

Deep Tissue Microcirculation Imaging

A non-invasive method using circularly polarized light

Microcirculation imaging is a useful tool to determine a patient's state dependent on oxygen perfusion through the capillaries or arterioles at a tissue site. Additionally, the pathology of this microvasculature can give an indication of the presence of a disease state such as diabetes, hypertension, chronic heart disease or sepsis.

Current methods for imaging microcirculation include Doppler laser imaging, videomicroscopy, and speckle analysis. These methodologies can contain motion artifacts, long measurement time or require contact with the tissue site leading to tissue deformation and further error in the analysis. Furthermore, current noninvasive methodologies are only able to image at a working depth of a millimeter or less, leading to a limited scope.

The technology

Researchers at Virginia Commonwealth University have designed a method of imaging microcirculation utilizing circularly polarized light to achieve a working distance of multiple millimeters. Circular polarization can penetrate deep into tissues before it is scattered enough to become depolarized, at which point the depolarized light reflected back can be detected by a photodetector. Any polarized light that is returned would be filtered out with a depolarized filter. In addition this filter could be tuned to a specific frequency, such that the clearest image of the blood platelets can be formed dependent on the wavelength range with the highest absorption rates. From platelet imaging, red blood cell count and blood flow velocity can be determined.

Benefits

- » Non-contact imaging method
- » Deeper imaging depth than current non-contact methods
- » Increase in imaging quality at organ surfaces

Applications

- » Imaging circulation in microvasculature, such as arterioles and capillaries
- » Determination of sufficient oxygen or nutrient perfusion
- » Diagnosis of diseases dependent on microvascular pathology

Patent status:

Patent issued: U.S. rights are available [US 8,214,023 B2](#)

License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Biomedical

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