



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

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

P60: PSYCHOLOGICAL DETERMINANTS OF TARGET ORGAN DAMAGE IN HYPERTENSIVE PATIENTS: FOCUS ON PULSE WAVE VELOCITY AND DEPRESSION

Andrea Greco, Alessandro Maloberti, Marisa Varrenti, Ilaria Bassi, Enrico Piccinelli, Francesco Panzera, Stephan Laurent, Pierre Boutouyrie, Massimo D'Addario, Anna Maria Annoni, Patrizia Steca, Cristina Giannattasio

To cite this article: Andrea Greco, Alessandro Maloberti, Marisa Varrenti, Ilaria Bassi, Enrico Piccinelli, Francesco Panzera, Stephan Laurent, Pierre Boutouyrie, Massimo D'Addario, Anna Maria Annoni, Patrizia Steca, Cristina Giannattasio (2017) P60: PSYCHOLOGICAL DETERMINANTS OF TARGET ORGAN DAMAGE IN HYPERTENSIVE PATIENTS: FOCUS ON PULSE WAVE VELOCITY AND DEPRESSION, Artery Research 20:C, 70–71, DOI: <https://doi.org/10.1016/j.artres.2017.10.082>

To link to this article: <https://doi.org/10.1016/j.artres.2017.10.082>

Published online: 7 December 2019

Methods: Cross-sectional, observational study in 171 consecutive, treatment-naïve subjects derived to a Hypertension Unit with suspected hypertension. Standard echocardiography, ECG, carotid ultrasound and laboratory tests were performed.

Results: Mean age was 49.7 years, 57.3% were women. Reproducibility: Mean differences ($\pm$ SD of the difference (SDD)) between duplicate SC and MG PWV measurements were non-significant. Agreement: cfPWV0.8 yielded the highest PWV values (8.17 ± 1.6 m/s), followed by cfPWVsub (7.98 ± 1.7 m/s), supPWVestim (7.83 ± 1.7 m/s) and sitPWVestim (7.80 ± 1.6 m/s).

We observed significant mean differences only between cfPWV0.8 and all other PWV measures: with cfPWVsub (0.23 m/s, $p = 0.001$), with sitPWVestim (0.39 m/s, $p = 0.001$) and with supPWVestim (0.38 m/s, $p = 0.002$). No significant correlation was found between the mean and the difference for PWV in any comparison.

Association with cardiac damage was highest with cfPWVsub, supPWVestim and sitPWVestim were more closely related to carotid damage, though differences were not significant.

Table 3. Differences between PWV measured by applanation tonometry according to two surface measurements and by brachial oscillometry according to supine or sitting position.

Comparison of PWV	Mean difference	CI	p
cfPWVsub–supPWVestim	0,16	–0,06/0,37	0,149
cfPWVsub–sitPWVestim	0,18	–0,034/0,39	0,098
cfPWV0.8–supPWVestim	0,38	0,15/0,62	0,002
cfPWV0.8–sitPWVestim	0,39	0,15/0,63	0,001
cfPWV0.8–cfPWVsub	0,23	0,12/0,35	0,000
supPWVestim–sitPWVestim	0,02	–0,07/0,12	0,635

cfPWV0.8: direct distance x 0.8-based carotid-femoral PWV.

cfPWVsub: subtracted distance-based carotid-femoral PWV.

sitPWVestim: estimated aortic PWV in sitting position.

supPWVestim: estimated aortic PWV in supine position.

Conclusions: SC and MG showed similar and acceptable reproducibility. SC and MG were interchangeable only using subtracted distance (cfPWVsub), while direct distance x 0.8 showed significantly higher PWV values. Association to TOD was significant and similar between SC and MG.

P58

ARTERIAL STIFFNESS IS ASSOCIATED WITH LOWER PERFORMANCE ON THE COGNITIVE TESTS AT DIFFERENT DOMAINS IN HYPERTENSIVE PATIENTS

Henrique Muela¹, Valeria Costa-Hong¹, Michel Machado², Natalia Moraes², Claudia Memória², Monica Yassuda², Edson Shu², Ayrton Massaro², Ricardo Nitirini², Alfredo Mansur¹, Luiz Bortolotto³

¹Hypertension Unity, Heart Institute (InCor), Hospital das Clinicas da FMUSP, Sao Paulo, Brazil

²Neurology Department, Hospital das Clinicas da FMUSP, Sao Paulo, Brazil

³Hypertension Unity, Heart Institute (InCor), Hospital das Clinicas da FMUSP, Sao Paulo, Brazil

Background: Cognitive impairment and elevated arterial stiffness are described in arterial hypertension (AH), but its correlations are not well studied.

Objectives: To study the cognitive function at different domains and arterial properties in patients with AH stage 1 to 3 compared to normotensives and to evaluate the correlations between these variables.

Methods: We evaluated 71 normotensives (52 ± 14 yrs, 47% male, 65% white) and 150 patients with stage 1–3 AH (52 ± 12 yrs, 45% male, 70% white) under treatment. The global cognitive function was assessed by Mini Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA). A validated battery of neuropsychological tests (NPE) assessed the main cognitive areas: memory, language, visuospatial ability, executive function, attention. Pulse wave velocity (PWV) was measured by Complior® device. Carotid properties were assessed by radiofrequency ultrasound (WTS®). Central arterial pressure and augmentation index (Alx) were obtained using applanation tonometry (Sphygmocor®).

Results: Mean BP of the normotensive group ($122.1 \pm 8/76.7 \pm 7$ mmHg) was significantly lower than hypertensive patients ($135.2 \pm 13/83.3 \pm 10$ and $149.9 \pm 29/91.5 \pm 16$ mmHg). Severe HTN group had worse performance in cognitive evaluation either by MMSE (26.8 ± 2.1 vs 27.4 ± 2.1 vs.

28.0 ± 2.0 , $p = 0.004$) or MoCA test (23.4 ± 3.7 vs. 24.9 ± 2.8 vs. 25.5 ± 3.2 , $p < 0.001$). On the neuropsychological tests hypertensive patients had worse performance mainly in visuo-perceptual and visuospatial capacities and executive function. On the multivariate regression analysis, the following independent associations were observed: Alx–language, executive function, visuospatial and attention; cSBP–MoCA; IMT–memory and attention; PWV–memory, executive function, visuospatial and attention. Higher PWV group had more cognitive dysfunction.

Conclusions: Cognitive impairment at different domains was more frequent in patients with different stages of AH. Arterial functional and structural properties were diversely associated with cognitive performance at different domains.

P59

ARTERIAL STIFFNESS AND PERIPHERAL VASCULAR RESISTANCE IN OFFSPRING OF HYPERTENSIVE PARENTS – INFLUENCE OF GENDER AND OTHER CONFOUNDERS

Niels Henrik Buus¹, Rasmus Carlsen², Dinah Khatir², Hans Eiskjær³, Michael John Mulvany⁴, Karin Skov²

¹Aalborg University Hospital, Department of Nephrology, Denmark

²Aarhus University Hospital, Department of Renal Medicine, Denmark

³Aarhus University Hospital, Department of Cardiology, Denmark

⁴Aarhus University, Department of Biomedicine, Denmark

Aim: Established essential hypertension (EH) is associated with increased arterial stiffness and peripheral resistance, but the extent of vascular changes in persons genetically predisposed for EH is uncertain.

Methods: Participants from the Danish Hypertension Prevention Project (DHyPP) (having two hypertensive parents) ($n = 95$, 41 ± 1 years, 53% males) were compared to available spouses ($n = 45$, age 41 ± 1 years, 43% males). The subjects had measurements of ambulatory blood pressure (BP), left ventricular mass (LVM), pulse wave velocity (PWV), central BP and augmentation index (Alx) in addition to forearm resting and minimal resistance (R_{rest} and R_{min}).

Results: DHyPP subjects with and without spouses were comparable and the DHyPP cohort, as compared to spouses, had higher 24-hour mean BP (94 ± 1 vs. 88 ± 1 mmHg, $P < 0.01$), LVM (90 ± 2 vs. 80 ± 2 g/m², $P < 0.01$), central systolic BP (119 ± 2 vs. 111 ± 2 mmHg, $P < 0.01$) and Alx (15.1 ± 1.2 vs. $10.5 \pm 1.7\%$, $P < 0.01$), but similar values of carotid-femoral PWV (7.3 ± 0.1 vs. 7.1 ± 0.2 m/s), R_{rest} (51 ± 2 vs. 51 ± 3 mmHg/ml/min/100 ml) and log R_{min} (0.57 ± 0.02 vs. 0.55 ± 0.02 mmHg/ml/min/100 ml). Alx, R_{rest} and R_{min} were higher in female as compared to male DHyPP participants ($P < 0.01$ for all) and the same was true for Alx and R_{min} among spouses ($P < 0.05$).

Using multiple linear regression analysis adjusting for gender, age, body mass index, 24-hour BP, 24-hour sodium excretion and creatinine clearance, Alx remained elevated in DHyPP subjects (3.4% [0.18; 6.60], $P = 0.039$). Furthermore, Alx was linearly associated with R_{rest} and R_{min} .

Conclusion: Young to middle-aged individuals genetically predisposed for EH display increased Alx, while vascular stiffness and peripheral resistance are still normal.

P60

PSYCHOLOGICAL DETERMINANTS OF TARGET ORGAN DAMAGE IN HYPERTENSIVE PATIENTS: FOCUS ON PULSE WAVE VELOCITY AND DEPRESSION

Andrea Greco¹, Alessandro Maloberti^{2,3}, Marisa Varrenti^{2,3}, Ilaria Bassi², Enrico Piccinelli², Francesco Panzera², Stephan Laurent^{4,5,6}, Pierre Boutouyrie^{7,5,6}, Massimo D'Addario¹, Anna Maria Annoni¹, Patrizia Steca¹, Cristina Giannattasio^{2,3}

¹Department of Psychology, University of Milano-Bicocca, Milan, Italy

²Medicine and Surgery Department, University of Milano-Bicocca, Milan, Italy

³Cardiology IV Unit, "A. De Gasperi" Department, Ospedale Niguarda Ca' Granda, Milan, Italy

⁴Université Paris Descartes, Sorbonne Paris Cité, Paris, France

⁵Inserm U970, Paris, Cardiovascular Research Centre (PARCC),

Cardiovascular and epidemiology and Sudden Death Team, Paris, France

⁶AP-HP, Hôpitaux Universitaires Paris Ouest, Department of Pharmacology, Paris, France

⁷Université Paris Descartes, Sorbonne Paris Cité, Paris, France

Objective: Prior studies have suggested that the principal determinants of arterial stiffening are age, BP and others CV risk factors such as dyslipidemia

and diabetes. However, scanty data are available on the role of psychological factors on arterial stiffness. The aim of the current cross-sectional study was to evaluate the association between depression, anxiety, perceived stress, Type A personality, and Type D personality and Pulse Wave Velocity (PWV) in a cohort of hypertensive patients, using baseline examination data of the TIPICO project.

Methods: A total of 259 outpatients (ages 18–80 years) followed by the Hypertension Unit of S. Gerardo Hospital (Monza, Italy) affected by essential hypertension were recruited.

Aortic stiffness was evaluated by c-f PWV. Moreover, anamnestic data, clinical BP, and laboratory data were evaluated. Patients were asked to complete a battery of psychological questionnaires under the guidance of a psychologist.

Results: At T0 mean age was 55.9 ± 10.1 years, SBP/DBP were $135.6 \pm 17.7/82.5 \pm 9.1$ mmHg and PWV was 8.6 ± 2.1 m/s. The multivariate stepwise linear regression analysis showed that age ($\beta = 0.284$, $p < 0.001$), pulse pressure ($\beta = 0.369$, $p < 0.001$), dyslipidemia ($\beta = 0.130$, $p = 0.012$), family history of CV disease ($\beta = -0.123$, $p = 0.017$), and depression ($\beta = 0.126$, $p = 0.014$) were significantly and independently associated with PWV.

Conclusion: Among psychological factors, higher levels of depression is related to higher PWV, while anxiety, perceived stress, Type-A personality and Type-D personality are not. Depression assessment and target intervention to reduce it should be recommended in hypertensive patients.

P61 PSYCHOLOGICAL DETERMINANTS OF TARGET ORGAN DAMAGE IN HYPERTENSIVE PATIENTS: FOCUS ON TYPE A PERSONALITY AND LEFT VENTRICULAR MASS INDEX

Andrea Greco¹, Alessandro Maloberti^{2,3}, Paola Sormani^{2,3}, Giulia Colombo^{2,3}, Luca Giupponi^{2,3}, Stephan Laurent^{4,5,6}, Pierre Boutouyrie^{4,5,6}, Massimo D'Addario¹, Anna Maria Annoni¹, Antonella Moreo³, Cristina Giannattasio^{2,3}, Patrizia Steca¹

¹Department of Psychology, University of Milan-Bicocca, Milan, Italy

²Medicine and Surgery Department, University of Milano-Bicocca, Milan, Italy

³Cardiology IV Unit, "A. De Gasperi" Department, Ospedale Niguarda Ca' Granda, Milan, Italy

⁴Université Paris Descartes, Sorbonne Paris Cité, Paris, France

⁵Inserm U970, Paris, Cardiovascular Research Centre (PARCC), Cardiovascular and epidemiology and Sudden Death Team, Paris, France

⁶AP-HP, Hôpitaux Universitaires Paris Ouest, Department of Pharmacology, Paris, France

Background: Increased Left Ventricular Mass Index (LVMI) is a well known risk factor for cardiac morbidity and mortality. Furthermore, it is widely recognized that clinical evolution and progression of established CV diseases

Results: At T0 the mean age was 55.9 ± 10.1 years, SBP and DBP were 135.6 ± 17.7 and 82.5 ± 9.1 mmHg and PWV was 8.6 ± 2.1 m/s. The multivariate stepwise linear regression analysis showed that sex ($\beta = 0.252$, $p < 0.001$), age ($\beta = 0.135$, $p < 0.037$), mean BP ($\beta = 0.178$, $p = 0.003$), family history of CV disease ($\beta = 0.129$, $p = 0.027$), and Type-A personality ($\beta = 0.148$, $p = 0.014$) were significantly and independently associated with LVMI.

Conclusion: Among psychological factors, higher levels of Type-A personality is related to higher LVMI, while Type-D personality, anxiety, depression and stress are not associated.

P62 BLOOD PRESSURE LOWERING HALTS CAROTID ARTERY STIFFENING IN HYPERTENSIVE PATIENTS: THE CATOD STUDY

Siske Bos¹, Rosa Maria Bruno², Bart Spronck³, Maarten Heusinkveld¹, Stefano Taddei⁴, Lorenzo Ghiadoni², Koen Reesink¹

¹Maastricht University, Netherlands

²University of Pisa, Italy

³Yale University, USA

⁴University of Florence, Italy

Background: We anticipate that in vascular outpatients followed over time, measured changes in arterial stiffness will be the multifactorial result of pressure-dependence, ageing-related degeneration, wall stress homeostasis, and medical treatment. Carotid ultrasound enables assessment of carotid pulse wave velocity (cPWV, via Bramwell-Hill), geometry (relative wall thickness, RWT = $2 \times \text{IMT}/\text{diameter}$), and intrinsic material stiffness (Young's-modulus, via Moens-Korteweg). We investigated changes in these carotid properties over time, and their interrelationship. To check whether the change in measured cPWV could be merely due to pressure-dependence, we calculated based on the stiffness index β_0 [2] the theoretical pressure-dependent change in cPWV [3].

Methods: Hypertensive outpatients ($n = 147$) were assessed at baseline and 3.5 ± 1.1 year follow-up, and were stratified according to baseline-to-follow-up change in diastolic blood pressure (ΔDBP) into three groups: *decreasedDBP* ($\Delta\text{DBP} < -7$ mmHg), *constantDBP* ($-7 \text{ mmHg} \leq \Delta\text{DBP} \leq 7$ mmHg) and *increasedDBP* ($\Delta\text{DBP} > 7$ mmHg), with the cut-off being twice the typical DBP measurement error [1].

Results: The theoretical pressure-dependent change in cPWV was 0.4 ± 1.3 m/s lower ($p < 0.001$, $n = 147$), corroborating the anticipated multifactorial conditions. Table 1 shows no changes in cPWV, RWT and Young's-modulus for *decreasedDBP*. For *constantDBP*, both cPWV and Young's-modulus were increased at follow-up.

IncreasedDBP showed increases in cPWV and Young's-modulus and a decreased RWT. The latter implies a 9.2 ± 10.7 kPa increase in circumferential wall stress ($p < 0.001$), in contrast to a 5.3 ± 6.9 kPa decrease ($p < 0.001$) in *decreasedDBP* ($p < 0.05$ for between groups).

Table 1. Changes in measure carotid properties with 3.5-year follow-up.

n = 147	ΔcPWV [m/s]		ΔRWT [–]		$\Delta\text{Young's-modulus}$ [MPa]	
	Mean $\pm$ sd	p	Mean $\pm$ sd	p	Mean $\pm$ sd	p
DecreasedDBP (n = 53)	-0.1 ± 1.4	0.72	0.00 ± 0.04	0.38	-0.01 ± 0.32	0.87
ConstantDBP (n = 67)	$+0.6^* \pm 1.4$	< 0.001	0.00 ± 0.04	0.18	$+0.10^* \pm 0.26$	< 0.001
IncreasedDBP (n = 27)	$+0.5^* \pm 1.5$	0.029	$-0.02^*, ** \pm 0.04$	0.002	$+0.19^* \pm 0.35$	< 0.001

Δ s calculated as follow-up – baseline. *: $p < 0.05$ compared to decreasedDBP. **: $p < 0.05$ compared to constantDBP.

The bold indicates that there is a statistically significant difference between follow-up and baseline.

are related to a range of psychological characteristics, which may partially explain the spread and recurrence of these diseases. Little is known about LVMI and its association with psychological characteristics in arterial Hypertension (HT) patients. The aim of the current cross-sectional study was to evaluate the association between psychological characteristics and LVMI in a cohort of hypertensive patients.

Methods: A total of 244 outpatients (age 18–80 years) followed by the Hypertension Unit of S. Gerardo Hospital (Monza, Italy) affected by essential hypertension were recruited. Anamnestic data, clinical BP, and laboratory data and LVMI were evaluated. Patients were asked to complete a battery of psychological questionnaires under the guidance of a psychologist.

Conclusions: In this outpatient cohort, with clear DBP reduction, there is a discontinuation of carotid stiffening, but no reversal. In patients with increased DBP, progressive carotid stiffening appears driven by impaired wall stress homeostasis.

References

- [1] Spronck et al. 2015. Pressure-dependence of arterial stiffness: potential clinical implications. *J Hypertens* 33(2): 330-8.
- [2] Spronck et al. 2017. Arterial stiffness index beta and cardio-ankle vascular index inherently depend on blood pressure but can be readily corrected. *J Hypertens* 35(1): 98-104 [3] Spronck et al. 2017. Patient-specific