Early detection of cardiovascular risk by QIMT: The Esaote Method

Esaote's QIMT uses radio frequency to measure intima-media thickness, conferring early diagnosis, improved quality of life, and cost reduction

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Cardiovascular diseases (CVD) are the biggest killers around the globe, mainly through atherosclerosis, yet, many premature deaths could be prevented by timely detection of modifiable risk factors and by adequate lifestyle interventions. Gender, age, diabetes, smoking, hyperlipidaemia, high blood pressure and family history of CVD are risk factors currently used in clinical practice algorithms to establish the risk of cardiovascular disease. However, the algorithms lack any information about organ damage at a reversible stage.

Ultrasound examination of the extracranial carotid tree has been proposed as an optimal tool to assess subclinical organ damage, as it reflects any early stages of the atherosclerotic process whereby artery walls thicken as a result of the accumulation of fatty materials such as cholesterol and triglyceride. Established markers of atherosclerotic change within the arterial wall are increases in intima-media thickness (IMT) and the presence of plaques.

According to the European Society of Cardiology (ESC) and European Society of Hypertension (ESH) guidelines, many organs can be subjected to damage during the course of hypertension. These include the heart, arteries, kidneys, retina and brain. A multitude of tests can be used in order to monitor and measure such organ damage, including; electrocardiography, microalbuminuria, arterial stiffness, fundoscopy and many more. These differ in their predictive value, availability, reproducibility and cost effectiveness. However, the advantage of using QIMT thickness lies in the fact that it is an *early predictor* of CVD and that it truly represents the mechanism by which the CV diseases occur.

What is IMT?

IMT (Intima Media Thickness) is a measurement of the innermost two layers of the arterial wall, and has been shown to correlate with the degree of atherosclerosis, thus providing exceptional insight into cardiovascular disease - and detection of early onset atherosclerosis. Increased carotid IMT is associated with CV risk factors, prevalent CVD and coronary artery atherosclerosis. Carotid IMT has also been shown to predict the occurrence of atherosclerotic plaques, future events and prognosis - independently of risk factors. Despite these promising features, IMT is difficult to assess with conventional equipment, because its value is close to their resolution. Conventional techniques have bad reproducibility and strong dependency on device settings and operator experience. Hence the development of QIMT by Esaote.

Medical imaging manufacturer, Esaote has designed unique software to support a personal and thorough detection of CVD risk assessment of an individual patient: The aim is to achieve early detection *before* symptoms of organ damage begin to occur, providing the patient with longevity and a better quality of life.

How does QIMT work?

QIMT uses Radio Frequency (RF) signal - a 'raw' ultrasound signal attained from the ultrasound scanner that is not yet processed - to measure the diameter and the thickness of the intima media layer with high spatial resolution. The QIMT tool automatically and accurately measures all the parameters needed for a complete evaluation of the vascular health of a patient. Measurements are independent of the investigator and device settings.

The high accuracy is due to the RF-based signal processing. Reports generated using QIMT also include an "Expected QIMT" values table, based on a worldwide database of 40,000 subjects obtained with RF-based techniques which correspond to the patient's age and vascular trending.[1]

QIMT as a monitoring OR preventative health tool

Esaote's QIMT is designed as a tool to support a personal and thorough CVD risk assessment of an individual patient. Patients in the early or intermediate stages of atherosclerosis show no external sign of risk or symptoms, so QIMT can be used for screening purposes in preventive healthcare. The presence of plaque, which is a latter stage of atherosclerosis and also associated with high cardiovascular risk, can be assessed through conventional imaging with the same device. Additionally, it can be used to monitor patients with known CVD and other risk factors.

Esaote's mission is to implement early detection before symptoms and organ damage occur, and to improve the quality of life and longevity of the individual. As a highly visual tool, QIMT can also be used to convince patients to change health-related behaviour and priorities, and take corrective action.

Esaote has managed to combine innovation and accuracy in cardiovascular imaging with accuracy within 20µm; an exam time of under a minute; real time measurement with immediate feedback; mostly operator independent; complete results via reports and graphs. Together, these factors confer improved quality of life, preventative healthcare, as well as potential cost reductions – all of which are highly relevant to today's health needs.

Further information about QIMT can be found at http://www.esaote.com/modules/core/page.asp?p=RF_QIMT

References

[1] Lian Engelen, Isabel Ferreira, Coen D. Stehouwer, Pierre Boutouyrie, and Stephane Laurent, (2012) *Reference intervals for common carotid intima-media thickness measured with echotracking: relation with risk factors,* European Heart Journal, Advance Access, published November 27, 2012

Available at: European Heart Journal - doi:10.1093/eurheartj/ehs380Accessed: 23.10.13

About Esaote

Esaote is one of the world's leading manufacturers of medical diagnostic imaging systems. Esaote is a European based manufacturer of ultrasound technology, and acknowledged as a world leader in musculoskeletal MRI systems. 20% of Esaote's 1,350 employees are exclusively focused on research and development at the company's R&D facilities in Genoa (I), Florence (I) and Maastricht (NL), and enjoy the co-operation with worldwide scientific and clinical research centres. Information about the Esaote Group and its products is available at http://www.esaote.com

About Prof Pierre Boutouyrie

Dr. Pierre Boutouyrie is Professor at the Pharmacology Unit, European Hospital Georges Pompidou, Paris, France. He holds a Medical Doctorate (1994) and specialises in diseases of the Heart and blood diseases. He gained a Ph.D. in Pharmacology in 1996. Professor Boutouyrie is a member of the European Society of Cardiology, of the French Society of Pharmacology and Therapeutics (SFPT), of the French Society of Arterial Hypertension (SF-HTA). His field of interest is large artery haemodynamics, in particular the interplay between large artery stiffness and large artery remodelling in hypertension. He studies the arterial phenotype in monogenic diseases of arteries, and the influence of vasoactive drugs on mechanical behaviour of large arteries. He is on the editorial board of the Journal of Hypertension, Artery Research and, Hypertension.

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