



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

Journal Home Page: <https://www.atlantis-press.com/journals/artres>

P3.15: CARDIAC PERFORMANCE VASCULAR PHYSIOLOGY AND ERECTILE STATUS; A QUESTION OF A HEALTHY DIET

Athanasios Angelis*, Nikolaos Ioakeimidis, Mahmoud Abderasoul, Ioanna Gourgouli, Konstantinos Aznaouridis, Dimitrios Terentes, Konstantinos Rokkas, Charalampos Vlachopoulos, Dimitrios Tousoulis

To cite this article: Athanasios Angelis*, Nikolaos Ioakeimidis, Mahmoud Abderasoul, Ioanna Gourgouli, Konstantinos Aznaouridis, Dimitrios Terentes, Konstantinos Rokkas, Charalampos Vlachopoulos, Dimitrios Tousoulis (2015) P3.15: CARDIAC PERFORMANCE VASCULAR PHYSIOLOGY AND ERECTILE STATUS; A QUESTION OF A HEALTHY DIET, Artery Research 12:C, 13–14, DOI: <https://doi.org/10.1016/j.artres.2015.10.239>

To link to this article: <https://doi.org/10.1016/j.artres.2015.10.239>

Published online: 7 December 2019

atherosclerotic burden and PWV than (C) and also the clinical score of risk (FRS) and the severity of vascular disease score. DBT2 and MS were almost similar.

Conclusion: The progression of vascular disease from the early MS to DBT2 could explain the higher degree of complications in DBT2. These findings suggest the usefulness of vascular evaluation of MS patients to guide and intensify preventive measures to improve the prognosis of DBT2 patients.

P3.10

REGIONAL CAROTID MECHANICS IS SIGNIFICANTLY IMPAIRED IN PATIENTS ON HEMODIALYSIS

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Objective: To study the correlation between carotid mechanics, carotid stiffness and cardiac parameters in patients on hemodialysis (kidney failure) and healthy subjects.

Methods: Study population consisted of 12 patients on hemodialysis (aged 24-73, median=48) and 24 healthy controls of the same age and gender. All subjects underwent comprehensive transthoracic echocardiography and ultrasound carotid exams. Peak carotid longitudinal, circumferential strains and longitudinal and radial displacement were measured using two-dimensional Speckle-Tracking Imaging. Carotid stiffness was calculated using wall-tracking software.

Results: Univariate analysis revealed direct correlations between carotid strains and displacement and parameters of LV diastolic function and carotid stiffness ($r=0.44$ between longitudinal strain (ST_L) and e' (interventricular septum), $r=-0.27$ between ST_L and carotid_PWV, $r=-0.47$ between ST_L and Intima_Media_Thickness, $p<0.05$) and correlations between LV diastolic function and carotid stiffness ($r=-0.51$ between carotid_PWV and e'). These correlations were confirmed by multiple linear regression after adjusting for potential confounders (age, blood pressure, gender, weight, etc.). Analysis showed significant decrease in carotid strains and displacements and increase in carotid stiffness in patients on hemodialysis (carotid PWV=8.9 and 6.9 m/s, ST_L=4.6 and 6.7 in dialysis patients and healthy subjects accordingly, $p<0.05$). Multivariate modeling confirmed that hemodialysis is an independent determinant of regional carotid mechanics.

Conclusions: This study demonstrated that regional carotid mechanics is related to heart diastolic function and carotid stiffness. Development of atherosclerosis impairs carotid mechanics. Key parameters of carotid mechanics are significantly decreased in patients on hemodialysis. Measurement of these parameters is important because their diversions may serve as an early marker of cardiovascular disease.

P3.12

URINARY LIVER-TYPE FATTY ACID-BINDING PROTEIN IS ASSOCIATED WITH AORTIC STIFFNESS IN MALE CORONARY ARTERY DISEASE PATIENTS

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Background: Urinary liver-type fatty acid-binding protein (L-FABP) is a promising diagnostic and prognostic biomarker for both acute and chronic kidney injury. Furthermore, this protein has been shown to possess antioxidant properties and appears to provide a prognostic value for cardiovascular morbidity and mortality in different clinical settings. The aim of the current study was to evaluate its relationship to inflammation and arterial stiffness in coronary artery disease (CAD) patients without reduced kidney function and in healthy controls.

Methods: We studied 52 patients with CAD (age 63.2 ± 9.2 years) and 41 clinically healthy controls (age 60.1 ± 7.2). Urinary L-FABP, serum adiponectin and resistin levels were measured using the enzyme-linked immunosorbent assay method. The technique of applanation tonometry was used for non-invasive pulse wave analysis and pulse wave velocity assessments.

Results: Higher carotid-femoral pulse wave velocity (cf-PWV) was observed in the CAD patients as compared to the controls (9.7 ± 2.6 vs. 8.2 ± 1.7 m/s; $P=0.003$). The two groups also differed in adiponectin (5701 ± 2890 vs. 7081 ± 3612 ; $P=0.045$) and resistin (3.4 (2.6-4.5) vs. 2.8 (2.4-3.5); $P=0.043$) levels. There was a positive relationship between log-L-FABP and cf-PWV ($r=0.46$, $P=0.001$) in subjects with CAD, which remained significant after adjustment for potential confounders. Log-L-FABP also correlated with serum adiponectin levels in the patient group ($r=0.35$, $P=0.015$).

Conclusions: Our findings suggest that urinary L-FABP might be independently associated with aortic stiffness and adiponectin in individuals with CAD.

P3.13

ARTERIAL STIFFNESS ASSESSED BY ULTRAFAST IMAGING IN HEALTHY SUBJECTS

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Aim: To assess normal values on the common artery by using new methodology using shear wave methods in healthy subjects

Methods: Healthy subjects underwent aortic stiffness by using shear wave echography (Aixplorer) at the carotid artery. All subjects were free from cardiovascular disease and medication. PWV at the beginning of systole (BS) and the end systolic (ES) of the cardiac cycle.

Results: 32 healthy subjects (16 male and 16 female) were included. The mean age was 41y.o (23 to 61). BS PWV $4.35/0.32$ (3.18 to 5.37) and ES PWV was $5.96/0.45$ (4.58 to 9.8) m/s.

Both ES PWV and BS PWV have high correlation with age ($r_2: 0.64$ and 0.58 respectively, $p<0.0001$).

Conclusion: Arterial stiffness assessed by ultrafast imaging is a promising method for assessment of arterial stiffness, which can potentially be clinically useful.

P3.14

ASSOCIATION OF CAROTID INTIMA-MEDIA THICKNESS, ENDOTHELIAL FUNCTION AND AORTIC STIFFNESS WITH CARDIOVASCULAR EVENTS IN METABOLIC SYNDROME PATIENTS

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Objective: The objective of this study was to assess predictive value of various arterial markers for cardiovascular (CV) events in patients with metabolic syndrome (MS).

Design and methods: A follow-up study enrolled 2728 (53.95 ± 6.18 years old, 63% women) MS patients without overt CV disease. Patients were followed-up for 3.9 ± 1.7 years for CV events. Various CV risk factors and arterial markers, such as brachial flow-mediated dilatation (FMD), carotid intima-media thickness (cIMT), carotid stiffness index (CSI), aortic pulse wave velocity (aPWV) and cardio-ankle vascular index (CAVI) were assessed. **Results:** Over the follow-up period, 83 (3%) patients had at least one CV event. In a multivariate stepwise Cox proportional hazard regression analysis, an increase in aPWV [HR 1.21 (1.04-1.4), $p = 0.016$] and cIMT [HR 1.003 (1.001-1.003), $p = 0.036$] and decrease in FMD [HR 0.30 (0.16-0.56), $p < 0.001$] was independently associated with the occurrence of the CV event.

In a two-level survival trees analysis we established that patients with $cIMT > 793$ mcm had higher CV risk and their prognosis was further compromised with an $FMD \leq 0.23$ mm, whereas in patients with $cIMT \leq 793$ mcm, aPWV but not FMD was of greater predictive value. The lowest Kaplan-Meier cumulative proportion surviving was observed in patients with $cIMT > 793$ mcm and aPWV values above the cut-off point 10.5 m/s ($p < 0.001$).

Conclusions: In the middle-aged patients with MS and increased cIMT, aPWV was strongest independent CV event predictor, whereas in patients with relatively low cIMT values, CV risk was associated primarily with endothelial dysfunction.

P3.15

CARDIAC PERFORMANCE VASCULAR PHYSIOLOGY AND ERECTILE STATUS; A QUESTION OF A HEALTHY DIET

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Purpose: The Mediterranean diet (Med-Diet) assists cardiovascular disease prevention. Erectile dysfunction (ED) reflects functional damage of the small peripheral vessels. Our aim is to investigate whether left ventricular (LV)

performance and peripheral vascular parameters associate with adherence to the Med-Diet in men with erectile disorder.

Methods: 150 ED patients (54±12 years) underwent cardiac ultrasound examination. E/ E' ratio and LV mass index (LVMI) were obtained to assess diastolic performance and myocardial strain respectively. Carotid-femoral pulse wave velocity (PWV) was used to evaluate central arterial stiffness and augmentation index (Alx) as a measure of wave reflections. Dietary habits were evaluated through a special diet score (Med-Diet score, range 0-55). Higher values indicate greater adherence to this pattern. ED severity was assessed by an international questionnaire, the SHIM-5 score.

Results: Population was divided into tertiles according to Med-Diet score (high >30, intermediate: 25-30 and low ≤ 25) with no significant differences in main risk factors between them. Low Med-Diet score patients had significantly higher LVMI and E/E' compared to intermediate and high score population. Regarding vascular performance, both PWV and Alx were inversely correlated to the Med-Diet score subgroups as well as ED severity ($r = -0.245$, $P = 0.005$). Associations remained significant in multivariate analysis after adjustment for age, blood pressure and lipid profile.

Conclusion: Low adherence to the Mediterranean type of diet charges unfavourably cardiac structure and diastolic performance as well as peripheral and central vascular physiology. Our data may clinically assist ED patients in preventing further cardiovascular damage by adopting healthier dietary habits.

P3.16

CENTRAL ARTERIAL STIFFNESS AND SYSTEMIC VASCULAR RESISTANCE INFLUENCE ON LEFT VENTRICULAR GEOMETRY AND DIASTOLIC FUNCTION IN ESSENTIAL HYPERTENSION

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Purpose: Vascular resistance remains a key determinant of arterial hypertension and target organ damage alters morbidity of the disease. Our aim is to investigate physiology and clinical relevance of the left ventricular and systemic vascular interaction in essential hypertension patients.

Methods: 112 participants enrolled the study. Systolic (SBP) and diastolic blood pressure (DBP) as well as pulse pressure (PP) assessed the blood pressure load. Based on 2D echocardiography, left ventricular mass index (LVMI) and Doppler E/ E' ratio determinate ventricular geometry and diastolic performance respectively. Pulse wave velocity (PWV) was measured as determinant of central arterial stiffness and systemic vascular resistance (SVR) was calculated by the ratio of the mitral regurgitation velocity jet to the time velocity integral on the left ventricular outflow tract. We used standard Pearson correlations and bivariate regression analyses on matched pairs of surrogate variables.

Results: Participants demographics included mean age of 53 years old (27–74), BMI of 32 kg/m² (23–44), SBP of 142 mm Hg (137–172), and DBP of 84 mm Hg (60–110). Bivariate- r values for the chosen models are shown in Table. SVR was strongly correlated with both LVMI, E/E' and PWV (all $P < 0.001$). All associations remained significant in logistic regression models after adjustment for age and BP.

Conclusions: LV geometry and diastolic performance are unfavorably influenced by both central arterial stiffness and systemic vascular resistance in primary hypertension. Our data reveal clinical information and interesting pathophysiology background in addition to standard BP components (SAP, DAP) in essential hypertension patients.

P3.17

THE EFFECTS OF ALPHA 1-ADRENOCEPTOR-BLOCKADE BY DOXAZOSIN AND ANGIOTENSIN CONVERTING ENZYME-INHIBITION BY RAMIPRIL ON CENTRAL AND BRACHIAL BLOOD PRESSURE AND VASCULAR REACTIVITY IN MILD-TO-MODERATE HYPERTENSION: THE DOXAZOSIN RAMIPRIL STUDY

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Objectives: To study whether inhibition of the renin-angiotensin-aldosterone system has effects on vascular function beyond blood pressure (BP) reduction alone.

Methods: Mild-to-moderate hypertensive patients (age 54±12 years, 34% women) were randomized double-blind to ramipril (10 mg od, n=33) or doxazosin (8 mg od, n=28) for 12 weeks. Central BP, pulse wave velocity (PWV), and augmentation index (Alx) were assessed by applanation tonometry (SphygmoCor, AtCor Medical). Endothelial function was studied by forearm post-ischemic flow mediated vasodilatation (FMD) and pulse wave analysis with beta 2-adrenoceptor-agonist stimulation, and by skin microcirculation iontophoresis (acetylcholine and sodium nitroprusside).

Results: Baseline central and brachial BP were 140/89 and 148/89 mmHg, carotid and brachial pulse pressures 51 and 60 mmHg, carotid-femoral and carotid-radial PWV 8.8 and 8.9 m/s, and Alx 30.1%. Treatment induced reductions (means±SEM) in central and brachial BP (-7.9±1.1/-6.6±1.1 and -6.0±1.0/-6.8±1.1%; all $P < 0.001$) with greater reductions in central BP (all $P < 0.05$), carotid/brachial pulse pressure ratio (-4.7±1.7%; $P < 0.01$), carotid-radial PWV (-2.9±2.0%; $P < 0.05$), and Alx (-15.9±4.5%; $P < 0.01$), but did not affect carotid-femoral PWV or carotid-femoral/carotid-radial PWV ratios. Ramipril induced greater changes than doxazosin in central and brachial systolic BP (-9.8±1.4 vs -5.4±1.6 and -7.9±1.3 vs -3.8±1.4%; all $P < 0.05$) but central/brachial BP ratio reductions were similar. All endothelial function indices suggested normal endothelial function (eg FMD 5.5±4.1%, reflection index 0.79±0.06) with no treatment effects.

Conclusions: Angiotensin converting enzyme-inhibition and alpha 1-adrenoceptor-blockade similarly reduce central BP more than brachial BP and improve indices of aortic stiffness. Evidence of endothelial dysfunction might require more advanced stages of hypertensive disease.

P3.18

COMPARISON OF STRUCTURAL AND FUNCTIONAL CAROTID AND AORTIC CHANGES IN DIABETES MELLITUS AND HYPERTENSION

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Background: It is known that age, blood pressure and diabetes mellitus are determinants of arterial stiffness. There are no studies comparing impact of hypertension and diabetes on structural and functional carotid and aortic changes.

Aim: The aim of the study was to evaluate structural and functional carotid and aortic changes in patients with diabetes without hypertension and patients with hypertension without diabetes.

Materials and methods: The study group consisted of 64 subjects without manifest cardiovascular disease (43 M and 21 F), mean age 54±10,4 years. Control group consisted of 40 healthy subjects. Patients were divided into two groups: group A with diabetes without hypertension (n=32), group B with hypertension without diabetes (n=32). From carotid arteries ultrasound – IMT and from carotid arteries – high-resolution echo-tracking (eT) local arterial stiffness parameters were evaluated: β -beta, E_p – epsilon, AI- augmentation index, PWV β -one-point pulse wave velocity; also aortic stiffness parameters: aortic distensibility, beta – aortic stiffness and aortic pressure strain elastic modulus E_p were calculated.

Results: In group A and group B mean values of IMT, eT and aortic stiffness indices were statistically significantly higher than in control group.

There was no significant differences in mean values of IMT, eT and aortic stiffness indices between two groups.

Conclusions: Impact of diabetes and hypertension on structural and functional carotid and aortic changes is equal.

P3.19

ASSESSMENT OF CARDIOVASCULAR RISK IN HYPERTENSIVES WITH WHITE COAT EFFECT VS. PATIENTS WITH MASKED UNCONTROLLED HYPERTENSION

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Background: According to current ESH guidelines cardiovascular risk assessment is recommended in vast majority of patients with hypertension. However the groups of patients exist where risk assessment may be challenging.

Aim: The aim of our analysis was to compare risk factors, and target organ damage profiles in two groups of hypertensive patients with discrepant results in office vs. ambulatory blood pressure values.