

# Laser Speckle Flowgraphy

# LSFG-NAVI®

## Real-Time Observation of Blood Flow Change in Retina

The software interface displays a patient list with the following data:

Patient ID	First Name	Last Name
DEMO0001	Demo	Patient1
DEMO0002	Demo	Patient2
DEMO0003	Demo	Patient3
DEMO0004	Demo	Patient4

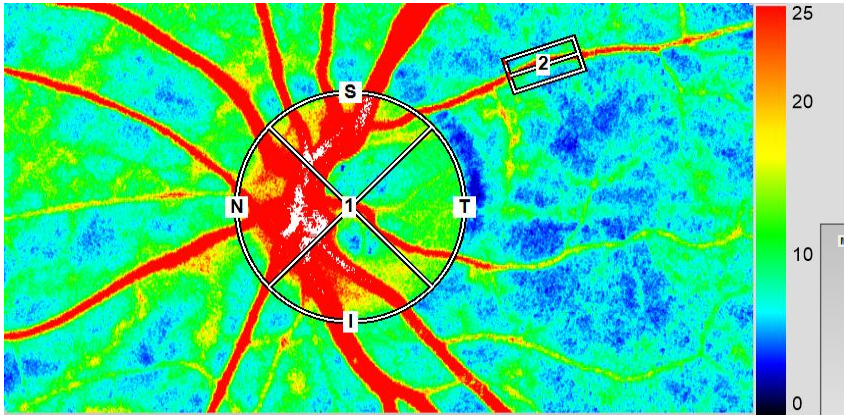
The summary window shows the following patient information:

Title: DEMO0003.Demo Patient3  
Datetime: 11/28/2011 15:05:44  
Quality: Normal  
Eye: Left  
Area: ON Area  
LD power[mW]: 20111128180515.Jsf

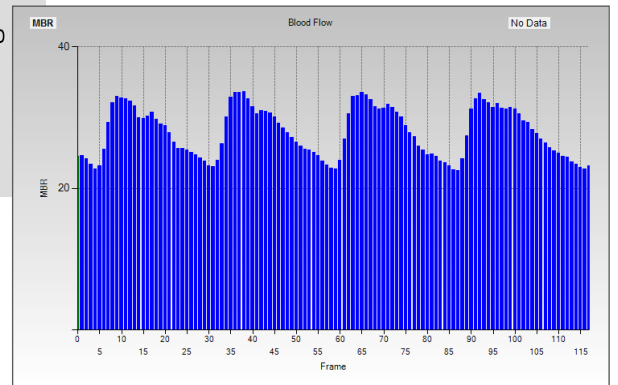
The main analysis window displays an "Analyzed map" and a "Light intensity map". The "Analyzed map" shows a color-coded retinal vessel network. The "Light intensity map" shows a color-coded intensity distribution. A "Blood Flow" graph is also visible, showing a fluctuating signal over time (Frame 0 to 110) with an average value of 29.9. The graph is labeled "Frame 92 MBR:42.89".

# Clinical Applications Using the LSFG-NAVI

## Normal Eye

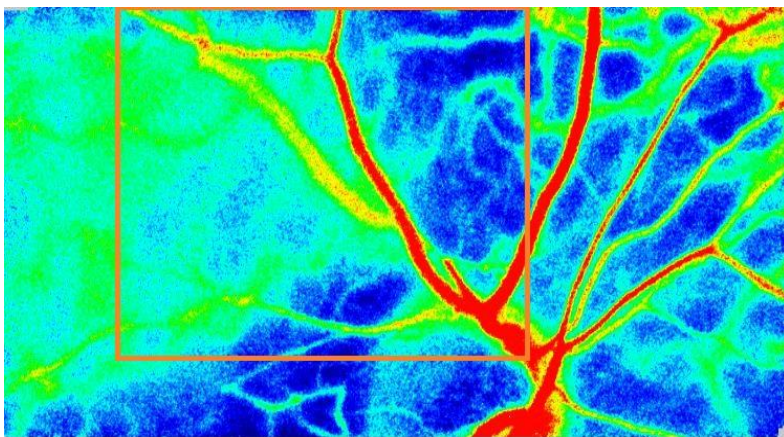


Composite Map  
( Gender: Male Age: 36 Eye: Left )

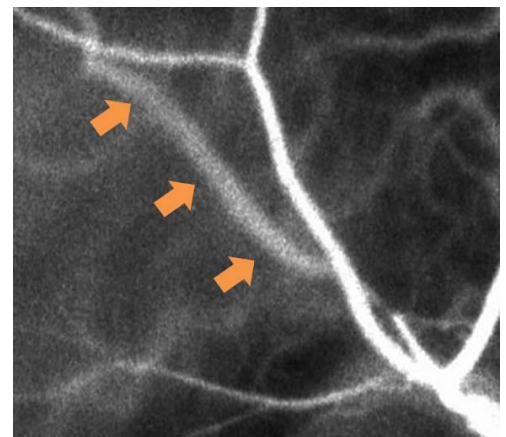


The time variation of  
blood flow in the ONH

## Branch Retinal Vein Occlusion (BRVO)



Composite Map

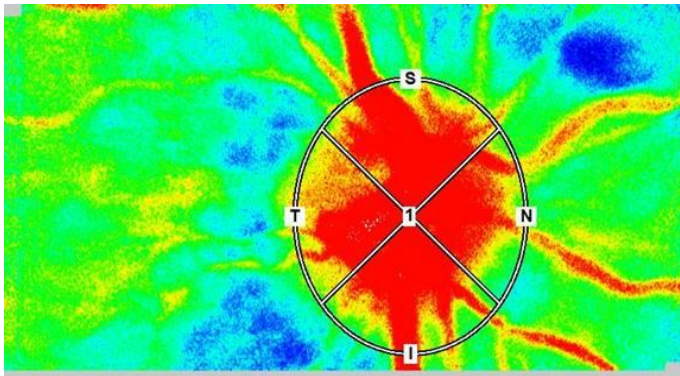


Enlarged Composite Map  
( Gray Scale )

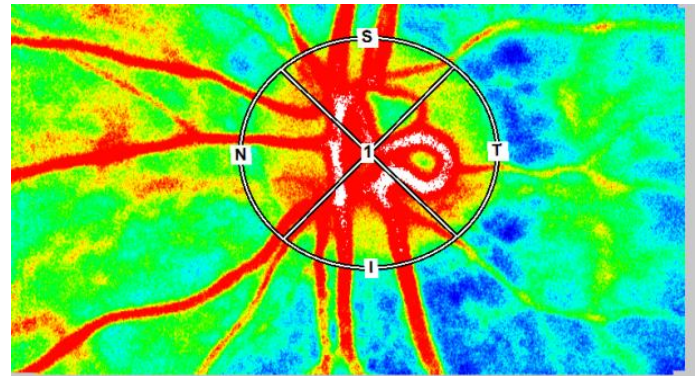
*Images courtesy of Department of Ophthalmology, Tokyo Women's Medical University.*

## Central Retinal Vein Occlusion(CRVO)

### Before Treatment



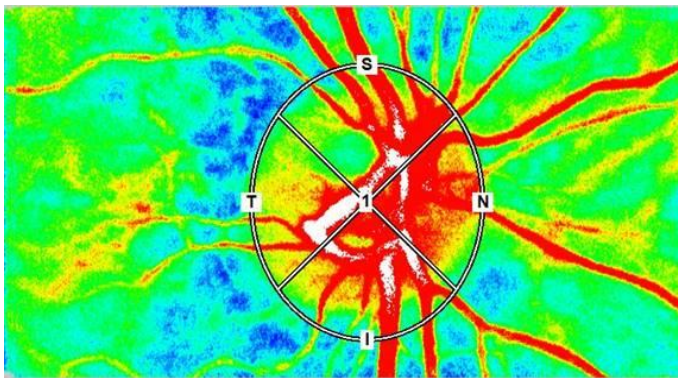
Affected Eye



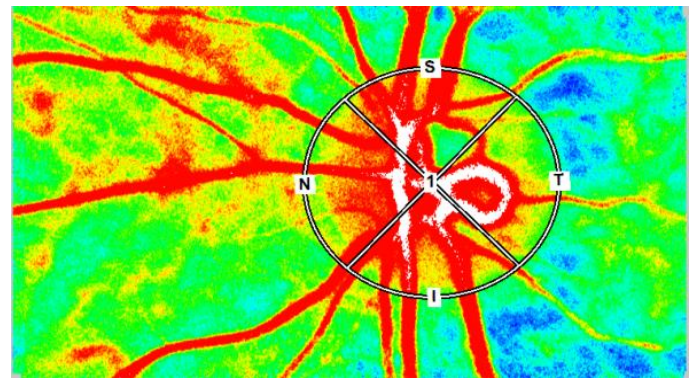
Fellow Eye



### After Treatment



Affected Eye



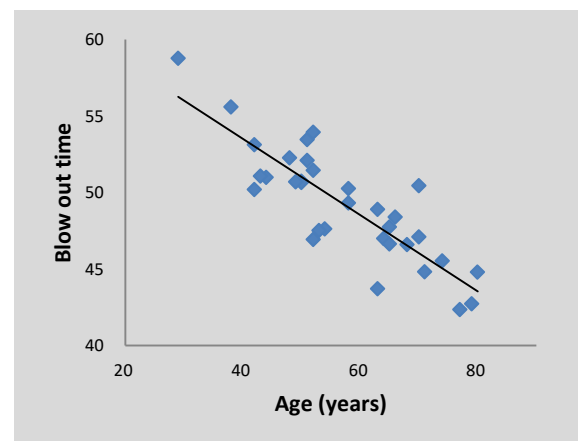
Fellow Eye

*Images courtesy of Department of Ophthalmology, Nagasaki University.*

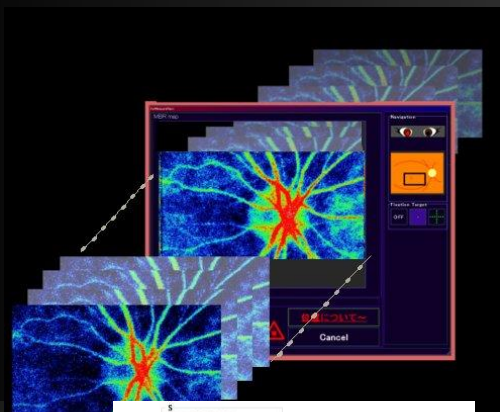
## Correlation between blowout time and age

The blowout time is one of the important indices that can be obtained from the pulse-wave analysis in the LSFG System. The graph indicates the blowout time for the periodic blood flow change in the optic nerve head is significantly correlated with age ( $r=-0.85$ ,  $P<0.0001$ ).

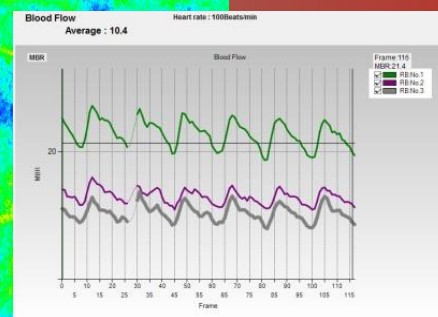
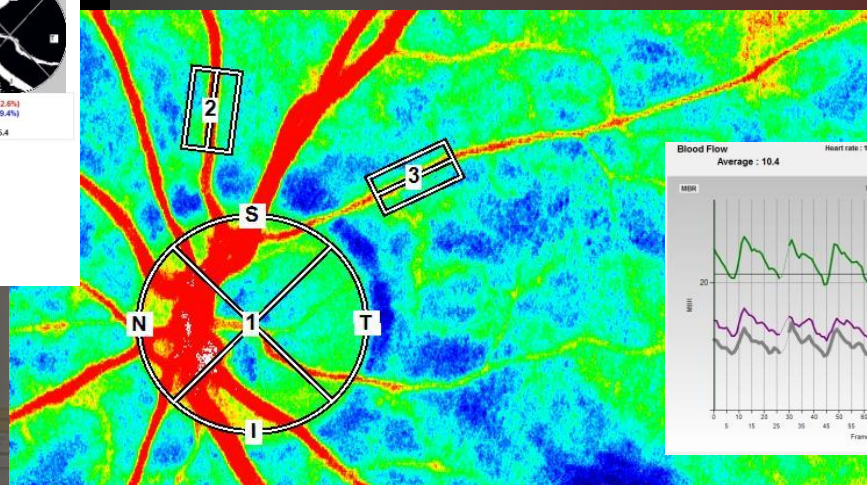
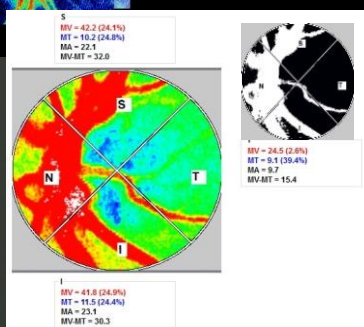
(T. Shiba, M. Takahashi, Y. Hori, T. Maeno (2012). Pulse-wave analysis of optic nerve head circulation is significantly correlated with brachial-ankle pulse-wave velocity, carotid intima-media thickness, and age, Graefes Arch Clin Exp Ophthalmol: DOI 10.1007/s00417-012-1952-5)



## Easy to Measure... Easy to Analyze...



- Observe real time blood flow in the retina
- Non invasive measurement of retinal blood flow without mydriatics or contrast media and without the strain of multiple measurements to subjects
- Easily create an average blood flow map with the auto tracking system
- Measure up to six specified locations simultaneously
- Easily guide a subject to a fixation target with a simple navigation system
- Easily read and review data from a hard disk when ready



## Specifications

Power		AC120V, 60Hz (AC adapter: PMP90-13)
Light Source	Type	Laser Diode
	Wave Length Class	830nm 1(Based on IEC60825-1:2007)
Spot size on retina		Area including macular and ONH of subjective eye with normal diopter
Output Image	View Angle	Maximum 21 degrees
	Resolution	750W × 360H Pixel
Time Resolution		30Frame/sec
Safety for medical electrical equipment		IEC60601-1, IEC60601-1-2
Size		About 40 x 50 x 40cm
Weight		About 18kg
510(k) Number		K153239

### Caution

This system cannot correctly measure increase or decrease in blood flow in the following instances:

- Subjects wearing contact lenses (however, it does depend on the type of the lens worn)
- Subjects with cataracts. The laser is scattered in the crystalline lens before it reaches the retina.
- Subjects wearing intraocular lens. The laser beam is often obstructed by the edge of the lens.
- Subjects with difficulty in focusing on the fixation target.

It is difficult for this system to measure absolute velocity such as mm/sec. This system is suitable for measuring the increase or decrease of blood flow within the same retinal or choroidal vessels and for observing the wave profiles of the flow velocity that changes with the beating of the heart.

### Manufacturer: Softcare Co., Ltd.

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