PeriCam PSI System

Revealing microcirculation with real-time imaging for animal applications

Product brochure

PERIMED
The Technology

What is the PeriCam PSI system?

The PeriCam PSI System is a blood perfusion imager based on Laser Speckle Contrast Analysis (LASCA) technology. LASCA provides new means to study the microcirculation in ways that were not possible in the past. It allows visualization of tissue blood perfusion in real-time and combines dynamic response with high spatial resolution. There is no influence on the perfusion, as no direct contact to the tissue is needed, nor dyes or tracer element.

What is Laser Speckle Contrast Analysis (LASCA)?

When an object is illuminated by laser light, the backscattered light will form a random interference pattern consisting of light and dark areas. This pattern is called a speckle pattern.

If the illuminated object is static, the speckle pattern is stationary. When there is movement in the object, such as red blood cells in tissue, the speckle pattern will change over time, causing blurring. Depending on the degree of movement, the level of blurring will differ. The more movement, the more blurred the speckle pattern will appear. The level of blurring is quantified by the speckle contrast. By analyzing these contrast fluctuations, information about the blood perfusion in the tissue is obtained. 1,2

In the PeriCam PSI System, an advanced CCD camera will record these changes in the speckle pattern at a speed of up to 113 images per second and up to 1386 x 1036 pixels per image. The result, an instant image of the microcirculation. Blood perfusion is expressed in the arbitrary units, Perfusion Units (PU).

PeriCam PSI System: HR or NR?

The PSI PeriCam System comes in two versions; the HR (high resolution) model – designed for small measurement areas, with higher magnification optics and a microscope-style stand, and the NR (normal resolution) model – which allows for greater flexibility in measurement area and working distance. The HR model is most suitable for applications where imaging small details is important, such as cerebral blood flow in mice. It operates at a fixed working distance of 10 cm and images up to 20 x 27 mm at a resolution of 20 µm/pixel. The NR model can reach 100 µm/pixel at 10 cm working distance, but can also be operated up to 40 cm away to enable a measurement area as large as 24 x 24 cm.

Some Animal Applications

MCAO – Stroke
Middle Cerebral Artery Occlusion (MCAO) is a commonly used stroke model in mice and rats. A major drawback with this model is the risk of incomplete occlusion upon filament insertion. As a quality control, the cortical blood flow can be monitored to ensure that a stroke has in fact been induced.³ The PeriCam PSI System provides data displaying both the dynamics and the spatial distribution of the perfusion throughout the procedure in real time. This opens up the possibility to not only confirm complete occlusion, but also to study the extent of the stroke by quantifying the affected area.

Hindlimb Ischemia Model
The hindlimb ischemia model is an animal model in which ischemia is induced by femoral artery ligation. It is often used to investigate the formation of new blood vessels during angiogenesis and arteriogenesis. In order to evaluate the model, blood perfusion imaging is commonly used.

The PeriCam PSI System will not only provide high resolution images of the blood perfusion distribution in the legs, but also opens up the possibility to follow the vascular dynamics after heat exposure, for example.

Cortical Spreading Depolarization
It is well known that cerebral blood flow is coupled to the neuronal response in the brain. Events, such as cortical spreading depolarization/depression (CSD), may therefore be characterized by studying changes in the cerebral blood flow.

The Pericam PSI System has proven useful for this purpose, as it is possible to investigate changes in high resolution and at high speed. Data evaluation is facilitated by software features, such as viewing the data as video recordings and applying different types of color scales.

Why choose the PeriCam PSI System?

1. Simple to get started
   - Quick and easy to adjust angle
   - Color camera for documentation
   - Automatic working distance calculation
   - Pre-define Regions Of Interest (ROIs)
   - Up to 113 images per second

2. Analyze data while recording
   - Instant update of data, graphs and images, in real-time
   - Add/Edit ROIs during measurement
   - Automatic background compensation once per second
   - Stable and accurate results at varying lighting conditions

3. Advanced data reviewing
   - Edit ROIs for single images, complete run or sections of a run
   - Time periods Of Interest - TOIs
   - Perfusion overlay feature
   - View recording in playback mode at different speeds

PeriCam PSI Specifications

- Image size (maximum):
  - Normal Resolution model: ~24 x 24 cm (at 40 cm)
  - High Resolution model: ~20 x 27 mm

- Image acquisition rate:
  - Up to 96/113 images per second depending on frequency of background light
  - Automatic frequency detection and synchronization

- Image resolution:
  - Maximum 1386 x 1036 measurement points
  - Normal Resolution model: 100 μm/pixel (at 10 cm)
  - High Resolution model: 20 μm/pixel

- Working distance:
  - Normal Resolution model: 10-40 cm
  - High Resolution model: 10 cm

- Dimensions and weight:
  - Scanner head: 22 x 15 x 20 cm, ~2.4 kg

- Laser safety:
  - Class 1 per IEC 60825-1:2007 - Safe to use without eye protection
  - Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007