

# PORTABLE SKIN CELL MICROSCOPE IMAGING SYSTEM



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Portable

Non-invasive

*In vivo*

*In situ*

Lable-free

Real-time

Quantifiable





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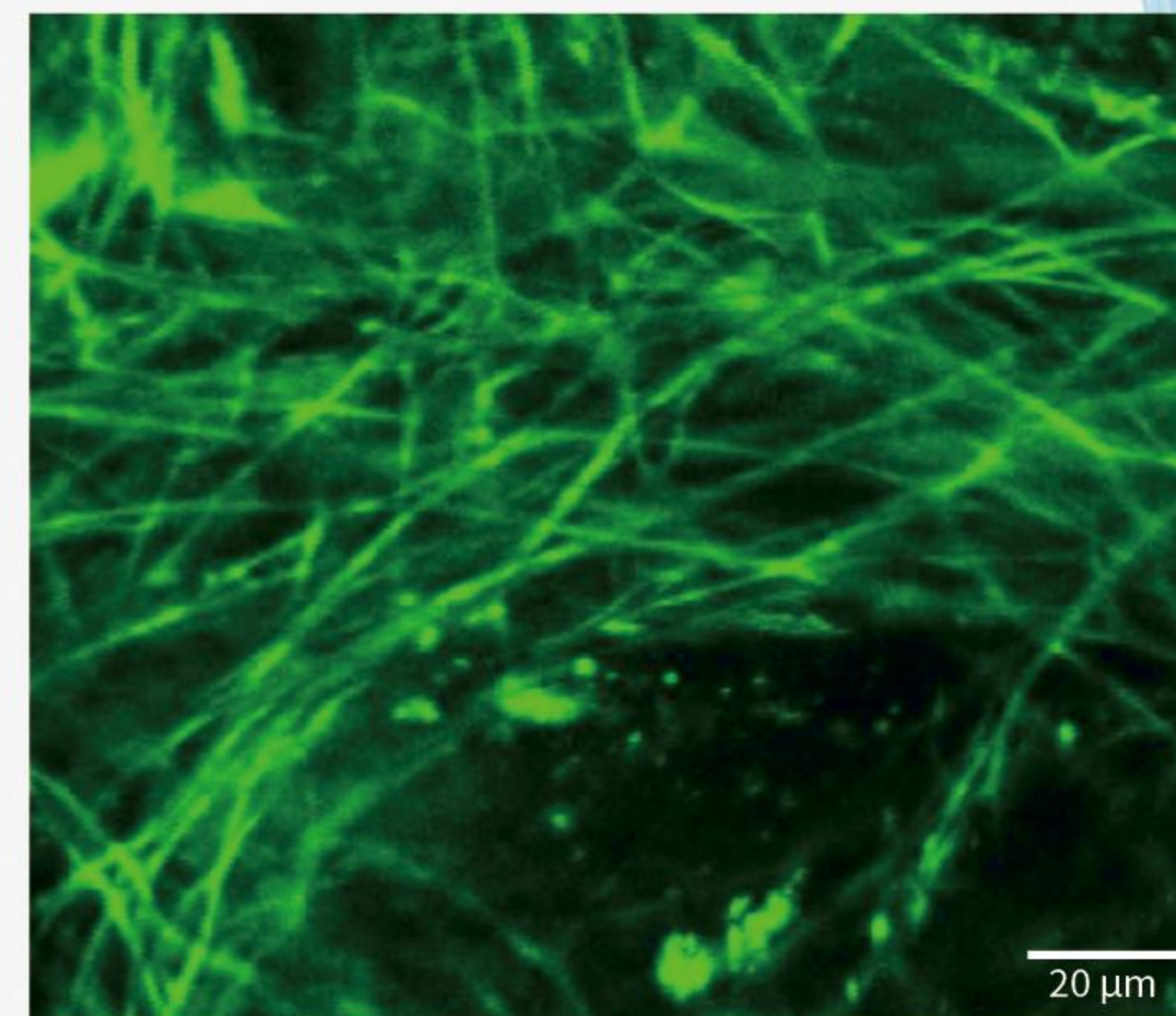
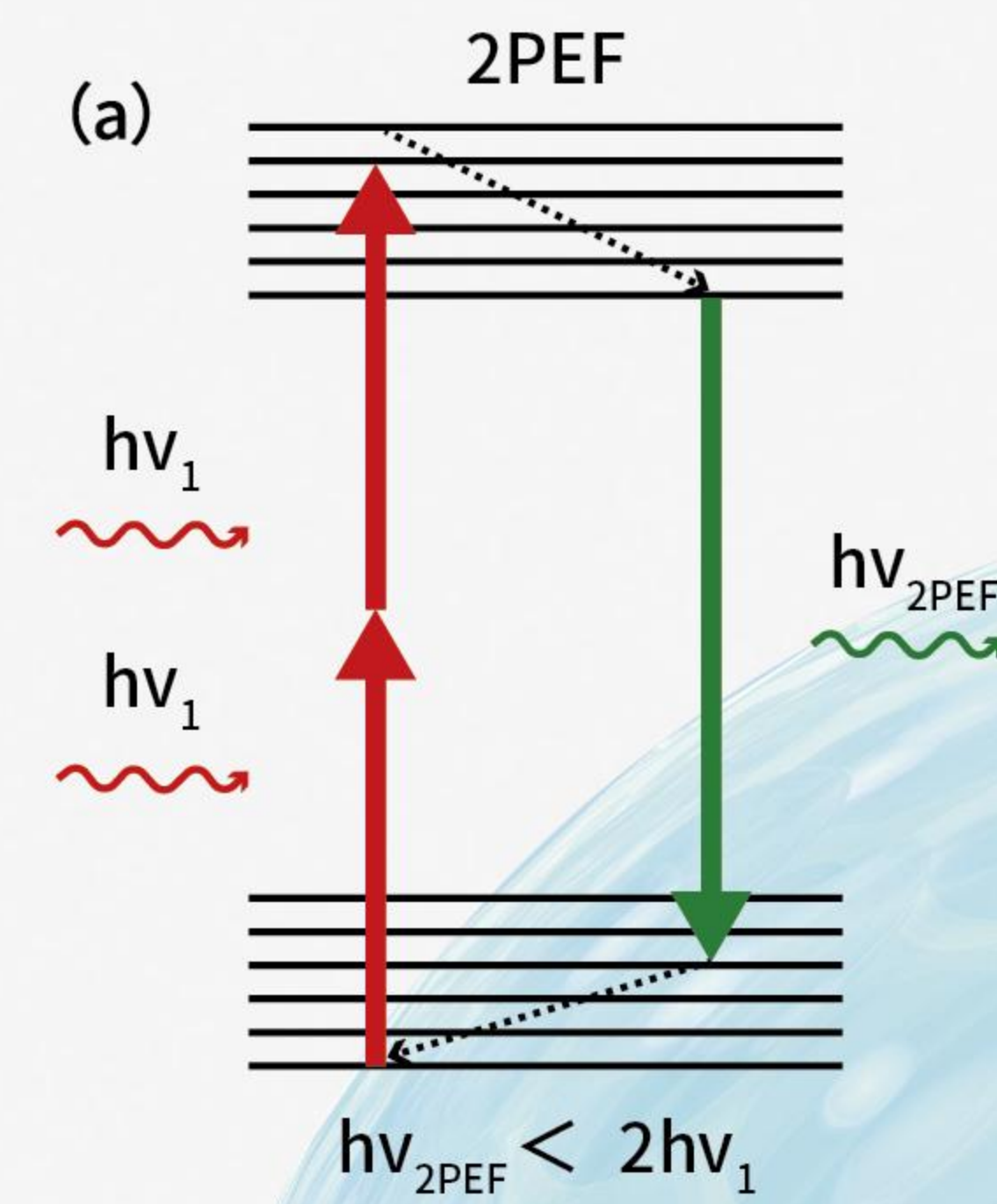
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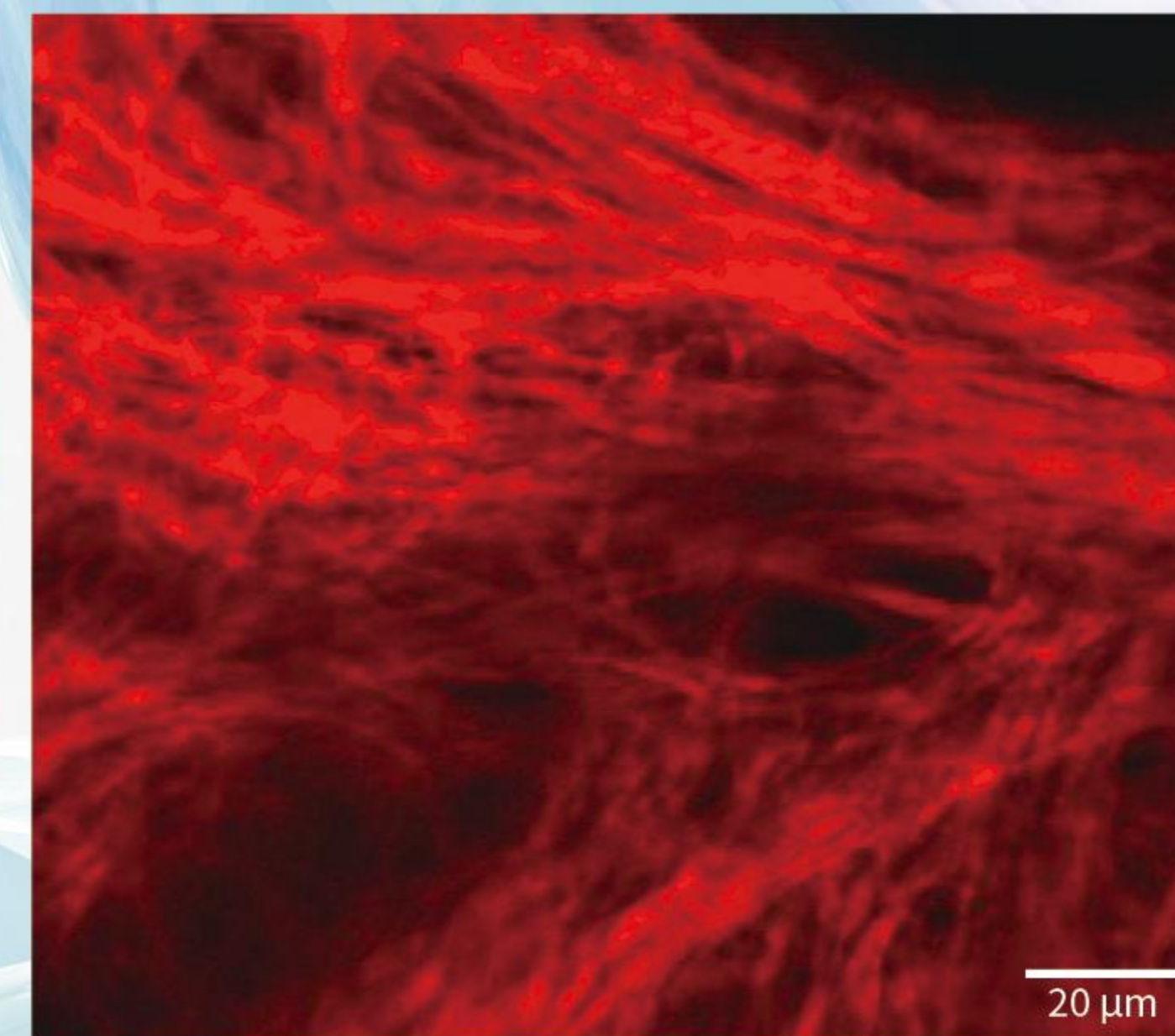
## TECHNICAL PRINCIPLES

### Two-photon excited fluorescence (2PEF)

Two-photon excited fluorescence (2PEF) refers to the process in which a ground-state fluorescent molecule or atom absorbs two photons and is moved to an excited state, and then returns to the ground level and fluoresces. After absorbing the first photon, the fluorescent molecule will transition to a virtual state. Only after the second photon interacts with the fluorescent molecule in its virtual state within a few femtoseconds can the fluorescent molecule reach the excited state. Autofluorescent substances refer to the fluorescent substances inherent in biological cells and tissues. Some cell and tissue contents are known as endogenous fluorophores because they emit a stable fluorescent signal when excited by the right wavelength of light.

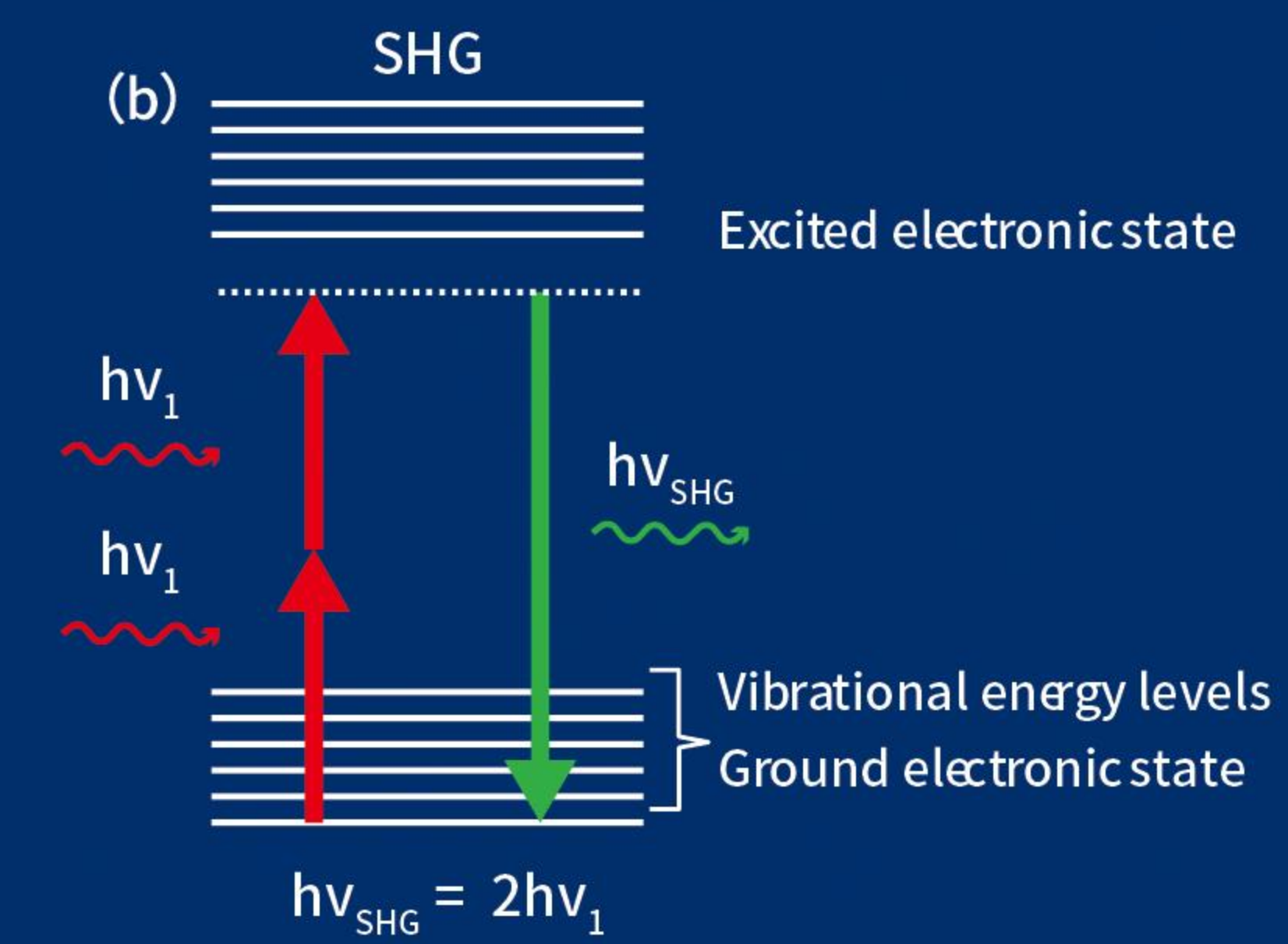


Elastin



Collagen

### Second-harmonic generation (SHG)



Second-harmonic generation (SHG) is a nonlinear optical process in which two photons of the same frequency interact with an asymmetric medium to excite it from the ground state to the virtual state. In the process of recovering from the virtual state to the ground state, a photon with doubled frequency and halved wavelength is released. Second harmonic imaging does not require fluorescent labeling as it can excite spontaneous fluorescent substance to the virtual state, and therefore is not affected by photobleaching or phototoxicity.



## IMAGING BASICS

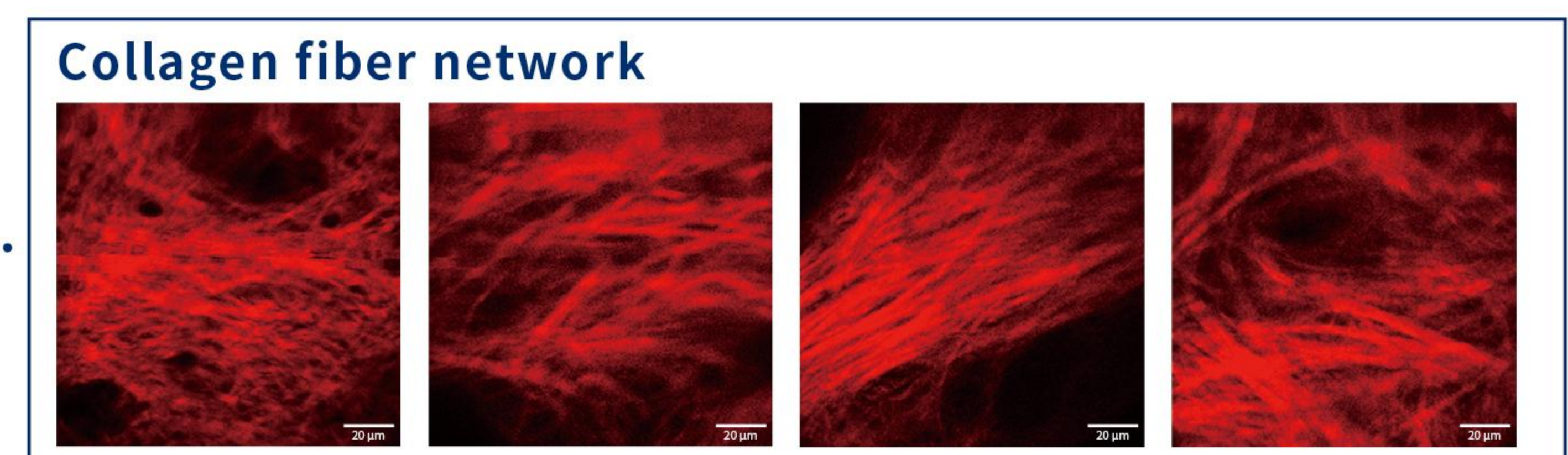
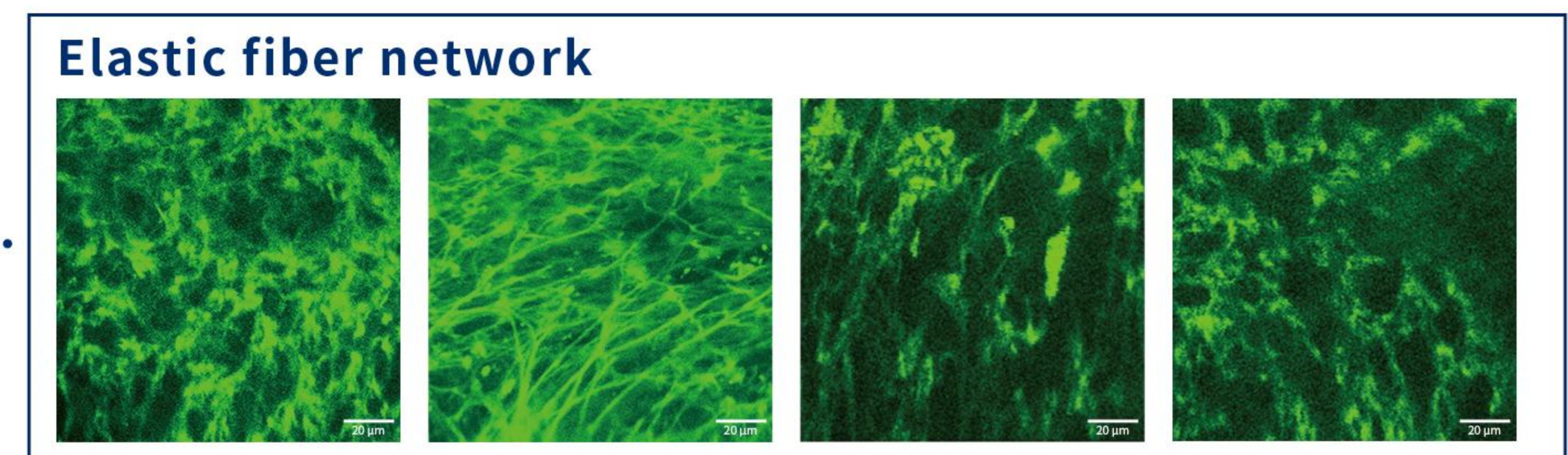
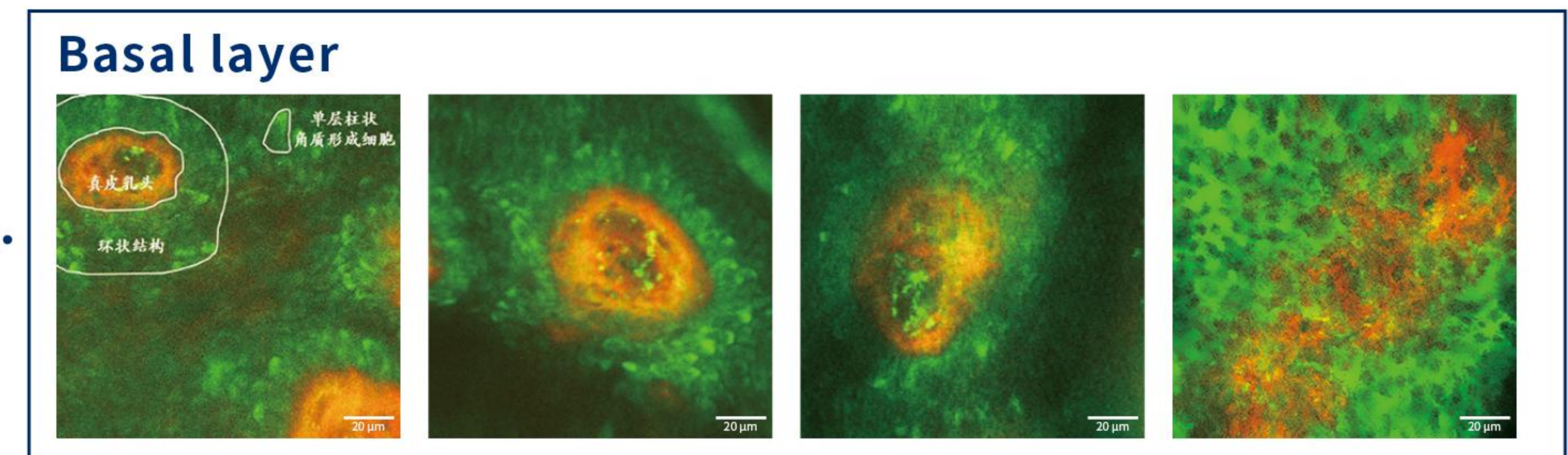
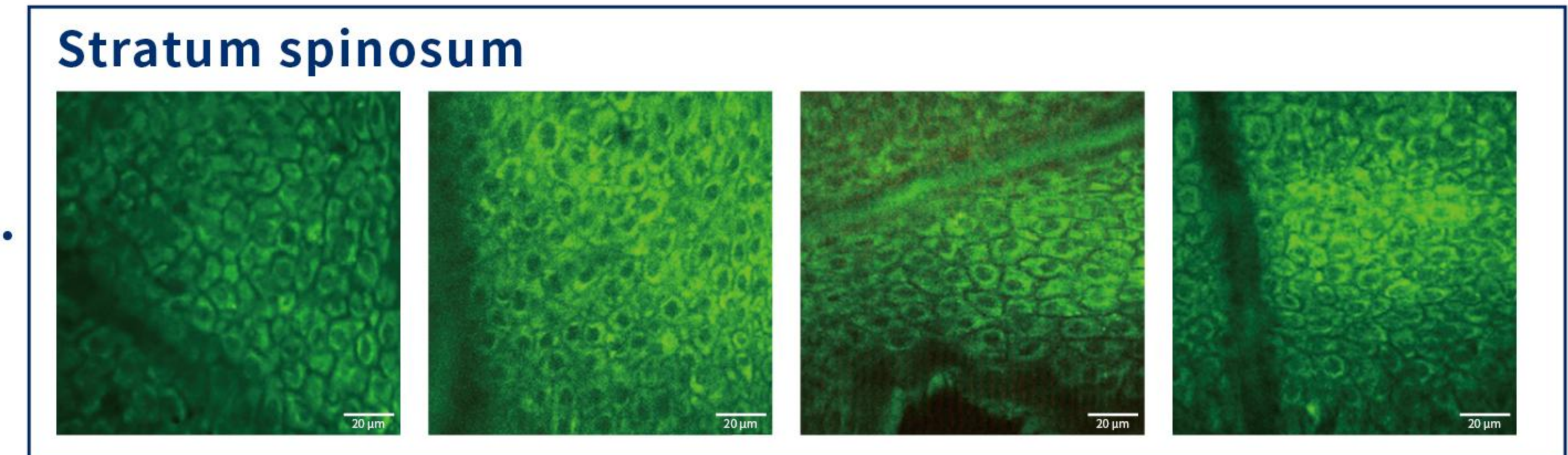
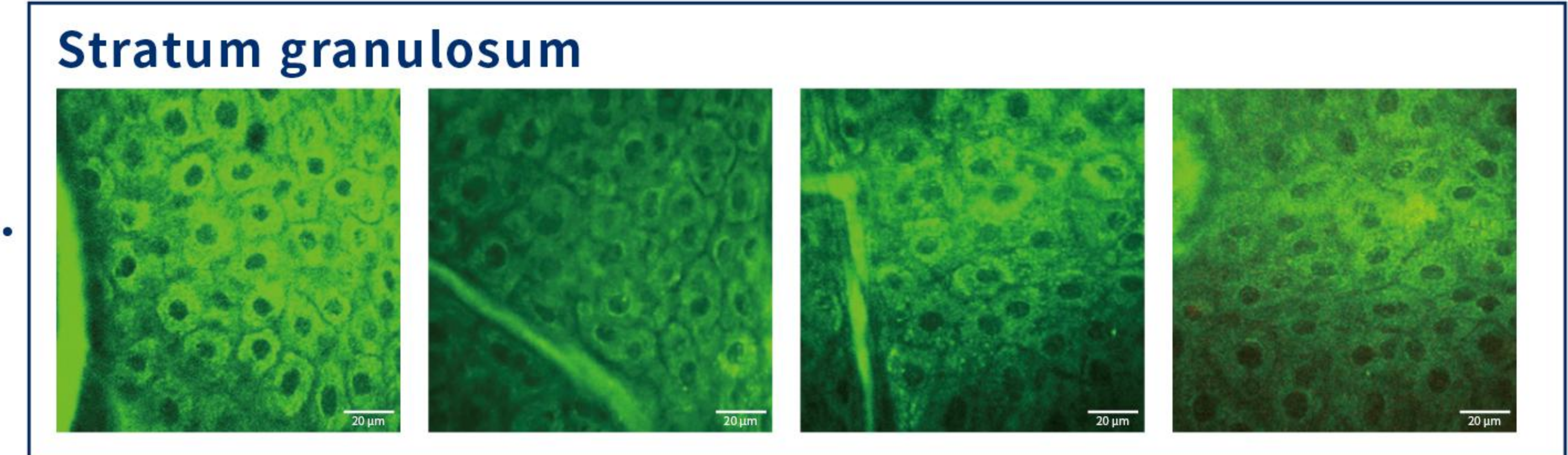
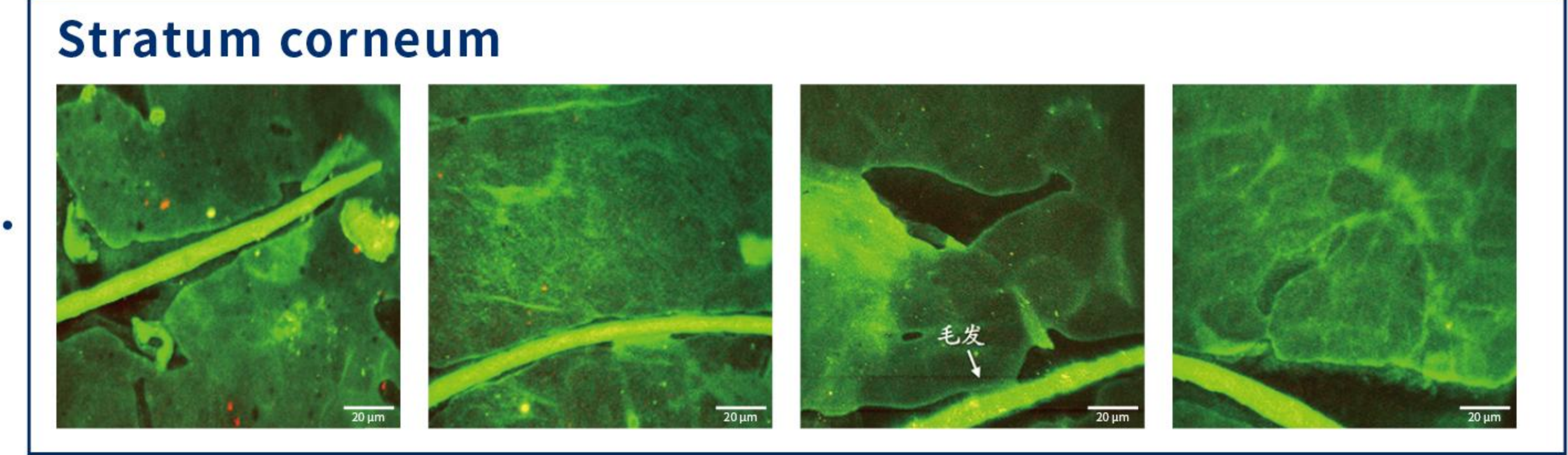
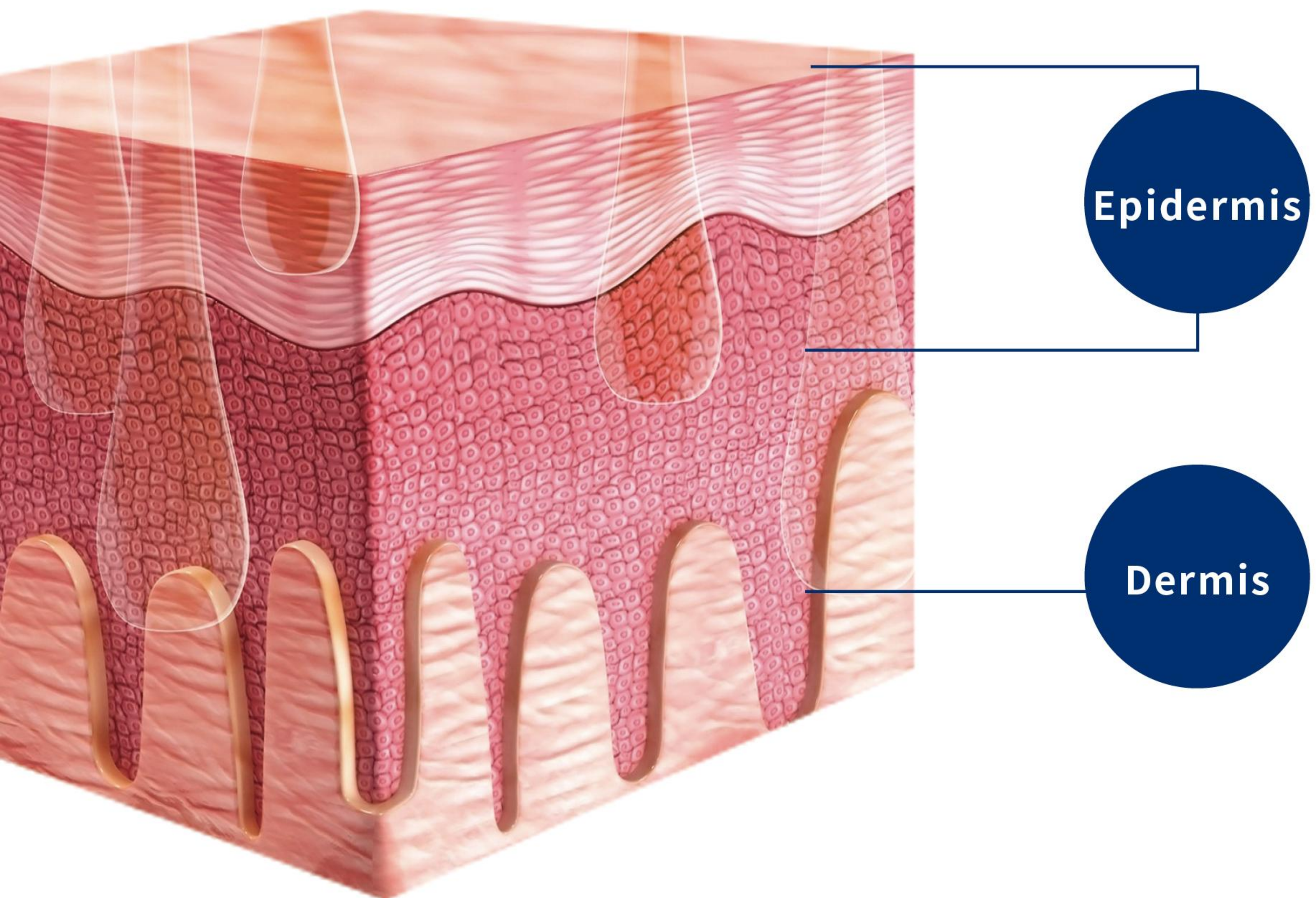
In two photon microscopy, the fluorescent substance of the specimen under the microscope is excited by the light of a certain wavelength to make it emit fluorescence and present fluorescence phenomenon.

Since there are abundant autofluorescence sources in skin tissue, multiphoton microscopy is especially suitable for imaging skin tissue without fluorescent dye.

In addition to spontaneous fluorescence, the emission in the visible range also includes SHG (second harmonic) signals. This special signal can show dermal collagen bundles and their differences from cellular components and elastin fibers.

<b>2PEF</b>
keratin, NAD(P)H, elastin, flavins, melanin ...
<b>SHG</b>
collagen.

## Morphological structures of the skin





## SYSTEM COMPONENTS

01

### Miniaturized two-photon microscope

This module is the core technology of the system, including the miniaturized two-photon microscope probe and laser conduction fiber, fluorescence signal acquisition fiber, MEMS scanning galvanometer cable and other consumables.

02

### Femtosecond pulsed laser ☒

The system offers three laser options: 780nm, 920nm and 1030nm, which are used to excite blue, green and red fluorescence respectively.

03

### Laser coupler

The laser coupler serves to adjust laser intensity, protect the laser shutter and adjust coupling.

04

### Fluorescent signal acquisition module

The acquisition and transformation of different fluorescence signals can be realized in this module. It adopts high sensitivity GaAsP photomultiplier tube (PMT) to detect weak fluorescence signal.

05

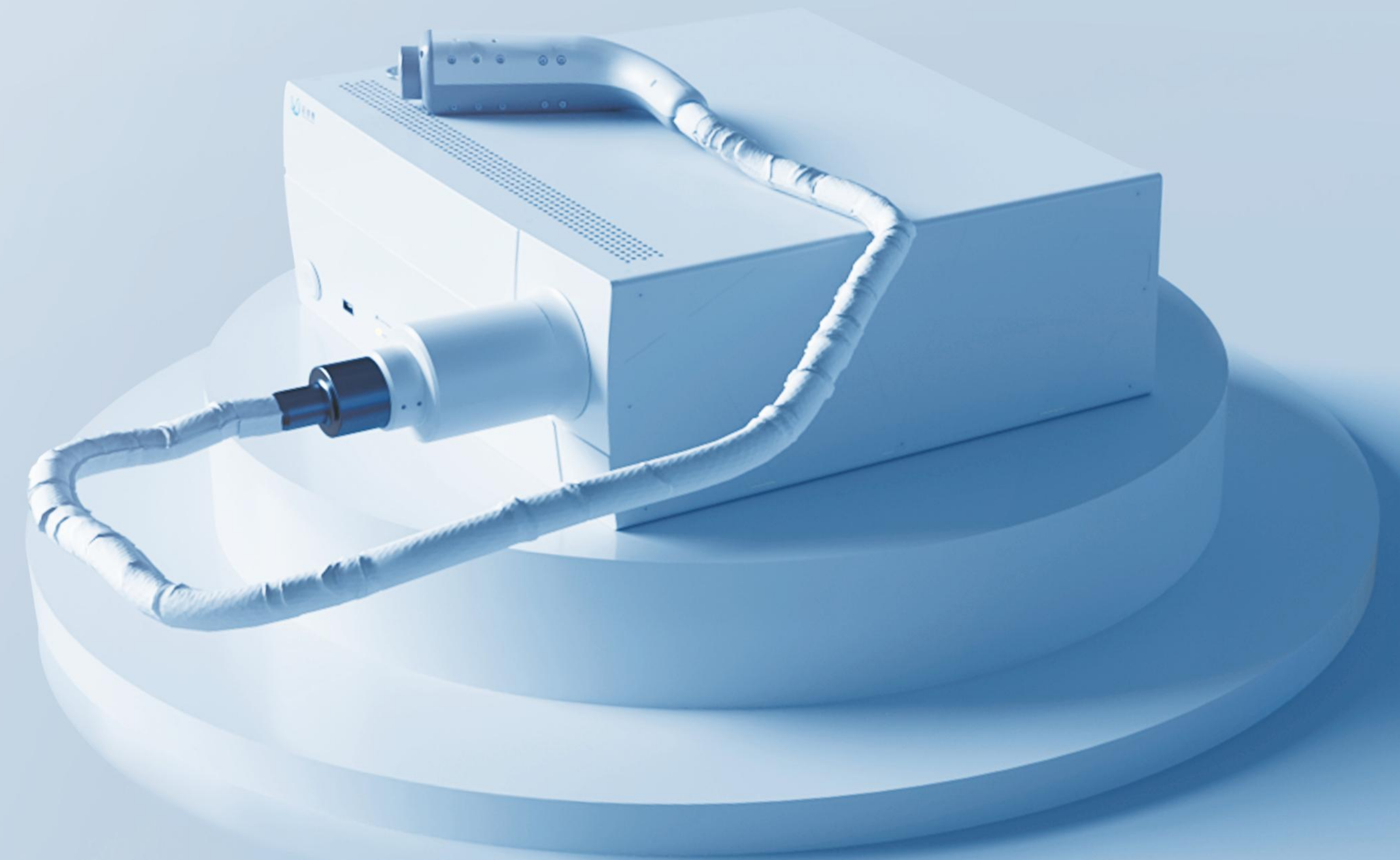
### Control module of image acquisition

The control center of the imaging system, including MEMS driver, signal generation module, signal acquisition module, signal processing and power supply, processes, restores and reconstructs the collected electrical signals to ensure the normal operation of the imaging system.

06

### Image processing module

The image processing module, which incorporates a computer workstation and imaging control analysis software, is used for image processing and analysis. Through this module, the imaging speed and laser power can be adjusted and images can be displayed, analyzed and processed.





## APPLICATIONS

### Efficacy evaluation of skin care products

- Experimental evaluation of human efficacy of skin care products
- Experimental evaluation on human efficacy of skin care raw materials
- Study on the action principle of skin care products



### Medical applications

- Dermatology: diagnosis of skin diseases
- Endocrinology: Study on the effect of diabetic AGEs on skin health
- Kidney disease hemodialysis center: Exploration of individualized dialysis program
- Plastic surgery: Real-time detection of plastic skin graft activity

### Efficacy evaluation of aesthetic medicine

- Evaluation of laser cosmetic efficacy
- Human cell activity detection
- Quantitative evaluation of elastic and collagen fibers
- Skin age detection

