Information

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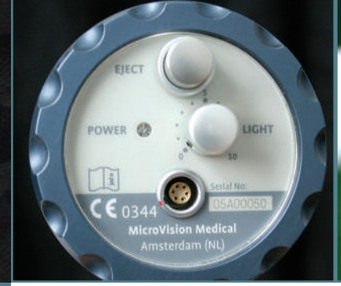
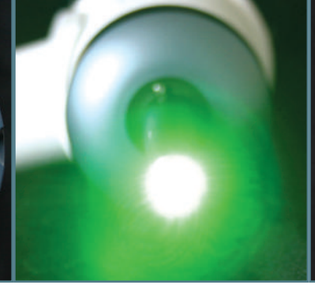
The MicroScan

Microcirculation assessment for easy, fast and effective treatment monitoring of critical care therapies.

MicroVisionMedical
a view to cure

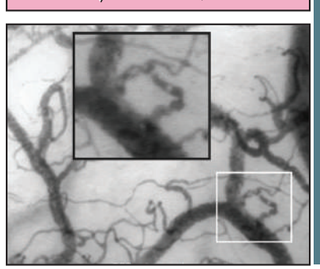




MicroScan System package

The MicroScan System package consists of:
- MicroScan Imaging Unit (pictured above)
- MicroScan Battery Unit (pictured on the top right)
- MicroScan Calibration Unit
- MicroScan Lens (20 pcs included in package)

The Automated Vascular Analysis software can be purchased separately and requires a Windows PC or laptop with a firewire input and SXGA resolution (1280 x 1024). Storage of of > 500 Gb is recommended.



Principles of Sidestream Dark Field Imaging(SDF)

SDF (Sidestream Dark Field) imaging, as used in the MicroScan, utilizes a novel method of reflectance avoidance in which the illuminated light and reflected light travel via independent pathways.

In this modality, a light guide is surrounded by green (540 nm) light emitting diodes (LEDs).

The light from the LEDs is absorbed by the hemoglobin of erythrocytes and results in the ability to observe the flowing cells.

The concentrically placed LEDs at the tip of the probe, protected by the disposable cap, send penetrating green light deep into the tissue, illuminating the microcirculation.

By not being in direct optical contact with the sensing central core of the probe, no direct surface reflections are allowed to interfere with the image of the microcirculation.

A lens is used to project the image onto a video camera, providing clear images of the capillaries without blurring.

The images can be assessed live by the physician without any additional tools as has been showed by Arnold et al. in 2009 to be as reliable as computer aided assessment.

The MicroScan is a valuable tool for patient monitoring and treatment during (septic) shock.

The MicroScan is a hand held device that allows the physician to easily as sess the microcirculation at the bed side.

In 2002 De Backer et al. showed that “The proportion of perfused small (< 20 um) vessels was reduced in patients with sepsis (48 [33-61]% versus 90 [89-92]% in volunteers, p < 0.001). These alterations were more severe in nonsurvivors.”

In 2004 De Backer et al. showed that “The proportion of perfused vessels was higher in patients who survived than in [cardiogenic shock] patients who did not survive in all vessels (90% [84%- 93%] vs 81% [74%-87%] , P < .05) and in small vessels (64% [49%-68%] vs 43% [37%-62%], P < .05).

In 2004 Sakr et al. showed that “The changes in microcirculatory perfusion were independent of changes in systemic hemodynamic variables and thus cannot be predicted by global hemo-dynamic measurements.”

In 2007 Trzeciak et al. showed that “early microcirculatory perfusion indices in severe sepsis/septic shock were more markedly impaired in nonsurvivors compared with survivors “

In 2008 Trzeciak et al. showed that “Early protocol-directed resuscitation were associated with reduced organ failure at 24 h in patients with sepsis. These data support the hypothesis that targeting the microcirculation distinct from the macrocirculation could potentially improve organ failure in sepsis.”

This led DeBacker and his team to conclude in 2010 that “Microcirculatory alterations are frequently observed in critically ill patients, and especially in patients with severe sepsis. These alterations are characterized by a decrease in capillary density and an increase in heterogeneity of perfusion with non-perfused in close vicinity to well-perfused capillaries. As a heterogeneous decrease in perfusion is less well tolerated than a homogenously decreased perfusion, the diagnostic tool used to assess the microcirculation should be able to detect heterogeneity of perfusion. This is best achieved with handheld micro-videoscopic techniques, such as OPS and SDF.”

De Backer, D. (2002). Microvascular blood flow is altered in patients with sepsis. American Journal of Respiratory and Critical Care Medicine, 166(1), 98-104.

De Backer, D. (2004). Microvascular alterations in patients with acute severe heart failure and cardiogenic shock. Am Heart J, 147(1), 91-9.

Sakr, Y. (2004). Persistent microcirculatory alterations are associated with organ failure and death in patients with septic shock. Critical Care Medicine, 32(9), 1825-31.

Trzeciak, S. (2007). Early microcirculatory perfusion derangements in patients with severe sepsis and septic shock: Relationship to hemodynamics, oxygen transport, and survival. Ann Emerg Med, 49(1)

Trzeciak, S. (2008). Early increases in microcirculatory perfusion during protocol-directed resuscitation are associated with reduced multi-organ failure at 24 h in patients with sepsis. Intensive Care Medicine, 34(12), 2210-2217.

De Backer, D. (2010). Monitoring the microcirculation in the critically ill patient: Current methods and future approaches. Intensive Care Medicine.

Using the MicroScan

Homogeneous perfusion of the capillaries is a prerequisite for normal function of the microcirculation and abnormal perfusion, or diminished capillary perfusion, is an early and sensitive indicator of cardiovascular disease and failure.

The MicroScan is used to enable the comprehensive evaluation of the functional state of the microcirculation in patients at the bedside.

Trzeciak et al. concluded in 2009 that “A Point of Care determination of Microvascular Flow Index had good agreement with conventional off-line analysis, and was highly sensitive and specific for detecting impaired microvascular flow. As the microcirculation emerges as a viable resuscitation target for new therapeutic strategies in critically ill patients, this bedside technique can be used to generate real-time data on the status of microvascular perfusion.”

This measurement represents a truly sensitive measurement which is indicative of cardiovascular function or dysfunction.

Additionally, morphological characteristics of the microcirculation, such as functional capillary density and micro-vessel morphology, can be measured using our specialized Automated Vascular Analysis software.