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### **P57: ASSESSMENT OF PULSE WAVE VELOCITY AND ASSOCIATION TO TARGET ORGAN DAMAGE IN TREATMENT-NAÏVE HYPERTENSIVE PATIENTS: A COMPARISON OF SPHYGMOCOR AND MOBIL-O-GRAPH**

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**Objectives:** Sex differences for parameters of arterial wave reflection and arterial stiffness were reported from single office measurements, but circadian patterns were not extensively investigated up to now. The aim of this study was to determine sex differences between day and night values of ambulatory central blood pressure as well as ambulatory pulse wave parameters related to arterial wave reflection.

**Methods:** A Mobil-O-Graph (IEM, Stolberg) with inbuilt PWA technology was used in patients without antihypertensive treatment visiting a doctor's practice for internal medicine. Aortic blood pressure was obtained using a generalized transfer function incorporating mean blood pressure for pressure calibration. Daytime was defined between 9 am and 8 pm and nighttime between 10 pm and 6 am.

**Results:** In the study 192 men (mean age 50.5 years) and 155 women (57.3 years) were included. Men had higher central systolic (cSBP) and diastolic blood pressures compared to women. In contrast, augmentation index (Alx) and reflection magnitude (RM) were significantly lower in men compared to women both during day and night. For both sexes, Alx and RM were higher during the night, see table for full details (all day-night differences were statistically significant).

Table	Mean values of both sexes during daytime and nighttime.			
	Day		Night	
	Men	Women	Men	Women
bSBP (mmHg)	134.5*	130.2	121.5	118.6
bDBP (mmHg)	86.7*	81.5	74.8*	70.3
HR (bpm)	75.2	77.1	64.5*	66.9
cSBP (mmHg)	136.7*	131.5	131.7*	125.4
Alx (%)	19.8*	28.2	25.1*	35.1
RM	60.5*	63.4	68.7*	71.4

\* Indicates a significant difference between men and women ( $p < 0.05$ ); bSBP – brachial systolic blood pressure, bDBP – brachial diastolic blood pressure, HR – heart rate, cSBP – central systolic blood pressure, Alx – augmentation index, RM – reflection magnitude.

**Conclusions:** A typical blood pressure dipping during nighttime was found for both sexes. However, an increase in wave reflection parameters was found during nighttime leading to highest values for women during the night. Thus, single measurements have to be interpreted with caution and an ambulatory blood pressure measurement including pulse wave analysis might be beneficial.

#### P55 TARGET ORGAN DAMAGE AND BLOOD PRESSURE VARIABILITY IN HYPERTENSION

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**Purpose/Background/Objectives:** Hypertension is associated with several markers of subclinical target organ damage (TOD). Short-term blood pressure variability (SBPV) is a prognostic factor for cardiovascular events in hypertensives. We hypothesised that there is a relationship between SBPV and TOD in never-treated hypertensives.

**Methods:** We enrolled 943 consecutive essential hypertensives (mean age  $53 \pm 12$  years, 497 males). Markers of subclinical TOD [left ventricular mass index (LVMI), pulse wave velocity (PWV), total arterial compliance (TAC), aortic augmentation index (Alx@75), ankle-brachial index (ABI) and estimated glomerular filtration rate (eGFR)] and 24-h ambulatory blood pressure were evaluated in all patients. SBPV was calculated as follows: 1) SD of 24-hour, daytime, or nighttime SBP and 2) weighted SD of 24-hour SBP.

**Results:** In multivariable regression analysis, all four variables of SBPV exhibited significant association with LVMI ( $p = 0.014$ ,  $p = 0.002$ ,  $p = 0.002$  and  $p < 0.001$ , respectively), PWV ( $p = 0.021$ ,  $p = 0.015$ ,  $p = 0.055$  and  $p = 0.006$ , respectively) and TAC ( $p = 0.048$ ,  $p = 0.020$ ,  $p = 0.036$  and

$p = 0.006$ , respectively). In multivariable analysis, ABI and eGFR were not associated with indices of SBPV. We assessed TOD based on 2013 European Guidelines for Hypertension [left ventricular hypertrophy (LVMI  $> 115 \text{ g/m}^2$  in men and  $> 95 \text{ g/m}^2$  in women), increased PWV (PWV  $> 10 \text{ m/s}$ ), increased Alx@75 (Alx@75  $> 28\%$ ), decreased ABI (ABI  $< 0.9$ ) and decreased renal function (eGFR  $< 60 \text{ ml/min}$ )]. In multivariable logistic regression analysis, SBPV indices were not associated with markers of TOD ( $P > 0.05$ ).

**Conclusions:** Our findings support a complex relationship between SBPV and TOD in hypertension. Specifically, SBPV is more closely related to markers of ventricular and vascular compliance than other markers of TOD in hypertension.

#### P56 ASSOCIATION BETWEEN URIC ACID AND CARDIAC, VASCULAR AND RENAL TARGET ORGAN DAMAGE IN HYPERTENSIVES SUBJECTS

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**Background:** To date no definitive results exist about the relationship of Serum Uric Acid (SUA) and TOD in HT subjects. We sought to determine if such an association exist between SUA and subclinical cardiac, vascular and renal alterations in HT.

**Methods:** We enrolled 632 consecutive outpatients, followed by the Hypertension Unit of S. Gerardo Hospital (Monza, Italy) affected by essential HT. We evaluated anamnestic data, clinical BP and laboratory data as well as TOD with cardiac echocardiography (both as LMVI and diastolic function – E/A), carotid ultrasound (IMT), arterial stiffness (PWV) and renal function analysis (creatinine and microalbuminuria).

**Results:** Age was  $53.4 \pm 12.7$  years, SBP/DBP were  $140.5 \pm 18.8$  and  $85.1 \pm 13.1$  mmHg and SUA was  $5.2 \pm 1.4$  mg/dL. Regarding TOD mean LVMI was  $109.6 \pm 31.4 \text{ g/m}^2$ , IMT  $0.71 \pm 0.1$  mm, PWV  $8.5 \pm 2.2 \text{ m/s}$ , while creatinine and microalbuminuria were  $0.8 \pm 0.2$  mg/dL and  $25.4 \pm 126.1 \text{ mg/24h}$  respectively. When subjects were divided into high and low SUA group (depending on the median SUA of 5.2 mg/dL), with similar age and BP values the first group showed significantly higher values of metabolic index (BMI, HDL chol, triglycerides and glucose,  $p < 0.001$ ), LVMI ( $117.1 \pm 32.8$  vs  $102.1 \pm 28.1 \text{ g/m}^2$ ,  $p < 0.01$ ), IMT ( $0.73 \pm 0.1$  vs  $0.70 \pm 0.1 \text{ mm}$ ,  $p = 0.04$ ), PWV ( $8.8 \pm 2.4$  vs  $8.3 \pm 2.1 \text{ m/s}$ ,  $p = 0.01$ ) and creatinine ( $0.9 \pm 0.2$  vs  $0.7 \pm 0.1 \text{ mg/dL}$ ,  $p < 0.01$ ) and lower E/A ( $1.0 \pm 0.3$  vs  $1.1 \pm 0.3$ ,  $p < 0.01$ ). SUA showed significant correlation with sex, age, BMI, SBP, HDL chol, triglycerides, glucose, creatinine, IMT, LVMI and E/A. Regarding TOD only creatinine presents SUA as as significant determinant in logistic regression analysis.

**Conclusion:** In HT, SUA values correlate with metabolic derangements and with cardiac, vascular and renal TOD. The most significant correlation is with renal damage.

#### P57 ASSESSMENT OF PULSE WAVE VELOCITY AND ASSOCIATION TO TARGET ORGAN DAMAGE IN TREATMENT-NAÏVE HYPERTENSIVE PATIENTS: A COMPARISON OF SPHYGMOCOR AND MOBIL-O-GRAPH

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**Introduction:** Comparison of Mobil-O-Graph<sup>®</sup> with SphygmoCor<sup>®</sup> exclusively in treatment-naïve hypertensives has never been done. Aims of the study were to assess 1) intra-device agreement between both methods, 2) inter-device agreement between two surface measurements of SC (subtracted distance (cfPWVsub)) and direct distance  $\times 0.8$  (cfPWV0.8)) with two patient's positions of MG (supine (supPWVestim)) and sitting (sitPWVestim)), 3) the strength of association between tonometric and oscillometric measures of PWV with target organ damage (TOD).

**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 ( $8.17 \pm 1.6$  m/s), followed by cfPWVsub ( $7.98 \pm 1.7$  m/s), supPWVestim ( $7.83 \pm 1.7$  m/s) and sitPWVestim ( $7.80 \pm 1.6$  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

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**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 ( $52 \pm 14$  yrs, 47% male, 65% white) and 150 patients with stage 1–3 AH ( $52 \pm 12$  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 ( $26.8 \pm 2.1$  vs  $27.4 \pm 2.1$  vs

$28.0 \pm 2.0$ ,  $p = 0.004$ ) or MoCA test ( $23.4 \pm 3.7$  vs.  $24.9 \pm 2.8$  vs.  $25.5 \pm 3.2$ ,  $p < 0.001$ ). 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

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**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) ( $n = 95$ ,  $41 \pm 1$  years, 53% males) were compared to available spouses ( $n = 45$ , age  $41 \pm 1$  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 ( $94 \pm 1$  vs.  $88 \pm 1$  mmHg,  $P < 0.01$ ), LVM ( $90 \pm 2$  vs.  $80 \pm 2$  g/m<sup>2</sup>,  $P < 0.01$ ), central systolic BP ( $119 \pm 2$  vs.  $111 \pm 2$  mmHg,  $P < 0.01$ ) and Alx ( $15.1 \pm 1.2$  vs.  $10.5 \pm 1.7\%$ ,  $P < 0.01$ ), but similar values of carotid-femoral PWV ( $7.3 \pm 0.1$  vs.  $7.1 \pm 0.2$  m/s),  $R_{rest}$  ( $51 \pm 2$  vs.  $51 \pm 3$  mmHg/ml/min/100 ml) and log  $R_{min}$  ( $0.57 \pm 0.02$  vs.  $0.55 \pm 0.02$  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

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