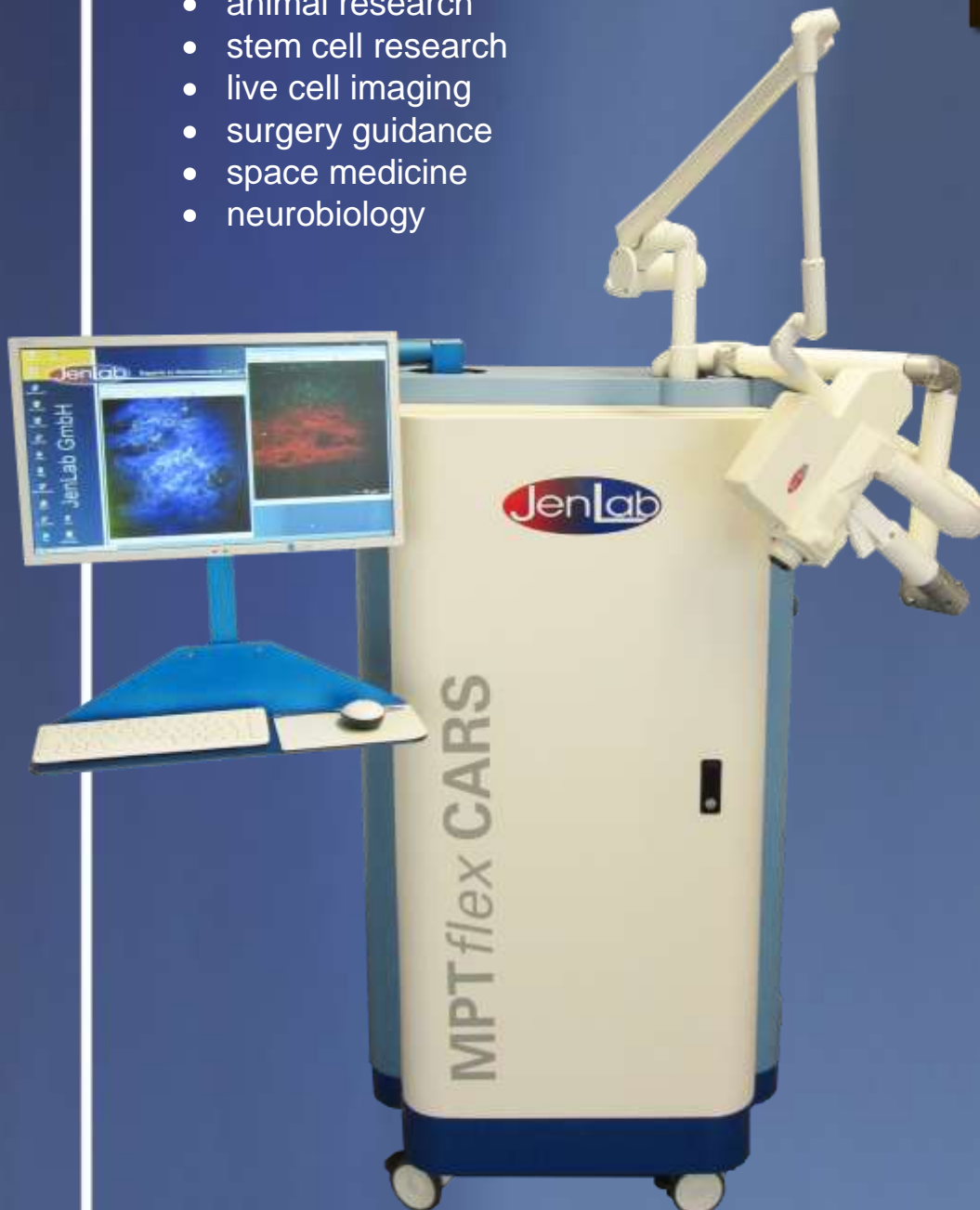
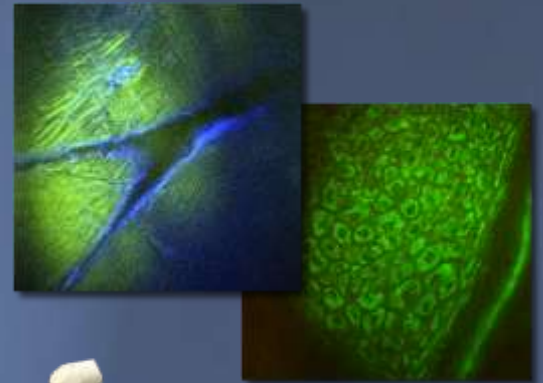


# MPT *flex*™ CARS

*In vivo* multiphoton tomography with chemical fingerprints

Optical biopsies with subcellular resolution and chemical information based on near infrared femtosecond laser technology for:

- cosmetic research
- evaluation of skin age
- melanoma/skin cancer detection
- in situ drug monitoring
- diagnosis of skin diseases
- tissue engineering
- animal research
- stem cell research
- live cell imaging
- surgery guidance
- space medicine
- neurobiology



# MPTflex™ CARS

## Product description

The MPTflex™ CARS tomograph is a CE-certified patented medical imaging system based on two-photon excited autofluorescence (AF) and an add-on module for Coherent Anti-Stokes Raman Scattering (CARS).

The endogenous *fluorescent* biomolecules NAD(P)H, flavins, porphyrins, elastin, keratin, and melanin as well as *non-fluorescent* biomolecules like water and lipids can be imaged within seconds and with submicron resolution. The extracellular matrix protein collagen can be detected by second harmonic generation (SHG). The signals are induced by two femtosecond near infrared laser beams that are guided through an optical arm to a flexible scan/detection head. AF, SHG and CARS signals are recorded by multichannel PMT detectors with single photon sensitivity. Horizontal and vertical sections up to 5 x 5 mm<sup>2</sup> are obtained by galvoscaning and piezo-driven optics. Additional add-on modules for two-photon FLIM and two-photon microendoscopy are available.

## Applications

Major clinical *in vivo* applications include early diagnosis of skin cancer and dermatitis as well as surgery guidance e.g. in melanoma and brain surgery. Multiphoton biopsies are obtained non-invasively and label-free with detailed information on living cells and tissue structures within seconds.

Long-term intratissue drug monitoring under physiological conditions for the evaluation of pharmaceuticals and cosmetics such as anti-ageing products have been performed on thousands of volunteers.

Multiphoton tomographs have been used to test the biosafety of sunscreen nanoparticles and to determine the skin age index of astronauts after exposure to UV and ionizing radiation.

The tomographs with their flexible patented scan heads and microendoscopes have been employed for small animal research e.g. neuron imaging in brain and spinal cord as well as stem cell tracking in transgenic mice.

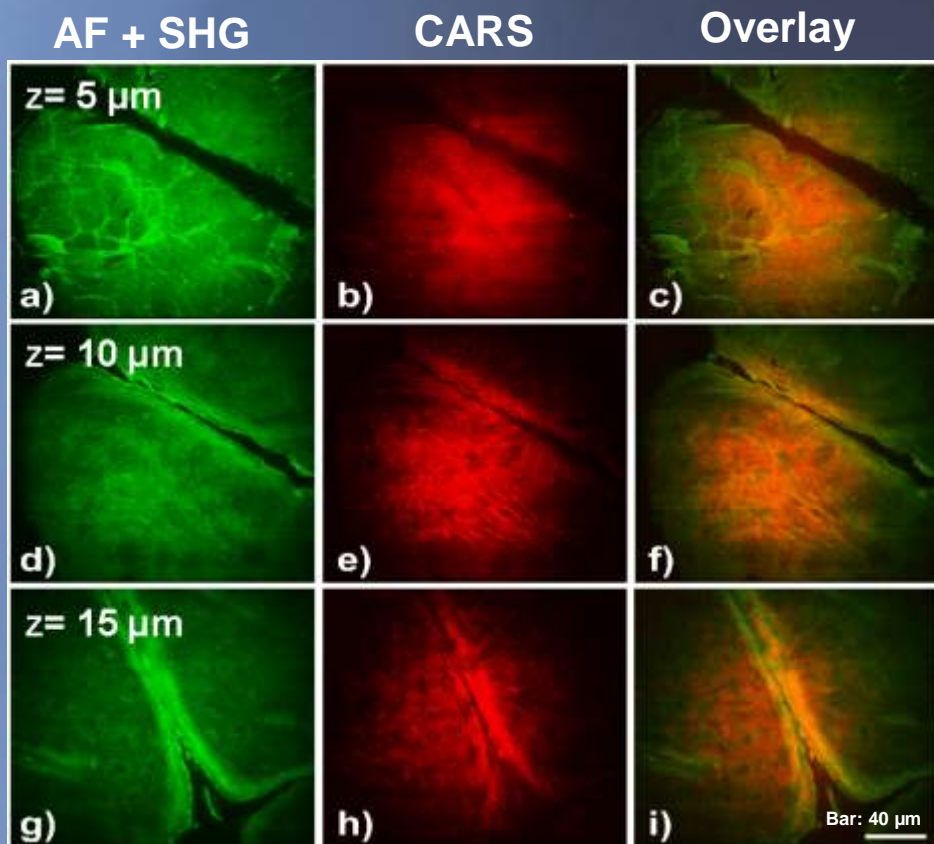
Cell biologists are using them for inverted and upright imaging of cell cultures.



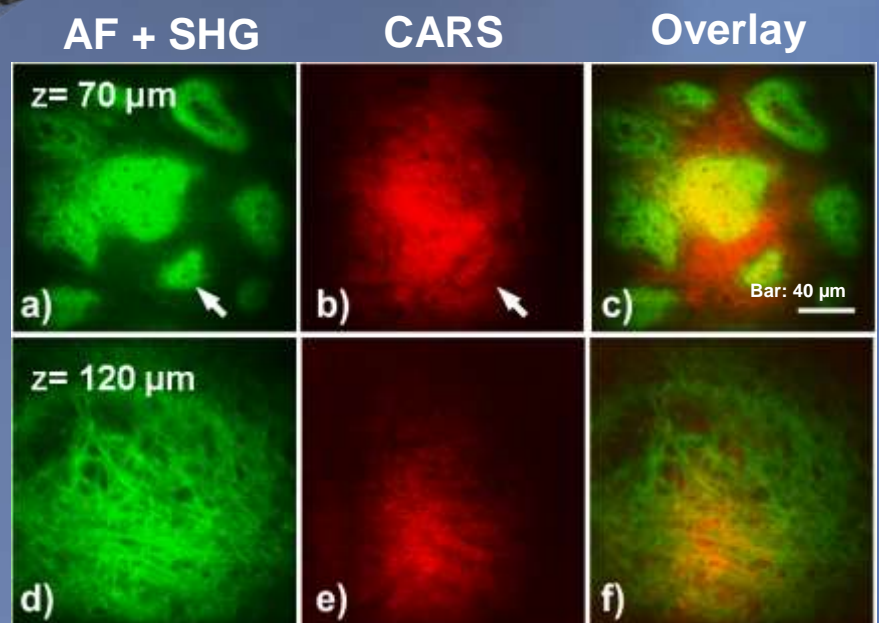
CARS energy diagram



# Autofluorescence (AF), Second Harmonic Generation (SHG) and Coherent Anti-Stokes Raman Scattering (CARS)



Non-invasive label-free *in vivo* skin biopsies.  
(CARS @ 2845  $\text{cm}^{-1}$ )



*In vivo* multiphoton skin sections of the collagen-elastin network and the lipid/protein distribution.

## Technical data

- pump laser: compact turn-key tunable Ti: Sapphire femtosecond laser
  - pulse width: 200 fs (after focusing optics)
  - repetition rate: 80 MHz
  - in situ laser power: 2 - 50 mW (after focusing optics)
  - wavelength range: 710 - 920 nm
- add-on modules for Stokes laser:
  - option 1: photonic crystal fiber (PCF) for broadband supercontinuum generation
  - option 2: optical parametrical oscillator (OPO)
- full-frame scanning, region-of-interest (ROI) scanning, line scanning, single-point illumination (spot scan)
- typical scan range: 350 x 350  $\mu\text{m}^2$  (horizontal); 200  $\mu\text{m}$  (vertical)
- large area scan: 5 x 5  $\text{mm}^2$
- spatial resolution: < 0.5  $\mu\text{m}$  (horizontal); < 2  $\mu\text{m}$  (vertical)
- focusing optics: 40x NA 1.3
- control and image processing software (JenLab Scan, JenLab Image)
- operating temperature: 20 - 23°C
- relative humidity: 5 - 65 %
- power requirements: 230 VAC (50 Hz) or 115 VAC (60 Hz)
- CE certified class 1M /IIa medical product
- 1800 mm x 780 mm x 1500 mm

The system requires an air-conditioned room with reduced ambient light.

These specifications are subject to change without notice.

JenLab GmbH  
Schillerstrasse 1  
07745 Jena  
GERMANY

Phone: +49 3641 470 501  
Fax: +49 3641 470 543  
E-Mail: [info@jenlab.de](mailto:info@jenlab.de)  
Web: [www.jenlab.de](http://www.jenlab.de)

