

# Tissue Viability Imager TiVi9000Dental

for

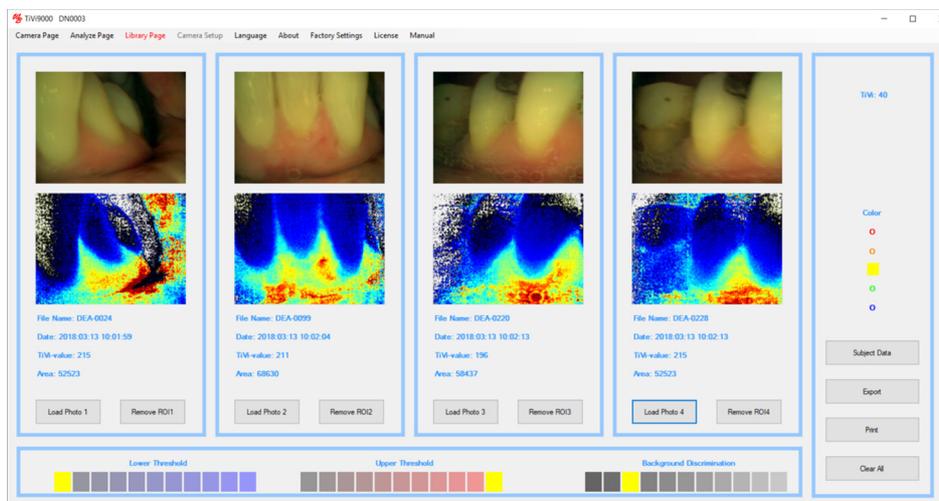
Microcirculation Mapping

based on

Polarisation spectroscopy imaging



using hand-held probe, PC or tablet computer



for investigation of intraoral cavity mucosa

Tissue Viability Imaging quantifies what can be observed by the unaided eye and takes subjectivity out of tissue testing.

*Wheels Bridge*

PIONEERS IN TISSUE VIABILITY IMAGING



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## Intended Use

The *TiVi9000Dental* is designed to map and display real time dynamic alterations in oral mucosa or other tissue microcirculation, depicting vasodilation and vasoconstriction effects related to:

- Topical or systemic applications of vaso-active materials
- Tissue irritation or tissue damage
- Microcirculation alterations in the gingiva
- Safety and efficacy of dental products under development

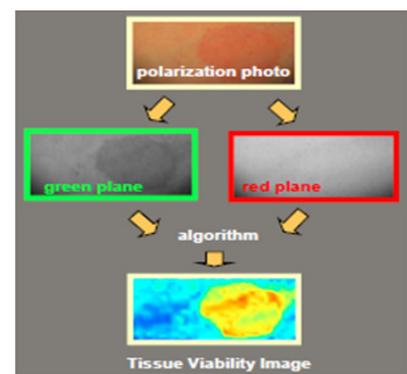
Microvascular Research | Rapid Screening of oral mucosa | Demonstration

## Basic Operation Principle and Analysis Tools

The Tissue Viability Imager *TiVi9000Dental* continuously displays a dynamic map of the microcirculation using live video capture. Individual image snapshots are selected and saved to file for detailed analysis and comparison. Unlike other imaging technologies, this methodology is unaffected by movement artefacts making it an ideal tool for investigating microcirculation also in moving objects. Local erythema and blanching are easily and accurately quantified through region of interest analysis. After selecting control and test site regions of interest in individual microcirculation images, the *TiVi9000Dental* software calculates relative changes in erythema intensity and area. Measurement data may be exported to an Excel spread-sheet or compiled as a hard-copy report. All images are exportable to the Tissue Viability Imager *TiVi700* system for optional in-depth analysis.

Tissue microcirculation is most effectively investigated through non-invasive and noncontact methods in order to avoid adverse effects from injected tracer elements and applied probes. Since the microvascular bed is highly heterogeneous by nature, imaging methods are far superior to those utilizing single point measurements. The patented TiVi technology combines polarization spectroscopy with advanced image processing resulting in highly versatile yet easy to use imaging systems. In studies involving dental and skin care, cosmetics, textiles, drug development, occupational medicine and microvascular or medical research, *TiVi9000Dental* increases productivity by automatically visualizing and quantifying important parameters such as erythema and blanching. All measurements are collected without the need to touch the tissue under investigation and without being affected by tissue movement artefacts. Mini-tablet computer portability greatly facilitates studies in the laboratory as well as in the clinic.

Operating in cross-polarized mode, the green component of light reaching the camera detector is attenuated due to a high absorption rate by the red blood cells. At the same time the red light component is virtually unaltered due to its low rate of absorption by the red blood cells. In contrast, surrounding tissue absorbs both the green and the red light components at approximately the same rate. *TiVi9000Dental* takes advantage of this wavelength dependence in red blood cells absorption. The software first separates the colour matrixes and then applies an algorithm subtracting the value of each picture element in the green colour matrix from the corresponding value in the red colour matrix. The software then generates and displays an output matrix which represents the local red blood cell concentration.



## Selected References

- Sub-epidermal imaging using polarized light spectroscopy for assessment of skin microcirculation.* O'Doherty J, Henricson J, Anderson C, Leahy MJ, Nilsson GE, Sjöberg F. *Skin Res Technol.* 2007 Nov;13(4):472-84.
- Comparison of instruments for investigation of microcirculatory blood flow and red blood cell concentration.* O'Doherty J, McNamara P, Clancy NT, Enfield JG, Leahy MJ. *J Biomed Opt.* 2009 May-Jun;14(3).
- Cutaneous bioengineering instrumentation standardization: the Tissue Viability Imager.* Nilsson GE, Zhai H, Chan HP, Farahmand S, Maibach HI. *Skin Res Technol.* 2009 Feb;15(1):6-13.

More reference and information about the TiVi-technology on our WEB-site: [www.wheelsbridge.se](http://www.wheelsbridge.se)