

Latest PAT Publications



Small artery dilation and endothelial markers in cardiovascular risk patients.

Aragonès G, Ferré R, Girona J, Plana N, Merino J, Heras M, Masana L.

Eur J Clin Invest. 2011 Epub ahead of print

Studied the correlations between the hyperemia reactivity of small peripheral arteries determined by EndoPAT and the levels of serum biomarkers of EF (endothelial function), inflammation and oxidation in patients with cardiovascular (CV) risk factors (N=407).

Results: A significant correlation was found between EndoPAT index and concentration of soluble E-selectin (sE-selectin) and soluble vascular cell adhesion molecule 1 (sVCAM-1). In non-metabolic syndrome patients (46%), these correlations were stronger, and oxidized low-density lipoprotein/LDL (oxLDL/LDL) was also correlated with EndoPAT index.

Conclusions: Elevated levels of sE-selectin and, to a smaller degree, sVCAM-1 and oxLDL/LDL are associated with lower EndoPAT index. sE-selectin is the main determinant biomarker of EndoPAT index as assessed by regression analysis.

<http://www.ncbi.nlm.nih.gov/pubmed/21631467>



Methods for evaluating endothelial function: a position statement from the European Society of Cardiology Working Group on Peripheral Circulation.

Lekakis J, Abraham P, Balbarini A, Blann A, Boulanger CM, Cockcroft J, Cosentino F, Deanfield J, Gallino A, Ikonomidis I, Kremastinos D, Landmesser U, Protogerou A, Stefanadis C, Tousoulis D, Vassalli G, Vink H, Werner N, Wilkinson I, Vlachopoulos C.

*Eur J Cardiovasc Prev Rehabil
2011 Mar 11. Epub ahead of print*

An ESC position paper on available in-vivo and ex-vivo methods for evaluating endothelial function emphasizing more recent ones, including diagnostic modalities such as epicardial and microvascular coronary endothelial function, local vasodilation by venous occlusion plethysmography and flow-mediated dilatation, arterial pulse wave analysis, pulse amplitude tonometry (EndoPAT), laser Doppler flowmetry, and biochemical markers and bioassays.

Results: In relation to the EndoPAT, the authors cited the findings that: a) patients with low Framingham Risk Score but with endothelial dysfunction were at a higher actual risk than patients with high Framingham Risk Score but normal endothelial function, and b) that endothelial dysfunction was found to be an independent risk factor for a future major adverse cardiovascular event.

Conclusions: Evaluation of endothelial function appears as an appealing adjunct for risk stratification, prevention and rehabilitation.

<http://www.ncbi.nlm.nih.gov/pubmed/21450600>



Noninvasive vascular function measurement in the community: cross-sectional relations and comparison of methods.

Schnabel RB, Schulz A, Wild PS, Sinning CR, Wilde S, Eleftheriadis M, Herkenhoff S, Zeller T, Lubos E, Lackner KJ, Warnholtz A, Gori T, Blankenberg S, Münzel T.

Circ Cardiovasc Imaging. 2011 Jul 1;4(4):371-80.

Simultaneously compared associations amongst brachial flow-mediated dilation (FMD), peripheral arterial volume pulse determined by infrared photo reflection index, and EndoPAT index, in relation to classical cardiovascular risk factors in an unselected cohort of 5000 participants.

Results: The strongest association for hyperemic response variables was between EndoPAT index and brachial FMD. Classical risk factors explained between 15.8% (reflection index) and 58.4% (brachial artery diameter) of the baseline values and 3.2% (reflection index), 15.4% (FMD), and 13.9% (EndoPAT index) of the variability of hyperemic responses. Regression models of the vascular function measures varied in relation to classical risk factors, but were consistently associated with age, sex, body mass index, and indicators of hypertension. EndoPAT index also showed a relation to fasting glucose concentrations.

Conclusions: Noninvasive measures of conduit artery (by FMD) and microvascular peripheral arterial function (by EndoPAT) are modestly correlated, differ in their relation to classical cardiovascular risk factors, and may thus reflect different pathologies.

<http://www.ncbi.nlm.nih.gov/pubmed/21551420>



NT-proBNP levels, atherosclerosis and vascular function in asymptomatic type 2 diabetic patients with microalbuminuria: peripheral reactive hyperaemia index but not NT-proBNP is an independent predictor of coronary atherosclerosis.

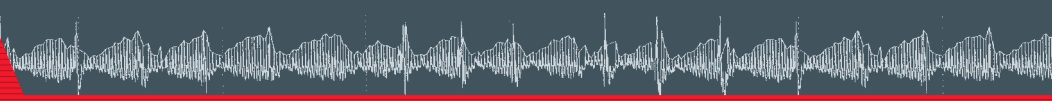
Reinhard H, Wiinberg N, Hansen PR, Kjaer A, Petersen CL, Winther K, Parving HH, Rossing P, Jacobsen PK.
Cardiovasc Diabetol. 2011 Aug 3;10(1):71.

Examined interrelationships amongst P-NT-proBNP, atherosclerosis and/or vascular dysfunction in the coronary, carotid and peripheral arteries using coronary calcium score, carotid intima-media thickness, ankle-brachial index, and/or toe-brachial index, in 200 asymptomatic type 2 diabetic patients with microalbuminuria receiving intensive multifactorial treatment, using EndoPAT as a marker for endothelial function.

Results: P-NT-proBNP was not associated with vascular dysfunction but was associated with atherosclerosis in unadjusted analysis, but not after adjustment for conventional risk factors. In total, 49% of the patients had atherosclerosis in one territory. Low EndoPAT index was an independent predictor of coronary atherosclerosis (odds ratio [CI], 2.60 [1.15-5.88]).

Conclusions: Half of asymptomatic patients with type 2 diabetes and microalbuminuria had significant atherosclerosis in at least one vascular territory despite intensive treatment. Coronary atherosclerosis was most prevalent, whereas carotid disease was more rarely observed. EndoPAT but not plasma NT-proBNP was predictive of coronary atherosclerosis.

<http://www.ncbi.nlm.nih.gov/pubmed/21812947>



Associations of cardiovascular risk factors with two surrogate markers of subclinical atherosclerosis: Endothelial function and carotid intima media thickness.

Fitch KV, Stavrou E, Looby SE, Hemphill L, Jaff MR, Grinspoon SK. Atherosclerosis. 2011 Aug;217(2):437-40.

Examined the correlation between endothelial function assessment, (EndoPAT), and carotid Intima Media Thickness (cIMT) in 54 healthy subjects.

Results: cIMT and EndoPAT index were significantly associated ($r=0.35$, $P = 0.02$) in univariate analysis. EndoPAT index was significantly associated with age, triglycerides, fasting glucose, HDL, WHR, waist circumference and VAT (visceral adipose tissue). cIMT was associated with other risk factors. In multivariate regression analyses, triglyceride level ($P = 0.04$) remained a significant determinant of EndoPAT index.

Conclusions: Determinants of cIMT and EndoPAT index were different, dominated by triglyceride and abdominal adiposity measures for EndoPAT index.

<http://www.ncbi.nlm.nih.gov/pubmed/21570076>



Multiwave associations between depressive symptoms and endothelial function in adolescent and young adult females.

Tomfohr LM, Murphy ML, Miller GE, Puterman E. Psychosom Med. 2011 Jul;73(6):456-61.

Examined whether symptoms of depression have a lasting negative influence on endothelial function in 135 adolescent and young adult females without known or suspected major health problems, followed for 2.5 years. Endothelial function was measured thrice throughout the study using EndoPAT, and Beck Depression Inventory was administered.

Results: Intrasubject self-reported depressive symptoms covaried with endothelial function ($\beta = -0.23$, $p < .05$). As depression symptoms rose beyond typical levels, endothelial function declined commensurately even after controlling for health practices and adiposity. There was no evidence that depressive symptoms predicted future endothelial function.

Conclusions: Depressive symptoms were concurrently associated with endothelial function, but no observation was made of a lasting negative effect.

<http://www.ncbi.nlm.nih.gov/pubmed/21715299>



Vitamin D status is associated with arterial stiffness and vascular dysfunction in healthy humans.

Al Mheid I, Patel R, Murrow J, Morris A, Rahman A, Fike L, Kavtaradze N, Uphoff I, Hooper C, Tangpricha V, Alexander RW, Brigham K, Quyyumi AA. J Am Coll Cardiol. 2011 Jul 5;58(2):186-92.

Explored the relationship between 25-hydroxyvitamin D (25-OH D), an established marker of vitamin D status, in 554 healthy adults, and endothelial function assessed by both brachial artery flow mediated dilation and by EndoPAT, Carotid-femoral pulse wave velocity, radial tonometry-derived central augmentation index and subendocardial viability ratio.

Results: After adjustment for traditional risk markers, 25-OH D remained independently associated with EndoPAT index ($\beta = 0.23$, $p < 0.001$), brachial flow-mediated vasodilation ($\beta = 0.1$, $p = 0.03$), pulse wave velocity, augmentation index, and subendocardial viability ratio.

In 42 subjects with vitamin D insufficiency, normalization of 25-OH D at 6 months was associated with increases in EndoPAT index (0.38 ± 0.14 , $p = 0.009$) and subendocardial viability ratio, and a decrease in mean arterial pressure but not with the other measurements.

Conclusions: Vitamin D insufficiency is associated with increased arterial stiffness and endothelial dysfunction irrespective of traditional risk burden.

<http://www.ncbi.nlm.nih.gov/pubmed/217189158>



Usefulness of peripheral vascular function to predict functional health status in patients with fontan circulation.

Goldstein BH, Golbus JR, Sandelin AM, Warnke N, Gooding L, King KK, Donohue JE, Gurney JG, Goldberg CS, Rocchini AP, Charpie JR.

Am J Cardiol. 2011 Aug 1;108(3):428-34.

Assessed the association between peripheral vascular function and functional health status in Fontan-palliated patients using the EndoPAT and Cardiopulmonary exercise testing in 51 Asymptomatic Fontan patients (94% New York Heart Association functional class I and 88% B-type natriuretic peptide level < 50 pg/ml), and 22 matched healthy controls.

Results: The Fontan EndoPAT baseline pulse amplitude was greater than controls (median 2.74, vs. median 1.86, $p = 0.03$). EndoPAT index was lower in Fontan patients (median 0.17, vs. median 0.50, $p = 0.002$). Key parameters of exercise performance were lower in Fontan patients than in the controls, and the EndoPAT index correlated with measurements of exercise performance.

Conclusions: In an asymptomatic Fontan population there is evidence suggesting dysfunction of the endothelium-derived nitric oxide pathway. Vasodilator function appears to correlate with exercise performance.

<http://www.ncbi.nlm.nih.gov/pubmed/21600541>



Greater Endothelial Dysfunction and Arterial Stiffness in Men With Chronic Prostatitis/Chronic Pelvic Pain Syndrome-A Possible Link to Cardiovascular Disease.

*Shoskes DA, Prots D, Karns J, Horhn J, Shoskes AC.
J Urol. 2011 Sep;186(3):907-10.*

Studied vascular dysfunction in patients with chronic prostatitis/chronic pelvic pain syndrome (N=21) and controls (N=14) using EndoPAT for endothelial function assessment and arterial stiffness. Symptoms were measured with the National Institutes of Health Chronic Prostatitis Symptom Index and patient phenotype was characterized by the UPOINT system.

Results: In patients with chronic pelvic pain syndrome, EndoPAT index was significantly lower vs. controls, (1.76 ± 1.2 vs. 2.21 ± 1.7 , $p = 0.03$), and augmentation index was significantly higher ($5.0\% \pm 2.3$ vs. $-6.0\% \pm 3.0$, $p = 0.006$).

Conclusions: Men with chronic prostatitis/chronic pelvic pain syndrome have evidence of increased arterial stiffness and vascular endothelial dysfunction and can be risk stratified using EndoPAT testing.

<http://www.ncbi.nlm.nih.gov/pubmed/21791354>



Interleukin 17 as a novel predictor of vascular function in rheumatoid arthritis.

*Marder W, Khalatbari S, Myles JD, Hench R, Yalavarthi S, Lustig S, Brook R, Kaplan MJ.
Ann Rheum Dis. 2011 Sep;70(9):1550-5.*

Analyzed conduit endothelial function using brachial artery FMD (BAUS); arterial compliance by pulse wave velocity (PWV); and endothelium-dependent microvascular function with EndoPAT in 50 patients with RA having minimal traditional CV risk factors and low disease activity score, receiving treatment with biological agents. IL-17 was quantified and disease activity was assessed by 28-joint count Disease Activity Score.

Results: IL-17 was the main determinant of lower EndoPAT index, traditional and non-traditional CV risk variables determined PWV with positive association to IL-17, and BAUS was mainly determined by rheumatoid factor titres.

Conclusions: In patients with RA treated with biological agents, IL-17 is a main predictor of microvascular function and arterial compliance and may play a significant role in development of endothelial dysfunction and cardiovascular disease.

<http://www.ncbi.nlm.nih.gov/pubmed/21727237>



Reduced brachial flow-mediated vasodilation in young adult ex extremely low birth weight preterm: a condition predictive of increased cardiovascular risk?

*Bassareo PP, Fanos V, Puddu M, Demuru P, Cadeddu F, Balzarini M, Mercurio G.
J Matern Fetal Neonatal Med. 2010 Oct;23 Suppl 3:121-4*

Assessed potential alterations to endothelial function using EndoPAT in 32 young adults born preterm at extremely low birth weight (<1000 g; ex ELBW), versus 32 healthy age-matched subjects born at term.

Results: Endothelial function was significantly reduced in ex-ELBW subjects compared to Controls (1.94 ± 0.37 vs 2.68 ± 0.41 , $p < 0.0001$). Moreover, it also correlated significantly with gestational age ($r = 0.56$, $p < 0.0009$) and birth weight ($r = 0.63$, $p < 0.0001$).

Conclusions: Taken together, these results suggest that an ELBW may underline the onset of early circulatory dysfunction predictive of increased cardiovascular risk.

<http://www.ncbi.nlm.nih.gov/pubmed/20925458>



Improvement effect on endothelial function in patients with congestive heart failure treated with cardiac resynchronization therapy.

*Enomoto K, Yamabe H, Toyama K, Matsuzawa Y, Yamamuro M, Uemura T, Morihisa K, Iwashita S, Kaikita K, Sugiyama S, Ogawa H.
J Cardiol. 2011 Jul;58(1):69-73.*

Investigated the relationship between CRT (cardiac resynchronization therapy) and vascular endothelial function (EndoPAT), in 22 consecutive severe CHF patients with dilated cardiomyopathy, receiving optimal medical therapy alone (medical therapy group: n=10) or CRT group (n=12) at enrolment, and after 12 weeks. Also analyzed the association between EndoPAT index and cardiac function.

Results: Both therapies significantly and equally improved functional class, LVEF, end-diastolic left ventricular dimension and plasma levels of brain natriuretic peptide (BNP). Only CRT significantly increased cardiac output and EndoPAT index (medical therapy group: 1.5 ± 0.2 to 1.5 ± 0.3 , $p = 0.824$; CRT group: 1.4 ± 0.2 to 1.7 ± 0.4 , $p = 0.003$). There was significant positive correlation between changes in EndoPAT index and cardiac output ($r = 0.600$, $p = 0.003$).

Conclusions: CRT significantly improved endothelial function through the improvement of cardiac output in CHF patients, compared to optimal medical therapy.

<http://www.ncbi.nlm.nih.gov/pubmed/21493043>

CloudPAT

the new web-portal
for

WatchPAT

Contact us for more information

Meet us @

ESC

European Society of Cardiology

August 27 – 31, 2011
Paris, France
Booth # A320

Angiologie Symposium
September 7-10, 2011
Frankfurt, Germany
Booth # 120

GW – ICC
The 22nd Great Wall International Congress of Cardiology
October 13 – 16, 2011
Beijing, China

OSA, Anesthesia and Sleep
The Common Ground
October 14, 2011
Chicago, IL, USA

Spotlight on

Prof. Lluís Masana



Lluís Masana, MD PhD, is a Professor of Medicine and Head of the Internal Medicine Department and Lipid and Cardiovascular Risk Unit at the University Hospital Sant Joan, Reus, and Director of the Lipid Clinic and the Vascular Medicine and Metabolism Unit at the University Rovira & Virgili (Reus-Tarragona) Spain.

His work and main fields of interest include:

- Lipid metabolism diseases.
- Diabetes and arteriosclerosis.
- Cellular transport of fatty acids.
- Subclinical arteriosclerosis.
- Genetic Hyperlipidemias.

In his distinguished career, Professor Masana has published over 200 papers in international journals and has been the recipient of numerous awards and honours. He is a Member Royal Academy of Medicine of Catalonia and past President of the Spanish Society of Arteriosclerosis.

Prof. Lluís Masana and colleagues, are making significant contributions to the scientific base and clinical acceptance of the EndoPAT as evidenced by the following publications:

Aragonès G, Ferré R, Girona J, Plana N, Merino J, Heras M, Masana L. Small artery dilation and endothelial markers in cardiovascular risk patients. Eur J Clin Invest 2011. Epub

Ferré R, Aragonès G, Plana N, Merino J, Heras M, Buixadera C, Masana L. High-density lipoprotein cholesterol and apolipoprotein A1 levels strongly influence the reactivity of small peripheral arteries. Atherosclerosis. 2011. Epub

G Aragonesa, R Ferrea, I Lazaroa, A Cabrea, N Planaa, J Merinoa, M Herasa, J Gironaa, L Masana. Fatty acid-binding protein 4 is associated with endothelial dysfunction in patients with type 2 diabetes. Atherosclerosis 2010;213(1):329-31

López-Uriarte P, Nogués R, Saez G, Bulló M, Romeu M, Masana L, Tormos C, Casas-Agustench P, Salas-Salvadó J. Effect of nut consumption on oxidative stress and the endothelial function in metabolic syndrome Clin Nutr. 2010; 29(3):373-80

Ferré R, Plana N, Merino J, Aragonès G, Girona J, Heras M, Coll B, Cos R, Masana L. Effects of therapeutic lifestyle changes on peripheral artery tonometry in patients with abdominal obesity. Nutr Metab Cardiovasc Dis. 2010. Epub

Coll B, Aragonés G, Parr S, Villaverde CA, Masana L. Ezetimibe effectively decreases LDL Cholesterol in HIV-infected patients. Aids 2006; 20(12):1675-1677 Research letter.

R Ferré, G Aragonés, N Plana, J Merino, M Heras, B Coll, R Cos, L Masana. Endothelial function assessed by peripheral artery tonometry is a determinant of carotid intima-media thickness regardless of framingham risk score. EAS 2010. poster.