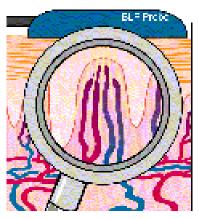
Laser Doppler Flowmetry Andrew P. Aubee February 6th, 2006 ELE 482

Abstract- Laser Doppler Flowmetry is an inexpensive, noninvasive method of measuring the continuous circulation of blood flow on a microscopic level. This method of measuring the flux of red blood cells is growing in practical application.

A Laser Doppler Flowmeter (LDF) works by reading the frequency of the oscillation produced by the Doppler frequency shift of the red blood cells in a peripheral tissue and translates the frequency to an intensity oscillation.



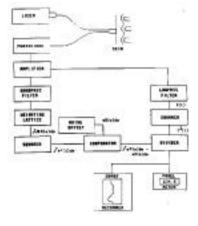
The apparatus is composed of a low-powered laser and probe that takes readings and sends results to an analyzer. The apparatus can penetrate 1-4 mm of nonpigmented tissue. The light emitted and reflected is fed through optical fibers to the analyzer-recorder. The output of the LDF is the flux of red blood cells, defined as the number of red blood cells times their velocity, which determines circulation.

Currently the apparatus can be found in many shapes and sizes, dependent on the industry and location of where the device will be used. Below is an accurate diagram of the basic hardware setup of an LDF:

Currently the LDF is used in the areas of dermatology, facial surgery, vascular surgery, dental applications, ocular applications, transplant surgeries,

cardiac surgery, pharmacology, and exercise physiology. The specific studies that have been performed all relate to detecting blood flow abnormalities in these specialties. Some

limitations of the LDF have been found



in its signal processing, processing bandwidth, motion artifaction and instrument calibration, the effect of probe pressure on the skin, and the type of laser used. Usually the best results are found when using a low-powered scanning laser.

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Journal Articles and Reviews

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2."Scanning laser Doppler is a useful technique to assess foot cutaneous perfusion during femoral artery cannulation"
Nicholas H Boyle, Peter C Roberts, Bernice Ng, Haim Berkenstadt, Angela McLuckie, Richard J Beale and Robert C Mason

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Online Resources:

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•Gerhard Zinser

•Heidelberg Engineering GmbH, Heidelberg, Germany •http://www.heidelbergengineering.com/docs/hrftutorial.pdf

•"Transonic Laser Doppler Monitor Operator's Manual" •<u>http://www.transonic.com/BLF_21_ManRev_B.pdf</u> •<u>http://www.transonic.com/icu.shtml</u>

Pictures:

•http://www.bme.jhu.edu/courses/580.471/circuits/ldoppler. JPG

•http://www.transonic.com/duplicate1/BLF21.jpg