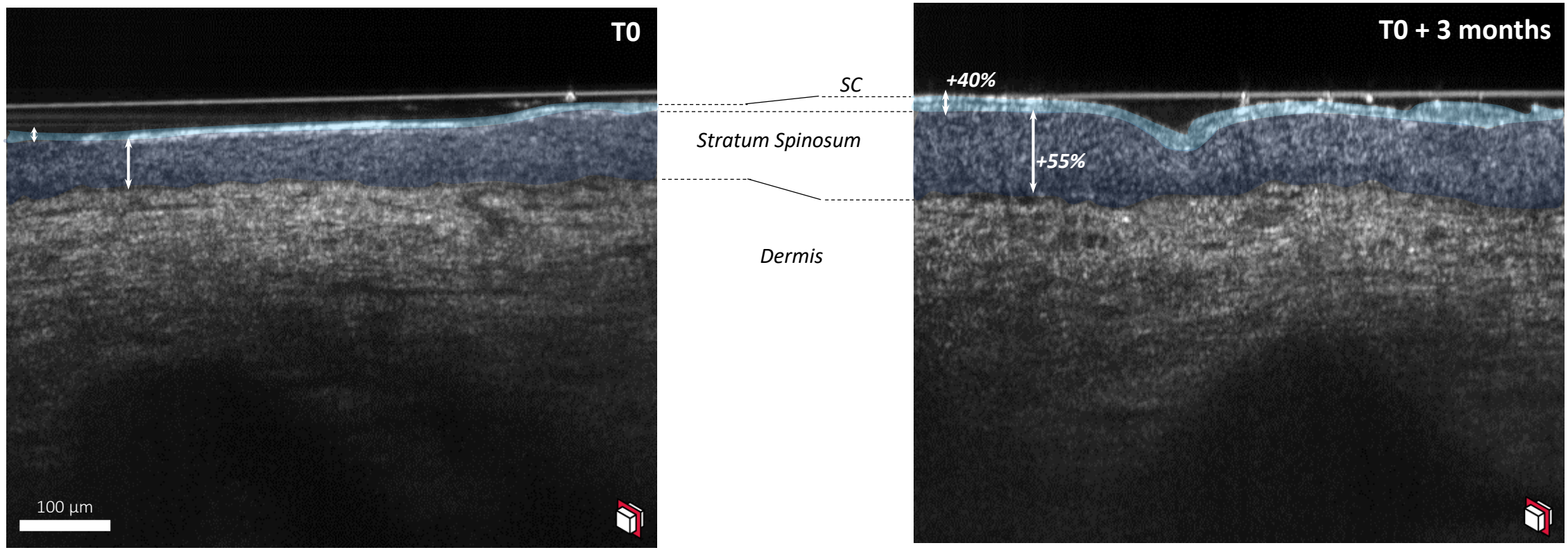


Automated 3D segmentation and quantification of the skin layers

- SC thickness
- Epidermis thickness
- DEJ undulation

QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

EVALUATION OF A SKIN CARE PRODUCT

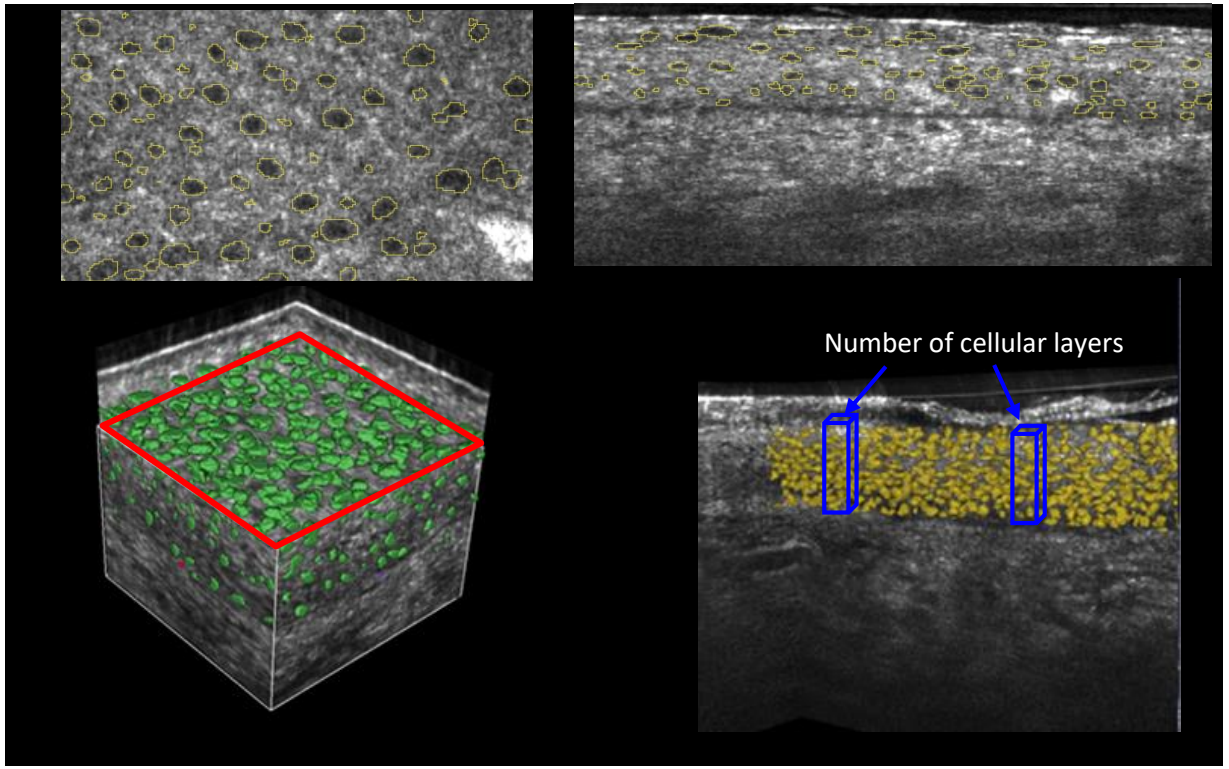


Increase of the skin layer thicknesses (SC + SS)
after 3 months of application of a skin care product

QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

3D quantification of keratinocytes size and density

SKIN LAYERS & DEJ | **CELLULAR** | TISSULAR

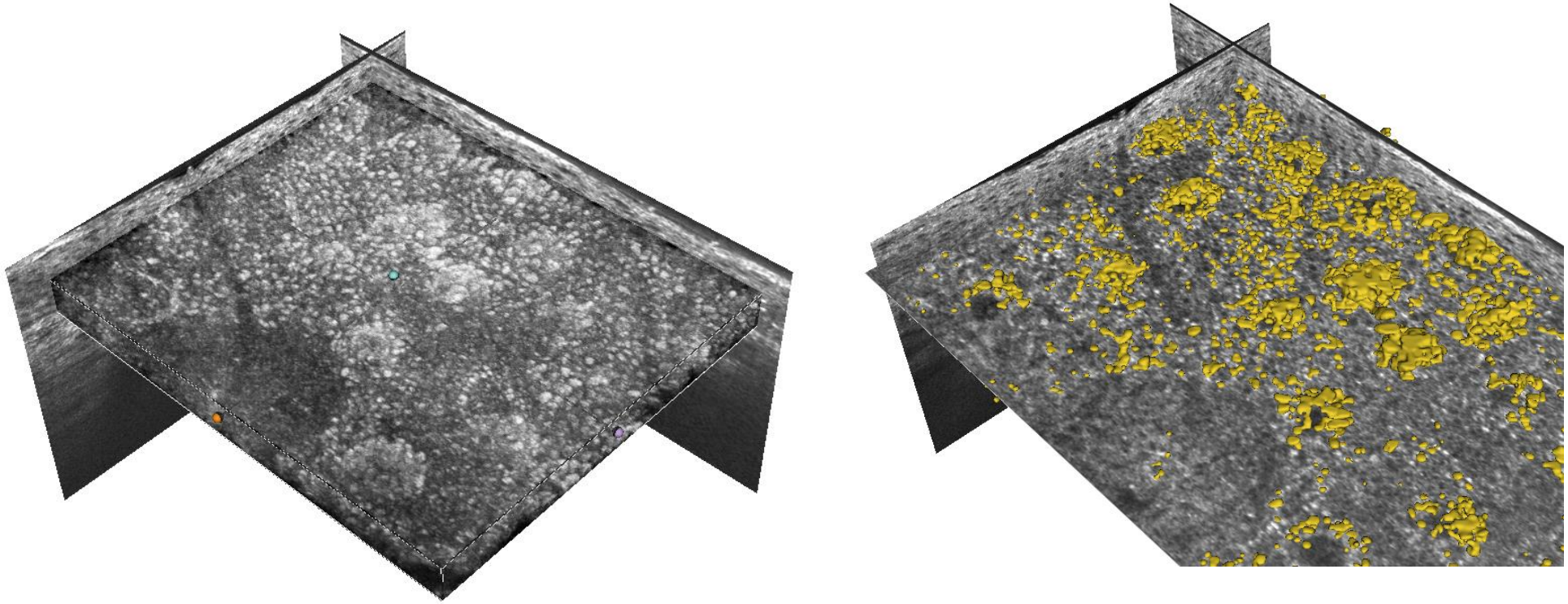


Keratinocytes nuclei segmentation and metrics

QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

3D quantification of melanin density and distribution (work in progress)

SKIN LAYERS & DEJ | **CELLULAR** | TISSULAR



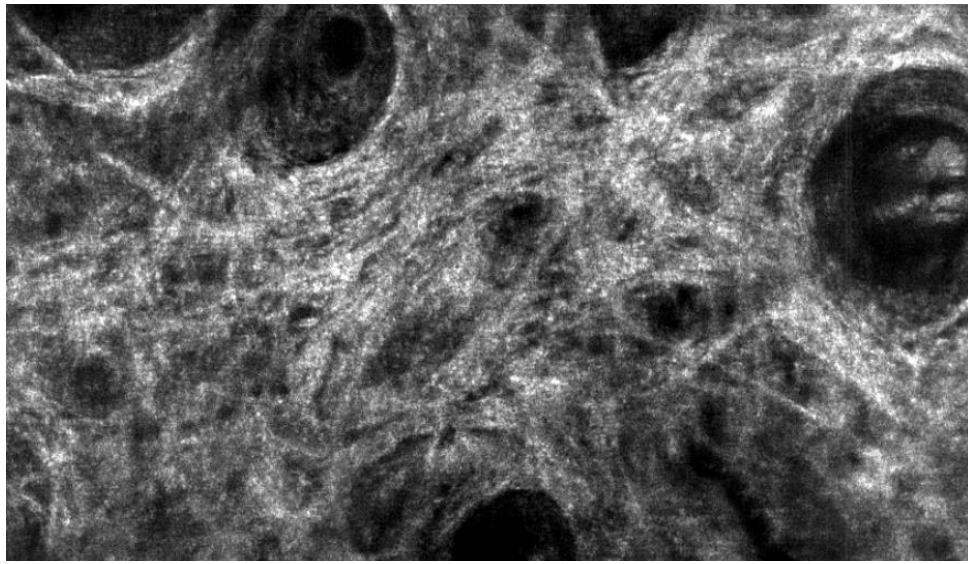
Melanin density and distribution

QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

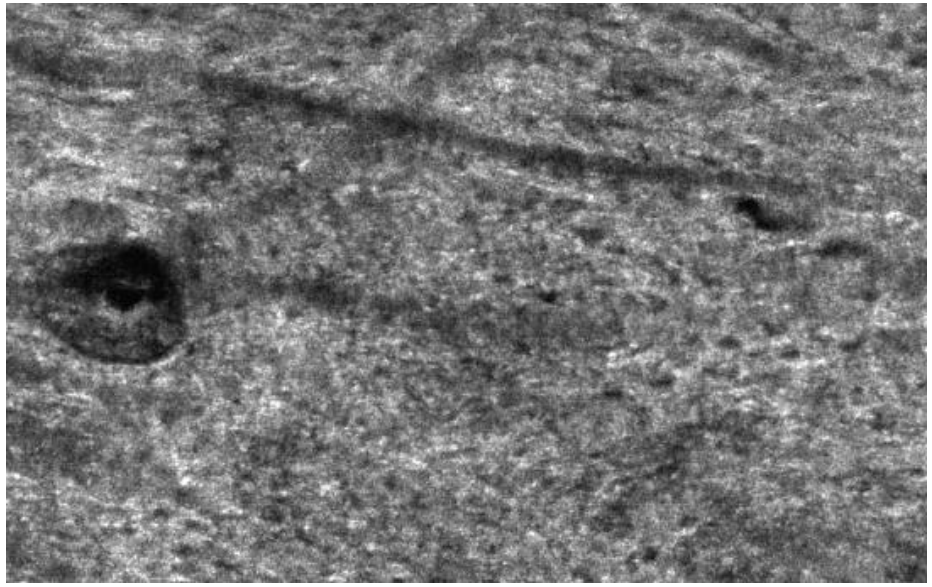
2D quantification of dermal fiber network (work in progress)

SKIN LAYERS & DEJ | CELLULAR | **TISSULAR**

Young dermal fiber network (23 years old)



Fragmented dermal fiber network (63 years old)

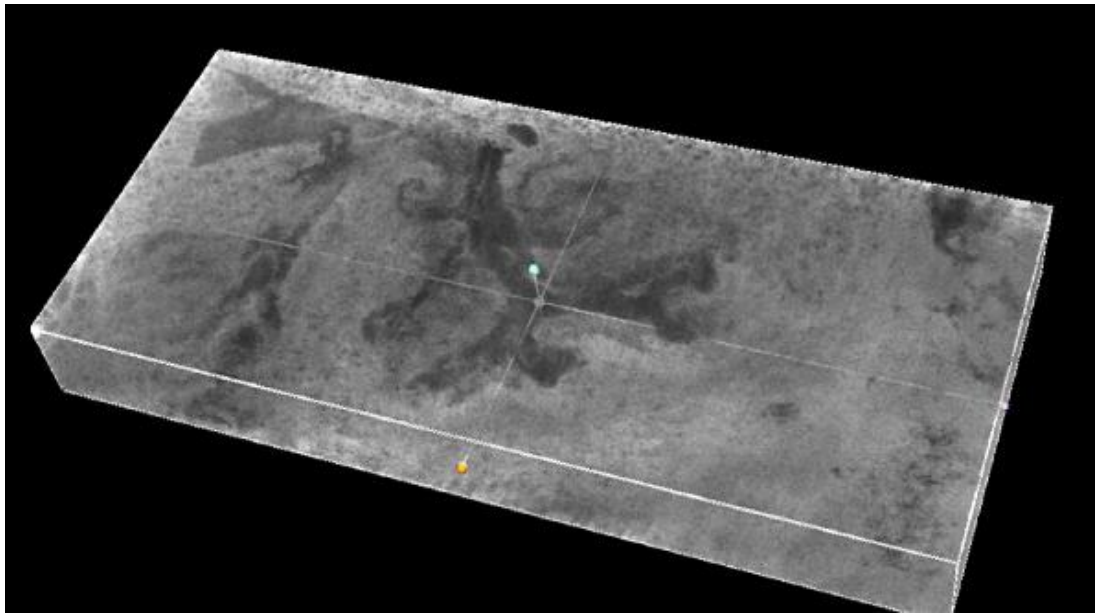


Collagen anisotropy quantification

QUANTITATIVE ANALYSIS BASED ON LC-OCT DATA

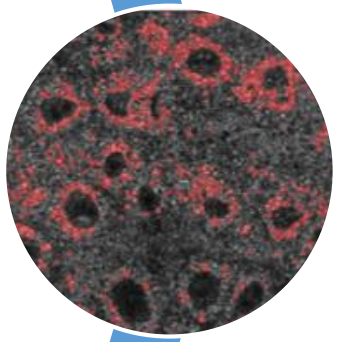
3D assessment of blood vessels size & organization (work in progress)

SKIN LAYERS & DEJ | CELLULAR | **TISSULAR**



Blood vessels size & organization

ASSISTANCE AT EACH STEP



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✓The new best-in-class skin imaging system, a **unique solution pairing penetration & cellular resolution** also including powerful **3D imaging** volumes and **AI-based segmentation and quantification** service

✓A full range of **possibilities to optimize** preclinical **research**, **development** or **characterization** of active ingredients benefits, **efficacy** of cosmetic formulations, **evaluation** of products to support marketing claims, or even **safety** through **3 levels of analysis**

Collaborative tests protocols to better design **custom-oriented studies.** Delivery of 3 levels of **tailored and interactive reports.** Selection of powerful **visual translation of results** for your customers

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