



Cardiovascular Suite is a software program for assessing markers of cardiovascular risk from ultrasound images. The suite consists of two applications: FMD Studio for assessment of endothelial function and Carotid Studio for assessment of carotid stiffness and intima media thickness.

Features

Online video analysis at 25/30 frames/sec.
Offline analysis of video (DICOM, AVI) and images (JPEG, TIFF, BMP).
Real-time video recording (PAL, NTSC, SECAM, VGA, HDMI, DVI).
Study archive with video, images and patient data.
Export of reports in PDF, Word, RTF format.
Multi-user access
Works with any ultrasound imaging system.

Requirements

APPLE COMPUTER
Apple Mac Computer with: Intel Core i5 2.3 GHz, 4GB RAM, 250GB Hard Disk, 1280x800 monitor resolution.
Mac OS X 10.8 or later.

MICROSOFT WINDOWS COMPUTER
Intel Core i5 2.3 GHz, 4GB RAM, 250GB Hard Disk, 1024x768 monitor resolution.
Microsoft Windows 7 64 bit, Windows 8.1 64 bit, Windows 10 64 bit.



We invite you to download a 14-day fully functional trial version of Cardiovascular Suite, including FMD Studio and Carotid Studio.

www.quipu.eu

Cardiovascular Suite™

your software for assessing
early markers of cardiovascular risk

Endothelial Function and Atherosclerosis



The endothelium plays a central role in the initiation, progression and clinical outcomes of atherosclerosis. Flow-mediated dilation (FMD) of the brachial artery is an established non-invasive method used to assess endothelial function. The method was introduced by Celermajer et al. in 1992, and over the last 20 years has become increasingly important since several studies have shown that an impaired FMD response is related to cardiovascular risk factors such as smoking, hypercholesterolemia, hypertension, diabetes and aging, and is an independent predictor of cardiovascular events. Indeed, thousands of papers have established that endothelial dysfunction is one of the earliest detectable signs of atherosclerosis in patients ranging from youngsters to adults.

FMD can be measured by ultrasound imaging, as described in the guidelines of the International Brachial Artery Reactivity Task Force (Corretti et al., 2002). The examination consists in measuring brachial artery diameter at rest and after reactive hyperemia induced by ischemia of the forearm. The measurement is made on a B-mode section of the artery, which is imaged above the antecubital fossa in the longitudinal plane.



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Carotid Stiffness and Intima Media Thickness

In recent years, great emphasis has been placed on the role of arterial stiffness in the development of cardiovascular disease. Indeed, assessment of arterial stiffness is increasingly used in the clinical assessment of patients. Local measurements on superficial arteries (mainly the carotid artery) can be performed using ultrasound together with tonometry. This approach provides optimal conditions for a precise determination of arterial stiffness, because in this way the measurement is directly obtained from the change in pressure driving the change in volume, i.e., without using any mathematical model of the circulation.

Ultrasound imaging can also provide the value of the Intima Media Thickness (IMT), a measure of the thickness of the artery. This measurement is now widely used and well-accepted as an index of atherosclerosis. In addition, the stiffness and thickness of the artery can be combined to provide a value for the elastic properties of the arterial wall material (Young's elastic module).





It is clinically challenging to evaluate the FMD without appropriate instrumentation. Our software, used in conjunction with an ultrasound system, can automatically measure the diameter of the vessel and calculate the value of FMD%.

FMD Studio user interface sections:

1. Video Window
2. Data Display
3. Instantaneous Diameter Chart
4. Mean Diameter Chart
5. Shear Rate Chart



Real-time Analysis

This is a great advantage in studies of FMD, where one of the most critical points is to maintain good image quality for the duration of the test (9 minutes). With the aid of a real-time system, the sonographer can more easily adjust the position of the ultrasound probe to compensate for the movements of the patient.

Automatic Doppler Flow Analysis

In addition to the automatic measurement of the diameter, the software automatically analyzes the Doppler signal (when available in dual-mode by ultrasound equipment) in order to calculate the value of instantaneous shear rate. This provides the exact amount of the vasodilation stimulus, which can be used to normalize the FMD value, as strongly recommended by more recent studies.

High Accuracy

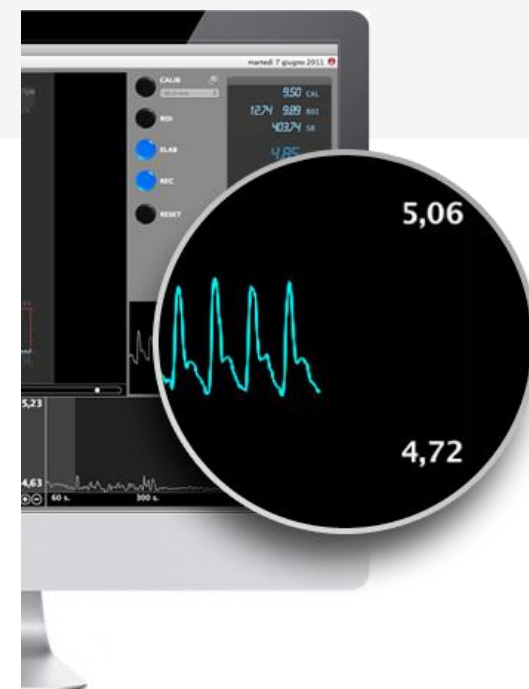
The system uses an innovative mathematical operator with sub-pixel precision. This permits overcoming the spatial resolution limitations of the image with results otherwise obtainable only through a more complex analysis of the ultrasound radio frequency signal.

ECG Gating Not Required

ECG gating is not required. This type of measurement usually requires synchronization with the ECG. The technique we developed overcomes this requirement in favor of the simplicity of the procedure and cost of the required equipment.

Quality Feedback

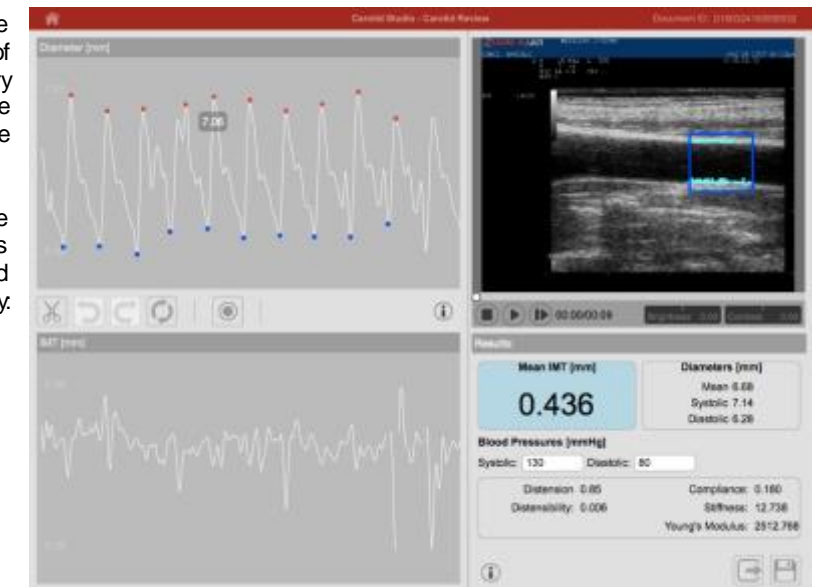
The system provides signals that can be used by the sonographer as markers of quality and reliability of the images.



Carotid Studio is a software application for analyzing sequences of ultrasound images of the carotid artery in order to provide information on the state of vascular health, and thus the patient's cardiovascular risk.

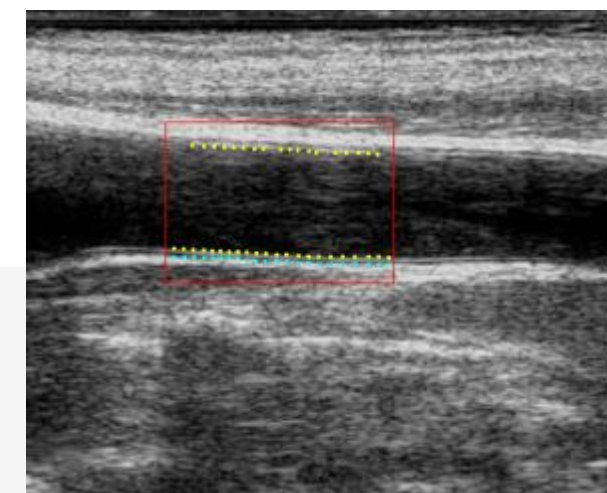
Once a measure of the local pulse pressure is provided, the system is able to calculate both structural and functional parameters simultaneously.

- Intima Media Thickness
- Wall cross-sectional area
- Stroke changes in diameter
- Cross-sectional compliance
- Cross-sectional distensibility
- Young's elastic module.



Simultaneous measurement

of the parameters of thickness and stiffness of the artery with assessment of the elastic properties of the arterial wall material.



Echotracking precision

The analysis is based on an innovative mathematical operator that overcomes the spatial resolution limitations of the conventional B-mode ultrasound images. With this new technology, a precision comparable with that obtainable with an echotracking system is obtained.

Real-time analysis

The ultrasound scan can be more easily optimized if real-time image analysis is shown.

Easy editing

and supervision of the signals. The automatic analysis can be corrected and supervised by an expert operator, excluding signals characterized by low signal-to-noise ratio or the presence of outliers.

