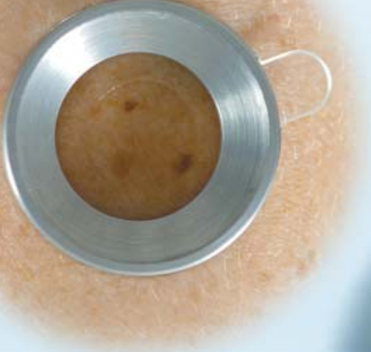


Topographical variations of normal skin

Stratum corneum | Stratum granulosum | Stratum spinosum | Stratum basale | Stratum reticulare

VivaScope® 1500:

Take an "optical biopsy"!

Confocal laser scanning microscopy opens a window into the epidermis and the dermis all the way down to the superficial stratum reticulare. It non-invasively images small sections of the skin – within living tissue with high resolution and contrast.

A metal tissue ring is being adhered to the skin with the help of an adhesive window (plastic).

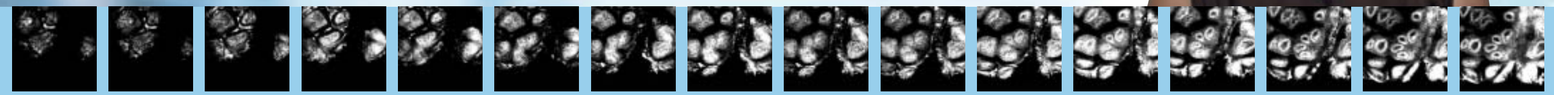
Subsequently, the tube of the objective lens magnetically adheres to the tissue ring, thus fixing the skin site to be examined.

Take care of our skin

During a life cycle, human skin is influenced by many **exogenic** factors:
Everyday care with personal care products, damage caused by ultraviolet light, wounds, toxic agents in private and professional settings, operation with consequent healing process, topically applied medication, just to name some of them.

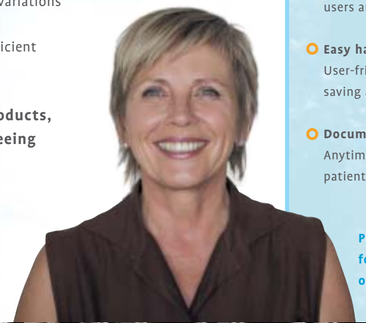
Endogenous factors, as well, determine cellular microstructures, topographical variations and therefore the gross appearance of human beings:
Acquired or inherited skin diseases, acne, loss of hair, diet with sufficient/insufficient vitamins, accelerated aging processes, etc.

Basic skin research, thus, is focusing on developing personal care products, as well as products that prevent or cure skin damage, while guaranteeing efficacy and compatibility to the customer or patient.



10µm | 16,34µm | 22,68µm | 29,02µm | 35,36µm | 41,70µm | 48,04µm | 54,38µm | 60,72µm | 67,06µm | 73,40µm | 79,74µm | 86,08µm | 92,42µm | 98,76µm | 105,10µm

Nevus on the hand of a 55-year-old man. The nevus can be observed through all layers of the epidermis down to the papillary dermis *in vivo*. Non-invasive, exact measurement (quantification, diameter, gross appearance) of dermal papillae (represented by black holes) is possible.
Mapped field of each image: 500µm x 500µm



VivaScope® 1500: Monitoring *in vivo*

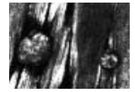
- **Variations in morphology**
  Exploring cellular and nuclear microstructures of skin lesions and adjacent healthy skin
- **No damage to the tissue**
  No processing (slicing, staining) of the living tissue necessary
- **Exact Measurement**
  Measuring the thickness of different layers of the skin (200µm – 300µm, depending on tissue)
- **Quantification**
  Keratinocytes, adnexa (hair follicles, sebaceous glands, etc.) and demal papillae
- **Monitoring of dynamic processes**
  Growth of hair, wound healing, laser treatment, therapeutic success, response of the skin to ultraviolet light, microcirculation, etc.
- **Painless**
  Non-invasive; laser wavelength harmless for users and test persons
- **Easy handling**
  User-friendly operation, thus time and money saving assessment
- **Documentation**
  Anytime reassessment and comparison of saved patient records (CD/DVD)

Please contact us for the complete list of publications

Aging

Topographical variations of skin can be observed *in vivo*.
Hair shaft, follicle and wrinkle in 5µm, 40µm and 80µm.
Mapped field of each image: 500µm x 500µm

Sweat ducts

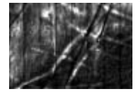


Follicle and sweat duct, plugged by anti-perspirant particles (axilla).
Mapped field: 500µm x 380µm

Cellulite

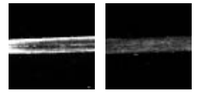
Image of stratum corneum with flattened corneocytes and dark wrinkles and glyphs. Other than usual, you can identify the stratum granulosum and the stratum spinosum in the same picture.
Mapped field: 500µm x 500µm

Wound healing



Process of wound healing: you see scar tissue to the left and normal tissue to the right. Reconstruction of the epithelium and therapeutic success can be monitored over a given period of time.
Mapped field: 4mm x 3mm

Hair



Grey, brown – colored? Laborious acquisition of defined hair specimens, which have to be damaged for certain aspects of analysis, belong to the past. VivaScope® 1500 documents the efficacy of hair care products *in vivo*!
Mapped field of each image: 500µm x 500µm

What is confocal laser scanning microscopy (CLSM)?

A confocal microscope consists of a small source of light which illuminates a small spot within the object; the illuminated spot is then imaged onto a detector through a small aperture.

The source, illuminated spot, and detector aperture are placed in optically conjugate focal planes, so we say they are confocal to each other. This enables us to build up the image with a defined horizontal layer of 5µm thickness, thus eliminating reflected light from other skin layers as well as abberations.
We use a near-infrared laser wavelength (830nm), which is absolutely harmless for user and patient.

VivaScope® 1500 System

Pentium Computer
and 17 " CRT Monitor;
Read/Write DVD/CD-R drive;
Motorized three axis stages

VivaScope® Control Software

The Windows based VivaScope® application software is a true Windows 2000® application.

Mapped Field

X- & Y-Directions:
± 2.0mm

Z-Stack Range:
16 frames at user defined depths

Optical Resolution:
Horizontal: 2.0µm; Vertikal: 5.0µm

Framerate:
~10 Frames per second

Mapped Field:
500µm x 500µm

VivaScope® 1500 is CE-certified.

How is contrast of the images being generated?

Between objective lens and skin, you apply an immersion, i.e. water or ultrasound gel.
Contrast is being generated due to naturally occurring refractive index variations of tissue microstructures.

	Refractive index
Water	~ 1.3
Keratin	~ 1.5
Cytoplasma	~ 1.4
Melanin	~ 1.7

Since water and cytoplasma have almost the same refractive index, cytoplasma is imaged with little contrast, whereas melanin, with a higher refractive index than water, acts as a contrast agent for the imaging. VivaScope 1500® uses a near-infrared laser wavelength (830nm), thus allowing the laser to penetrate deep into the tissue (approx. 200µm – 300µm, depending on the tissue). Only by adjusting refractive indices from object to skin we realize the imaging *in vivo*, without the use of additional contrast agents.