

# POSTER SESSION

## POSTERS' SESSION PS21:

## EPIDEMIOLOGY AND RISK FACTORS

### GLOBAL MORTALITY OF MEDITERRANEAN POPULATION HYPERTENSIVE >65 YEARS

D. Godoy Rocati<sup>1</sup>, B. Roig Espert<sup>2</sup>, J.J. Tamarit García<sup>1</sup>, A. González-Cruz Cervellera<sup>1</sup>, V. Pallarés Carratalá<sup>3</sup>, P. Morillas Blasco<sup>4</sup>, -. FAPRES. Registry Investigator. <sup>1</sup>Servicio de Medicina Interna. Consorcio Hospital General Universitario de Valencia., Valencia, SPAIN, <sup>2</sup>Servicio de Medicina Interna. Hospital Universitario de Manises., Manises-Valencia, SPAIN, <sup>3</sup>Unidad de Vigilancia de la Salud. Unión de Mutuas., Castellón de La Plana-Castellón, SPAIN, <sup>4</sup>Servicio de Cardiología. Hospital Universitario de San Juan., Sant Joan d'Alacant-Alicante, SPAIN

**Objective:** In Spain, hypertension is a health problem of the first magnitude. The importance of determining the cardiovascular risk (CVR) associated with high blood pressure is based on the evidence that most hypertensive patients have additional CVR factors that, when concurrent with hypertension, enhance each other, giving rise to a CVR total that is greater than the sum of its components. Our objective was to assess the overall mortality of this population group.

**Design and method:** Epidemiological, observational, longitudinal, prospective and multicentre study of the care setting, carried out in the Valencia Community with a hypertensive population over 65 years of age that went to the Health Centre or to a Hospital Unit of Hypertension (FAPRES Registry). The collected data have been entered into a computer database for further analysis of the data using the statistical program IBM - SPSS Windows version 20 with a statistical significance of  $p < 0.05$ .

**Results:** Of the 1,028-hypertensive patients basally included, 1,003 patients (97.6%) completed the follow-up after a median of 803 (721–896) days, with the following results:

- Average age:  $72.8 \pm 5.8$  years.
  - Women: 52.5%.
  - Years of average evolution of HBP:  $10.9 \pm 8.3$  years.
  - CVR factors: 63.2% sedentary lifestyle, diabetes 27.5%, dyslipidaemia 48.3%, smoking 9%, alcohol consumption 3.8%.
- During the follow-up there were 41 deaths (overall mortality 4.1%). The deceased presented the following statistically significant differences:
- Higher percentage of male sex.
  - Older middle age.
  - Higher frequency of history of heart failure and/or coronary disease.
  - Lower diastolic blood pressure and higher pulse pressure.
  - More sedentary lifestyle.
  - Higher percentage in anticoagulant treatment.
  - Lower levels of HDL cholesterol.
  - Greater presence of the Q wave of necrosis in the electrocardiogram.

In the multivariate analysis, the factors associated with overall mortality were age, coronary heart disease and previous heart failure. On the contrary, physical exercise, the history of hypercholesterolemia and female sex were associated with lower mortality.

**Conclusions:** Physical exercise prevents global mortality, from which the importance of it in hypertensive patients over 65 years of age is deduced.

### RISK FACTORS FOR CARDIOVASCULAR EVENTS, ENDOTHELIAL FUNCTION, LEVEL OF LEPTIN AND LEVEL OF CREATININE IN PATIENTS WITH CORONARY HEART DISEASE COMBINED WITH HEPATIC STEATOSIS

M. Grechanyk. Dnepropetrovsk Medical Academy, Dnepro, UKRAINE

**Objective:** To compare the relationship risk factors for cardiovascular events, endothelial function, echocardiographic indicators, level of leptin and level of creatinine in patients with coronary heart disease (CHD) combined with hepatic steatosis.

**Design and method:** The study involved 62 men (group A) with CHD combined with hepatic steatosis, control group - 17 patients with CHD without steatosis

(group B). The study group was divided into 3 subgroups according to BMI (subgroup 1 - overweight, <sup>2</sup>- obesity 1 degree, <sup>3</sup>- obesity grade 2). Evaluated echocardiographic ranges, level of leptin and level of creatinine.

**Results:** All patients were at high risk, but in the analysis on the scale SKORE in the group A, a moderate risk was detected in 56% patients, in the control group in 41%. High risk - in 41% in group A and in 47% in B. A very high risk in group A was defined only in 3%, in the control group - in 11% participants. Endothelial dysfunction was found in 90% in a group A and in 46% in a group B. Reactive hyperemia index (RHI) was lower ( $4.92 \pm 4.2\%$ ) in the group A than in group B ( $9.4 \pm 3.4\%$ ) ( $p < 0.05$ ). RHI was lower ( $4.2 \pm 5.3\%$ ) in the group 2 and in group 3 ( $4.6 \pm 1.7\%$ ) than in group 1 ( $7.8 \pm 5.4\%$ ) ( $p < 0.05$ ). Echocardiographic parameters: diastolic left ventricular (LV) internal dimension, systolic LV internal dimension, LV end-diastolic volume, LV end-systolic volume, LV mass were larger in a group A compared with a group B ( $p < 0.03$ ). The mean level of leptin were  $16.1 \pm 9.8$  ng/ml in a group 1,  $24.4 \pm 14.6$  ng/ml in a group 2 then in a group 3 ( $43.6 \pm 20.2$  ng/ml ( $p < 0.05$ ). All patients had a normal level of creatinine.

**Conclusions:** The scale does not assess the risk of developing cardiovascular events. There was correlation between the diastolic left ventricular (LV) internal dimension, and endothelial dysfunction ( $r = -0.79$ ,  $p = 0.01$ ), levels of leptin ( $r = -0.73$ ,  $p = 0.01$ ) and creatinine ( $r = -0.76$ ,  $p = 0.01$ ) in a group 2. Patients with CHD and liver steatosis showed significant differences in the structural and functional properties of the myocardium with more pronounced disorders endothelial function.

### HIGH SYMPATHETIC RESPONSE AND PHENOBARBITAL IN PRIMARY HYPERTENSIVE PATIENTS

M. El Bakkali, S. Aboudrar, A. Jniene, J. El Hangouche, H. Rkain, L. Errguig, T. Dakka, H. Benjelloun. *Physiology of Exercise Team and Autonomic Nervous System (PET-ANS), Faculty of Medicine and Pharmacy, University Mohamm, Rabat, MOROCCO*

**Objective:** The literature showed that the high sympathetic activity can be considered as a cardiovascular risk factor. This phenomenon has been well found in primary hypertensive patients (PHP). The purpose of this study was to see if phenobarbital in small doses (10 mg) is able to decrease the sympathetic hyperactivity in primary hypertensive patients (PHP) using cardiovascular autonomic reflexes before and after treatment.

**Table 1:** Alpha peripheral sympathetic response (alpha SP) obtained on hand grip test. Alpha central sympathetic response (alpha SC), beta central sympathetic response (beta SC) obtained during mental stress, and alpha peripheral adrenergic sympathetic (alpha PAS). Parameters were measured before and after treatment by phenobarbital, and expressed as mean  $\pm$  SE; \* $p < 0.05$ .

Test	alpha PS	alpha CS	beta CS	alpha PAS
Before phenobarbital treatment	$35.6 \pm 8.7$	$29.3 \pm 9.2$	$32.0 \pm 5.3$	$25.3 \pm 6.0$
After phenobarbital treatment	$12.0 \pm 2.5^{**}$	$11.8 \pm 2.4^{**}$	$29 \pm 6.1$	$13.0 \pm 3.4^{**}$

**Design and method:** This prospective study was conducted on a total of 123 primary hypertensive patients (PHP) in whom we noted a high central and/or peripheral sympathetic response diagnosed by mental stress and orthostatic tests. Inclusion criteria: All primary hypertensive patients who had shown a sympathetic hyperactivity were included in this study. Exclusion criteria. The patients with an abnormal electrocardiogram, severe arterial hypertension, secondary or complicated hypertension or having over-sensitiveness to the molecule were excluded from this study. This is a prospective study comparing two cardiac autonomic evaluations: pre and post-therapeutic, carried out in the unit of exploration of the autonomic nervous system, service of cardiology "A" at the University hospital Ibn Sina. A written consent form was obtained from each patient before the tests.

Statistical analysis: Group comparisons were carried out by independent samples Student's t-test for interval variables and the khi square test for categorical variables, with 95% confidence intervals (CIs) calculated where appropriate. P significant if  $p < 0.05$ . All analyses were performed using SPSS, version 15.0 (SPSS Inc., Chicago, IL).

**Results:** Table 1: Alpha peripheral sympathetic response (alpha SP) obtained on hand grip test. Alpha central sympathetic response (alpha SC), beta central sympathetic response (beta SC) obtained during mental stress, and alpha peripheral adrenergic sympathetic (alpha PAS). Parameters were measured before and

after treatment by phenobarbital, and expressed as mean  $\pm$  SE; P is significant if  $< 5\%$ .

**Conclusions:** In hypertensive patients, use of Phenobarbital (10 mg) showed a significant decrease of the sympathetic activity.

### FACTORS ASSOCIATED WITH EARLY BLOOD PRESSURE CONTROL IN NEWLY DIAGNOSED HYPERTENSIVE PATIENTS

E. Nicolas<sup>1</sup>, F. Beauvais<sup>2</sup>, R. Benainous<sup>1</sup>, L. Weisslinger<sup>1</sup>, S. Lejeune<sup>1</sup>, J. J. Mourad<sup>1</sup>. <sup>1</sup>ESH excellence Centre, Avicenne Hospital, APHP, Bobigny, France, <sup>2</sup>Lariboisiere hospital, Paris, FRANCE

**Objective:** In January 2013, the French society of HTA (SFHTA) issued a recommendation to enhance the management of patients with high blood pressure (BP) in France. This recommendation put great emphasis of the 'diagnosis announcement procedure' and the first 6 months of therapeutic management of a hypertensive patient. This initial period of management, crucial for the patient's adherence, has not been the subject of much study. The primary endpoint was to evaluate and estimate the impact of initial management and the patient's perception of the disease on BP control in newly treated hypertensive patients.

**Design and method:** This observational retrospective study was carried out in France in 2016 within a representative sample of general practitioners, in a usual follow-up. Each doctor had to include 4 consecutively treated hypertensive patients for more than 3 months and less than one year (3 uncontrolled + 1 controlled). The data was carried over by each physician from the consultation data, and by the patients in a self-questionnaire.

**Results:** 214 doctors included 846 patients. Data from 643 patients could be analysed. The patients were  $58 \pm 10$  years old and 61.5% were male. 23.8% had BMI  $> 30$  kg/m<sup>2</sup>. Significantly different data between controlled patients (mean BP:  $129 \pm 6/77 \pm 6$  mmHg) and uncontrolled (mean BP:  $158 \pm 11/93 \pm 8$  mmHg) were summarized in the following table. Analysis of the concordance between the physician's declarative data on patient information and the patient's perception of this information shows that early-controlled patients receive more comprehensive information than other patients and have a better adherence or are more in agreement with the information issued by doctors than uncontrolled patients.

	Controlled HT (n=122)	Uncontrolled HT (n=521)	p
Age (years)	56 $\pm$ 10	59 $\pm$ 10	0.001
BMI (kg/m <sup>2</sup> )	26 $\pm$ 3	28 $\pm$ 4	0.01
Presence of diabetes	9.8%	17.9%	0.001
Presence of dyslipidemia	37.7%	53.1%	0.001
Active smoking	25.4%	36.4%	0.001
Excessive alcohol intake	9.8%	22.7%	0.001
Regular physical activity	47.1%	26.7%	0.001
Known sleep apnea	3.3%	9.7%	0.01
Information delivered concerning the selected therapeutic strategy	76.7%	71.3%	0.001
Information delivered concerning the BP objectives	93.1%	88.1%	0.01

**Conclusions:** This study shows that factors usually associated with late BP control can also have an impact at the early therapeutic stages. The results underline how the deliverance of the initial diagnosis may impact patient's perception and BP control. A standardisation of the deliverance of this information through a dedicated consultation, as advocated by the French recommendations seems legitimate.

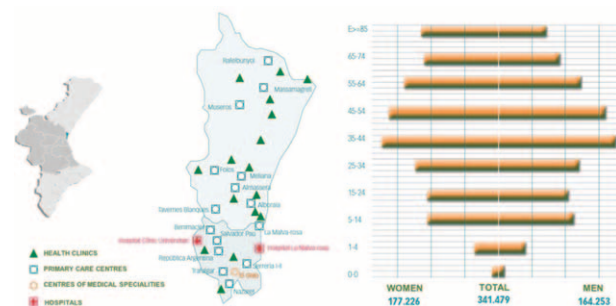
### EPIDEMIOLOGY OF HYPERTENSION IN AN URBAN AREA DEPENDING OF A TERTIARY HOSPITAL

F. Martínez García<sup>1</sup>, G. Pichler<sup>1,2</sup>, R. Usó<sup>2</sup>, A. Ruiz<sup>1,2</sup>, I. Sauri<sup>2</sup>, E. Solaz<sup>1,2</sup>, O. Calaforra<sup>2</sup>, J. Cacheiro<sup>1,2</sup>, J. Redon<sup>1,2</sup>. <sup>1</sup>Internal medicina department. Clinical hospital of Valencia, Valencia, SPAIN, <sup>2</sup>Research institute of the clinical hospital of Valencia, Valencia, SPAIN

**Objective:** Electronic Health Recordings are useful tools for monitoring chronic diseases. However, there are potential issues regarding the veracity of the information. Our objective was to know the epidemiological data for hypertension in our health department using the EHR and our own data from a specialised Hypertension Unit.

**Design and method:** Information regarding the status of hypertension in the dependence area of a tertiary hospital of Valencia (Spain) was reviewed, as well as those obtained from the corresponding specialized Hypertension Clinic.

**Results:** The total population ascribed to the tertiary hospital was 341.340 inhabitants. The structure of our Health Department and its demographic characteristics are shown in Figure 1.



Of those, one of the many different diagnostics related to hypertension was present in 139,899, which means a prevalence of almost 41%. The main codified diagnosis was "Essential Hypertension" (almost 47.5%), follow by "non-specified hypertension" (35.5%), "benign hypertension" (14%) and "malign hypertension" (1.5%). There were other 25 different diagnosis, which had very low prevalence (less than 1%) and mainly related with hypertensive kidney/heart organ damage. From April 2014 to June 2017, 2296 subjects were attended in the Hypertension Unit. The majority of individuals had only one (28.2%) or two visits (34.6%). There were 495 (21.6%) with three, 236 (10.4%) with four, 75 (3.27%) with five, 24 (1%) with six, 14 (0.6%) with seven and 10 patients with 10 visits. Roughly, around 37% patients had criteria to be follow in a specialized unit. The average age of those, was 60 year, 46% women, 87% dyslipidemics, 52% with obesity, 37% diabetics, 23% current smokers, 20% in secondary prevention, 10% with resistant hypertension, 20% with microalbuminuria and 12% with LVH.

**Conclusions:** In order to be useful, EHR integrating primary and specialized care should be implemented to better reflect the grade of control and the associated organ damage.

### ARTERIAL HYPERTENSION IN ATHLETES IN THEIR MIDDLE AND LATE ADULTHOOD DURING SPORTS ACTIVITIES

M. Tsareva, A. Shmoylova, Y. Shvarts. SSMU n. a. V. I. Razumovsky, Saratov, RUSSIA

**Objective:** The aim was to analyze the changes in blood pressure measured before and after the physical exertion experienced by veteran athletes, taking into account their existing diagnosis of hypertension.

**Design and method:** The 108 competitive athletes aged 40 to 72 years have also undergone the measurement of their pre-exercise (standing/resting) and post-exercise blood pressure (after the physical activities and after the competitions). It's necessary to mention that all measurements under this research have been treated with regard to the diagnosis of arterial hypertension, determined by a physician earlier.

**Results:** 41% of all the examined athletes have been diagnosed with the increased pre-exercise systolic blood pressure (SBP) and 29.6% of them with the increased pre-exercise diastolic blood pressure (DBP). After the physical activities, the same 41% of all the examined athletes have been diagnosed with the increased post-exercise SBP, while already 50.9% of them with the increased post-exercise DBP. Under competitions pressure, the 61.8% of all the examined athletes have been diagnosed with the increased pre-exercise SBP, and 35.3% of them with the increased pre-exercise DBP. Immediately after the exercise stress, 67.6% of all the examined athletes have been diagnosed with the increased post-exercise SBP, and 41.2% of them with the increased post-exercise DBP. The increased pre-exercise SBP (more than 139 mm Hg) has been recorded in 30.6% of the athletes NOT diagnosed with the arterial hypertension; the increased post-exercise SBP has been recorded in 42% of them. The increased pre-exercise SBP has been recorded in 56% of the athletes diagnosed with the arterial hypertension; the increased post-exercise SBP has been recorded in 60% of them. This tendency is clearly defined during competitions. The blood pressure history in those patients diagnosed with the arterial hypertension has shown to be statistically independent of the antihypertensive therapy and its regularity.

**Conclusions:** Almost half of the athletes in their middle and late adulthood are diagnosed with the hypertension. The increased pre-exercise and post-exercise blood pressure is registered in a significant part of veteran athletes, as well as one third of those athletes not suffering from hypertension at all.

### CHANGES IN BLOOD PRESSURE AND METABOLIC PARAMETERS IN OVERWEIGHT PATIENTS WITH OBSTRUCTIVE SLEEP APNOEA SYNDROME AFTER 3-MONTH CONTINUOUS POSITIVE AIRWAY PRESSURE THERAPY

F. Spannella, F. Giuliotti, C. Di Pentima, E. Borioni, F.E. Lombardi, G. Cocci, B. Bernardi, C. Iacocci, R. Sarzani. Internal Medicine and Geriatrics IRCCS-INRCA, Politecnica delle Marche University, Ancona, ITALY

**Objective:** Obstructive sleep apnea syndrome (OSAS) is closely related to hypertension and altered glucose and lipid metabolism. Overweight represents a key risk factor for OSAS. Aim: to describe the blood pressure (BP) and metabolic changes in overweight/obese adults with moderate to severe OSAS before and after 3-month continuous positive airway pressure (CPAP) therapy.

**Design and method:** Prospective observational study on 56 patients (T1) of whom 13 were re-evaluated after 3-month CPAP therapy (T2). Inclusion criteria: BMI > 25 kg/m<sup>2</sup>, age > 18 years, CPAP therapy indication (AHI > 15). Instrumental examinations: home sleep apnea polygraphy, 24 h ambulatory BP monitoring, 72 h metabolic monitoring (Sensewear Armband®). Laboratory examinations: glycemia, insulinemia, total cholesterol, HDL cholesterol, triglycerides. Insulin resistance (IR) was evaluated by HOMA-index.

**Results:** Evaluation at T1: mean age 57.2 ± 10.4 years. Males: 49 (89%). Mean BMI: 31 ± 4 kg/m<sup>2</sup>; mean waist: 110.8 ± 7.7 cm. Mean AHI: 44 ± 15. Prevalence of hypertension: 87.5%; prevalence of dyslipidemia: 67.9%; prevalence of diabetes mellitus: 14.3% (IR: 78.3%); prevalence of peripheral arterial disease: 33.9%; prevalence of atrial fibrillation: 8.9%. Patients with non-dipper BP profile: 58.9%. Patients with AHI > 30 had higher risk of having IR than patients with AHI > 15 (OR = 4.5, p = 0.047). Considering 13 patients re-evaluated at T2, there were no significant changes in BMI or glycemic and lipid profile. There was a trend of reduction in baseline metabolism, which correlated significantly with ODI and SpO<sub>2</sub> nadir at T1 (p = 0.007, p = 0.038, respectively). There was also a significant reduction in nighttime BP (-8 / -5 mmHg, p = 0.012 and p = 0.019), even after adjusting for antihypertensive therapy.

**Conclusions:** Overweight/obese patients with OSAS are also often affected by hypertension and altered glucose and lipid metabolism. CPAP therapy is effective in reducing nighttime BP that mostly affects cardiovascular risk. CPAP may also reduce basal metabolism but does not significantly affect body weight nor glucose and lipid parameters, unless coupled with lifestyle changes.

## DIABETES, PHYSICAL EFFORT, VISCERAL OBESITY AND SUBCLINICAL VASCULAR RISK FACTORS IN POSTMENOPAUSAL WOMEN

L. Woznicka-Leskiewicz, A. Posadzy-Malaczynska. *Department of Family Medicine, Poznan University of Medical Sciences, Poznan, POLAND*

**Objective:** Objective: The impact assessment of type 2 diabetes, visceral obesity and physical effort on the development of subclinical vascular risk factors in postmenopausal women.

	DM + Women (SD) n=37	DM - Women (SD) n=25	Statistical significance
BMI [kg/m <sup>2</sup> ]	30,42	25,80	**
Tchol [mmol/l]	176,28	222,21	**
HDL [mmol/l]	51,68	63,55	*
TG [mmHg]	153,72	124,43	NS
LDL [mmHg]	102,64	134,42	*
Number of patients on statin	19	12	*
SBP [mmHg]	141,64	134,38	NS
DBP [mmHg]	83,16	81,84	NS
ABI	1,00	1,04	NS
PWV [m/s]	9,25	8,35	*
Visceral fat index	10,32	7,78	**
Number of smoking patients	6	6	NS
MLTPAQ [kcal/week]	9202,66	6509,05	NS
SCORE	4,8	4,2	NS
Framingham	24,38	12,07	**

**Design and method:** Design and methods: We divided 62 postmenopausal women in two groups: DM+ 37 women with type 2 diabetes mellitus; and DM- 25 women without type 2 diabetes mellitus. The average age of them [yrs]: 64 and 67 (\*p < 0,05). Following measurements were taken: BMI, total cholesterol (Tchol), triglycerides (TG), HDL and LDL cholesterol, blood pressure, ankle- brachial index (ABI), pulse wave velocity (PWV), visceral fat index. Each patient was evaluated cardiovascular risk according to SCORE and Framingham scales and intensification of physical effort according the short version of the Minnesota Leisure

Time Activity Questionnaire (MLTPAQ). Statistical calculations were performed in the StatSoft Statistica 10. The t-student test was used for the statistical analysis.

**Results:** We revealed following results in both groups: DM+ and DM- respectively [\*for p < 0,05; \*\*for p < 0,001; NS- negligible statistically]. Women with diabetes were characterized by higher BMI, PWV, visceral fat index, number of patients on statin and cardiovascular risk according to Framingham scale. Normoglycemic women were characterized by higher level of Tchol, HDL and LDL cholesterol.

## Conclusions: Conclusions

1. Visceral obesity is more common in women with diabetes despite similar intensity of physical effort taken by both groups of patients.
2. Diabetes adversely affects the aortic stiffness, which is expressed by a higher PWV score.
3. Women with diabetes are characterized by a better lipid profile due to the more frequent treatment with statins in this group.

## MORNING SURGE AS PROGNOSTIC RISK FACTOR FOR TARGET ORGAN DAMAGE IN HYPERTENSIVE PATIENTS – DATA FROM A ROMANIAN UNIVERSITY-BASED HOSPITAL

A. Varga<sup>1</sup>, E. Ardeleanu<sup>2</sup>, C. Cuci<sup>1</sup>, I. Tilea<sup>1</sup>. <sup>1</sup>University of Medicine and Pharmacy, Targu Mures, ROMANIA, <sup>2</sup>University of Medicine and Pharmacy, Timisoara, ROMANIA

**Objective:** Morning surge (MS), considered as a physiological pattern, still was identified as a risk factor for cardiovascular events in hypertensive patients. Previous studies confirmed that by increasing of target organ damage (TOD) in hypertensive patients there is an increase of total cardiovascular risk and mortality.

**Design and method:** A descriptive, observational, cross-sectional study was performed on 160 hypertensive patients, fulfilling the inclusion criteria. The study was performed from January 2016 – February 2017 in patients admitted in a university-based hospital, in middle income area from Romania. For the accuracy of measurements ABPM was performed twice, for a minimum period of 24 hours using a BTL CardioPoint® ABPM equipment. Socio-demographic and biochemistry data were collected. Cardiac impairment was assessed by transthoracic echocardiography (Vivid E9 XD Clear, General Electric, Milwaukee, USA). Ankle – brachial index (ABI), as a marker of systemic atherosclerosis, was also assessed. Renal damage was quantified (eGFR – MDRD formula).

**Results:** We included in our study 79 female, 81 males (mean age 63.3±/ 11.7 y.o.) out of which ABPM data of 3 pts. were excluded for technical failure.

A statistically significant correlation between systolic MS (>20 mmHg) and left ventricular hypertrophy (LVH) was computed out (p = 0.05).

Neither renal impairment or vascular damage did not show a statistically significant correlation with pathological MS blood pressure rise.

No statistically significant correlation was identified as trigger for MS rising above cut-off value for different c-v risk factors: gender (p = 0.49), age group (p = 0.43), smoking (p = 0.48), BMI (p = 0.19), diabetes mellitus (p = 0.15), total cholesterol (p = 0.77), triglycerides (p = 0.71).

**Conclusions:** In hypertensive patients a 20 mmHg cut-off morning surge is associated with heart damage but same cut-off limit is not a sensitive predictive risk factor for chronic kidney disease. Extended studies could refine a more specific cut-off value of MS in different subsets of high risk patients. Targeted strategies to improve continuous 24 hours BP control may prevent cardiovascular morbidity and mortality.

## MULTIPLE SPOT URINE SAMPLING IS MORE PRECISE, ACCURATE AND SIMPLE COMPARED TO 24 HOURS COLLECTION FOR ESTIMATING SODIUM EXCRETION

P.Salice, G. Ardissino, S. Ghiglia, M. Perrone, F. Tel, A. Mezzopane, A. Piantanida, T. Lettera, F. Mehmeti, P. Savina, G. Grimaldi, L. Xaiz, F. Napolitano, F. De Luca, A. Giussani, L. Cortinovis, S. Milani, D. Consonni. *NeoNeph-SPA Project Fondazione IRCCS Policlinico Ca Granda, Milan, ITALY*

**Objective:** The 24 hours urinary collection (24-hrUC) that is the standard of care to estimate Sodium (Na) intake in the management of HPT, can be inaccurate because of errors in time and/or volume, unpractical and when done during week-ends, not representative of usual Na intake. Multiple spot urine sampling is not affected by any of the above mentioned sources of error. We hypothesized that the mean urinary Sodium-to-urinary Creatinine ratio (uNa-to-uCrR) of multiple spot samples, collected in different days, is more precise and accurate for estimating the average Na excretion compared to 24-hrUC.

**Design and method:** A total of 180 urine samples (1 for each voiding) and the related 30 24-hrUC performed in different days in 4 healthy subjects (up to nine voiding per day) were collected. For the purpose of comparison, uNa excretion in mEq/Kg/day from each sample was derived multiplying by 2 each uNa-

to-uCrR (the mean conversion constant obtained from all ratios as determined from 24-hrsUCs). We calculated Lin's correlation coefficient, mean bias, and 95% limits of agreement (LOA), of uNa for: the single 24-hrsUC and 1000 random samples of means of 4 spot urine samples (1 per subject in 4 different days) using the individual overall 24-hrsUC average as reference in both. Statistical analysis was performed using Stata 15

**Results:** 1) The single 24-hrs-UC urine collections showed a Lin's coefficient of 0.64, with 95% limits of agreement (LOA) of  $\pm 1.65$  mg/Kg/die (difference between upper and lower LOA: 3.29). 2) In the 1000 random samples the average Lin's coefficient was 0.72 (SE: 0.23). Mean bias and 95% LOA were 0.21, -1.06, and 1.48, respectively, while mean difference between upper and lower LOA was 2.54. Lin's coefficient was greater than 0.64 in 76.6% of samples. Difference between upper and lower LOA was smaller than 3.29 in 81.0% of samples

**Conclusions:** The mean uNa-to-sCrR from 4 spot samples estimates Na excretion more precisely and accurately than a single 24-hrsUC, providing a more reliable estimate in as many as 81% determinations as compared to only 19%

### **BLOOD PRESSURE VARIABLES, SMOKING STATUS, SEDENTARY LIFESTYLE AND OBESITY AS PREDICTORS OF INCREASED ARTERIAL STIFFNESS AND EARLY ARTERIAL AGEING IN MIDDLE-AGED STUDY PARTICIPANTS**

I. Mozos<sup>1</sup>, A. Lascu<sup>1</sup>, S. Gligor<sup>2</sup>. <sup>1</sup>Victor Babes University of Medicine and Pharmacy, Timisoara, ROMANIA, <sup>2</sup>West University, Timisoara, ROMANIA

**Objective:** To study the relationship between blood pressure variables, cardiovascular risk factors and arterial stiffness and arterial age, respectively in middle-aged study participants.

**Design and method:** A total of 61 middle-aged patients, 46% male, were investigated using an Arteriograph, in a cross-sectional study. Blood pressure variables, pulse wave velocity (PWV), augmentation indices and arterial age were measured. Additional information related to family history of cardiovascular disorders, body mass index, smoking status and physical activity were available from medical records.

**Results:** Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), pulse wave velocity (PWV), brachial augmentation index (Aix-Brach), arterial age (AA) were, as follows:  $123 \pm 14$  mmHg,  $72 \pm 9$  mmHg,  $89 \pm 10$  mmHg,  $8.06 \pm 1.44$  m/s,  $-40.27 \pm 29.8\%$ ,  $41 \pm 15$  years. Significant correlations were obtained between SBP and PWV ( $r = 0.29$ ;  $p = 0.011$ ). DBP and MAP also significantly correlated with PWV ( $r = 0.426$ ;  $p < 0.01$  and  $r = 0.4$ ;  $p < 0.01$ , respectively) and AA ( $r = 0.403$ ;  $p < 0.01$  and  $r = 0.388$ ,  $p = 0.001$ ). The most sensitive and specific predictors of early arterial aging were smoking status (0.511; 95%CI: 0.356–0.664) and DBP exceeding 90 mmHg, respectively (0.882; 95%CI: 0.622–0.979). Increased DBP was the most specific predictor of elevated AixBrach (0.962; 95%CI: 0.861–0.993), and sedentary lifestyle and smoking status, the most sensitive (0.571; 95%CI: 0.202–0.881 for both). An elevated SBP and body mass index were found as the most specific determinants of increased PWV (0.867; 95%CI: 0.74–0.94 for both) and smoking status, the most sensitive (0.75; 95%CI: 0.355–0.955).

**Conclusions:** SBP, DBP, MAP, smoking status, sedentary lifestyle and obesity provide valuable information related to increased arterial stiffness and early arterial aging in middle-aged individuals.

### **TARGET ORGAN DAMAGES IN HYPERTENSIVE PATIENTS ACCORDING TO THEIR GLYCAEMIC PROFILE. THE ROLE OF ANAEMIA**

C. Liakos<sup>1</sup>, E. Karpanou<sup>2</sup>, C. Grassos<sup>3</sup>, M. Markou<sup>4</sup>, G. Vyssoulis<sup>1</sup>, D. Tousoulis<sup>1</sup>. <sup>1</sup>1st Cardiology Department, Hippokraton Hospital, National and Kapodistrian University of Athens, Medical School, Athens, GREECE, <sup>2</sup>1st Cardiology Clinic, Anti-hypertension Center, Onassis Cardiosurgery Center, Athens, GREECE, <sup>3</sup>ESH Center of Excellence for Hypertension, Cardiology Department, KAT General Hospital of Attica, Athens, GREECE, <sup>4</sup>Cardiology Department, Hippokraton Hospital, Athens, GREECE

**Objective:** Target organ damages (TODs) are common in hypertensive patients especially when an impaired glycaemic profile co-exists. Both hypertension and impaired glycaemic profile cause kidney damage that brings on anaemia. This study examined the prevalence of TODs (left ventricular hypertrophy, LVH and microalbuminuria) in hypertensives according to their glycaemic profile and the presence/absence of anaemia.

**Design and method:** The study comprised 20236 hypertensives ( $57.4 \pm 13.9$  years,  $165.2 \pm 10.9/99.7 \pm 9.0$  mmHg). A 2-hour post-load plasma glucose (mg/dl)  $< 140$  defined normal glycaemic profile (NGP),  $140-199$  impaired glucose tolerance (IGT) and  $> 199$  diabetes. Haemoglobin (g/dl)  $< 13$  in men;  $< 12$  in women defined anaemia. Left ventricular mass index (LVMI, g/m<sup>2</sup>)  $> 115$  in men;  $> 95$

in women defined LVH. Albumin-to-creatinine ratio (ACR, mg/g)  $30-300$  defined microalbuminuria. The glomerular filtration rate (eGFR, ml/min/1.73 m<sup>2</sup>) was also estimated.

**Results:** All TODs markers (LVMI, ACR, eGFR) were worse in the presence of anaemia or/and worse glycaemic profile ( $p < 0.01$  for all comparisons). In NGP patients LVMI was  $119.0 \pm 15.0$  in anaemics vs  $118.7 \pm 15.3$  in non-anaemics, in IGT  $131.4 \pm 14.4$  vs  $127.3 \pm 16.9$ , in diabetics  $144.2 \pm 17.3$  vs  $131.9 \pm 14.9$  and in total  $126.7 \pm 18.7$  vs  $121.9 \pm 16.3$ . In NGP patients LVH prevalence was 47.0% in anaemics vs 41.0% in non-anaemics, in IGT 82.6% vs 68.5%, in diabetics 95.1% vs 83.1% and in total 63.7% vs 51.2%. In NGP patients ACR was  $35.0 \pm 24.0$  in anaemics vs  $32.5 \pm 28.7$  in non-anaemics, in IGT  $62.5 \pm 37.7$  vs  $52.6 \pm 36.1$ , in diabetics  $126.0 \pm 136.9$  vs  $85.9 \pm 47.9$  and in total  $60.1 \pm 78.7$  vs  $43.1 \pm 38.2$ . In NGP patients microalbuminuria prevalence was 43.7% in anaemics vs 35.4% in non-anaemics, in IGT 77.9% vs 67.3%, in diabetics 95.4% vs 89.5% and in total 61.1% vs 48.0%. In NGP patients eGFR was  $74.2 \pm 17.3$  in anaemics vs  $74.7 \pm 17.6$  in non-anaemics, in IGT  $61.2 \pm 15.6$  vs  $66.4 \pm 15.4$ , in diabetics  $50.5 \pm 9.5$  vs  $60.6 \pm 13.4$  and in total  $66.7 \pm 18.5$  vs  $71.4 \pm 17.6$ . Percentage differences between anaemics/non-anaemics were 0.3, 3.2, 9.3% for LVMI, 7.7, 18.8, 46.7% for ACR and -0.7, -7.7, -16.5% for eGFR in NGP, IGT, diabetic hypertensives, respectively.

**Conclusions:** The prevalence of TODs in hypertensives is higher in the presence of anaemia especially in those with impaired glycaemic profile. Underlying mechanisms need to be explored.

### **BLOOD PRESSURE LEVELS AND BODY MASS INDEX IN ADULTS WITH DOWN SYNDROME**

M.L. De Rosa, L. Gioia, L. Ferrante, N. Ferrara. University Federico II, Naples, ITALY

**Objective:** Increased life expectancy among people (p) with Down syndrome (DS) has introduced new environmental factors that may affect blood pressure (BP) and/or lead to obesity in this p. The aim here was to investigate BP levels and body mass index (BMI) in p with DS, correlating these data with the p' sex and age.

**Design and method:** Analytical cross-sectional observational study conducted in our ambulatory in Naples, Italy 37 p were included. BP was measured in accordance with the established guidelines. BMI was calculated by dividing the weight by the height squared (kg/m<sup>2</sup>).

**Results:** Sex had no influence on BMI; nor did systolic BP (SBP) or diastolic BP (DBP). The age range was from 18 to 62 yrs. No correlation was observed between increasing age and greater BMI or BP. 18 p (49%) presented lower BP than  $90 \times 60$  mmHg, 18 (49%) normal BP and one hypertension. BMI ranged from 18 to 48 kg/m<sup>2</sup> (mean of  $28.8 \pm 3.92$  kg/m<sup>2</sup>): 21% had normal weight; 39% were overweight; and 25% had obesity class I, 10% class II and 5% class III. Higher BMI was associated with significantly greater SBP and DBP ( $P = 0.0175$  and  $P = 0.0015$ ).

**Conclusions:** Sex and age did not influence SBP, DBP or BMI in p with DS. Higher BMI was associated with greater BP (both systolic and diastolic). We conclude that BP is low in DS and that this is a feature of the disease rather than of the protected environment in which p live. A mechanism related to trisomy 21 is likely, and there may be a link with Alzheimer's disease (AD) because BP is also low in AD and a high proportion of DS develop this disease. If, as is likely, BP is lowered in Alzheimer's by the neuropathy, the same neuropathy developing early in DS may also reduce BP

### **PROGNOSTIC FACTORS IN PATIENTS WITH FIRST GRADE ARTERIAL HYPERTENSION**

T.A. Mangileva. Crimea Federal University, medical academy, department of internal medicine N<sup>1</sup>, Simferopol, RUSSIA

**Objective:** To specify prognostic criteria in patients with first grade arterial hypertension for real clinical practice.

**Design and method:** In 66 patients with first grade arterial hypertension office blood pressure measurement and ambulatory blood pressure monitoring were done twice with  $71.3 \pm 1.5$  months interval. Initial investigation includes cholesterol, triglycerides, creatinine and uric acid assessment; fasting and postprandial glucose and insulin level measurement, fasting and postprandial heart rate and heart rate variability calculation. After initial examination proper antihypertensive treatment was prescribed to all patients. During period between first and second visits patients were not observed by investigator, depending on their own choice they attended different medical specialists or didn't visit doctors. Treatment adherence was assessed at the final visit by investigator.

**Results:** Office ( $149.2 \pm 2.0 / 93.5 \pm 1.2$  mmHg vs  $141.3 \pm 1.5 / 88.5 \pm 1.0$  mmHg,  $p < 0.001$ ) and 24-hours ( $146.3 \pm 2.5 / 89.8 \pm 1.8$  mmHg vs  $132.5 \pm 2.6 / 80.8 \pm 1.6$  mmHg,  $p < 0.001$ ) blood pressure levels in majority of patients were lower at the final than initial visit. Negative results (higher blood pressure at the

final visit, myocardial infarction, unstable angina or sudden death within period between first and second visits) were detected in 11 patients (91% with high or very high total cardiovascular risk). In these patients initially were detected higher fasting ( $28.5 \pm 21.2$  mcU/ml vs  $15.4 \pm 6.2$  mcU/ml,  $p < 0.05$ ) and postprandial ( $56.0 \pm 40.6$  mcU/ml vs  $21.4 \pm 14.6$  mcU/ml,  $p < 0.05$ ) insulin concentration and faster postprandial ( $88.0 \pm 10.2$  bpm vs  $72.5 \pm 8.8$  bpm,  $p < 0.01$ ) and fasting ( $85.2 \pm 13.3$  bpm vs  $67.7 \pm 8.1$  bpm,  $p < 0.01$ ) heart rate than in others. Negative results were detected in 78% of patients with high or very high total cardiovascular risk and heart rate greater than 80 bpm. In the observation period irregular antihypertensive pharmacotherapy was revealed in 70% of patients with negative results and 36% of other participants ( $p < 0.05$ ). Physical activity reduction was detected in 60% of persons with negative result and 23% of others.

**Conclusions:** Unfavorable prognostic factors in patients with first grade arterial hypertension in real clinical conditions include high or very high total cardiovascular risk, tachycardia, hyperinsulinemia and poor treatment adherence (irregular antihypertensive therapy, low physical activity level).

#### ACUTE DETRIMENTAL EFFECTS OF E-CIGARETTE AND TOBACCO CIGARETTE SMOKING ON BLOOD PRESSURE AND SYMPATHETIC NERVE ACTIVITY IN HEALTHY SUBJECTS

K. Dimitriadis, K. Tsioufis, D. Konstantinidis, T. Kalos, C. Fragoulis, K. Konstantinou, M. Mantzouranis, N. Vogiatzakis, D. Tousoulis. *First Cardiology Clinic, Medical School, National and Kapodistrian University of Athens, Hippokraton Hospital, Athens, GREECE*

**Objective:** This study aimed to assess the acute effects of tobacco cigarettes, e-cigarettes and sham smoking on blood pressure and sympathetic nervous system in healthy subjects.

**Design and method:** We studied 10 normotensive male habitual smokers (mean age 33 years, body mass index:  $24.1$  kg/m<sup>2</sup>, office blood pressure =  $117/72$  mmHg) free of cardiovascular disease. The study design was randomized and placebo controlled with 3 experimental sessions. Subjects smoked 2 tobacco cigarettes containing 1.1 mg nicotine or simulate smoking (sham smoking) with the 2 cigarettes separated by 5 minutes, while 45 minutes after finishing the second cigarette, subjects smoked a third cigarette or sham cigarette. Additionally, participants smoked e-cigarettes for a period of 5 and 30 minutes. Sympathetic drive was assessed by muscle sympathetic nerve activity (MSNA) (baroreflex-dependent) and skin sympathetic nerve activity (SSNA) (baroreflex-independent).

**Results:** After the first, second and third tobacco cigarette smoking there was an increase in mean arterial pressure (by  $11.2 \pm 1.4\%$ ,  $12.3 \pm 1.3\%$  and  $13.1 \pm 1.4\%$ , respectively,  $p < 0.05$  for all) and heart rate (by  $25.1 \pm 3.7\%$ ,  $26.3 \pm 2.7\%$  and  $25.9 \pm 3.7\%$ , respectively,  $p < 0.05$  for all). Similarly e-cigarette smoking at 5 and 30 minutes was accompanied by augmentation of mean arterial pressure (by  $10.9 \pm 1.2\%$  and  $12.8 \pm 1.4\%$ , respectively,  $p < 0.05$  for both) and heart rate (by  $22.5 \pm 3.3\%$  and  $23.9 \pm 3.8\%$ , respectively,  $p < 0.05$  for both). The first, second and third tobacco cigarette smoking was accompanied by lower MSNA (by  $28.1 \pm 4.4\%$ ,  $29.6 \pm 5.3\%$  and  $30.1 \pm 5.2\%$ , respectively,  $p < 0.05$  for all), whereas SSNA was increased (by  $98.2 \pm 19.4\%$ ,  $100.2 \pm 22.7\%$  and  $101.5 \pm 21.6\%$ , respectively,  $p < 0.05$  for all). Additionally, e-cigarette smoking at 5 and 30 minutes caused a decrease in MSNA (by  $26.9 \pm 3.6\%$ , and  $28.3 \pm 5.1\%$ , respectively,  $p < 0.05$  for both), and an augmentation in SSNA (by  $97.9 \pm 20.1\%$  and  $100.9 \pm 20.6\%$ , respectively,  $p < 0.05$  for both). Sham smoking was devoid of any effects on blood pressure, MSNA and SSNA.

**Conclusions:** E-cigarette smoking acutely increases blood pressure and has a detrimental effect on sympathetic nerve activity regulation similar to tobacco smoking in healthy subjects.

#### ARTERIAL HYPERTENSION AND ITS PREVALENCE IN THE SOUTH AND NORTH REGIONS OF THE REPUBLIC OF KAZAKHSTAN (ACCORDING TO EPIDEMIOLOGICAL STUDY)

T. Leonovich, D. Utebaeva, M. Tundubaeva, Z. Mamedgulyeva, G. Junusbekova, S. Berkinbaev, A. Bulekbayeva. *Scientific Research Institute of Cardiology and Internal Diseases, Almaty, KAZAKHSTAN*

**Objective:** To analyze regional features of the prevalence of Arterial Hypertension (AH) in the south and north regions of the Republic of Kazakhstan (RK).

**Design and method:** In the current study, people aged from 18 to 69 years, who live in the south and north regions of the RK, were invited to participate: 840 respondents from the Almaty region and 1401 people from the Pavlodar region. The proportion of men in the south and north is 29,4 % and 23,2 %, of women – 70,6 % and 76,8 %. In accordance with the standardized methodology of The World Health Organization, named STEPS, we used the data of instantaneous (cross-sectional) epidemiological multicenter study with identification of risk factors.

**Results:** According to the survey the AH's frequency of the occurrence is 51,8% among the population of the north and 47,7% in the south. We have identified the increase of the occurrence of AH related to the age (from 18–69 in both parts of the country). Among participants older than 60 years it reaches 75,9 % in the north part and respectively 78,5 % of patients of the south parts of the country. The prevalence levels of uncontrolled AH in the north are 34% (the standardized rate – 32,2%). This indicator of uncontrolled AH in the south is 33,4% (the standardized rate is 24,6%). In the north part of the RK an antihypertensive drugs (AHD) is taken by 46,2% patients who suffer from hypertension, in the south part – 43,1%; in the north 23,3% participants use that treatment only during periods of high blood pressure values, in the south – 31,9%; do not use AHD 28% of patients in the north and 22,1% in the south.

**Conclusions:** The prevalence of AH and uncontrolled AH in the south and north regions of the RK is rather high. Gender features of the prevalence of AH were not taken into consideration. The prevalence of AH in the both regions has increases with age. An adherence to treatment is remained low in the studied regions.

#### IMPORTANCE OF CARDIOVASCULAR DISEASE RISK FACTORS – RUSSIAN POPULATION OPINION (ESSE-RF STUDY)

O. Rotar, N. E. Parizhskaya, A. V. Orlov, M. A. Boyarinova, A. S. Alieva, E. V. Moguchaya, N. A. Paskar, E. I. Baranova, A. O. Konradi. *Almazov National Medical Research Centre, Saint Petersburg, RUSSIA*

**Objective:** to assess awareness about the importance of cardiovascular risk in the Saint Petersburg population-based sample depending on age and gender.

**Design and method:** In terms of national epidemiological observational ESSE-RF study 1600 inhabitants of Saint Petersburg aged 25–64 years old were randomly selected. All participants were required to answer a questionnaire that asked them to rate the negative impact of different factors on health on a scale of 1 to 5. The answers were processed as following ratings of 5 and 4 were considered as significant impact, ratings of 2 and 3 were considered as insignificant impact and rating of 1 – as negligible impact. Social status and education were assessed.

**Results:** More than 75% of the participants named excessive alcohol consumption, smoking, stress, excessive body weight and elevated blood pressure among the significant risk factors. Unhealthy nutrition and insufficient physical activity were considered significant only by 60–65% of respondents independently of gender and age. Excessive consumption of alcohol and smoking were considered dominant risk factors in the young group. Older participants gave more attention to hypertension and stress. Females rated more important stress, elevated blood pressure and unhealthy nutrition compared with males. Unmarried women considered obesity to have more impact on their health and divorced women thought poor nutrition and alcohol consumption are more harmful.

**Conclusions:** Saint-Petersburg residents regardless of age and gender do not consider unhealthy nutrition and insufficient physical activity to have high impact on the risk of cardiovascular disease. Younger participants rate excessive alcohol consumption and smoking as more significant, and participants from the older age group – stress and elevated blood pressure. Overall, females more often consider lifestyle factors to be important for their health than males. Marital status is important only for females awareness

#### THE PRESENCE OF GLUCOSE METABOLIC DISORDERS AND SUBCLINICAL RENAL IMPAIRMENT IN PATIENTS WITH ARTERIAL HYPERTENSION AND ISCHEMIC HEART DISEASE

S. Kostic<sup>1</sup>, I. Tasic<sup>2</sup>, D. Djordjevic<sup>2</sup>, V. Stoickov<sup>2</sup>, D. Petrovic<sup>2</sup>. <sup>1</sup>*Institute for Therapy and Rehabilitation Niska Banja, Niska Banja, Nis, SERBIA*, <sup>2</sup>*University of Nis, Medical Faculty, Nis, SERBIA*

**Objective:** The importance of microalbuminuria as an independent predictor of progressive renal disease and cardiovascular mortality was shown in a number of prospective and epidemiological studies particularly in patients with diabetes and hypertension.

**Objective:** To evaluate the presence of glucose metabolic disorders and subclinical renal insufficiency in patients with arterial hypertension and ischemic heart disease.

**Design and method:** Metod: The study included 192 patients, with coronary heart disease and arterial hypertension (mean age  $64.01 \pm 8.66$  years, 135 (70 %) men.). For all patients there was determined: presence of risk factors for cardiovascular disease (hypertension, hyperlipidemia, smoking, diabetes, obesity, gender, age), anthropometric measurements, laboratory analyses, creatinine clearance (CrCl) using Cocroft – Gault equation, eGFR, albumin/creatinine ratio (ACR), oral glucose tolerance test (OGTT) for subjects without diabetes.

**Results:** According to the presence of diabetes patients were divided into two groups. The first group (I) consisted of subjects without DM,  $n = 138$  (71,8%), the second (II) group patients with DM,  $n = 54$  (28,2%). The second group had

a significantly higher average number of risk factors ( $3.56 \pm 0.76$  vs  $2.42 \pm 0.96$ ,  $p < 0.0001$ ) but no significant differences in age, body mass index and waist circumference. Abnormal OGTT was found in 55 (40 %) of patients from the first group: 26 (19 %) had diabetes, 29 (21 %) impaired glucose tolerance. There was no significant difference in mean creatinine and CrCl (I gr.  $84.12 \pm 29.97$  vs II gr.  $79.87 \pm 27.23$ ) between the two groups. Decline in CrCl ( $< 89$  ml/min) was found in 42% patients I gr. vs 50 % in II gr.,  $< 60$  ml/min in 24,5:26 %, n.s. Abnormal ACR was found in 41 (30 %) of patients I gr. vs 18 (33%) in II gr., n.s.

**Conclusions:** Conclusion: Quarter of patients with arterial hypertension and diabetes had early renal impairment with a decrease in glomerular filtration and about thirty percent had microalbuminuria. Patients with unknown history of diabetes have a high incidence of glucose metabolic disorders and subclinical renal insufficiency. OGTT and ACR can identify individuals with subclinical disease requiring a more aggressive treatment of risk factors and more intensive therapy.

#### THE PREVALENCE OF RESISTANT AND UNDERCONTROLLED HYPERTENSION AMONG PATIENTS OF A HYPERTENSION OUTPATIENT CLINIC IN SZEGED

L. Péter, P. Legrády, I. Fejes, G. Abraham. *University of Szeged, 1st Department of Medicine, Szeged, HUNGARY*

**Objective:** In Hungary, between 2005–2009 around 57% of hypertensive patients did not reach the goal blood pressure (BP).

**Design and method:** In one of the Hypertension Outpatient Clinics of the 1st Department of Medicine Nephrology-Hypertension Center in Szeged 310 patients' data were analyzed. Means of two measurements were calculated. The goal SBP was 140/ mm Hg. Means  $\pm$  SD are reported.

**Results:** The mean age of hypertensive patients was  $61.4 \pm 14.3$  years. The mean duration of HT was  $14.2 \pm 12.0$  years. Among these 310 HT patients 115 (37%) were men (age  $58.2 \pm 15.6$  years) and 195 (63%) women (age  $63.4 \pm 13.1$  years). BP of 186/310 (60%) patients were in goal range (SBP  $124 \pm 9$  mm Hg) and 124/310 (40%) were not (SBP  $155 \pm 17$  mm Hg). Among the 310 patients 45 (15%) had only DM as additional risk factor, type-1 and type-2 together. Twenty-one (17%) of 124 HT patients with undercontrolled BP had diabetes mellitus (DM) (BP  $149 \pm 15/89 \pm 8$  mm Hg). By the definition of RHT altogether 234/310 (76%) patients had RHT (BP  $158 \pm 17/97 \pm 8$  mm Hg) in this population. But 257/310 (83%) patients were taking 3 or more antihypertensive drugs, and their SBP was  $136 \pm 20$  mm Hg. The difference ( $n = 23$ ) between 257 and 234 were the patients with 3 drugs but reaching the goal SBP. With combinations of 4 or more drugs 111 of the 234 (47%) RHT patients had BP  $< 140/90$  mm Hg and 63 (27%) of patients with 4 or more drugs them didn't reach the goal BP. Among the multiple drug combinations, 83/310 (27%) patients were taking 3 antihypertensive drugs, 65/310 (21%) 4 drugs, 48/310 (15%) 5 drugs, 34/310 (11%) 6 drugs, 20/310 (6%) 7 drugs and 7/310 (2%) 8 drugs. Fifteen patients were on monotherapy, their BP were  $124 \pm 12/79 \pm 9$  mm Hg, and only 1 of them was undercontrolled (BP 154/100 mm Hg). All the patients taking 2 drugs were in goal range.

**Conclusions:** A fourfold combination of antihypertensive agents was the most frequent in this population. The most frequent drug classes were the ACEIs and/or ARBs, the DHP-CCBs and the thiazide diuretics.

#### DETERMINANTS OF HYPERTENSION IN RURAL DELHI, INDIA

P. K. Gupta<sup>1</sup>, C. Kohli<sup>2</sup>, J. Kishore<sup>3</sup>, N. Gupta<sup>4</sup>. <sup>1</sup>Jhpiego- MNH Department, Jai-pur, INDIA, <sup>2</sup>Indian Council of Medical Research, New Delhi, INDIA, <sup>3</sup>Vardhman Mahavir Medical College-Department of Community Medicine, New Delhi, INDIA, <sup>4</sup>Indian Council of Medical Research, New Delhi, INDIA

**Objective:** To find burden and determinants of hypertension in a rural area in Delhi.

**Design and method:** It was a community based cross sectional study Conducted in two rural areas in Delhi. Study was conducted on 1005 adults aged 18 years and above selected by systematic random sampling method over a period of one year from July 2013 to June 2014. A pretested, predesigned, semistructured questionnaire schedule was used in local language. WHO STEPS approach was used to study the profile of the hypertension in the population.

**Results:** The prevalence of hypertension was 14.1% (142/1005) among study subjects. Hypertension was significantly higher in individuals more than 35 years as compared to those less than 35 years. No significant difference with tobacco intake was seen between both present and past tobacco users. Hypertension was significantly higher in those who take alcohol, in subjects with raised total cholesterol levels, triglycerides levels and among obese ( $p$  value = 0.01). In multivariate analysis only age, education and cholesterol levels were independently associated with hypertension

**Conclusions:** Age, education and cholesterol levels were independent risk factors of hypertension. Education level of people should be raised and cholesterol

levels should be cut down using approaches of behaviour change communication in the community.

#### LDL CHOLESTEROL CONTROL IN PATIENTS FROM A HYPERTENSION CLINIC

P. Marques, T. Morai, M.J. Lume, S. Tavares, C. Silva, L. Nogueira-Silva, M.J. Lima. *Centro Hospitalar de S. João, Porto, PORTUGAL*

**Objective:** The evaluation and follow up of hypertensive patients requires the consideration of all cardiovascular risk factors such as the lipid profile, particularly the LDL cholesterol. Hypertensive patients usually gather other risk factors that make them high and very high risk patients requiring aggressive LDL control. We aimed to stratify the cardiovascular risk profile from patients evaluated during a year and their LDL control.

**Design and method:** Retrospective study based on clinical records from patients evaluated in Hypertension clinic of a tertiary care hospital during a year. Demographic, biometric and clinical data were gathered. We used the European Society of Cardiology Heart Score to determine the category of risk in 10-years time of our patients and also the exceptions considered in the European Society of Cardiology guidelines. Student t tests and chi-square test were used to compare continuous and categorical variables, respectively.

**Results:** A total of 228 patients, 55% females, aged  $60.4 \pm 15.9$  were evaluated in a year. 31 patients (13.6%) were classified as low risk, 39 (17.1%) as moderate risk, 21 (9.2%) as high risk and 133 (58.3%) as very high risk. 35% patients were classified using Heart Score, 30% had established cardiovascular disease and 20% were diabetic and hypertensive patients. 30% of patients did not receive a statin at the moment of observation. Of the 144 patients classified as high or very high risk 26% didn't receive a statin and only 26% received a high potency statin. Association with ezetimibe was only used at baseline in 3 patients. At baseline LDL control was accomplished in only 38% of patients. In high and very high risk patients only 19% of patients were controlled at baseline. Only 23 patients from the high/very high risk population (15%) were receiving a high potency statin and were not controlled. High salt diet, body weight, risk category and Obstructive sleep apnea were associated with poor LDL control.

**Conclusions:** Many patients evaluated in our Hypertension Clinic were classified as high or very high risk patients. LDL control is markedly insufficient partly due to unawareness and non compliance with European guidelines.

#### THE SPREADING OF RISK FACTORS FOR AH AMONG 29–69 YEARS FEMALE INDIVIDUALS WITH TYPE 2 DIABETES, LIVING IN PAVLODAR

Z.Mamedgulyeva, M.K. Tundiybayeva, D.D. Utebaliyeva, T.N. Leonovich, G.A. Junusbekova, S.P. Berkinbayev, D. Mukhtarhanova. *Scientific Research Institute of Cardiology and Internal Diseases, Almaty, KAZAKHSTAN*

**Objective:** To investigate the spreading of AH RF in 29–69 years women with type 2 diabetes, who live in Pavlodar.

**Design and method:** The object of the study was a representative sample of 763 women aged 29–69 years, living in Pavlodar. All surveyed completed a questionnaire to identify non-specific non-communicable diseases and the presence of bad habits, blood pressure was measured, body mass index was determined, and laboratory studies to determine the lipid spectrum were made.

**Results:** The obtained results demonstrated that among the women with diabetes the most common risk factors were cigarette smoking and low physical activity, which reached 41.0% and 38.4% respectively. Next in frequency of occurrence is the use of alcohol - 31,2% and excess weight of a body (BMI) - 28.1%, followed by obesity (24.2%). Turn to lipid profile, the picture was as follows: the percentage of patients who were diagnosed with LDL was 100%; the percentage of patients with LDL  $< 2.5$  mmol/L amounted to 82.5%, hypercholesterolemia (HCS) was 21.7%; hypocholesterolemia (hypo-cholesterol) - 17,9%, and hypertriglyceridemia (GTG) was more than 1/3 of surveyed and amounted to 36.8%.

**Conclusions:** The high frequency of the above-mentioned risk factors indicates the absence of timely preventive measures, which are important in fighting hypertension, which could prevent the further development of complications and the reduction of mortality rates from heart diseases.

#### APBM HYPERTENSIVE INDEX TIME, IN TREATED HYPERTENSIVE PATIENTS, CAN PREDICT VENTRICULAR REMODELING AND CARDIOVASCULAR EVENTS

H. Rus<sup>1</sup>, E. Bobescu<sup>1</sup>, C. Dascalescu<sup>1</sup>, E. Grancea<sup>2</sup>, C. Luca<sup>2</sup>, I. Barsan<sup>2</sup>. <sup>1</sup>University Transilvania Brasov, Brasov, ROMANIA, <sup>2</sup>Emergency Hospital Brasov, Brasov, ROMANIA

**Objective:** It is currently known that intensive blood pressure reduction in hypertensive patients would lead to more lower risk of left ventricular hypertrophy (LVH), effect that partially explains the long term cardiovascular benefits. We use in our study the ABPM hypertensive time index (HTI), as an indirect marker for the level of blood pressure reduction and presence of target organ damage.

**Design and method:** We include in our study 600 patients (men age 61,5 years, 38%women) with hypertension and no diabetes, with ABPM recorded in the first month after randomization. We appreciate the HTI as marker of blood pressure control and target organ damage and compare patients with HTI more (group A) and less (group B) than 40%. Progression and regression of LVH as defined by Cornell voltage criteria was recorded and baseline and biannual during a medium follow-up of 3 years. The effect of BP lowering pattern had been analyzed on cardiovascular(CVD) outcome (myocardial infarction, acute coronary syndrome, stroke, heart failure and CV death), before and after adjustment for LVH as a time-varying co-variate.

**Results:** Patients with HTI <40% without LVH(n = 552, 91,84%) at randomization had a 52% lower risk of developing LVH (hazard ratio = 0.60, 95% confidence interval, 0.45–0.70). Hypertensive patients with baseline HVS (n = 49, 8,16%), with HTI <40% were more likely to regress their LVH (hazard ratio = 1.60, 95% confidence interval, 1.25–2.20). Adjustment for LVH as a time-varying covariate did not attenuate the effect of HTI on CVD(hazard ratio in patients with HTI < 40% vs. HTI > 40%, 0.71[95% confidence interval 0.62–0.91] and 0.80[95% confidence interval, 0.63–0.92].before and after adjusting for LVH as a time-varying covariate).

**Conclusions:** In patients with hypertension but no diabetes, ABPM appreciated hypertension index time less than 40%, is associated with lower rates of developing new LVH in those without LVH, and regression of LVH in those with previous LVH. The positive effect on global cardiovascular events, is the result of the reduced target organ damage at a global scale, not only on left ventricular remodeling.

#### INCOME FROM CORONARY DISEASE IN MEDITERRANEAN POPULATION HYPERTENSIVE > 65 YEARS

J.J. Tamarit García<sup>1</sup>, B. Roig Espert<sup>2</sup>, D. Godoy Rocati<sup>1</sup>, A. González-Cruz Cervellera<sup>1</sup>, V. Pallarés Carratalá<sup>3</sup>, P. Morillas Blasco<sup>4</sup>, -. FAPRES. registry investigator. <sup>1</sup>*Consorcio Hospital General Universitario de Valencia, Valencia, SPAIN*, <sup>2</sup>*Hospital Universitario de Manises, Manises-Valencia, SPAIN*, <sup>3</sup>*Unidad de Vigilancia de la Salud, Unión de Mutuas, Castellón de La Plana-Castellón, SPAIN*, <sup>4</sup>*Hospital Universitario de San Juan, Sant Joan d'Alacant-Alicante, SPAIN*

**Objective:** In Spain, high blood pressure is a health problem of the first magnitude. The importance of the determination of cardiovascular risk (CVR) associated with hypertension is based on the evidence that most hypertensive patients have other additional CVR factors that, when simultaneous with hypertension, enhance each other, giving rise to a total CV risk that is greater than the sum of its components. Our objective was to study the incidence and characteristics of patients who required admission for coronary disease in this population group.

**Design and method:** Epidemiological, observational, longitudinal, prospective and multicentric study of the care setting, carried out in the Valencian Community with a hypertensive population over 65 years of age that went to the Health Center or to a Hospital Unit of hypertension (FAPRES Registry).

The collected data have been entered into a computer database for further analysis of the data using the statistical program IBM - SPSS Windows version 20 with a statistical significance of  $p < 0.05$ .

**Results:** 4.4% of the patients required hospital admission due to the presence of a coronary event, including in those admissions those caused by angina, acute myocardial infarction or coronary revascularization (percutaneous transluminal coronary angioplasty and/or surgery).

These patients presented the following statistically significant differences:

- higher percentage of male sex.
- higher frequency of a history of diabetes, dyslipidaemia, heart failure and/or coronary heart disease.
- lower diastolic blood pressure.
- higher percentage in beta-blocker, antiaggregant and/or statin treatment.
- more prevalence of left ventricular hypertrophy in the electrocardiogram.

In the multivariate analysis, the factors associated with admission due to coronary disease were previous coronary disease and the use of antiplatelet therapy. The higher mean diastolic blood pressure was associated with the decrease in coronary events.

**Conclusions:** The history of coronary artery disease and the decrease in diastolic blood pressure increase the admissions for new episodes of coronary disease, confirming the existence of the so-called J-curve in hypertensive patients over 65 years of age.

#### PULSE WAVE EVALUATION IN HYPERTENSION CONSULTATION

M. Freixa<sup>1</sup>, J. Rodrigues<sup>1</sup>, A. Ferreira Simões<sup>2</sup>, S. Úria<sup>1</sup>, G. Nunes Da Silva<sup>1</sup>. <sup>1</sup>*Hospital Pulido Valente, CHLN, Lisbon, PORTUGAL*, <sup>2</sup>*Hospital de Vila Franca de Xira, Lisbon, PORTUGAL*

**Objective:** The authors sought to: study patients followed in high blood pressure (HBP) consultation; determine the importance of central BP (cBP) and pulse wave velocity (PWV).

**Design and method:** Prospective longitudinal observational study of patients with HBP diagnosis. Patients are evaluated at inclusion in the study, after 1 month, 3 months and 1 year. In each evaluation is carried out: sociodemographic and clinical data registry; measurement of peripheral BP (pBP; OMRON M6 2014®), cBP and PWV (applanation tonometry with Sphygmocor® system); registry of exams regarding previous 6 months if patient remained stable and without therapeutic changes. Were excluded individuals with diagnosis of secondary hypertension, peripheral artery disease, atrial fibrillation or flutter, hospitalization and therapeutic changes in prior 6 months.

**Results:** The sample corresponds to first evaluation during the first month of study: 19 patients, with mean age of  $63 \pm 10$  years, majority male (73.7%), on average with  $14 \pm 7$  years of HBP. Most frequent comorbidities are dyslipidemia (57.9%), obesity (52.6%), type 2 diabetes (36.8%) and smoking (26.3% former, 10.5% active smokers). Patients ingest  $2.2 \pm 2$  coffees per day, do not perform regular physical activity (68.4%), nor hyposaline diet (53.6%). Considering pBP measured in consultation, the majority have grade I HBP (mean values: systolic BP (SBP)  $152 \pm 14$  mmHg; diastolic BP (DBP)  $88 \pm 10$  mmHg), with 21.1% presenting controlled BP values. Regarding cBP: SBP  $142 \pm 15$  mmHg; DBP  $86 \pm 13$  mmHg. Mean central pulse pressure is  $55.9 \pm 18.1$  mmHg and peripheral is  $64.1 \pm 17.7$  mmHg. Mean PWV is  $7.8 \pm 2.7$  m/s, with 18.2% of patients presenting PWV > 10 m/s. Regarding antihypertensive therapy: 73.7% are medicated with diuretics; 42.1% angiotensin converting enzyme inhibitors; 42.1% calcium channel antagonists; 36.8% angiotensin receptor antagonists (ARA); 36.8% beta-blockers. 36.8% of patients report difficulties in taking medication, in terms of adherence to the regimen instituted and/or recall barriers.

**Conclusions:** The evaluation of cBP and PWV can play an important role in clinical practice by allowing the definition of the best therapeutic strategy for each patient. It is also necessary to establish strategies in order to optimize therapy compliance, as it is as much, if not more, important than the choice of therapy itself.

#### BETTER CONTROL OF OBESE HYPERTENSIVE PATIENTS WITH MODERATE HYPERTENSION, WHEN CENTRAL BLOOD PRESSURE ARE USED AS A PARAMETER FOR FOLLOWING-UP

R. Cabrera Sole, C. Turpin Lucas, L. Urrego Rivera, S. García Ruiz. *General University Hospital, Albacete, SPAIN*

**Objective:** Introduction: it is known that arterial hypertension in obese patients has more difficulty for adequate control, not only because of the measurements that are more technically difficult, but also because more drugs are necessary in their control. In the present study, we assessed the usefulness of central systolic and diastolic pressures (TASc and TADc), for a more adequate follow-up.

**Objectives:** to compare the control of arterial hypertension in obese hypertensive patients (PHO) in which central pressures are used as a guide compared to standard control.

**Design and method:** we studied 320 obese hypertensive patients, who were divided into two groups: Group I composed of 180 PHO (mean age  $68 \pm 5$  years, 70 women), in whom TASc and TADc were measured in addition to the peripheral controls in the right arm, and group II, composed of 140 PHO (mean age of  $67 \pm 3$  years, 69 women), in whom the usual control was performed with the taking of the TA in arms with standard devices and subsequently the central pressures were also measured. The referred central tensions, peripheral voltages, the rate of increase (AI) and the pulse wave velocity (PWV) were measured in all. The results were compared and are shown in the following table

**Results:** Table of Results:

Datos	TASc	TADc	TASp	TADp	AI	PWV
Grupo I	110+4*	78+5*	138+4	84+3	23+5	7+3
Grupo II	119+4	83+5	139+5	86+3	29+5	9+5

\*means  $p$  value < 0.05

**Conclusions:** the PHO, have better control of their pressures, when central pressures are used, but this method has still little diffusion in clinical practice, so in the future, its use should be increased especially in those patients with greater difficulty in control through measurements of peripheral pressures such as obesity.

# POSTER SESSION

## POSTERS' SESSION PS22:

## AGEING, CHILDREN AND ADOLESCENTS, WOMEN

### AMBULATORY BLOOD PRESSURE MONITORING AFTER PEDIATRIC LIVER TRANSPLANTATION

J. Antoniewicz<sup>1</sup>, P. Czubkowski<sup>2</sup>, I. Jankowska<sup>2</sup>, M. Teisseyre<sup>2</sup>, M. Dadalski<sup>2</sup>, D. Kaminska<sup>2</sup>, J. Pawlowska<sup>2</sup>. <sup>1</sup>The Children's Memorial Health Institute, Department of Nephrology, Kidney Transplantation and Hypertension, Warsaw, POLAND, <sup>2</sup>The Children's Memorial Health Institute, Department of Gastroenterology, Hepatology, Nutritional Disturbances and Pediatrics, Warsaw, POLAND

**Objective:** Due to immunosuppressive treatment, patients after liver transplantation (LTx) are at higher risk of arterial hypertension (HT), which is significant risk factor for cardiovascular disease. Ambulatory blood pressure monitoring (ABPM) is widely used as an extension of casual blood pressure (CBP) measurement. The aim of the study was to investigate the role of ABPM after pediatric LTx.

**Design and method:** CBP was defined as the mean of 2 manual measurements performed on day of ABPM and was classified as normal < 90th percentile (pc), high normal (HN) 90th-95th pc, HT > 95th pc. The result was accepted if at least 70% of total measurement count was approved. Daytime and nighttime mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) were compared to 95th pc values for gender and height. Wake and sleep blood pressure (BP) loads were calculated as the percent of readings at or above the 95th pc. Nocturnal non-dipping (NND) was defined as < 10% difference between the average daytime and nighttime BP. Classification of ABPM was based on current recommendations.

**Results:** CBP, followed by 24h-ABPM were performed in 104 patients (63 females) at the mean age of 13.6 years (10.0–17.8), 10.5 years after LTx (5.1–16.8). Patients presented with stable graft function, and immunosuppression was based on tacrolimus (90%) or sirolimus (10%). Renal function by cystatin-c was > 95th pc in 8% (0.86 ± 0.21). Mean BP was 82.2 ± 6.0 (SBP 109.3 ± 8.8; DBP 67.5 ± 5.9). There were "white coat" HT in 0.9%, HN in 1.9%, masked HT in 4.8%, and severe HT in 2.8% of patients. In 20% of patients there were normal CBP, mean ambulatory BP < 95th pc and BP loads > 25% and 27% had normal CBP, mean ambulatory BP < 95th pc and NND < 10%.

**Conclusions:** Patients after LTx are at higher risk of arterial hypertension. ABPM should be performed routinely during follow-up as a supplement of CBP. Patients with borderline results or unclassified abnormalities should be closely monitored especially before transition to adult care. Significance of nocturnal non-dipping in children after LTx require further studies including assessment of organic cardiovascular damage.

### HIGH BLOOD PRESSURE AND OBESITY PREVALENCE IN ADOLESCENTS: RESULTS OF A SCREENING PROGRAM

L. Szabó<sup>1</sup>, J. Kormos-Tasi<sup>2</sup>, E. Gácsi<sup>2</sup>, N. Scheuring<sup>1</sup>. <sup>1</sup>Heim Pál Children Hospital, Budapest, HUNGARY, <sup>2</sup>Semmelweis University, Budapest, HUNGARY

**Objective:** Obesity is a growing problem worldwide and is likely a major cause of the increased prevalence of high blood pressure in children. The aim of the screening program was to investigate the association of blood pressure levels and obesity, hypercholesterinaemia and increased body fluid in adolescents.

**Design and method:** 2202 children participated in the screening program between April 2010 to May 2011. Blood pressure, heart rate, body composition, cholesterol and blood glucose level, bodyweight, height and BMI were assessed.

**Results:** The participants range of age was between 14–18 years. The average systolic blood pressure (SBP) was 126.34 ± 12.55 mmHg. Boys had higher SBP than girls (131.87 ± 13.59 mmHg versus 117.49 ± 5.69 mmHg,  $p < 0.001$ ). The average diastolic blood pressure (DBP) was 71.86 ± 8.74 mmHg. DBP was also higher in boys than girls (72.61 ± 9.17 mmHg versus 66.69 ± 5.04 mmHg,  $p < 0.001$ ). High SBP (> percentile 95%) was detected in 307/1326 cases (23.15%) in girls, and in 403/876 cases (46%) in boys. High DBP occurred in 85 girls and in 90 boys. Overweight and

obese were 18.994% of the girls and 15.26 % of the boys. The percentage of high blood pressure was more frequent among boys and girls who were in the overweight and obese group 93/145 (64.14%), 94/239 (39.33%). The pathologically high level of body fat percentage appeared to be 12.98% among girls and 5.9% among boys. In elevated BMI groups the frequency of high body fat was 66% among girls and 81% among boys. The mean cholesterol level was significantly higher in the overweight and obese group 3.78 ± 1.26 and 4.17 ± 0.91 mmol/L ( $p < 0.001$ ).

**Conclusions:** Prevalence rates of hypertension and overweight and obesity are high in school children in Budapest, and increased bodyweight is a significant risk factor for hypertension. The results of the study will help to design preventive programmes.

### COMPARISON OF ANKLE-BRACHIAL INDEX AND UPSTROKE TIME PER CARDIAC CYCLE IN ASSOCIATION WITH TARGET ORGAN DAMAGE IN ELDERLY CHINESE: THE NORTHERN SHANGHAI STUDY

S. Yu<sup>1</sup>, J. Xiong<sup>1</sup>, Y. Lu<sup>1</sup>, H. Ji<sup>1</sup>, J. Teliewubai<sup>1</sup>, C. Chi<sup>1</sup>, B. Bai<sup>1</sup>, Y. Zhou<sup>1</sup>, X. Fan<sup>1</sup>, J. Blacher<sup>2</sup>, J. Li<sup>3</sup>, Y. Zhang<sup>1</sup>, Y. Xu<sup>1</sup>. <sup>1</sup>Department of Cardiology, Shanghai Tenth People's Hospital, Tongji University School of Medicine, Shanghai, CHINA, <sup>2</sup>Paris Descartes University; AP-HP; Diagnosis and Therapeutic Center, Hôtel-Dieu, Paris, FRANCE, <sup>3</sup>The Research Institute of Clinical Epidemiology, Tongji University School of Medicine, Shanghai, CHINA

**Objective:** Recent studies indicated that upstroke time per cardiac cycle (UTCC) in lower extremity is equivalent to ankle-brachial index (ABI) in diagnosing peripheral arterial disease and in predicting cardiovascular mortality. In the present study, we aim to compare ABI and UTCC in relation to target organ damage (TOD)

Figure 2. Association of TOD with ABI and UTCC analyzed by multivariate regression when ABI and UTCC separately put into the same model

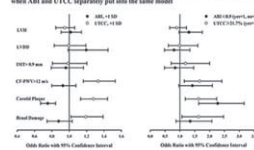
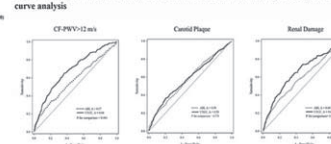


Figure 3. Comparison of the ability of ABI and UTCC in discriminating TOD by ROC curve analysis



ROC curve analysis was conducted to further compare the difference of ability between ABI and UTCC in discriminating abnormal CF-PWV, carotid plaque and renal damage. Z test was used to detect the difference of area under curves between ABI and UTCC. CF-PWV, carotid-femoral pulse wave velocity.

Table 4. Association of TOD with ABI and UTCC analyzed by multivariate stepwise regression when ABI and UTCC both put into the same model

	LVH	LVDD	CF-PWV	Carotid Plaque	Renal Damage
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age, year	1.037(1.009,1.065)	1.009(1.037,1.102)	1.109(1.082,1.137)	1.062(1.042,1.082)	1.174(1.141,1.209)
Gender (male=1, female=0)	0.280(0.221,0.355)	0.467(0.323,0.677)	1.568(1.003,2.450)	1.279(1.019,1.606)	...
Body mass index, kg/m <sup>2</sup>	1.075(1.041,1.110)	1.088(1.035,1.144)	...	...	...
Current smoking (yes=1, no=0)	...	...	1.748(1.014,3.015)	...	...
Hypertension (yes=1, no=0)	1.961(1.546,2.487)	1.996(1.323,3.011)	...	2.534(1.691,3.798)	1.554(1.024,2.359)
Diabetes (yes=1, no=0)	...	...	2.276(1.618,3.201)	1.422(1.101,1.838)	...
Total Cholesterol, mmol/L	...	...	1.277(1.104,1.477)	1.154(1.041,1.279)	1.176(0.986,1.403)
High density lipoprotein, mmol/L	...	...	...	...	0.342(0.188,0.626)
ABI<0.9 (yes=1, no=0)	...	...	...	2.085(1.490,2.919)	...
UTCC<21.7% (yes=1, no=0)	...	...	1.718(1.187,2.480)	1.387(1.000,1.925)	1.675(1.110,2.520)

Multivariate stepwise logistic regression was conducted to investigate the association of each TOD with abnormal ABI and UTCC. Variables staying in the final model were represented in the table. ... designates no significance. ABI, ankle brachial index; UTCC, upstroke time per cardiac cycle; LVH, left ventricular hypertrophy; LVDD, left ventricular diastolic dysfunction; IMT, carotid intima-media thickness; CF-PWV, carotid-femoral pulse wave velocity.

**Design and method:** 1841 elderly participants (mean age of 70 years) derived from the Northern Shanghai Study were included in the present study. ABI and UTCC were measured using VP-1000 device (Omron, Japan). TOD including left ventricular hypertrophy and diastolic dysfunction, carotid intima-media thickness and plaque, carotid-femoral pulse wave velocity (CF-PWV) and renal damage, were all evaluated.

**Results:** ABI and UTCC both were significantly correlated with CF-PWV, carotid plaque and eGFR, but not with cardiac damage. Compared with ABI, UTCC showed stronger correlation with CF-PWV. When ABI and UTCC separately put into same multivariate full-mode logistic regression models, both ABI (Odds Ratio [OR]:2.273; 95% Confidence Interval [CI]:1.632–3.165) and UTCC (OR:1.627; 95%CI: 1.182–2.240) significantly associated with carotid plaque, but only UTCC significantly associated with increased CF-PWV (OR:1.664; 95%CI:1.147–2.416) and renal damage (OR:1.625; 95%CI:1.068–2.472). When ABI and UTCC both put into same multivariate stepwise logistic regression models, consistent results were observed. In ROC curve analysis, UTCC was better than ABI in discriminating increased CF-PWV (AUC:0.68 vs. 0.57;  $P < 0.001$ ) and renal damage (AUC:0.67 vs. 0.60;  $P = 0.012$ ).

**Conclusions:** Compared with ABI, UTCC showed stronger association with vascular and renal damage in this elderly cohort. In combination with previous

findings, UTCC may be a useful tool for diagnosing PAD and stratifying cardiovascular risk.

### CARDIOVASCULAR DISEASE IN VERY ELDERLY PATIENTS HOSPITALIZED IN A DISTRICT HOSPITAL

M. Mellado-Ferreiro<sup>1</sup>, V. Jarne-Betrán<sup>1</sup>, M. Arteaga-Mazuelas<sup>1</sup>, A. Redondo-Arriazu<sup>2</sup>, L. Urbina-Soto<sup>1</sup>. <sup>1</sup>Hospital García Orcoyen, Estella, SPAIN, <sup>2</sup>Complejo Hospitalario de Navarra, Pamplona, SPAIN

**Objective:** To determine prevalence of cardiovascular disease (CVD) in elderly patients (85 years old or more) in a given district hospital and by gender distribution.

**Design and method:** We collected data on every 85-year-old patient admitted to an Internal Medicine Service in a given district hospital during a one-year period (June 2016-May 2017). Using the patient's medical records, we conduct a retrospective descriptive study

**Results:** We conducted a study on 452 patients, aged 85 years and over. Our sample included 257 women (57%) and 195 men (43%), with an average age of 89.5 years. CVD was found in 344 (76%) patients (74% of the women and 78% of the men, without statistically significant differences between genders): 47% 1 CVD, 28.5% 2 CVD, 16% 3 CVD and 9% 3 or more CDV. These were distributed as: atrial fibrillation 40.5% (183), heart failure 35% (158), chronic renal failure 28% (126), cerebrovascular disease 19% (87), ischemic heart disease 16% (73) and peripheral arterial disease 5% (22). By gender (female/male, in %): heart failure 39/29, atrial fibrillation 38/44, chronic renal failure 29/27, cerebrovascular disease 16/21, ischemic heart failure 8/20, peripheral arterial disease 2/6. Statistically significant association was only observed between female gender and heart failure ( $p = 0.026$ ).

**Conclusions:** In a study conducted on 195 men and 257 women, we find CVD symptoms in 76% of them. Our results show that, for the whole group, the most prevalent CVD are atrial fibrillation, heart failure and chronic renal disease. However, when analyze the sample by gender, we find that women have heart failure more frequently than men ( $p = 0.026$ ).

### A TEN-YEAR ANALYSIS OF ANTIHYPERTENSIVE THERAPY IN OVER-EIGHTY-YEARS-OLD-PATIENTS

A. Grossi, E. Cattaneo, N. Tandurella, S. Moretti, G. Cavallaro, L. Robustelli Test, M. Agostinis, V. Pierobon, L. Tavecchia, V. Mancuso, C. Mongiardi, L. Montalbetti, L. Guasti, A.M. Grandi, A.M. Maresca. *University of Insubria, Department of Medicine and Surgery, Varese, ITALY*

**Objective:** To investigate type and number of antihypertensive drugs in over-eighty-years-old-patients and five years follow-up changes in antihypertensive therapy. To evaluate also prevalence of adequate blood pressure (BP) control, orthostatic hypotension, cardiovascular (CV) risk factors and comorbidities in this population.

**Design and method:** From 2007 to 2015 we enrolled 239 over-eighty-years-old-hypertensives (systolic-BP > 140mmHg and/or diastolic-BP > 90mmHg and/or use of antihypertensive-drugs). For each patient we assessed home and office-BP, other CV-risk factors, organ damage (left ventricular hypertrophy-LVH, microalbuminuria, intima-media thickening), comorbidities, antihypertensive-drugs. Follow-up consisted in telephone-interview (July/2017) to detect if patients were alive, had CV-events and/or changed their antihypertensive-therapy.

**Results:** At the first visit, BP-values were controlled (<140/90mmHg) in 133 patients (55.6%). Systolic-BP was > 140mmHg in 87 patients (36.4%), diastolic-BP > 90mmHg in 3 (1.3%), whereas both systolic and diastolic-BP were uncontrolled in 16 (6.7%). Orthostatic hypotension was diagnosed in 19.2% patients. 133 patients had LVH (77.3%) and 107 carotid-plaques (70.9%). Among CV-risk factors, heart diseases affected 70 patients (heart failure-6.7%, coronary diseases-10%, atrial fibrillation-12%), cerebrovascular-diseases interested 14 patients (5.8%), chronic kidney failure affected 46 patients (19.2%), diabetes and/or dyslipidemia were found in 134 patients (56.1%). 52.3% of patients took 2-3 type of antihypertensive drugs, 32.7% 4 or more, 12.6% followed monotherapy, 2.5% didn't take antihypertensive molecules. Generally, well-controlled hypertensives used less drugs than uncontrolled ones ( $2.75 \pm 1.4$  vs  $3.23 \pm 1.35$ ;  $p:0.008$ ). Most used drugs were: Calcium-antagonists (CA,66%), Angiotensin-receptor-blockers (ARB,57%), Beta-blockers (BB,42%), thiazide-diuretics (TD,47%), Angiotensin-converting-enzyme-inhibitors (ACE-I,33%), sympatholytic (25%), loop-diuretics (LD,15%), mineralcorticoid-antagonists (MA,6%). After  $4.9 \pm 2.2$  years, 51.7% of patients took 2-3 type of antihypertensive drugs, 25.3% 4 or more, 16.7% followed monotherapy, 6.3% didn't take antihypertensive molecules. Thus, the mean number of drugs passed from  $2.96 \pm 1.40$  to  $2.58 \pm 1.34$ , with cut both in male and female and both in well-controlled and uncontrolled hypertensives. We found the rise of LD prescriptions ( $p:0.004$ ), whereas CA ( $p:0.04$ ), TD ( $p:0.001$ ) and ARB ( $p:0.01$ ) were less used. 28 patients were lost at the follow-up (11.7%), 37

were died (15.5%:54% for CV-events, 46% for other causes). Among the 174 alive-patients (72.8%), 6.9% had CV-events.

**Conclusions:** Our data underlined deprescribing of hypertensives-drugs in an out-patient population of over-eighty-year-old-hypertensives, especially for TD, ARB and CA.

### REFERENCE VALUES FOR OFFICE BLOOD PRESSURE IN BRAZILIAN ADOLESCENTS: DATA FROM THE STUDY OF CARDIOVASCULAR RISK IN ADOLESCENTS (ERICA STUDY)

T. V. Jardim<sup>1</sup>, B. Rosner<sup>2</sup>, K. Bloch<sup>3</sup>, P. Jardim<sup>1</sup>. <sup>1</sup>Hypertension League, Federal University of Goias, Goiania, BRAZIL, <sup>2</sup>Channing Laboratory, Department of Biostatistics, Harvard T.H. Chan School of Public Health, Boston, MA, USA, <sup>3</sup>Federal University of Rio de Janeiro, Instituto de Estudos em Saúde Coletiva, Rio de Janeiro, BRAZIL

**Objective:** Office blood pressure (BP) references for Brazilian adolescents are missing in the literature. This study aims to investigate the normal range of office BP in a healthy non-overweight Brazilian population of adolescents.

**Design and method:** The Brazilian Study of Cardiovascular Risks in Adolescents (ERICA) is a national school-based study that included adolescents (aged between 12 and 17 years), enrolled in public and private schools, in cities with over 100,000 inhabitants, from all five Brazilian macro-regions. Information about sex, age, type of school (public or private), skin color, smoking, alcohol consumption, and physical activity were obtained from a self-administered questionnaire. Adolescents' height and body mass index (BMI) were classified in percentiles according to age and gender, and reference curves from the World Health Organization were adopted. Three consecutive office BP measurements were taken with a validated oscillometric device using the appropriate cuff size. Mean values of the last two readings were used for analyses. Polynomial regression models relating BP, age and height were applied.

**Results:** From a total of 73,399 adolescents enrolled, non-overweight individuals represented 74.5% (95%CI 73.3-75.6) of the total sample. Age distribution across the sample varied from 14.1% (95%CI 13.8-14.4) in 17-18 years to 18.0% (95%CI 17.7-18.3) in 15-16 years old. The majority of the non-overweight sample was from public schools 84.2% (95%CI 79.9-87.7) and sedentary 54.8% (95%CI 53.7-55.8). Adolescents' reporting their skin color as brown (48.8% [95%CI 47.4-50.1]) and white (37.8% [95%CI 36.1-39.5]) were most frequent. Systolic and diastolic 50th, 90th, 95th and 99th BP percentiles by sex, age and height percentiles are provided. Estimated BP increased in both sexes by age and height percentiles. Systolic BP growth patterns were more marked in males when compared to females, along all height percentiles. The same pattern was not observed for diastolic BP.

**Conclusions:** The first Brazilian adolescents' BP references by sex, age and height based on measurements performed with a validated oscillometric device and following an appropriate methodology for data collection are presented here. The proposed reference values should be used in clinical practice.

### RENALASE, BLOOD PRESSURE AND ARTERIAL STRUCTURE AND FUNCTION IN CHILDREN WITH CHRONIC KIDNEY DISEASE

P. Skrzypczyk<sup>1</sup>, M. Okarska-Napierala<sup>2</sup>, E. Gorska<sup>3</sup>, A. Stelmaszczyk-Emmel<sup>3</sup>, M. Pancyk-Tomaszewska<sup>1</sup>. <sup>1</sup>Medical University of Warsaw - Department of Pediatrics and Nephrology, Warsaw, POLAND, <sup>2</sup>Medical University of Warsaw - Department of Pediatrics with Observation Unit, Warsaw, POLAND, <sup>3</sup>Medical University of Warsaw - Department of Laboratory Medicine and Clinical Immunology of Developmental Age, Warsaw, POLAND

**Objective:** Aim of the study was to assess level of renalase in children with chronic kidney disease (CKD) and to find the relation between renalase level and blood pressure and arterial structure and function in this group of patients.

**Design and method:** In 38 children (21 boys, 17 girls) aged  $12.23 \pm 4.19$  years with CKD we evaluated serum renalase level (Cloud Corp. WUHAN, China) [mcg/mL], BMI Z-score, arterial stiffness parameters (pulse wave analysis, pulse wave velocity - PWV), peripheral and central blood pressure, intima-media thickness (IMT), medications used, kidney function (GFR ac. to Schwartz formula), and selected biochemical parameters. Control group included 38 healthy children (19 boys, 19 girls) with mean age:  $11.79 \pm 3.29$  years.

**Results:** Glomerular filtration rate was from 4.19 to 85.55 mean  $25.74 \pm 8.94$  mL/min/1.73 m<sup>2</sup>, 14 children were in CKD stage G2, 11 in stage G3, 6 in stage G4 and 7 in stage G5 (6 children were dialysed); 26 children had arterial hypertension. Renalase level in the study group was from 0.93 to 114.16 mean  $59.45 \pm 23.25$  [mcg/mL] and was higher compared to control group ( $27.20 \pm 5.15$  [ug/mL]) ( $p < 0.0001$ ). In children with CKD renalase level correlated with BMI Z-score

( $r = -0.36$ ,  $p = 0.027$ ) and alphacalcidol dose [ $\mu\text{g}/24 \text{ h}$ ] ( $r = 0.41$ ,  $p = 0.02$ ). In the study group we found correlations of renalase with GFR ( $r = -0.69$ ,  $p = 0.00001$ ), hemoglobin ( $r = -0.48$ ,  $p = 0.002$ ), phosphate ( $r = 0.35$ ,  $p = 0.03$ ), Calcium-phosphorus product ( $r = 0.35$ ,  $p = 0.03$ ), parathormone ( $r = 0.58$ ,  $p = 0.0001$ ), total cholesterol ( $r = 0.35$ ,  $p = 0.03$ ), LDL-cholesterol ( $r = 0.36$ ,  $p = 0.03$ ) and triglycerides ( $r = 0.52$ ,  $p = 0.01$ ). We found no correlations between renalase and peripheral and central blood pressure and IMT; renalase correlated only with PWV Z-score ( $r = 0.42$ ,  $p = 0.043$ ). In control group renalase was dependent only on age ( $r = -0.37$ ,  $p = 0.022$ ); such relation was not found in the study group. No other correlations between renalase and analyzed clinical, vascular and biochemical parameters were found in the control group.

**Conclusions:** 1. In children with chronic kidney disease renalase level is higher compared to healthy peers and is highly dependent on glomerular filtration. 2. In children with chronic kidney disease renalase seems to be related neither to central nor to peripheral blood pressure but may be a marker of arterial stiffness.

### INFLUENCE OF THE CARDIOPROTECTION ON HEMODYNAMIC IN PERIOPERATIVE PERIOD IN ELDERLY

Y. Plushchenko, O. Klyunenko. *SE Dnipropetrovsk medical academy MOH of Ukraine, Dnipro, UKRAINE*

**Objective:** The issue of prevention of cardiac complications during non-cardiac elective surgery is an actual problem of anesthesiology. Decompensation of cardiac function is characteristic for the elderly, which may be the cause of postoperative lethality. Cardioprotective therapy may contribute to survival of cardiomyocytes under ischemia – hypoxia. In our real clinical practice only a few drugs with cardioprotective properties are introduced, in particular which include the amino acids L-arginine and L-carnitine. Affecting endothelial dysfunction, it energizes the cardiomyocyte. For the anesthesiologist also there is an important absence of negative hemodynamic action. The purpose of the study was to detect the presence of cardioprotective effect of the solution of L-arginine and L-carnitine by assessing the central hemodynamic effects in elderly patients in the perioperative period.

**Design and method:** We examined 20 patients aged 60 to 81 years with cardiovascular comorbidities, which was performed by abdominal surgery in anesthesiology department of the Dnipropetrovsk City Multidisciplinary Clinical Hospital N 4. All patients in the preoperative period, as preparation for anesthesia and surgical intervention, received the solution of L-arginine and L-carnitine 100 ml intravenous, there was continued for the next three days at a daily dose in the postoperative period. To control the cardioprotective effect before surgery and after infusion, we used echocardiography and central hemodynamics by thoracic rheography (modified Kubicek technique, electrodes on the back).

**Results:** In the study of echocardiography in patients receiving the solution of L-arginine and L-carnitine, during the entire period of the perioperative period, no significant variability of the main parameters (ejection fraction, volume of chambers of the heart) was observed. In the analysis of rheograms preoperatively in patients there was a hypokinetic type of hemodynamics with high vascular pressure. From 2 days there was a tendency to normal circulation, with simultaneous decrease of vascular resistance to normal indexes, the index of work of left ventricle decreased.

**Conclusions:** the use of the the solution of L-arginine and L-carnitine in the perioperative period reduces the hemodynamic load on the myocardium and is appropriate in order to prevent cardiac complications of non-cardiac elective surgery in elderly patients.

### A PREGNANT WOMAN WITH PSEUDOHYPERALDOSTERONISM DUE TO MUMIJO CONSUMPTION: A LICORICE-LIKE SYNDROME

K. Imprialos, K. Stavropoulos, D. Patoulas, S. Bouloukou, G. Kerpiniotis, G. Lales, A. Manafis, C. Mitas, K. Petidis, V. Athyros, A. Karagiannis, M. Doumas. *2nd Propedeutic Department of Internal Medicine, Aristotle University of Thessaloniki, Thessaloniki, GREECE*

**Objective:** To report the first case of pseudohyperaldosteronism due to mumijo consumption and provide the pathophysiologic background.

**Design and method:** A 37-year-old woman on the 32nd-week of gestation was referred to our Department due to persistent hypokalemia, hypomagnesaemia and high blood pressure (BP). After meticulous investigation of her medical history, we found that the patient received without prescription mumijo over the last six-months. Physical examination was unremarkable. A thorough diagnostic work-up was then initiated to evaluate the persistent hypokalemia along with hypertension.

**Results:** Serum potassium at admission was 2.7mmol/L, while serum magnesium was 1.72 mg/dl. The rest serum electrolytes values were within normal values. Office BP was 152/97mmHg. Air blood gases examination revealed the

presence of metabolic alkalosis. Twenty-four-hour urine sample revealed high urinary excretion of potassium, magnesium and calcium. The 24 h ambulatory BP monitoring confirmed the increased BP levels (146/104mmHg) with non-dipping pattern. Consequently, patient had a high clinical suspicion for primary aldosteronism, thus underwent the diagnostic procedure of the disease. Interestingly, both plasma renin activity and aldosterone were found at remarkably low levels (0.08ng/ml, and  $> 0.16\text{ng}/100 \text{ ml}$ , respectively). Normal early cortisol level (8.9mcg/100 ml) and 1 mg dexamethasone suppression test (2.3mcg/100 ml) excluded Cushing's syndrome. Moreover, dehydroepiandrosterone level measured in normal values (1.494,9ng/ml). These findings excluded the diagnosis of primary aldosteronism and emerged the probability of a pseudohyperaldosteronism-syndrome. Biochemical and hormonal normalization was observed with mumijo withdrawal.

**Conclusions:** Our patient was finally diagnosed with pseudohyperaldosteronism-syndrome due to mumijo consumption, a "licorice-like syndrome", via inhibition of 11-hydroxysteroid dehydrogenase type 2, leading to impaired inactivation of cortisol to cortisone and finally to excessive mineralocorticoid activity, mainly in the distal- and cumulative-tubule. Clinicians should be aware of this side effect when prescribing mumijo, and a detailed medical history is always needed.

### VITAMIN D AND BLOOD PRESSURE PARAMETERS IN CHILDREN AND ADOLESCENTS WITH ARTERIAL HYPERTENSION

P. Skrzypczyk<sup>1</sup>, K. Dziedzic-Jankowska<sup>1</sup>, A. Ofiara<sup>2</sup>, M. Szyska<sup>2</sup>, M. Panczyk-Tomaszewska<sup>1</sup>. *<sup>1</sup>Medical University of Warsaw - Department of Pediatrics and Nephrology, Warsaw, POLAND, <sup>2</sup>Medical University of Warsaw - Student Scientific Group at the Department of Pediatrics and Nephrology, Warsaw, POLAND*

**Objective:** Observational studies suggest that low vitamin D levels may promote hypertension. Aim was to assess vitamin D status in children and adolescents with arterial hypertension and to find relation between vitamin D and clinical, biochemical and ABPM parameters.

**Design and method:** Study group included 49 pediatric patients aged  $14.29 \pm 3.17$  years with arterial hypertension; 24 children received antihypertensive medications. In all patients we evaluated vitamin D status, serum calcium, phosphorus, parathormone, alkaline phosphatase, urinary calcium and phosphorus loss, office blood pressure, ABPM, height, weight and BMI, GFR, uric acid, lipids and albuminuria. Children were not supplemented with vitamin D. According to Central European Guidelines vitamin D status was defined as: deficiency ( $<20 \text{ ng/mL}$ ), suboptimal status ( $20\text{--}30 \text{ ng/mL}$ ), adequate status ( $>30$  to  $50 \text{ ng/mL}$ ), high supply ( $> 50$  to  $100 \text{ ng/mL}$ ).

**Results:** Vitamin D level was from 6.1 to 55.3, mean  $19.74 \pm 9.68 \text{ ng/mL}$ . Vitamin D deficiency was found in 29 (59.2%), suboptimal status in 17 (34.7%), adequate status in 1 (2.0%), high supply in 2 (4.1%) children. Vitamin D level was higher in Spring-Summer months compared to Autumn-Winter months ( $21.79 \pm 10.19$  vs.  $15.53 \pm 7.08 \text{ ng/mL}$ ,  $p = 0.031$ ), did not differ between boys and girls ( $20.14 \pm 11.13$  vs.  $18.83 \pm 5.25 \text{ ng/mL}$ ,  $p = 0.974$ ) and between treated and untreated children ( $20.72 \pm 12.71$  vs.  $18.80 \pm 5.53 \text{ ng/mL}$ ,  $p = 0.031$ ). Other parameters of calcium-phosphorus metabolism were within normal limits in all children. Vitamin D level correlated with height Z-score ( $R = 0.39$ ,  $p = 0.003$ ), BMI Z-score ( $r = -0.34$ ,  $p = 0.016$ ), uric acid ( $r = -0.31$ ,  $p = 0.044$ ) and triglycerides ( $r = -0.37$ ,  $p = 0.014$ ). Vitamin D level correlated negatively with mean 24-hour heart rate ( $r = -0.38$ ,  $p = 0.007$ ); whereas no relation was found between vitamin D and age. In the subgroup of 24 children treated with antihypertensive medications (mean duration of hypertension  $23.54 \pm 21.64$  months) vitamin D correlated with ambulatory arterial stiffness index ( $r = 0.50$ ,  $p = 0.036$ ).

**Conclusions:** 1. Inadequate supply (deficiency or suboptimal status) is ubiquitous in children with arterial hypertension.

2. Vitamin D deficiency should be suspected especially in Autumn-Winter period and among obese and short children.

3. The relation between vitamin D status and ambulatory arterial stiffness index suggests negative influence of vitamin D on arterial wall but requires further examinations.

### RED BLOOD CELLS COUNT AND HEMOGLOBIN LEVEL ARE ASSOCIATED WITH ARTERIAL STIFFNESS IN HEALTHY SUBJECTS

I. Strazhesko, A. Staroverova, E. Borisov, Y. Orlova. *Lomonosov Moscow State University, department of age-associated diseases, Moscow, RUSSIA*

**Objective:** Increased arterial stiffness (AS), measured as increased pulse wave velocity (PWV), has been considered as important aspect of vascular aging and independent risk factor for both cardiovascular events and overall mortality. Chronic inflammation due to the aging of immune system and disturbances in the functional state of endothelial progenitor cells is one of the key mechanisms of

increased AS. The complete blood count, which changes with age, characterizes the state of the hematopoietic system and the immune response. The aim of the study was to investigate the relationship between PWV and the parameters of blood test in healthy subjects of different ages.

**Design and method:** We investigated 304 healthy subjects (200 women, 104 men), mean age  $51.5 \pm 13.3$  years. PWV was measured with ambulatory blood pressure monitoring device BPLab Vasotens (BPLab, Russia). Red blood cells (RBC), white blood cells and platelets count, hemoglobin, hematocrit, were measured using routine methods.

**Results:** Mean systolic BP was  $125.2 \pm 16.7$  mm Hg, diastolic BP was  $76.7 \pm 10.4$  mm Hg, PWV =  $8.8 \pm 2.1$  m/s. Multivariate regression analysis showed a positive association between PWV and age ( $p < 0.0001$ ), systolic BP ( $p = 0.002$ ), RBC count ( $p = 0.003$ ), hemoglobin ( $p = 0.029$ ). Other blood test parameters did not demonstrate a significant association with PWV.

**Conclusions:** The independent direct association of the PWV and RBC count, hemoglobin level confirms the role of AS in ensuring normal microcirculation in the tissues.

## PREVALENCE AND ASSOCIATIONS OF FRAILTY IN ELDERLY PATIENTS WITH ACUTE CORONARY SYNDROME

N. Soseliya, B. Lobzhanidze, I. Meray, N. Bagmanova, S. Villevalde, Z. Kobalava. *RUDN University, Moscow, RUSSIA*

**Objective:** The aim of the study was to assess the prevalence and clinical associations of frailty in elderly patients with acute coronary syndrome (ACS).

**Design and method:** In 130 patients older 75 years ( $83 \pm 5$  years, arterial hypertension (AH) 92%, previous myocardial infarction (MI) 32%, atrial fibrillation 32%, diabetes 27%) admitted with MI (75%) or unstable angina (25%) frailty (national validated questionnaire), physical disability (Barthel index), functional mobility, nutritional status (Mini Nutrition Assessment), cognitive function (Mini Mental State Examination), mortality and hemorrhagic risk (GRACE, TIMI, CRUSADE scales) were assessed.

**Results:** Frailty was revealed in 66% of patients. 68% of patients had  $> 140$  points on GRACE scale, 53%  $> 5$  points on TIMI, 73%  $> 40$  points on CRUSADE. Patients with frailty were more likely women (72 vs 59%;  $p < 0.05$ ), had higher incidence of AH (94 vs 86%;  $p < 0.01$ ), MI in this hospitalization (86 vs 55%;  $p < 0.05$ ), GFR  $< 60$  ml/min/1.73 m<sup>2</sup> ( $71$  vs  $48$ %;  $p < 0.05$ ). Patients with frailty had higher risk of bleeding ( $47 \pm 10$  vs  $41 \pm 10$  points on CRUSADE scale,  $p < 0.001$ ) and higher risk of mortality ( $162 \pm 36$  vs  $144 \pm 22$  points on GRACE scale,  $4.9 \pm 1.1$  vs  $4.5 \pm 1.1$  points on TIMI scale,  $p < 0.001$ ). Patients with GRACE  $> 140$  points had more pronounced cognitive dysfunction ( $26.6 \pm 5.0$  vs  $29.9 \pm 1.9$  points,  $p < 0.05$ ), decreased functional mobility ( $34.0 \pm 3.6$  vs  $37.1 \pm 1.2$  points,  $p < 0.01$ ). Patients with TIMI  $> 5$  points had higher scores on a frailty scale ( $3.3 \pm 1.1$  vs  $2.5 \pm 0.5$ ,  $p < 0.001$ ), more physical disability of daily living ( $86.9 \pm 9.4$  vs  $95.2 \pm 5.1$ ,  $p < 0.001$ ). Patients with CRUSADE  $> 40$  points had more pronounced score on frailty ( $3.1 \pm 1.0$  vs  $2.0$  points,  $p < 0.001$ ), disorders of functional mobility ( $34.4 \pm 3.4$  vs  $38.2 \pm 1.1$  points,  $p < 0.01$ ), physical disability of daily living ( $89.3 \pm 8.9$  vs  $100$  points,  $p < 0.001$ ). Duration of hospitalization was higher in group of patients with frailty ( $9.6 \pm 3.8$  vs  $9.1 \pm 2.2$  days,  $\chi^2 = 36.3$ ,  $p < 0.01$ ). In-hospital mortality was found in group of patients with frailty (1.16%). In patients with frailty, mortality for six months was higher ( $24.6$  vs  $16.2$ %,  $p = 0.3$ ).

**Conclusions:** Frailty occurs in 66% of elderly patients with ACS, is associated with increased prevalence of cardiovascular diseases, higher risk of mortality and bleeding

## CIRCULATING LOW-DENSITY LIPOPROTEIN CHOLESTEROL IS INVERSELY CORRELATED WITH N-TERMINAL PRO-B-TYPE NATRIURETIC PEPTIDE IN VERY ELDERLY HOSPITALIZED PATIENTS

F. Spannella, G. Cocci, F. Giulietti, L. Landi, G. Rosettani, V. Bordoni, P. Giordano, R. Sarzani. *Internal Medicine and Geriatrics IRCCS-INRCA, Politecnica delle Marche University, Ancona, ITALY*

**Objective:** Our studies on human adipocytes suggest that natriuretic peptides (NP) may affect plasma cholesterol levels by inhibiting PCSK9 expression, a key regulator of low-density lipoprotein receptor (LDLR). To test this hypothesis in a real-life clinical setting, we evaluated associations between NT-proBNP and cholesterol in very elderly hospitalized patients.

**Design and method:** Cross sectional study on 288 very elderly admitted to our Internal Medicine and Geriatrics Department for medical conditions. NT-proBNP, total cholesterol (TC), HDL cholesterol (HDL-c) and triglycerides (TG) were

collected after stabilization of the acute illness. Patients were taking no lipid-lowering drugs. Calculated LDL-cholesterol (cLDL) was used for the analyses. NT-proBNP was analyzed both as a continuous and as a discrete variable (NT-proBNP tertiles).

**Results:** Mean age was  $87.7 \pm 6.2$  years with female prevalence (57.3%). Median NT-proBNP: 2949 (1005–7335) pg/ml; mean TC:  $145.1 \pm 40.3$  mg/dl; mean HDL-c:  $38.4 \pm 18.6$  mg/dl; median TG: 100 (75–129) mg/dl; mean cLDL:  $84.0 \pm 29.5$  mg/dl. We found a negative correlation between NT-proBNP and both TC and cLDL ( $r = -0.157$ ;  $p = 0.008$  and  $r = -0.166$ ;  $p = 0.005$ , respectively), while no correlations emerged between NT-proBNP and HDL ( $r = -0.065$ ;  $p = 0.275$ ) or triglycerides ( $r = -0.009$ ;  $p = 0.874$ ). These associations were also confirmed for NT-proBNP tertiles (Figure 1). The inverse association between NT-proBNP and cLDL was maintained even after adjusting for sex, albumin, hemoglobin and cognitive impairment.

**Conclusions:** We found an inverse association between NT-proBNP and LDL cholesterol levels, that remained statistically significant even after adjusting for covariates such as albumin, a common indicator of malnutrition or hepatic failure. Our real-life clinical study supports the possible direct role of NP on cholesterol metabolism, as suggested by our laboratory studies.

## COMPARATIVE ASPECTS OF THE STUDY OF EATING BEHAVIOR OF ADOLESCENTS 12 TO 13 YEARS DEPENDING ON THE LEVEL OF BLOOD PRESSURE

A. Ospanova<sup>1</sup>, T. Rymbaeva<sup>1</sup>, A. Kerimkulova<sup>2</sup>, A. Markabaeva<sup>1</sup>. <sup>1</sup>*Semey Medical University, Semey, KAZAKHSTAN*, <sup>2</sup>*Astana Medical University, Astana, KAZAKHSTAN*

**Objective:** to investigate the dependence between eating behavior, ethnicity, gender, and hypertension in adolescents 12 to 13 years of age

**Design and method:** Cross-sectional study of adolescents with 12–13 years studying at 12 middle schools. There were included in the study 1473. Age, gender, nationality, BP, height, questionnaire data were taken for analysis. BP was measured three times by oscilometric method and high BP was defined as systolic BP (SBP) and/or diastolic BP (DBP)  $> = p95$  for age, gender and height percentile.

**Results:** 1473 adolescents were evaluated (48,8% males). The prevalence of elevated BP was 12,6%. For comparison, according to nationality, 2 most numerous groups were singled, the Kazakh population was 87% ( $n = 1282$ ) and Russian 13% ( $n = 191$ ) adolescents. Boys with hypertension consume table salt (65,9%) more than girls (64,3%) ( $p = 0.705$ ). Adolescents of the Russian population no longer consume fatty foods, irrespective of the level of blood pressure. The situation of eating fast food by teenagers of 12–13 years is regarded as unsatisfactory, 79,2% ( $n = 1167$ ) of teenagers consume fast food, teenagers with hypertension are slightly more than teenagers with normal BP indicators ( $p = 0.946$ ). Teenagers of Russian nationality are more likely to abuse fast food than teenagers of Kazakh nationality, regardless of the level of blood pressure.

**Conclusions:** The data of the study showed high prevalence of hypertension (12,6%) in the population among adolescents 12–13 years old. Adolescents who do not consume and limit the consumption of fatty foods accounted for the majority of 63,8%. The situation with the use of fast foods by adolescents is unsatisfactory.

## ETHNIC AND GENDER FEATURES OF WEIGHT INFLUENCE AT BLOOD PRESSURE OF ADOLESCENTS WITH 12–13 YEARS OLD

A. Ospanova<sup>1</sup>, A. Kerimkulova<sup>2</sup>, T. Rymbaeva<sup>1</sup>, A. Markabaeva<sup>1</sup>. <sup>1</sup>*Semey Medical University, Semey, RUSSIA*, <sup>2</sup>*Astana Medical University, Astana, RUSSIA*

**Objective:** to learn interconnection of obesity, abdomen overweight and blood pressure (BP) among adolescents with 12–13 years

**Design and method:** Cross-sectional study. Adolescents were evaluated at their schools after parent consent. There were included in the study 1473 (middle age, SD  $12.1 \pm 0.002$ ). Age, gender, nationality, BP, height, weight, abdominal circumference (AC), body mass index (BMI). BP was measured three times by oscilometric method and high BP was defined as systolic BP (SBP) and/or diastolic BP (DBP)  $> = p95$  for age, gender and height percentile; O/O as BMI  $> = p85$  for gender and age; and increased AC as  $> = p90$  for age and gender.

**Results:** 1473 adolescents were evaluated (48,8% males). The prevalence of elevated BP was 12,6%. For comparison, according to ethnicity, the two most numerous groups were identified, of which the Kazakh population was 87% ( $n = 1282$ ) and Russian 13% ( $n = 191$ ) adolescents. By weight, BMI, SBP, DBP, AC revealed statistically significant differences ( $p < 0.001$ ). According to the study in the boys' population, the following data were found in the structure of individuals with normal BP for BMI: overweight in 4, 7% ( $n = 59$ ), obesity in 0,7% ( $n = 9$ ). In the structure of individuals with hypertension in boys, the BMI score was: overweight



Because of suspicion of mercury intoxication, urine sample taken in the first days after exposure was analyzed and it was found that mercury concentration was significantly elevated.

**Conclusions:** Acrodynia is a condition of pain and dusky pink discoloration in the hands and feet most often seen in children chronically exposed to heavy metals, especially mercury. Besides peripheral neuropathy and discoloration, profuse sweating, tachycardia, salivation and elevated blood pressure with hypertensive

crises suggesting catecholamine excess can also occur. This is explained by the fact that mercury can block metabolism of catecholamines, e.g. epinephrine). Usually, mercury intoxication is caused by swallowing of mercury droplets by small children. However, as we present, severe intoxication leading to symptoms mimicking pheochromocytoma can be caused by inhalation of vapor from dispersed droplets of mercury. Nephrocalcinosis can be explained by repeated bouts of hypercalciuria during hypertensive crises.

# POSTER SESSION

## POSTERS' SESSION PS23:

### HEART

#### CHANGE OF WALL THICKNESS OF MIOCARDIUM WITH ARTERIAL HYPERTENSION ACCORDING TO MORTEM EXAMINATION BY ETHNICITY (BETWEEN KAZAKH AND RUSSIAN HYPERTENSION PATIENTS)

A. Kerimkulova<sup>1</sup>, V.R. Veber<sup>2</sup>, N.A. Latypova<sup>1</sup>, A.S. Ospanova<sup>3</sup>. <sup>1</sup>Astana Medical University, Astana, KAZAKHSTAN, <sup>2</sup>Novgorod State University, Veliky Novgorod, RUSSIA, <sup>3</sup>Semey State Medical University, Semey, KAZAKHSTAN

**Objective:** To study the ethnical features of left and right ventricles of the heart remodeling among patients who died after suffering from hypertension during the lifetime according to mortem examination in Semey (Kazakhstan).

**Design and method:** A retrospective study was conducted, which explored the autopsy protocols of patients suffered from hypertension that died during the sixteen-year period (from 1999 to 2014) in Semey, Kazakhstan. To analyse the available data in the study group, the values were taken that defined the parameters of the left and right ventricles at the time of autopsy. The normal wall thickness of the left ventricle (without papillary muscle) had the value of 0.7–1.2 cm, the right ventricle - 0.2–0.3 cm. We studied the changes in cardiac remodelling of the two most numerous study groups among Russian and Kazakh population.

**Results:** A mortem examination cardiac remodeling processes among patients with hypertension was conducted based on 674 data representing 407 male and 267 female, 208 Kazakh, 437 Russian and 29 other nationalities. The average age was  $54.02 \pm 11.84$  (M+SD). Our analysis of those autopsy protocols of patients, who were suffering from hypertension and who died suddenly, showed that there were different changes in the settings of the left and right ventricles. Differences have been identified based on ethnicity. Right ventricular hypertrophy was detected in 86.9% of cases. When comparing the right ventricular wall thickness among Russian and Kazakh, statistically significant difference ( $p = 0.001$ ) was found, using the criterion of Mann-Whitney U at a significance level of 0.05. Categorical data were compared using chi-squared tests. The presence of right ventricular hypertrophy was detected among ethnic Russians in 90.5% ( $n = 382$ ), ethnic Kazakhs - 78.9% ( $n = 153$ ), Chi-square Pearson  $15.81$ ,  $p < 0.001$ .

**Conclusions:** High prevalence of having right ventricular hypertrophy (up to 86.9%) was identified among patients suffering from hypertension. Moreover, there is statistically significant difference in the thickness of the wall of the right ventricle by ethnicity. Greater distribution of right ventricular hypertrophy was observed in Russian population than Kazakh.

#### LEFT VENTRICULAR DEFORMATION IN PATIENTS WITH SYSTEMIC ARTERIAL HYPERTENSION BY 2D SPACKLE TRACKING ECHOCARDIOGRAPHY

N. Gronkova-Zlatareva, V. Dimitrova, I. Petrov, S. Tsonev. *ACIBADEM City Clinic, Cardiovascular center, Sofia, BULGARIA*

**Objective:** Systemic arterial hypertension represents an increase in cardiac afterload and the compensatory mechanism is the development of left ventricular concentric hypertrophy with diastolic dysfunction, and secondarily atrial dysfunction.

The aim of our study is to evaluate the left ventricular mechanical deformation by 2D spackle tracking echocardiography and estimate left ventricular longitudinal and circumferential strain in the patients with systemic arterial hypertension.

**Design and method:** We investigated 38 patients with systemic hypertension without heart failure, valvular or myocardial lesion and 36 healthy controls. The control group had no clinical symptoms, and the electrocardiogram and echocardiogram were normal. All patients had conventional transthoracic echocardiography following current guidelines and longitudinal and global longitudinal and circumferential strain by 2D spackle tracking. All statistical analyses were performed with SPSS version 17.0

**Results:** Statistically significant differences were not found between hypertensive and control patients in left atrial volume, inter-ventricular septum, posterior wall thickness, left ventricular diastolic diameter, left ventricular relative wall thickness, left ventricle mass index, E/A ratio, E/e' ratio, systolic pulmonary artery pressure. The global circumferential strain showed significantly decreased ( $p < 0.001$ ) in the patients with arterial hypertension compared to the controlled group ( $-17.8 \pm 4$  versus  $-20.4 \pm 6$ ). The longitudinal strain also significant decreases ( $p < 0.008$ ) in the hypertensive patients ( $-20.38 \pm 2.3$  versus  $-22.30$ ).

**Conclusions:** In hypertensive patients the global longitudinal and global circumferential deformation was significantly decreased. The speckle tracking gives the knowledge of subclinical left ventricular dysfunction in hypertensive patients.

#### UBIQUINOL INNOVATIVE FORM PROVIDES CARDIOPROTECTION BY A SINGLE INTRAVENOUS INJECTION

O. Kuliak, E.A. Gorodetskaya, E.I. Kalenikova, O.S. Medvedev. *M.V. Lomonosov Moscow State University, Moscow, RUSSIA*

**Objective:** Introduction: Coenzyme Q10 (CoQ10) is the endogenous compound essential for mitochondrial function and bioenergetics of cells. In the body CoQ10 exists in two forms - oxidized (ubiquinone) and reduced (ubiquinol). The main role in achieving the protective effects of CoQ10 is due to the antioxidant properties of ubiquinol. Innovative dosage form of ubiquinol for intravenous administration was created for the first time.

**Purpose:** Experimental evaluation of cardioprotective efficacy of the innovative drug form of ubiquinol for intravenous administration.

**Keywords** ubiquinol, intravenous injection, cardioprotection, myocardial infarction.

**Design and method:** Method: The experiments were carried out on the rat model of myocardial infarct (MI) induced by coronary artery ligation. In 10 min after occlusion solubilized ubiquinol (10 mg/kg, group «MI + ubiquinol»,  $n = 10$ ) or saline (group «MI + saline»,  $n = 12$ ) was administered by intravenous injection. Sham operated rats were given saline (group «Sham»,  $n = 8$ ). Severity of the myocardium damage, CoQ10 tissue levels were evaluated on the 21st day after coronary occlusion. The CoQ10 content was measured by HPLC with electrochemical detection.

**Results:** Result: In group «MI + ubiquinol» aneurysm size of the left ventricle ( $13.19 \pm 7.13$  %) was much less than in group «MI + saline» ( $31.55 \pm 17.9$  %,  $p < 0.05$ ). The interventricular septum in group «MI + ubiquinol» ( $2.61 \pm 0.03$  mm) was thinner than in group «MI + saline» ( $2.83 \pm 0.27$  mm,  $p < 0.05$ ) and did not differ from «Sham» group ( $2.51 \pm 0.29$  mm). Only in the treated animals there was a correlation between the thickness of the interventricular septum and the level of ubiquinol in the myocardium ( $r^2 = 0.672$ ,  $p < 0.05$ ), that shows that it was the administration of ubiquinol that caused the cardioprotective effect.

**Conclusions:** Conclusion: Intravenous administration of ubiquinol after coronary artery occlusion reduces the aneurysm size the left ventricle and prevents from the development of left ventricular hypertrophy in rats. This study was supported by the grant of Russian Science Foundation 14-15-00126.

#### CARDIAC DAMAGE IN ADULT ROMANIAN POPULATION

O.F. Tautu<sup>1</sup>, R. Darabont<sup>2</sup>, D. Dimulescu<sup>3</sup>, C. Sinescu<sup>4</sup>, L. Radulescu<sup>5</sup>, N. Oprescu<sup>1</sup>, S. Onciul<sup>1</sup>, C. Stefan<sup>1</sup>, D. Cadil<sup>1</sup>, M. Dorobantu<sup>1</sup>. <sup>1</sup>Carol Davila University of Medicine and Pharmacy, Clinical Emergency Hospital Bucharest, Cardiology Department, Bucharest, ROMANIA, <sup>2</sup>Carol Davila University of Medicine and Pharmacy, University Emergency Hospital Bucharest Cardiology Department, Bucharest, ROMANIA, <sup>3</sup>Carol Davila University of Medicine and Pharmacy, Elias Emergency Hospital, Cardiology Department, Bucharest, ROMANIA, <sup>4</sup>Carol Davila University of Medicine and Pharmacy, Bagdazar Arseni Emergency Hospital Bucharest, Cardiology Department, Bucharest, ROMANIA, <sup>5</sup>Carol Davila University of Medicine and Pharmacy, Clinical Emergency Hospital Bucharest, Dialysis Department, Bucharest, ROMANIA

**Objective:** To evaluate the prevalence of different types of cardiac damage among the adult population of an Est-European country with very-high cardiovascular (CV) risk, using the data from SEPHAR III national survey.

**Design and method:** A number of 1970 adults (52.5% females, mean age  $48.45 \pm 17.44$  years) were included in SEPHAR III survey and were evaluated for cardiac damage by: left ventricular hypertrophy (LVH) defined by left ventricular

mass index (LVMI) > 115 g/m<sup>2</sup> in males and > 95 g/m<sup>2</sup> in females, coronary artery disease (previous history of MI, angina pectoris, myocardial revascularization, ischemic ST/T changes of pathological Q waves on 12-lead ECG tracings and segmental LV wall movements abnormalities), the presence of heart failure (HF) defined by previous history of HF, LVEF < 50% and/or E/A < 1 or > 2 on echocardiography; and the presence of atrial fibrillation (AF) by previous history or the presence on AF rhythm on ECGs.

**Results:** LVMI values had a mean value of  $80.61 \pm 26.39$  g/m<sup>2</sup> among females and  $90.74 \pm 27.98$  g/m<sup>2</sup> among males. LVH was detected in 314 cases representing 15.9% of the study sample. In the whole sample, a total number of 511 subjects (25.9%) had a form of CAD out of which: 209 subjects (10.9%) with history of MI of AP, 58 subjects (2.9%) with history of myocardial revascularization, 347 subjects (17.6%) with ischemic changes on ECG tracings and 78 subjects (3.9%) with segmental LV abnormal wall movements on echocardiography. AF was recorded among 107 subjects representing 5.4% of the study sample. A previous history of HF was recorded among 129 subjects representing 6.5% of the study sample, LVEF values recorded in the study sample had a mean value of  $56.45 \pm 4.69\%$ . LV systolic dysfunction was recorded in 58 cases representing 2.9% of the total sample, LV diastolic dysfunction defined by E/A values < 1 or > 2 was recorded in 827 cases representing 42% of the total sample.

**Conclusions:** The results of the SEPHAR III study on cardiac damage highlights the high prevalence of this pathology among the adult population of Romania, reconfirming our country at the same time as the country with a very high CV risk.

## EXPERIENCE WITH VALSARTAN/SACUBITRILLO IN PATIENTS WITH CHRONIC KIDNEY DISEASE

M. D. Martinez Esteban, T. Vazquez Sanchez, J. Alonso Titos, E. Sola Moyano, G. Martin Reyes, A. Torres De Rueda, R. Toledo Rojas, C. Gutierrez de la Fuente, D. Hernandez Marrero. <sup>1</sup> Hospital Regional Universitario, Malaga, SPAIN

**Objective:** The main cause of admission in patients with heart failure (HF) is congestion. Treatment is complex, because of resistance to diuretics, and limitation to the use of potassium-sparing drugs. This situation is particularly frequent in patients with heart failure and chronic kidney disease (CKD).

Therefore, the use of a drug that acts simultaneously on the renin angiotensin aldosterone system (RAAS) and on the Nprprilina, can play an important role.

1. To evaluate the use of valsartan/sacubitrilo in patients with congestive heart failure and kidney disease 3B-4, analyzing its impact in the improvement of symptoms as overload and the effect on renal function.

2. Analyze the safety profile of the drug

**Design and method:** Prospective observational study (October 2016-October 2017): 7 patients with heart failure, a depressed ejection fraction and dyspnea functional grade II/IV onwards, to which had been added Valsartan/Sacubitrilo, previous suspension of ACE inhibitors or ARA II that came taking

**Results:** The proportion F/M was 5/2. The mean age was 71 years. All patients are hypertensive, (85.6%) diabetic, 71.4% dyslipidemic. The 71 % with Cardiomyopathy. The 57.1% was being treated with combinations of diuretics, reducing this number to the 28.6%, after adding the new drug. 3 of the 7 patients (42.9%) stopped diuretics. There were no significant changes in the glomerular filtration rate, proteinuria and arterial blood pressure. 4 of the 7 patients improved the degree of dyspnea. Only 1 of these patients went to the emergency room with symptoms of heart failure once treated with the drug. None of the patients had adverse effects which would lead to the suspension of the drug.

**Conclusions:** Valsartan/sacubitrilo in patients with CKD is useful to improve the functional class in patients with heart failure, allowing a lower use of diuretics and reducing emergency visits for symptoms in relation to the decompensation of heart failure. It is a reliable drug and help in the therapeutic management of these patients. It will be necessary to assess the impact on the long-term preservation of renal function.

## THE EFFECT OF MICROGRAVITY ON CENTRAL AORTIC BLOOD PRESSURE

F. S. Seibert, F. Bernhard, U. Stervybo, S. Vairavanathan, F. Bauer, B. Rohn, N. Pagonas, N. Babel, T. H. Westhoff. Medical Department I, University Hospital Marien Hospital Herne, Ruhr-University of Bochum, Bochum, GERMANY

**Objective:** BACKGROUND: Blood pressure has been traditionally measured at peripheral arteries. In the past decade evidence has grown, that central aortic blood pressure may be a more powerful predictor for cardiovascular events, but data on its regulation are rare. The present work examines the impact of microgravity on central blood pressure for the first time.

**Methods:** We performed seven parabolic flights with 22 seconds of weightlessness in each parabola. Hemodynamic parameters including central systolic blood

pressure were measured non-invasively in a free-floating position in 20 healthy subjects (19–43 years of age).

**Results:** Arterial elasticity at rest was normal in all participants (augmentation index 14% [interquartile range IQR 10–22], pulse wave velocity 5.2 m/s [IQR 5.0–5.4]). Transition of 1 g to 0 g led to a significant increase of central systolic blood pressure from 124 (IQR 118–133) to 127 (IQR 119–133) mmHg ( $p = 0.017$ ). Cardiac index propelled significantly from 2.5 (IQR 2.2–2.8) to 2.7 (IQR 2.3–3.0) l/min/m<sup>2</sup> ( $p < 0.001$ ), whilst peripheral vascular resistance showed a decrease from 1.30 (IQR 1.14–1.48) to 1.25 (IQR 1.15–1.40) s\*mmHg/ml ( $p = 0.037$ ). Peripheral systolic blood pressure did not change significantly ( $p > 0.05$ ).

**Conclusion:** Whereas there is a multitude of studies on the effects of microgravity on peripheral blood pressure, this study provides first data on central aortic blood pressure. An acute loss of gravity leads to a central blood volume shift with an augmentation of cardiac output. In healthy subjects with normal arterial stiffness the compensatory decrease of peripheral resistance does not outweigh this effect resulting in an increase of central blood pressure.

## THE LYMPHOCYTE-TO-MONOCYTE RATIO - A NOVEL INDEPENDENT PREDICTOR OF ALL-CAUSE MORTALITY IN PATIENTS WITH HEART FAILURE

C. Delcea<sup>1</sup>, A. Buzea<sup>1,2</sup>, A. Dima<sup>2</sup>, A. Tocitu<sup>1</sup>, A. Andrus<sup>1</sup>, A. Brehal<sup>1</sup>, M. Dobranici<sup>1,2</sup>, R. Popescu<sup>1,2</sup>, D. Ciuculete<sup>1</sup>, G.A. Dan<sup>1,2</sup> <sup>1</sup>Colentina Clinical Hospital, Bucharest, ROMANIA, <sup>2</sup>Carol Davila University of Medicine and Pharmacy, Bucharest, ROMANIA

**Objective:** Given the involvement of chronic inflammation in the pathophysiology of heart failure (HF) and the impact of inflammation on different leucocyte subpopulations, monocyte and lymphocyte counts were related to mortality in these patients.

Our aim was to determine the utility of LMR in predicting medium-term all-cause mortality of heart failure patients.

**Design and method:** Patients with heart failure admitted to our clinic from January 2011 to December 2014 were included in this study. Patients with acute coronary syndromes, pulmonary embolisms, and in hospital mortality were excluded. Clinical, laboratory and echocardiographic parameters were recorded for all patients on admission. Survival status was assessed in January 2016.

**Results:** Our sample consisted of 612 HF patients, 337 (55.07%) female, with a mean age of  $70.19 \pm 11.18$  years. Median (interquartile range) LMR was 2.88 (2.00; 4.04). LMR was inversely correlated with NT-proBNP levels ( $r = -0.463$ ,  $p < 0.001$ ), NYHA class ( $r = -0.423$ ,  $p < 0.001$ ), and length of hospital stay ( $r = -0.329$ ,  $p < 0.001$ ), and directly correlated to ejection fraction ( $r = 0.305$ ,  $p < 0.001$ ). Mortality rate was 28.69% during a median follow-up time of 3.7 (2; 5) years. In the entire study group, lower LMR predicted all-cause mortality with an AUC of 0.716 (95%CI 0.671–0.762),  $p < 0.001$ . Mortality was inversely proportional to LMR quartiles from 76 (50.33%) in first quartile to 15 (10.13%) in the fourth one,  $p$  for trend < 0.001. Patients in the first LMR quartile had an OR of 3.73 (95%CI 2.52–5.52),  $p < 0.001$  for all-cause mortality. We therefore established the cut-off for adverse outcome at a LMR < 2, the upper limit of the first quartile. In multiple logistical regression forward conditional method, LMR < 2 was an independent predictor of mortality with a HR of 1.67 (95% CI 1.03–2.69),  $p = 0.035$ , after adjusting for age, sex, ejection fraction and NYHA class.

**Conclusions:** LMR is an inexpensive, readily-available inflammation biomarker useful as an independent predictor of mortality in HF patients, with additional value alongside the classical prognostic parameters. We suggest the cut-off value of LMR < 2 as an indicator of poor prognosis in HF patients.

## FACT – A NEW PREDICTION SCORE FOR SUPRAVENTRICULAR TACHYARRHYTHMIAS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

C. Delcea<sup>1</sup>, C.A. Buzea<sup>1,2</sup>, M.I. Balea<sup>1</sup>, D. Gologanu<sup>1</sup>, M. Dobranici<sup>1,2</sup>, R.A. Popescu<sup>1,2</sup>, G.A. Dan<sup>1,2</sup> <sup>1</sup>Colentina Clinical Hospital, Bucharest, ROMANIA, <sup>2</sup>Carol Davila University of Medicine and Pharmacy, Bucharest, ROMANIA

**Objective:** Chronic obstructive pulmonary disease (COPD) patients have an increased risk of atrial arrhythmias, with a significant impact on prognosis.

Our aim was to determine a prediction score for developing supraventricular arrhythmias (SVT) in COPD patients, for an adequate selection of those who would benefit from Holter monitoring for early diagnosis of SVT.

**Design and method:** COPD patients admitted to our clinic were included in this study, after excluding those with heart failure, decreased systolic function, ischemic heart disease, hemodynamically significant valvular disease, pulmonary

embolism, permanent rhythm or conduction abnormalities, antiarrhythmic treatment or pacing/resynchronization therapy. SVT were defined as presence of atrial fibrillation, atrial flutter or atrial tachycardias. The FA<sup>2</sup>CT score was composed of forced expiratory volume in the first second (FEV1), right atrium diameter (RA), arterial pressure of carbon dioxide (pCO2) and the presence of arterial hypertension (HTN).

**Results:** Of the 43 patients with a mean age of  $65.1 \pm 9.3$  years, 65.1% men, 60.5% presented SVT. In multivariate analysis, FEV1 ( $p = 0.053$ ), RA ( $p = 0.028$ ) and pCO2 ( $p = 0.037$ ) were independent predictors of SVT. In ROC curve analysis, the prediction model FEV1+AD had an AUC of 0.545 (95%CI 0.358–0.733,  $p = \text{ns}$ ), FEV1+AD+pCO2 – AUC 0.713 (95%CI 0.542–0.883,  $p = 0.020$ ), and the FA<sup>2</sup>CT prediction model (FEV1+AD+pCO2+HTA) – AUC 0.799 (95%CI 0.663–0.935,  $p = 0.001$ ). The FA<sup>2</sup>CT score was derived from the prediction model: FEV1 < 1000 ml (1 point), RA > 35 mm (2 points), pCO2 > 45mmHg (1 point) and presence of HTN (1 point). Scores ranged from 0 to 5, with SVT in 25% of patients with score 0, 40% - score 1, 60% - score 2, 63.63% - score 3, 78.57% - score 4 and 50% - score 5,  $p$  for trend = 0.084. The predictive value of the FA<sup>2</sup>CT model was significantly amplified by adding the presence and number of atrial extrasystoles /24 hours on Holter monitoring (AUC 0.889 (95%CI 0.782–0.986,  $p < 0.001$ )).

**Conclusions:** Based on routine clinical, imaging and functional tests for patients with COPD, the FA<sup>2</sup>CT score could be useful in identifying those at high risk of developing supraventricular tachyarrhythmias. Patients with an elevated score could benefit from Holter monitoring to diagnose SVT and establish the adequate therapeutic conduct.

### SERUM LDL AND GLYCEMIC CONTROL IN PATIENTS WITH CONCURRENT ATRIAL FIBRILLATION, ARTERIAL HYPERTENSION AND TYPE 2 DIABETES MELLITUS

A. Vintila<sup>1</sup>, M. Horumba<sup>2</sup>, G. Cristea<sup>2</sup>, C. Tudorica<sup>2</sup>, V. Vintila<sup>3</sup>. <sup>1</sup>Carol Davila University of Medicine and Pharmacy, Coltea Clinical Hospital, Internal Medicine and Cardiology Department, Bucharest, ROMANIA, <sup>2</sup>Coltea Clinical Hospital, Internal Medicine and Cardiology Department, Bucharest, ROMANIA, <sup>3</sup>Carol Davila University of Medicine and Pharmacy, Emergency University Hospital, Cardiology Department, Bucharest, ROMANIA

**Objective:** Atrial fibrillation (AF) is one of the leading causes of stroke, heart failure, sudden death and cardiovascular mortality in the world. Diabetes and dyslipidemia are other risk factors for stroke and often coexist with AF. The aim of our study was to assess control of LDL-cholesterol and glycated hemoglobin (HbA1c) in AF patients at very high risk due to concurrent hypertension and type 2 diabetes mellitus.

**Design and method:** We performed a retrospective analysis on patients admitted over a two year interval (January 2016 to December 2017). Our study included patients with both arterial hypertension and type 2 diabetes mellitus - a total of 438 men (40.57%) and 640 women (59.42%) ( $n = 1078$ ), out of which 317 (29.40%) also exhibited AF. Serum cholesterol, glycemia and HbA1c were analyzed. As all patients were over the age of 40, with diabetes mellitus and at least one additional cardiovascular risk factor (arterial hypertension), the estimated cardiovascular risk was very high. Thus, HbA1c and LDL-cholesterol targets were below 7% and 70 mg/dl, respectively.

**Results:** The mean age of enrolled patients was  $69.03 \pm 9.88$  years, with AF patients being older ( $73.1 \pm 8.7$ ) than those without AF ( $67.3 \pm 9.9$ ),  $p < 0.001$ . Patients with atrial fibrillation had better glycemic control than those without AF, with mean glycemia  $133.1 \pm 60.4$  mg/dl ( $p = 0.008$ ) and HbA1c values of  $6.8 \pm 1.6\%$  ( $p < 0.001$ ) as opposed to  $145.6 \pm 74.8$  mg/dl and  $7.4 \pm 1.7\%$ . Two thirds of AF patients (66.1%) had HbA1c below 7%. LDL-cholesterol values were lower in AF patients: mean LDL  $67.2 \pm 27.1$  mg/dl versus  $81.0 \pm 30.2$  mg/dl,  $p < 0.001$ . Still, only 38.4% of AF patients had LDL values below target.

**Conclusions:** Diabetes and hypertension are risk factors that increase the likelihood of stroke. Dyslipidemia leads to atherosclerotic plaque formation, while atrial fibrillation, even under anticoagulant treatment, may produce emboli that disrupt cerebral blood flow. As a consequence, cardiovascular risk factors should be even more strictly corrected in patients with concurrent AF. However, as the analysis performed on patients presenting to our clinic suggests, though diabetes and dyslipidemia control are better in AF patients than in the general population, improvement is needed in order to decrease cardiovascular risk.

### IMPAIRED ANKLE BRACHIAL INDEX AND UNFAVORABLE AMBULATORY BLOOD PRESSURE PROFILE IN PATIENTS WITH HOSPITALIZED FOR MYOCARDIAL INFARCTION

K. Konstantinou, K. Tsioufis, M. Mantzouranis, A. Koumelli, C. Fragoulis, N. Vogiatzakis, K. Dimitriadis, A. Kasiakogias, D. Tousoulis. *First Cardiology Clinic, Medical School, National and Kapodistrian University of Athens, Hippokraton Hospital, Athens, GREECE*

**Objective:** The aim of the present study was to assess the vascular status as assessed by ankle brachial index (ABI) and ambulatory blood pressure (BP) profile in patients hospitalized for myocardial infarction.

**Design and method:** We studied 75 patients (76% males, age  $65 \pm 13$  years) who were hospitalized because of ST-elevation myocardial infarction (STEMI) and Non ST-elevation myocardial infarction (NSTEMI). All patients underwent baseline estimation of clinical and laboratory parameters during their hospitalization. Moreover, ABI was measured according to established methodology and patients underwent 24-hour ambulatory BP monitoring during the third day of hospital stay.

**Results:** From the total population, 20% had family history of cardiovascular events, 72% were hypertensives, 32% had diabetes, 51% were smokers and 32% had previous history of coronary artery disease. Regarding the type of myocardial infarction, 37% were admitted for STEMI and 55% had coronary revascularization. Focusing on the ABI the levels in the entire population was  $1.04 \pm 0.25$ , while 36% of patients had impaired ABI < 0.9. Mean 24-h BP was 1156/69 mmHg, while 59 patients (78%) presented a non-dipping profile.

**Conclusions:** Patients admitted for STEMI and NSTEMI are characterized by impaired ABI and high prevalence of non-dipping of BP during nighttime. These findings may explain the unfavorable overall cardiovascular prognosis of these patients.

### ETIOLOGICS AND AGGRAVATION FACTORS OF CHRONIC HEART FAILURE IN A SUB SAHARAN INTRA-HOSPITAL MILIEU

C. Ngongang Ouankou, L.O. Chendjou Kapi, K. Tachim, L. Tsambang, J. Wandji Nganga, A. Etoundi, A. Essono, C. Tsamo, I.L. Nchoua Soule, M.D. Ouankou, M. Kowo, L. Kuete Mfeukeu, F.J. Kaze, K. Ngu Blackett. *Teaching hospital of Yaoundé, Yaoundé, CAMEROON*

**Objective:** The objective of this study was to determine the main etiologic and aggravation factors of chronic heart failure and to evaluate their impact on the life quality of patients from a referral hospital of Cameroon.

**Design and method:** It consisted in a prospective study, including all newly diagnosed patients with chronic heart failure (less than one year ago), as well as patients with acute decompensation on a chronic background (included after being stabilised for at least 2 months). Were included patients with clinical and echocardiographic signs of heart failure.

**Results:** In all, we enrolled 40 patients. The mean age was of 64 years. The sex ratio was of 0.48. Hypertension (55%) was the most encountered etiologic factor. The main cardiovascular risk factors were: physical inactivity (72.5 %), dyslipidemia (50%), and alcohol consumption (37.5%). Dyspnoea was always present. The other biological perturbations were: an elevation of gamma GT (77.5%), hyperuricemia (75%), an elevation of free bilirubin (65%). The atrial fibrillation was 20% and Natriuretic peptide abnormal. The echocardiography shown 40% of the patients with a preserved left ventricular function, 37% with a severe systolic dysfunction of the left ventricle, and 23% had an intermediary ejection fraction. More than half the number enrolled (63.2%) had a low resistance to effort with a walk perimeter below 300 meters in 6 minutes. Hypertensive cardiomyopathy (45%) represented the main cause, closely followed by dilated cardiomyopathy (17.5%). About the life quality test, next to one-quarter (73%) of the study population lived very poorly their heart failure, mostly when many etiologic and aggravation factors were found in the same individual. Beta-blockers (90%) represented the most used pharmacological class, followed by Loop Diuretics (72.5%) and Angiotensin converting enzyme inhibitors (62.5%). Two (2) patients were placed on dobutamine following a cardiogenic choc (with hypotension). The mortality rates at D30

**Conclusions:** In Cameroon chronic heart failure arise towards sixty years, with hypertension as principal etiologic factor. The research, prevention and correction of these factors constitute important steps to its management, since it greatly improves the follow-up of patients and in such doing improves their prognosis.

### NURSES' NIGHTSHIFT WORKLOAD: PSYCHOLOGIC, METABOLIC AND CARDIOVASCULAR DATA

K. Kisters<sup>1</sup>, C. Scardelli<sup>2</sup>, M. Moser<sup>3</sup>, A. Kastner<sup>3</sup>, S. Opresnik<sup>2</sup>, M. Walz<sup>4</sup>, C. Tiesenhausen<sup>4</sup>, S. Porta<sup>2,3</sup>. <sup>1</sup>Med. Clinic I, Herne, GERMANY, <sup>2</sup>Institute of Applied Stress Research, Fernitz-Mellach, AUSTRIA, <sup>3</sup>Theresian Military Academy, Wiener Neustadt, AUSTRIA, <sup>4</sup>Hansa Clinic, Graz, AUSTRIA

**Objective:** Nightshift workload can cause arterial hypertension. An overall impression of miscellaneous strains elicited in nurses of geriatric clinic by nightshift working has been attempted.

**Design and method:** The stress of 11 nurses at the Albert Schweitzer Clinic, Graz, AUSTRIA (6 participants were measured repeatedly) has been determined comprehensively by 1. psychological questionnaire, asking about subjective good or bad feelings (PA), 2. by measuring diastolic blood pressure values by Beurer,

Ulm, and 3. by determination of ion. Mg and pCO<sub>2</sub> with a Phox-M device of TECOM, Wiener Neustadt, Austria. All measurements were performed between 08.00 pm and 06.00 am respectively.

**Results:** The well-being score decreased in all cases after shifts, from a best mark of -0.25 pts to minimal -3 pts diastolic blood pressure (RR dia) was up- and downregulated during nightshift in an erratic way. Well-being deteriorates the less, the more diastolic blood pressure values drop.

**Conclusions:** Subjective well-being expressed in PA scores seems to be a relevant marker of cardiovascular, metabolic and electrolyte changes. Vice versa, all those changes correlate with subjective well-being. Well-being does not correlate with actual diastolic blood pressure values, but with the intensity of diastolic blood pressure changes, although seemingly erratic. Well-being also correlates with change in Mg in a polynomial way, and Mg correlates linearly with pCO<sub>2</sub>, a marker of breathing frequency.

Remarkably, well-being seems to be less disturbed, when diastolic blood pressure values, Mg or pCO<sub>2</sub> changes are most expressed. We conclude, that persons with the most flexible reactions are less affected by the loss of well-being due to fatigue. In conclusion, those participants who are still able to react most flexibly enjoy the least reduction of well-being, even though fatigued.

#### **BOTH HIGH AND LOW SUPINE BLOOD PRESSURE AS WELL AS ITS POSTURAL FALL ARE INDEPENDENT RISK FACTORS FOR THE PROGNOSIS IN PATIENTS WITH HEART FAILURE**

R. Imazu<sup>1</sup>, S. Fujishima<sup>1</sup>, S. Yamamoto<sup>2</sup>, K. Yamamori<sup>2</sup>, H. Shimazoe<sup>2</sup>, K. Tsukahara<sup>1</sup>, N. Murakami<sup>1</sup>, S. Kaseda<sup>1</sup>, Y. Koyanagi<sup>2</sup>, T. Koga<sup>1</sup>, T. Tsuchihashi<sup>1</sup>.  
<sup>1</sup>Steel Memorial Yawata Hospital - Department of Cardiology, Kitakyushu, JAPAN, <sup>2</sup>Steel Memorial Yawata Hospital - Department of Rehabilitation, Kitakyushu, JAPAN

**Objective:** Orthostatic hypotension has been reported to be a risk factor for worsening heart failure (HF). The authors investigated prognostic values of blood pressure (BP) in the supine, sitting and standing positions, and those of postural variation of BP, in patients with HF.

**Design and method:** Seventy-six consecutive cases (age, 81 ± 9y; male, 53%) who admitted to our hospital for HF and discharged after cardiac rehabilitation during a period from Jul 2014 to Jan 2016 were studied. Patients with atrial fibrillation, or who could not keep standing for 2 minutes at discharge, were not included. The left ventricular ejection fraction (LVEF) was preserved (40% or more) in 61 cases (80%). BPs were measured in the supine and sitting positions, and 1-min and 2-min after standing just before the discharges. The relationships among composite events (admission due to cardiovascular disease and all cause death) and demographic factors including BP and BP variation were investigated.

**Results:** Over a median follow-up of 10.9 months, 26 composite events (readmission due to HF, 21; angina, 1; all-cause death, 4) occurred. Among subgroups of supine systolic BP (SBP) categories, the 1st quintile (77~108mmHg) and the 4th+5th quintiles (126~169mmHg) had increased risks of the composite events, compared with the 2nd+3rd quintiles (109~125mmHg) ( $p < 0.01$ ). On the other hand, there were no significant differences in the events rate among the subgroups of sitting or standing SBP categories. Among the subgroups of dSBP from the sitting position to 1-min standing, the 1st+2nd quintiles (-60~-12mmHg) had more events than the 3rd+4th+5th quintiles (-11~+30mmHg) did ( $p < 0.01$ ). There was no significant association between dSBP from the supine to sitting position and prognosis. In a multivariate analysis, supine SBP, dSBP from the sitting position to 1-min standing, and eGFR were significant prognostic factors.

**Conclusions:** Both supine SBP and dSBP from the sitting to 1-min standing had independent prognostic values in patients with HF: they might reflect different mechanisms of worsening HF.

# POSTER SESSION

## POSTERS' SESSION PS24:

## LIFESTYLE, HYPERTENSION MANAGEMENT

### INFLUENCE OF GENDER ON THE ADAPTATION OF CORONARY ARTERIOLES IN SPORT

M. Török<sup>1</sup>, A. Monori-Kiss<sup>2</sup>, É. Pál<sup>2</sup>, E. Horváth<sup>1</sup>, A. Jósai<sup>3</sup>, P. Merkely<sup>1</sup>, A. A. Sayour<sup>4</sup>, C. Mátyás<sup>4</sup>, A. Oláh<sup>4</sup>, T. Radovits<sup>4</sup>, B. Merkely<sup>4</sup>, N. Ács<sup>1</sup>, G. Nádasy<sup>5</sup>, S. Váró<sup>1</sup>. <sup>1</sup>2nd Department of Obstetrics and Gynecology, Semmelweis University, Budapest, HUNGARY, <sup>2</sup>Institute of Clinical Experimental Research, Semmelweis University, Budapest, HUNGARY, <sup>3</sup>Department of Neurosurgery, Military Hospital, Budapest, HUNGARY, <sup>4</sup>Heart and Vascular Center, Semmelweis University, Budapest, HUNGARY, <sup>5</sup>Department of Physiology, Faculty of Medicine, Semmelweis University, Budapest, HUNGARY

**Objective:** 'Athlete's heart', which means hypertrophy and remodeling of left ventricular tissue induced by heavy exercises, is known and searched for a long time. The increased muscle mass would need an increased perfusion which would require the remodeling of the coronary circulation. But coronary arterioles adaptation in this process is not well known and the influence of the gender on this is not known at all, so far. We aimed to study the gender differences in sport-adaptation for coronaries.

**Design and method:** Young adult Wistar rats were distributed into four groups, Male and Female sedentary animals and Male and Female trained in swimming exercises, with 8 rats in each group. The exercise program lasted 12 weeks, 200 min/day. Sedentary animals swam 5 min/day. Ventricular function was checked by echocardiography. At the end of the research intramural coronary resistance arteries (200 mm outer diameter) were removed and examined with pressure arteriography the followings: contractility (spontaneous and TxA<sub>2</sub> agonist induced tones), adenosine relaxation, endothelial dilation (bradykinin), tangential wall stress and elastic modulus. Elastic remodeling was examined stained by resorcin-fuchsin on histological sections.

**Results:** Relative heart mass increased both in male and female trained animals ( $p < 0.001$ ) without arterial hypertension, increased the ejection fraction ( $p < 0.001$ ), and the fractional shortening ( $p < 0.001$ ) as well. The walls of resistance arteries became thicker and the isobaric tangential wall stress been reduced ( $p < 0.05$ ). Both the elastic modulus at physiological pressures and the density of inner elastic membrane increased in male and female trained animals ( $p < 0.05$ ). Both spontaneous ( $p < 0.05$ ) and TxA<sub>2</sub> agonist induced tones ( $p < 0.001$ ) increased and endothelium dependent (bradykinin,  $p < 0.05$ ) and independent (adenosine,  $p < 0.001$ ) relaxations became more effective. While in female swimmer animals we measured stronger contraction ( $p < 0.001$ ) than in male swimmer animals, the endothelial vasodilation improved more in the male swimmer animals, compared to females and sedentary groups ( $p < 0.025$ ).

**Conclusions:** The range of coronary vascular reactivity increased in both genders, but its mechanism was different between males and females.

### COFFEE INTAKE AND BLOOD PRESSURE

L. Fan, H.M. Zhang, J. Cai. Fuwai Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, CHINA

**Objective:** Current hypertension guidelines lack in recommendations on coffee consumption. We therefore review the available data on the relationship of coffee intake and blood pressure with underlying mechanisms.

**Design and method:** A literature review on coffee intake and blood pressure till November 2017 in English was performed using PubMed, Web of Science and Embase database.

**Results:** Cross-sectional studies incline to null or negative association between BP level or hypertensive prevalence and habitual coffee intake. Prospective studies figure out an inverse linear or inverse U-shape relationship between long-term coffee consumption and hypertension risk among males free from cigarettes and premenopausal females. Compared with the lowest consumption (<1 cup/d), coffee intake with 3–4 cups/d parallel hypertension risk, while higher consumption (>3–4 cups/d) decrease the risk of hypertension. Clinical trials proved: 1) Acute BP elevation directed by caffeine (3 h) 2) Moderate or inverse BP elevation after coffee intake over 7 days 3) Protective effect of coffee on BP among habitual coffee intake under mental stress or

long-term alcohol consumption. Key possible mechanisms include 1) CYP1A2 gene and enzyme associated with inverse connection between BP and coffee via inhibition of adenosine receptor in nonsmoking population 2) Inhibition of sodium and water reabsorption through AMPK/alpha-ENaC pathway directed by caffeine 3) Inhibition of inflammation, oxidant stress and RAAS via chorogenic acids.

**Conclusions:** Coffee intake is not suggested before blood pressure measurement and in those with high cardiovascular risk and unstable BP. Habitual coffee intake probably be protective over 3–4 per cups/d among habitual alcohol intake or nonsmoking males and premenopausal females, mainly related to gene, caffeine and chorogenic acids.

### VALIDATION OF THE IHEALTH AMBULATORY BLOOD PRESSURE MONITOR IN ADULTS ACCORDING TO THE ANSI/AAMI/ISO 2013 STANDARD

A. Kollias, A. Ntineri, K. Kyriakoulis, E. Stambolliu, G. S. Stergiou. Hypertension Center STRIDE-7, University of Athens, School of Medicine, Third Department of Medicine, Sotiria Hospital, Athens, GREECE

**Objective:** To assess the blood pressure (BP) measurement accuracy of the iHealth oscillometric ambulatory BP monitor (iHealthlabs Europe SAS, Paris, France) in adults according to the American National Standards Institute/Association for the Advancement of Medical Instrumentation/International Organization for Standardization 81060–2:2013 (ANSI/AAMI/ISO) standard.

**Design and method:** The test device is a fully automated oscillometric ambulatory BP monitor attached on an upper-arm cuff (without tubes) and synchronizes data via Bluetooth with an app running on iPad. Adults were recruited to fulfil the age, gender, BP and cuff distribution criteria of the ANSI/AAMI/ISO standard using the same arm sequential BP measurement method. Two cuffs of the test device were used for arm circumference 22–34 and 30–42 cm.

**Results:** A total of 100 subjects were recruited and 85 were included in the analysis. For validation criterion 1, the mean  $\pm$  SD of the differences between the test device and reference systolic BP was  $-0.7 \pm 6.0$  mmHg and for diastolic  $0.7 \pm 4.8$  mmHg. For validation criterion 2, the SD of the averaged systolic BP differences between the test device and reference method per subject was 4.72 and for diastolic 3.97 mmHg.

**Conclusions:** The iHealth oscillometric ambulatory BP monitor fulfilled the requirements of the ANSI/AAMI/ISO validation standard in adults and can be recommended for clinical use.

### USE OF THE EVALOBS® ADHERENCE SCALE IN AN UNSELECTED FRENCH POPULATION OF TREATED SUBJECTS WITH ANTIHYPERTENSIVE, STATINS OR ORAL ANTIDIABETICS MEDICATIONS: THE FLAHS 2017 STUDY

X. Girerd, O. Hanon, B. Pannier, B. Vaisse. Comité Français de Lutte contre l'HTA et Fondation de Recherche sur l'HTA, Paris, FRANCE

**Objective:** A Visual Analog Scale (VAS) is useful for diagnosing medication nonadherence and its validity has been evaluated using electronic pillbox as the gold standard. We have developed the EVALOBS® scale for use on paper or on smartphone, and the aim of the study was to administrate the scale among FLAHS 2017 participants treated for an hypertension, a dyslipidemia or diabetes. In subjects treated with antihypertensive medications, participants completed the 6-item Girerd Scale and EVALOBS®.

**Design and method:** The French League Against Hypertension Survey (FLAHS) are carried out by self-questionnaire sent by mail to individuals from the French Kantar Health sampling frame (representative panel of the population living in metropolitan France). In 2017, FLAHS was conducted in 4783 subjects aged 35 and over. The EVALOBS® has a scale from 0 to 15 and the use instruction is how many days have you taken the drug in the past 15 days. A score > 12 indicates a good compliance. The 6-item Girerd scale was also completed. Good adherence was determined for a score of 0 to 2 and nonadherence for a score of 3 or more. The agreement between EVALOBS® and the 6-item Girerd scale was evaluated in treated hypertensives.

**Results:** The survey included 4783 subjects with 1308 treated hypertensives, 942 subjects treated with lipid-lowering drugs and 405 subjects treated with anti-diabetics. EVALOBS® indicates Good adherence in 96% of subjects and the 6 questions questionnaire indicates good adherence in 95% of subjects. An excellent agreement is noted in 93.8%. An EVALOBS® score indicating nonadherence or an absence of response to EVALOBS® is observed in 3.6% [CI 95, 2.5–4.7] of hypertensives, in 6.0% [CI 95, 3.9–8.1] of diabetics and in 8.2% [CI 95, 6.5–9.9] of dyslipidemic patients.

**Conclusions:** In the population living in France and in unselected patients treated for metabolic disease or hypertension, non-adherence is lowest for antihypertensive medications and highest for statins. EVALOBS®, which shows good agreement with an adherence questionnaire, is a quick and simple tool for assessing adherence. The smartphone app EVALOBS is available for free on Google play and the Apple store.

#### INFLUENCE OF PCSK9 INHIBITION ON THE STABILIZATION OF ATHEROSCLEROTIC PLAQUE DETERMINED BY BIOCHEMICAL METHODS AND MAGNETIC RESONANCE IMAGING

M. Basiak<sup>1</sup>, M. Konopka<sup>2</sup>, M. Dziubinska-Basiak<sup>2</sup>, L. Buldak<sup>1</sup>, B. Okopien<sup>1</sup>. <sup>1</sup>Medical University of Silesia - Department of Internal Medicine and Clinical Pharmacology, Katowice, POLAND, <sup>2</sup>SCANIX Medical Imaging, Katowice, POLAND

**Objective:** The aim of this work was to assess the effect of PCSK9 inhibition on biomarkers of progression and destabilization of atherosclerotic plaque, secretion of proinflammatory cytokines and mechanism of stabilization of atherosclerotic plaque in hypertensive patients.

**Design and method:** Study group consist of 11 outpatients with atherosclerotic plaque undergoing MR of the carotid arteries (or CT if contraindicated) before and after 2 months of PCSK9 inhibitors treatment. The concentration of plasma biomarkers of destabilization of the atherosclerotic plaque was marked using ELISA kits. The examination of the carotid arteries and IMT in the extracranial segment was performed using ultrasound with linear head with a frequency of 7.5–10 MHz. Carotid Magnetic Resonance exams was performed on the scanner with a field strength of at least 1.5 T with dedicated software to perform carotid artery and analysis of structure of atherosclerotic lesions. Statistical analysis was performed using ANOVA test, Wilcoxon or Kruskal-Wallis.

**Results:** The mean age of patients was 60.4 years. 8 were males. Before treatment all of plaque was characterized as vulnerable. After 2 months of PCSK9 inhibition based on the predominant components of the plaque, plaques were characterized as lipid (5), lipid with recent hemorrhage (1), fibrous (3), fibrofatty (1), fibrofatty with some hemorrhagic components (2). Moreover, we observed a decrease in the concentration of osteopontin, osteoprotegerin, metalloproteinase 3 and a positive correlation with the image of stabilization in CT or MR.

**Conclusions:** Based on preliminary data, it can be concluded that diagnostic Imaging methods together with biochemistry markers can provide complete information about the plaque characteristics in hypertensive patients

#### INCREASED CLINIC EFFICIENCY AND DECREASED BLOOD PRESSURE WITH A NOVEL HYPERTENSION MANAGEMENT MODEL OF CARE IN A WEST AFRICA

I. Owusu<sup>1</sup>, F. Adomako-Boateng<sup>2</sup>, F. Kueffer<sup>3</sup>, M. Guy<sup>3</sup>, C. Lang<sup>3</sup>, T. Whitman<sup>3</sup>, K. Holloman<sup>3</sup>, D. Hettrick<sup>3</sup>, K. Opare-Sem<sup>1</sup>, G. Lazarus. <sup>1</sup>Kwame Nkrumah University of Science and Technology, Kumasi, GHANA, <sup>2</sup>Ghana Health Service, Kumasi, GHANA, <sup>3</sup>Medtronic, Inc., Minneapolis, MN, USA

**Objective:** High prevalence and low control rates amplify the cardiovascular risks associated with hypertension in Sub Saharan Africa. A novel hypertension management model of care was developed and tested in the Republic of Ghana to address specific socioeconomic and community-related barriers to blood pressure control and to improve efficiency and outcomes.

**Design and method:** Patients with a history of hypertension agreed to visit a participating local community pharmacy at least once per week for 6 months for a BP check, symptom questions, and medication adherence monitoring. Weekly pharmacy visit data were manually logged into a mobile application that generated immediate personalized feedback. The primary physician could view real-time BP data and provide feedback to patients via text messages. Electronic prescriptions were also accessible by participating pharmacies, as appropriate. Clinic recorded BP data for the 6 months prior to enrollment were also obtained retrospectively by chart review in a subset of patients.

**Results:** Baseline BP of the 150 enrolled subjects ( $57 \pm 8$  years; 73% Female) was  $135 \pm 18/84 \pm 10$  mmHg. Average blood pressure in the 6 months prior to study enrollment was similar to baseline blood pressure ( $n = 137$ , SBP  $136.7 \pm 14.3$  vs.  $134.7 \pm 17.3$ ;  $p = 0.21$ ). Patient compliance with weekly BP assessments was 61% and 2705 pharmacy BP assessments were conducted. During the 6-month trial period, scheduled office visits decreased by 60% compared to standard monthly visits. Despite fewer clinic visits, population systolic blood pressure dropped by  $-4.8 \pm 18.2$  mmHg ( $p < 0.01$ ). The application directly referred 25 patients to a health facility for further evaluation. No deaths occurred, and six patients required inpatient hospitalization. Physicians indicated satisfaction with the model of care and the impact it had on their clinic workflow. Improvement in overall health awareness was reported in 82% of the patients and 95% indicated a desire to continue using the model of care in the future.

**Conclusions:** The multifaceted hypertension care model resulted in fewer clinic visits, high patient and clinician satisfaction and sustained decreases in blood pressure without major safety concerns in this West African hypertensive population.

#### PHARMACIST INTERVENTION IN HYPERTENSION. PHYSICIAN-PHARMACIST COLLABORATIVE PROJECT OF THE CROATIAN SOCIETY OF HYPERTENSION (PHY-PHA-COLL-CRO).

A. Jelakovic<sup>1</sup>, M. Brozovic<sup>2</sup>, Z. Dobrincic<sup>2</sup>, V. Domislovic<sup>3</sup>, K. Djapic<sup>3</sup>, N. Lugovic<sup>2</sup>, M. Mrcic<sup>2</sup>, M. Radovic<sup>2</sup>, O. Velkovski Skopic<sup>2</sup>, B. Jelakovic<sup>3</sup>. <sup>1</sup>University hospital center Zagreb, Department for nephrology, hypertension, dialysis and transplantation, Zagreb, CROATIA, <sup>2</sup>Zagreb County Pharmacies, Zagreb, CROATIA, <sup>3</sup>School of Medicine, University of Zagreb, Zagreb, CROATIA

**Objective:** Pharmacist interventions in community pharmacies have been reported to be associated with improvement in hypertension control. During the World Hypertension Day 2017 pharmacist from the Zagreb County joined the Croatian Society of Hypertension aiming to analyze characteristics of subjects who are entering pharmacies as the first step in planning broader educational actions.

**Design and method:** Blood pressure (BP) and total serum cholesterol (TC) (Roche Accutrend Plus; not always fasting) were measured by local pharmacists. In total, 906 subjects (369 M, 546 F, mean age 53.7, range 21–74) who visited pharmacies for various reasons and agreed to participate were enrolled. BP was measured twice after rest of 5 minutes in seated position using Omron M6 device. Subjects were divided in 2 subgroups depending on smoking habits. There is a risk of sampling bias as only those who agreed to participate were included. Demographic and anthropometric data; cardiovascular risk factors; data on salt intake and opinion about the usefulness of smart-phone applications in hypertension were collected.

**Results:** Both M and F smokers were younger than non-smokers ( $p < 0.01$ ), and in both groups M were older and had higher systolic BP ( $p < 0.01$ ). M smokers have significantly higher prevalence of BP  $> 140/90$  mmHg and TC  $> 5$  mmol/L than M non-smokers ( $x^2 = 4.23$ ;  $p = 0.05$ ;  $x^2 = 5.24$ ;  $p = 0.02$ ) F non-smokers had significantly higher prevalence of TC than F smokers ( $x^2 = 4.36$ ;  $p = 0.03$ ), while there was no difference in prevalence of BP  $> 140$  mmHg between F smokers and non-smokers. In the group of smokers M had significantly higher prevalence of BP  $> 140/90$  mmHg and TC than F ( $x^2 = 4.23$ ;  $p = 0.03$ ;  $x^2 = 21.2$ ;  $p < 0.0001$ , respectively). In non-smokers we failed to find difference between M and F in BP and TC. M smokers have higher BP and TC than M non-smokers and F regardless of smoking habits.

**Conclusions:** Pharmacists-led interventions (lifestyle support and adherence increasing programs) have to be individualized. General population must be educated, but those at higher CV risk i.e. young M smokers should be in focus.

#### RECENTLY DIAGNOSED SEVERE HIGH BLOOD PRESSURE IN A SUB-SAHARAN COUNTRY: EPIDEMIOLOGICAL, CLINICAL, THERAPEUTIC, EVALUATIVE ASPECTS AND FACTORS OF ADHERENCE TO THE TREATMENT

C. Ngongang Ouankou<sup>1</sup>, L.O. Chendjou Kapi<sup>2</sup>, A.P. Kengne<sup>3</sup>, K. Ngu Blackett<sup>4</sup>, M. Azabji Kenfack<sup>4</sup>, F.J. Kaze<sup>1</sup>, W.L. Tsambang<sup>5</sup>, M. Ouankou<sup>5</sup>, L. Kuete Mfeukeu<sup>4</sup>. <sup>1</sup>Teaching hospital of Yaoundé, Yaoundé, CAMEROON, <sup>2</sup>Centre des urgences et de réanimation de Yaoundé, Yaoundé, CAMEROON, <sup>3</sup>University of Captown, Cape Town, SOUTH AFRICA, <sup>4</sup>Faculty of Medicine and Biomedical Sciences, Yaoundé, CAMEROON, <sup>5</sup>Centre Cardiologique et Médical, Yaoundé, CAMEROON

**Objective:** Our objective was to determine the clinical presentations, evolution and factors of adherence to the treatment. We conducted nine months prospective cohort study, from January to September 2016 in Yaounde teaching Hospital.

**Design and method:** We conducted nine months prospective cohort study, from January to September 2016 in Yaounde teaching Hospital. We recruited from members of the public who accepted voluntary blood pressure screening offered in various localities in Yaounde, and were aged 18 years or over. We examine them by doing assessment of target organs and evaluating the treatment and the adhesion to it.

**Results:** Of a total of 6,519 people who participated in the screening then 363 (5.6%) had severe HBP. Our cohort comprised 153 (42.1%) of these individuals with sustained severe hypertension, not on medication, who accepted the invitation to participate in the study. The range 45–54 years and 55–64 years were the most represented; the sex ratio was 0.9. The cardiovascular risk factors number range from 5 to 8 with a median of 6. Systolic BP ranged from 184 to 225 mmHg with a median of 200 mmHg; while the diastolic BP ranged between 111–132.5 mmHg with a median of 119 mmHg. Kidney injury (78.8%) was the main complication. We identified 3 clinical forms: hypertensive emergencies 121 (79.1%) cases and hypertensive crises 32 (20.9%) cases. The average rate of BP control over 6 months was 39%. The main cause of poor BP control was lack of therapeutic compliance. We registered one death at the 3rd month due to acute kidney injury.

**Conclusions:** High blood pressure is remaining a major problem of public health, not only because of the effects on the target organs, but mainly because of poor adherence to the treatment linked to poverty, and ignorance.

### IMPACT OF SHORT-TERM EXERCISE TRAINING ON ARTERIAL BLOOD PRESSURE AND QT DISPERSION IN DIABETIC PATIENTS AFTER MYOCARDIAL INFARCTION

V. Stoickov<sup>1</sup>, M. Deljanin Ilic<sup>1</sup>, M. Stoickov<sup>2</sup>, S. Saric<sup>2</sup>, D. Simonovic<sup>2</sup>, D. Marinkovic<sup>3</sup>, I. Stokovic<sup>3</sup>, S. Andonov<sup>2</sup>, S. Mitic<sup>2</sup>. <sup>1</sup>University of Nis, Medical Faculty, Institute of Cardiology Niska Banja, Nis, SERBIA, <sup>2</sup>Institute of Cardiology Niska Banja, Nis, SERBIA, <sup>3</sup>University of Nis, Medical Faculty, Nis, SERBIA

**Objective:** The aim of this study was to establish the influence of short-term exercise training on arterial blood pressure and QT dispersion in diabetic patients after myocardial infarction.

**Design and method:** The study involved 139 diabetic patients after myocardial infarction (average age 55.7 years), in the sinus rhythm without AV blocks or branch blocks. Patients were randomly divided into the physical training group (TG: 115 patients) and non-training group (NTG: 24 patients). Patients were of similar age, site of infarction and baseline stress test duration. In all subjects standard ECG and exercise test on treadmill were performed and after that TG patients were included in a training program for three weeks. TG patients were instructed to follow a training program using the bicycle ergometer (10 min, 2 times a day), gymnastic exercises, and walking. The patients continued to take the same medications in same doses. From standard ECG corrected QT dispersion (QTdc) was calculated.

**Results:** After program of physical training in TG of patients, significant reduction of QTdc was found, from  $81.9 \pm 24.8$  to  $73.5 \pm 23.7$  ms;  $p < 0.01$ . Also, in TG of patients, after program of physical training, we have found significant reduction of systolic blood pressure from  $137.6 \pm 12.9$  to  $128.4 \pm 12.1$  mmHg;  $p < 0.001$ ; of diastolic blood pressure from  $87.1 \pm 7.9$  to  $82.9 \pm 9.1$  mmHg;  $p < 0.001$  and of double product from  $12834.6 \pm 1975.2$  to  $11392.1 \pm 1684.3$  beat/min  $\times$  mmHg;  $p < 0.001$ . In TG of patients, after program of physical training, significant reduction of glycemia was found, from  $7.9 \pm 2.9$  to  $6.9 \pm 1.9$  mmol/L;  $p < 0.005$ . In contrast, NTG of patients showed no significant changes.

**Conclusions:** Short-term exercise training has favourable effects on arterial blood pressure and QT dispersion in diabetic patients after myocardial infarction. Physical training led to the significant decrease of myocardial oxygen uptake at rest and probably decreased the possibility of arrhythmia events in diabetic patients after myocardial infarction.

### CPET – GUIDED EXERCISE PROGRAM FOR PATIENTS WITH HYPERTROPHIC CARDIOMYOPATY

I. Gruev<sup>1</sup>, V. Velchev<sup>2</sup>, D. Raev<sup>2</sup>. <sup>1</sup>National Transport Hospital Tsar Boris III, Sofia, BULGARIA, <sup>2</sup>University Hospital St. Anna, Sofia, BULGARIA, <sup>3</sup>University Hospital St. Anna, Sofia, BULGARIA

**Objective:** We studied 10 patients with Hypertrophic cardiomyopathy /HCM/ . All the patients were treated with maximal tolerated dose of beta- blocker. 1 patient was treated with septal alcohol ablation and one with pacemaker implantation

**Design and method:** A cardio-pulmonary exercise test /CPET/, using Bruce protocol on treadmill, was performed at baseline and after two months of aerobic exercise program. The test was well tolerated. No symptoms, different from fatigue and breathlessness were reported. 1 patient developed transitory LBBB during the test, without angina or elevation of the troponin and one patient had monomorphic ventricular extrasystoles at peak exercise.

**Results:** The following changes in the mean values of the most important parameters were found: the duration of the exercise test was increased by 1, 20 min. The maximal achieved speed of the treadmill increased by 1.30 m/sec. The maximal oxygen consumption/VO<sub>2</sub> max/ increased by 73 ml, VO<sub>2</sub> max/kg- by 1.14 ml. The maximal heart rate increased by 10 beats/min.

**Conclusions:** Conclusion: CPET – guided exercise program for patients with Hypertrophic cardiomyopathy is safe and effective tool for improvement of the aerobic exercise capacity of patients with HCM.

### CARDIAC STRESS DURING SAUNA APPLICATION CORRESPONDS WITH CARDIAC RESPONSES DURING MODERATE EXERCISE

S. Ketelhut<sup>1</sup>, R.G. Ketelhut<sup>2,3</sup>. <sup>1</sup>Institute of Sport Science, Martin-Luther-University Halle-Wittenberg, Halle (Saale), GERMANY, <sup>2</sup>Charité - University Medicine Berlin, Berlin, GERMANY, <sup>3</sup>Medical Center Berlin, Berlin, GERMANY

**Objective:** Heat application is known to have a vasodilating effect. Therefore, acute sauna bathing is expected to reduce arterial blood pressure (BP). The acute effects of a single sauna session on BP and heart rate (HR) were investigated in the present study.

**Design and method:** In 19 subjects (7 women, aged  $46.4 \pm 10.2$  years, BMI  $24.4 \pm 2$  kg/m<sup>2</sup>) BP and HR were determined at rest, throughout a 25-minute sauna session (93°, 13% humidity) and during a subsequent 30-minute rest period. Furthermore, BP and HR were measured during standardized submaximal exercise testing on a bicycle ergometer (50–100 watts, increments 10 watts/1 min) and compared with the measurements during the sauna session.

**Results:** Compared to baseline, BP was significantly ( $p < 0.01$ ) higher in the sauna and increased progressively with length of stay. After the sauna, BP decreased continuously throughout the 30 min resting period displaying significantly ( $p < 0.001$ )

lower values when compared with baseline. This was true for HR as well, which increased continuously throughout the heat application ( $p < 0.001$ ) thus resulting in an increase in the product of systolic BP and HR, a measure of myocardial oxygen (O<sub>2</sub>) consumption, by 107% ( $p < 0.001$ ). After the sauna, HR declined again ( $p < 0.001$ ), but did not return to baseline level within the 30 minutes.

If comparing BP responds during the sauna with BP during ergometry, sauna bathing corresponded to an exercise load of 60 watts. The increase in HR during the sauna application corresponded to an increase in HR due to an exercise load of 100 watts.

**Conclusions:** Acute sauna application represents a cardiac burden that leads to an increase in BP, HR, and myocardial O<sub>2</sub> consumption. After the sauna session, the expected favorable effect on BP could be detected. The cardiac load in the sauna corresponds to a moderate physical load of 60–100 watts. Accordingly, sauna bathing does not seem to be contraindicated in well-adjusted patients.

### CORRELATION BETWEEN PROPER NUTRITION AND LIFESTYLE WITH HYPERTENSION

D. Utebaliyeva, T. Leonovich, Z. Mamedgulyeva, M. Tundybayeva, G. Junusbekova, S. Berkinbayev, R. Myrzashcheva. *Scientific Research Institute of Cardiology and Internal Diseases, Almaty, KAZAKHSTAN*

**Objective:** To study the diet and lifestyle of patients with essential hypertension (AH) and unstable blood pressure (BP) figures.

**Design and method:** The study involved 82 patients with essential hypertension (45% of men, 55% of women). The average age was 62 years (from 40 to 85 years). Duration of arterial hypertension was from 1 year and more than 13 years. All patients consulted a doctor in outpatient department for unstable blood pressure figures.

**Results:** When analyzing the lifestyle of patients with essential hypertension and unstable BP numbers, it was revealed that 91% of cases diet wasn't kept. 58% of respondents (of whom 62% of cases are men) refuse to exclude coffee and strong tea from their diet. Abuse of fatty, fried and smoked food accounted for 85% of patients, where again a greater number of cases 78% accounted for the male population. As for the salting, 55% of patients do not even examine it by tasting, and again, 66% of cases are men. 51% of respondents do not exclude alcohol from their diet. And again, the majority are men, 63% of the respondents. Only 19% of patients had a body mass index within normal limits, the remaining 81% of patients had a body mass index higher than normal. Slightly more than half of the 54% studied patients lead a physically active lifestyle. In this group, women are more active, accounting for 60% of cases. 98% of the patients we examined were trained in school for hypertension, but only 4% of them remember a year later what they were taught.

**Conclusions:** For patients with unstable BP numbers, a properly chosen diet plays a crucial role, which, combined with daily dynamic physical exertion, can prevent the development of stroke and heart disease. For patients with this disease it is necessary to attend schools for arterial hypertension every year, in order to replenish old knowledge and acquire new ones.

### MUSIC THERAPY AS PART OF THE TREATMENT OF HYPERTENSIVE PATIENTS: CONTRIBUTING TO HEALTH EDUCATION

C. Zanini, A.L. Sousa, D. Teixeira, P.C. Veiga Jardim, D. Pereira, B. Vilela. *Federal University of Goiás, Goiânia, BRAZIL*

**Objective:** This paper presents the experience of a university extension project conducted in an University Hospital, with inclusion of music therapy in outpatient multidisciplinary care of the hypertensive patient.

**Design and method:** It is developed music therapy interventions in different settings, mainly in the waiting room of the outpatient service, using as main resources the voice and the guitar, which become more accessible instruments for outpatient/hospital service. The interventions last for approximately forty minutes. Other interventions of music therapists occur in different settings, such as the bi-weekly meeting of Clube do Hipertenso (for all the patients) or prevention actions. The main music therapy techniques are interactive and singing is the main activity. Breathing and relaxation activities are also performed, together with the sound-musical expression or the musical hearing.

**Results:** With the interventions, carried out with a humanistic approach and holistic vision, an environment of listening and welcoming is provided, where patients can express themselves and perceive habits that influence health and quality of life. It encourages a look at itself and the other, because the consultations/interventions are realized in group and they provide the sharing of experiences. The project has been provided: encourage the adoption of healthy habits; decrease the stress of patients; include the music therapist in the multidisciplinary team; contribute to the humanization of care in collective health; promote health education; and, to stimulate the relation between extension, teaching and research actions in the university.

**Conclusions:** It is considered that the action of the music therapist seeks the integral improvement of the individual, since it can cover biopsychosocial aspects of the hypertensive individual and meets the main objectives of the following Public Policies of the Ministry of Health: National Humanization Policy, National Health Policy of the Elderly People, National Policy of Basic Attention and National Policy of Health Promotion, consciously inserted in the actions of all the health team.

## ARTERIAL STIFFNESS, CENTRAL BLOOD PRESSURE, AND CARDIAC BIOMARKERS ANALYSIS DURING LONG-TERM WALKERS

P. Vitorino<sup>1</sup>, W. Sousa<sup>2</sup>, M. Euzebio<sup>2</sup>, A.L. Sousa<sup>2</sup>, T. Jardim<sup>2</sup>, P.C. Jardim<sup>2</sup>, W. Sebbá Barroso<sup>2</sup>. <sup>1</sup>Pontifícia universidade Católica de Goiás, GOIÂNIA, BRAZIL, <sup>2</sup>Universidade federal de Goiás, Goiânia, BRAZIL

**Objective:** To evaluate arterial stiffness, central arterial pressure and to correlate them with cardiac biomarkers in long-term walkers.

**Design and method:** Longitudinal prospective study with participants of the Ecological Walk of Goiás. Evaluated the peripheral systolic blood pressure (SBPp), peripheral diastolic (DBPp), central systolic blood pressure (SBPc), central diastolic blood pressure (DBPc), pulse wave velocity (PWV), augmentation index (Aix) and peripheral vascular resistance (PVR) using the Mobil O'Graph® device. The evaluation was performed 30 days before the event (A0) and at the end of the 1st (A1), 2nd (A2), 3rd (A3) and 4th (A4) day of the walk. Used Anova of repeated measures, post hoc of Bonferroni and the tests of Pearson or Spearman.

**Results:** 25 men with mean of  $46 \pm 10.5$  years and mean BMI of  $20.2 \pm 2.3$  kg/m<sup>2</sup>. There was a reduction of the SBPp from the A0 ( $122.8 \pm 2.2$ ) to A1 ( $111.6 \pm 2.1$ ) ( $p = 0.004$ ) and SBPc from A0 ( $110.2 \pm 2.2$ ) to A1 ( $101 \pm 1.8$ ) ( $p = 0.035$ ). The CK-MB enzyme correlated with PVR in both A1 ( $r = 0.445$ ,  $p < 0.033$ ) and A4 ( $r = 0.554$ ,  $p < 0.006$ ). Troponin T showed correlation in A4 with SBPc ( $r = 0.468$ ,  $p < 0.024$ ) and SBPp ( $r = 0.470$ ,  $p < 0.023$ ).

**Conclusions:** Central and peripheral systolic blood pressure decreased between the initial evaluation and the first day. There was no correlation between arterial stiffness parameters and cardiac biomarkers. There was a positive correlation between CK-MB and peripheral vascular resistance on the first and fourth day as well as between troponin T and central systolic blood pressure on the fourth day.

## BUNGEE VERSUS RUNNING: ELECTROLYTES, METABOLISM AND BLOOD PRESSURE VALUES

K. Kisters<sup>1</sup>, M. Moser<sup>2</sup>, A. Kastner<sup>2</sup>, S. Oprešnik<sup>3</sup>, M. Walz<sup>4</sup>, C. Tiesenhäusen<sup>4</sup>, S. Porta<sup>2,3</sup>. <sup>1</sup>Med. Clinic I St. Anna Hospital, Herne, GERMANY, <sup>2</sup>Theresian Military Academy, Wiener Neustadt, AUSTRIA, <sup>3</sup>Institute of Applied Stress Research, Fernitz-Mellach, AUSTRIA, <sup>4</sup>Hansa Clinic, Graz, AUSTRIA

**Objective:** Disorders in sports or mental stress concerning electrolytes, metabolism and blood pressure values are of recent interest under the aspect of cardiovascular disease. In this context these parameters were investigated both in running and bungee sports.

**Design and method:** At the Austrian Military Academy in Wiener Neustadt, capillary blood of 20 officer trainees (run) and 34 trainees (bungee jump) has been sampled 10 minutes before and after the respiratory contest, whereby BE, magnesium ionized, lactate, blood glucose, Ca/Mg ratio (Phox-M apparatus, TECOM, Wiener Neudorf, Austria) and additionally diastolic blood pressure values (Breuer, Ulm, Germany) have been determined. All participants of study showed normal blood pressure values, normal kidney function and no diabetes mellitus in history.

**Results:** There was no statistically significant difference in BE, Ca/Mg ratio in both bungee versus running (n.s.). Blood glucose increased from  $127 \pm 3$  to  $146 \pm 14$  mg/dl in the bungee group as compared to  $112 \pm 3$  to  $114 \pm 5$  mg/dl in the running group (means  $\pm$  SD) ( $p < 0.05$ ). Additionally a small magnesium loss in both groups was measured (n.s. in group comparison). Diastolic blood pressure values were measured  $77 \pm 2$  before and  $71 \pm 3$  mmHg after in bungee jumpers as compared to  $69 \pm 2$  before and  $102 \pm 2$  mmHg after running sports (means  $\pm$  SD,  $p < 0.01$ )

**Conclusions:** Diastolic blood pressure values were significantly different in both compared groups after the respiratory contest. Mental stress in bungee jumping leads to a significant decrease in diastolic blood pressure values after the performance whereas in runners a significant increase in systolic blood pressure values occurred ( $p < 0.01$ ). In addition in both groups a decrease in ionized magnesium concentrations was noted. Carbohydrate metabolism was affected significantly due to adrenal anticipation before the bungee jump showing significantly increased blood glucose levels ( $p < 0.05$ ). Metabolic parameters and diastolic blood pressure values are different in mental or physical exercise and sports.

## TIME COURSE OF BODY WEIGHT REDUCTION IN ELDERLY OVERWEIGHT OUTPATIENTS MOTIVATED THROUGH EMPATHETIC REINFORCEMENT

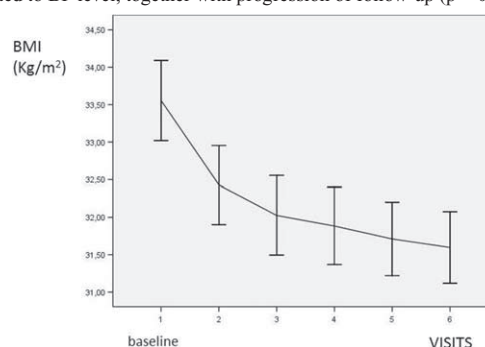
T. Marotta<sup>1</sup>, A. De Mitri<sup>2</sup>. <sup>1</sup>Azienda Sanitaria Locale Napoli I-centro, Naples, ITALY, <sup>2</sup>University of Naples Federico II, Naples, ITALY

**Objective:** It is known that compliance to diet regimens weakens during time. Improving patient motivation through empathetic reinforcement could help to overcome this problem. The effects of recommendations about this issue included in the US high blood pressure guidelines have been studied in elderly overweight patients, attending two public Internal Medicine facilities conducted by the same physician.

**Design and method:** Overweight patients over 60 years of age followed-up at least 5 times after baseline were included in the study. Diet and, if indicated, pharmacological treatment were prescribed at baseline and changed when necessary. Patients'

issues about treatment directions were discussed at each visit. Body weight and blood pressure (BP) data at baseline and at the first 5 follow-up visits are presented.

**Results:** 95 patients (75 F, age at baseline =  $65 \pm 6$  years) were studied. 81 of them (85%) were hypertensive. Mean follow-up duration was 143 weeks (24 to 669, median = 65). Body mass index (BMI) was significantly reduced during follow-up ( $33.7 \pm 5$  to  $31.7 \pm 5$  kg/m<sup>2</sup>,  $p < 0.001$ ), such as waist circumference ( $108 \pm 10$  to  $103 \pm 8$  cm,  $p < 0.001$ ), and BP ( $151/84 \pm 26/13$  to  $136/77 \pm 21/11$  mmHg,  $p < 0.001$ ). A progressive BMI reduction was obtained, without evidence of reversal along time ( $p < 0.001$  at the general linear model for repeated measures, see plot). BP decreased until a plateau at the 4th follow-up visit, with mean values below 140/90 mmHg since the 2nd follow-up visit. Changes in BMI and BP along time were not significantly affected by either sex or education level. Season at which visits were performed did not affect BMI, whilst significantly lower BP levels were observed in summer in comparison to winter ( $135/80 \pm 21/12$  vs  $144/82 \pm 20/12$  mmHg,  $p < 0.005$  at ANOVA), but not in comparison to spring and autumn. When considered as a covariate, season of the visit independently contributed to BP level, together with progression of follow-up ( $p < 0.005$ ).



**Conclusions:** These data strongly suggest that implementing the current recommendations on motivational reinforcement improves adherence to therapy and contributes to avoid reversal of treatment effect during time. Season of the year can affect BP control, but does not interfere with the effects of hypocaloric diet on BW.

## DAILY PHYSICAL EXERCISE FOR 15 MINUTES, IMPROVES THE CONTROL OF HYPERTENSION AND ARTERIAL STIFFNESS IN OBESE HYPERTENSIVE PATIENTS

R. Cabrera Sole<sup>1</sup>, C. Turpin Lucas<sup>1</sup>, L. Urrego Rivera<sup>2</sup>, S. Ruiz Garcia<sup>1</sup>, E. Stephan Luepke<sup>3</sup>, M. Aguilera Saldaña<sup>1</sup>. <sup>1</sup>General University Hospital, Albacete, SPAIN, <sup>2</sup>Health Center N° 6, Albacete, SPAIN, <sup>3</sup>General Hospital, Huddersfield, UNITED KINGDOM

**Objective:** Obesity is an increasing risk factor in Western society, partly due to the sedentary lifestyle of modern life. It is known that daily physical exercise significantly improves the control of many diseases. In the present study, we value the usefulness of performing physical exercise in the improvement of the control of hypertension in obese patients (HTAO). Objectives: to assess the usefulness of daily physical exercise for 15 minutes in the control of hypertension in HTAO.

**Design and method:** We evaluated 750 patients with hypertension (HTA), of whom we selected 50 HTAO ( $58 \pm 8$  years, 30 women) with a body mass index (BMI)  $> 30$  who received  $2 \pm 1$  drugs to control the HTA and we compared them with other 80 hypertensive patients ( $59 \pm 9$  years 50 women), with BMI  $< 25$  (HTANO) and  $2 \pm 1$  drugs for HTA control. Everyone was instructed to perform 15 daily minutes of active walks and write down on a sheet both the days they did and those that did not, as well, they had to self-monitor their blood pressure every 3 days with checking 4 times a day (when they got up, at half a day, in the afternoon and before going to bed). At the beginning and after 12 weeks, the figures for HTA, BMI, ambulatory arterial stiffness index (AASI), and central pressures (Syst.CBP/Diast.CBP) using a Mobil O Graph device. Results are shown in the following table

**Results:** Respect to, systolic peripheral blood pressure in HTANO vs HTAO were  $150 \pm 3$  vs  $148 \pm 4$  basal and at the end  $135 \pm 3$  vs  $125 \pm 2$  ( $p < 0.05$ ), while diastolic were  $88 \pm 3$  vs  $85 \pm 3$  (NS) basal, and  $82 \pm 3$  vs  $79 \pm 2$  ( $p < 0.05$ ).

DATA	Syst.CBP basal	Diast.CBP basal	Syst.CBP final	Diast.CBP final	AASI BASAL	AASI FINAL
HTAO	112±2	83±3	101±2	77±2*	0.95±0.2	0.55±0.2*
HTANO	102±3	79±2	100±2	75±3	0.92±3	0.88±0.2

**Conclusions:** In this study we demonstrated that the performance of moderate intensity physical activity of at least 15 minutes daily has a beneficial effect not only on the peripheral control of blood pressure, but also in reducing the central pressures and arterial stiffness measured by the AASI, which should make us reflect on the need to insist on the realization of physical activity in our patients, especially those obese.

# POSTER SESSION

## POSTERS' SESSION PS25:

## BLOOD PRESSURE MEASUREMENT AND VARIABILITY

### BLOOD PRESSURE AND HEART RATE VARIABILITY IN ERECTILE DYSFUNCTION

S. Pantou, C. Vlachopoulos, D. Terentes-Printzios, A. Angelis, N. Ioakeimidis, V. Gardikioti, G. Christopoulou, E. Sigala, L. Korogiannis, K. Gini, D. Tousoulis. *First Department of Cardiology, Hippokraton Hospital, Athens Medical School, Athens, GREECE*

**Objective:** Cardiac autonomic dysfunction is associated with increased cardiovascular mortality. No data on sympathovagal balance is available in patients with erectile dysfunction (ED), in whom cardiovascular risk is high. The aim of the study was to assess blood pressure variability (BPV) and heart rate variability (HRV) in patients with hypertension and erectile dysfunction.

**Design and method:** We studied 215 untreated hypertensives (104 diagnosed with ED, mean age  $53.9 \pm 10.3$  and 111 controls, mean age  $48.3 \pm 11.8$ ). Cardiac autonomic function was evaluated by analysis of short-term BPV and HRV measures over 24-h, daytime, and nighttime using 24-h ambulatory blood pressure monitoring and the standard deviation of the measurements. Echocardiography was also performed and left ventricular mass index (LVMI) was estimated with the Demereux formula. ANCOVA was applied and the comparison between the two groups was adjusted for age, office pulse pressure, body-mass index, history of diabetes, smoking status, LDL and high sensitivity C-reactive protein.

**Results:** In comparison with controls, patients with ED had higher daytime diastolic blood pressure variability (11.2mmHg vs. 10.7mmHg,  $p = 0.046$ ) and daytime HRV (10.5 beats per minute vs. 10.3 beats per minute,  $p = 0.033$ ). All other daytime, nighttime and 24 h measurements of BPV and HRV were not different between groups ( $p > 0.05$ ). At echocardiography, hypertensives with ED had similar LVMI compared to hypertensives without ED ( $p < 0.05$ ).

**Conclusions:** Compared to controls, ED patients showed a daytime sympathovagal imbalance, characterized by a relatively increased sympathetic activity. Whether this autonomic alteration has a prognostic role in hypertensive ED patients for future cardiovascular events warrants further investigation in prospective studies.

### CHANGES IN PARAMETERS OF ARTERIAL STIFFNESS WITH POSTURE IN HYPERTENSIVE PATIENTS WITH AND WITHOUT ANTI-HYPERTENSIVE TREATMENT

A.A. Sule<sup>1</sup>, A.B. Cesar<sup>1</sup>, Z.A. Azhar<sup>2</sup>. <sup>1</sup>Tan Tock Seng Hospital Department of General Medicine, Singapore, SINGAPORE, <sup>2</sup>Monash University, Melbourne, AUSTRALIA

**Objective:** 1. To determine and compare any differences in postural variation for the parameters of arterial stiffness between hypertensive patients on medications and those off medications.

**Design and method:** Postural variations of parameters of arterial stiffness are measured in hypertensive patients on anti-hypertensive medication (41 subjects) and off anti-hypertensive medication (15 subjects). Operator index, central aortic systolic pressure (ASP), central aortic pulse pressure (APP), Augmentation Index (AI) and brachial systolic pressure (SP) and brachial diastolic pressure (DP) were measured in supine and sitting positions. Hypertensive subjects were chosen based on their ambulatory blood pressure monitoring and had brachial blood pressure above 140/90 mmHg on at least two separate occasions in clinic. The BP characteristics were obtained through SphygmoCor device between 8am to 10am on supine position. After three minutes, values in sitting position were obtained. Informed verbal consent was obtained from all participants and ethics approval was taken before the start of the study. Demographics such as age, race, gender height and BMI were noted. Differences between BP characteristics in supine and sitting were compared using non-parametric paired test of Wilcoxon Signed-rank test. Differences in BP characteristics amongst the different groups of subjects were analysed using Man Whitney U test. A  $p < 0.05$  was accepted as statistically significant in both tests.

Number	41		
Mean age in years (SD)	45.3 (19.5)		
Mean BMI (SD)	29.2 (7.4)		
Parameters	Supine	Sitting	P-value
Median Aortic SP mm Hg (Interquartile range)	119 (112-130)	119 (113-127)	0.74896
Median Aortic PP mm Hg (Interquartile range)	38 (35-54)	38 (31-48)	0.00578
Median AP Aortic Augmentation (Interquartile range)	6 (0-17)	4 (1-14)	0.79486
Median AI Aortic Augmentation Index (Interquartile range)	14 (2-28)	9 (2-28)	0.83366
Median SP mm Hg (Interquartile range)	136 (128-144)	138 (131-144)	0.71138
Median DP mm Hg (Interquartile range)	74 (69-83)	76 (69-87)	0.0226

Number	15		
Mean age in years (SD)	33.1 (12.6)		
Mean BMI (SD)	26.9 (4.9)		
Parameters	Supine	Sitting	P-value
Median Aortic SP mm Hg (Interquartile range)	118 (109-127.25)	120 (107.5-129)	0.20054
Median Aortic PP mm Hg (Interquartile range)	39.5 (32-46.5)	38 (34.75-47.25)	0.85716
Median AP Aortic Augmentation (Interquartile range)	7 (3.75-15)	9 (4.25-12)	0.71884
Median AI Aortic Augmentation Index (Interquartile range)	16.5 (0.75-31)	23 (0.75-27.5)	0.5485
Median SP mm Hg (Interquartile range)	133 (128-139.25)	136 (128.75-147)	0.19706
Median DP mm Hg (Interquartile range)	76 (69.75-83.75)	83.5 (68.75-86.25)	0.18352

**Results:** A statistically significant decrease in APP (38(35-54 vs 38(31-48),  $p = 0.0058$ ) and a significant increase in DP (74(69-83) vs 76(69-87),  $p = 0.023$ ) was observed in hypertensive subjects on medications, when they were moved

from the supine into sitting position (Table 1). However, no significant changes were seen in hypertensive subjects off medications (Table 2). No significant changes seen in other parameters of arterial stiffness and SP in both groups.

**Conclusions:** Postural variation had an effect on APP and DP in hypertensive subjects on anti-hypertensive medications but no effect in subjects off medications. While postural variations of AI were noted in subjects on medication compared to subjects off medication, this was not statistically significant.

## POSTPRANDIAL HYPOTENSION, IS IT REAL? THE PRELIMINARY RESULTS OF A PILOT STUDY

J.H. Lee, K. Hwang, M. Cho. *Chungbuk National University Hospital, Cheongju, SOUTH KOREA*

**Objective:** Postprandial hypotension is an important hemodynamic abnormality but it is very under-recognized. We performed this pilot study to evaluate the prevalence of postprandial hypotension and the possible associations between postprandial blood pressure (BP) decline and other forms of BP variability in type 2 diabetes.

	Patients with PPH (n=14)	Patients without PPH (n=7)
<b>Age</b>	67.0 ± 10.6	62.6 ± 11.5
<b>Ambulatory BP</b>		
Average ABP		
SBP/DBP (mmHg)	128.7 ± 14.7/71.6 ± 10.0	124.6 ± 10.0/77.2 ± 9.1
Heart rate (/min)	79.7 ± 14.2	79.8 ± 8.1
<b>Daytime ABP</b>		
SBP/DBP (mmHg)	128.0 ± 18.8/72.3 ± 10.4	126.8 ± 9.6/78.3 ± 9.8
Heart rate (/min)	82.6 ± 14.0	81.4 ± 7.7
<b>Nighttime ABP</b>		
SBP/DBP (mmHg)	121.8 ± 15.3/69.7 ± 9.8	119.0 ± 12.8/74.1 ± 9.2
Heart rate (/min)	74.0 ± 16.0	76.0 ± 9.6
Nighttime dipping (%)	4.1 ± 8.0	6.2 ± 7.3
Morning BP rising (mmHg)	27.8 ± 28.9	18.7 ± 14.4
Morning surge (n, %)	7 (50%)	4 (57.1%)
Average postprandial BP fall (mmHg)	19.1 ± 8.8 <sup>†</sup>	3.6 ± 5.4
<b>Postprandial BP fall</b>		
After breakfast (mmHg)	23.2 ± 10.9 <sup>†</sup>	2.2 ± 10.5
After lunch (mmHg)	15.4 ± 11.4 <sup>†</sup>	2.0 ± 9.1
After dinner (mmHg)	16.8 ± 20.4	6.5 ± 9.6
<b>Postprandial hypotension</b>		
After breakfast (n, %)	11 (78.6%)	
After lunch (n, %)	5 (38.5)	
After dinner (n, %)	7 (50%)	
<b>Average BP variability</b>		
SBP variability/DBP variability	15.1 ± 6.2/9.5 ± 4.2	10.9 ± 1.9/7.6 ± 2.0
Heart rate variability	8.4 ± 2.9	8.1 ± 3.5
<b>Daytime ABP</b>		
SBP variability/DBP variability	15.4 ± 6.9/9.8 ± 5.5	10.1 ± 1.6/6.8 ± 2.2
Heart rate variability	7.9 ± 3.8	7.4 ± 3.1
<b>Nighttime ABP</b>		
SBP variability/DBP variability	11.1 ± 4.0/7.0 ± 2.6	8.8 ± 3.0/6.7 ± 1.8
Heart rate variability	4.3 ± 1.5	7.3 ± 5.9

Mean ± SD. PPH, postprandial hypotension; BP, blood pressure; ABP, ambulatory blood pressure; SBP, systolic blood pressure; DBP, diastolic blood pressure.  
<sup>†</sup>p<0.05 when compared to the patients without PPH

**Design and method:** We enrolled 21 patients with type 2 diabetes. All patients were examined with ambulatory BP monitoring and we recorded every meal time. Postprandial hypotension was defined as a systolic BP fall of at least 20 mmHg compared with baseline BP level.

**Results:** Mean age was 64.4 ± 11.8 years and 11 patients were female (52.4%). Overall systolic BP and diastolic BP are 127.4 ± 13.2 mmHg and 73.4 ± 9.8 mmHg. Overall systolic BP variability was 13.7 ± 5.5. Average postprandial BP fall was 13.9 ± 10.7 mmHg and the BP fall was most conspicuous after breakfast. Fourteen patients (67%) were experienced postprandial hypotension by definition. Among them, <sup>†</sup>patients (43%) were non-dipper, <sup>‡</sup>patients (36%) were reverse dipper and a patient was extreme dipper. Average systolic BP variability was significantly higher in the patients with postprandial hypotension (15.1 ± 6.2 vs. 10.9 ± 1.9, P = 0.02).

**Conclusions:** Postprandial hypotension is common in type 2 diabetes and there is possible relationship between postprandial hypotension and other abnormal BP patterns. To clarify the clinical significance of postprandial hypotension, large sized long term prospective study is needed.

## SELF-MONITORING IS NOT JUST FOR A STUDY, SELF-MONITORING IS FOR LIFE: ANALYSIS OF PATIENT LIKELIHOOD TO CONTINUE SELF-MONITORING FOLLOWING A HYPERTENSION SELF-MANAGEMENT STUDY

C. Schwartz<sup>1</sup>, C. Koshiaris<sup>1</sup>, E. Bray<sup>2</sup>, S. Greenfield<sup>3</sup>, M. Haque<sup>4</sup>, R. Hobbs<sup>1</sup>, P. Little<sup>5</sup>, J. Mant<sup>6</sup>, B. Williams<sup>7</sup>, R. McManus<sup>1</sup>. <sup>1</sup>Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UNITED KINGDOM,

<sup>2</sup>School of Psychology, University of Central Lancashire, Preston, UNITED KINGDOM, <sup>3</sup>Institute of Applied Health Research, University of Birmingham, Birmingham, UNITED KINGDOM, <sup>4</sup>Institute of Clinical Science, University of Birmingham, Birmingham, UNITED KINGDOM, <sup>5</sup>School of Medicine, University of Southampton, Southampton, UNITED KINGDOM, <sup>6</sup>Department of Public Health & Primary Care, University of Cambridge, Cambridge, UNITED KINGDOM, <sup>7</sup>Institute of Cardiovascular Sciences, University College London, London, UNITED KINGDOM

**Objective:** Self-management in the TASMIN-SR trial successfully reduced and controlled blood pressure (BP) compared to clinic monitoring over 12 months. This study aimed to assess how self-management affected patient preference to wards future management of BP.

**Design and Methods:** Patients with hypertension, above target clinic BP and one-or-more of stroke, diabetes, coronary heart disease or chronic kidney disease, were randomised to a self-management intervention (self-monitoring with self-titration) or usual clinic BP management. At baseline and 12 months patients were asked to rank methods of BP measurement and at 12 month follow-up were asked: "Are you planning to continue/start to self-monitor your BP after the study? Why?" Responses were coded thematically by trial arm and according to whether patients planned to continue self-monitoring. Themes were identified from the resulting codes.

**Scientific Data** Quantitative data regarding ranked preference for self-monitoring plus qualitative data from free text responses.

**Results and Conclusions:** At baseline, self-monitoring was ranked as the preferred method of BP measurement by both intervention and usual care groups, but only intervention patients continued to rank self-monitoring as their preferred choice at 12 months, usual care patients preferring health professional measurement. Self-management patients were three times more likely to want to continue self-monitoring following the trial (OR 3.9 (95% CI 2.62 – 5.87; p < 0.0001). Overarching themes summarising reasons expressed by patients who wanted to continue self-monitoring included: "Positive effects of self-monitoring"; "Concern about high BP and the overall effect on health"; "Self-monitoring already part of the patients' routine/lifestyle"; and "Inspired by the study". For patients who did not want to continue/start self-monitoring, comments fell into five overarching themes: "Anxiety or concerns about self-monitoring"; "BP measured at the surgery"; "Feels BP is controlled"; "Not interested in self-monitoring"; "Never considered self-monitoring or had the opportunity to do it". Self-management provides additional features over-and-above self-monitoring including: a medication plan in advance, training patients to understand and interpret BP targets, when to increase medication and links with a health professional. These features appear to keep patients motivated to use self-monitoring as a way of managing their BP long-term and should be considered when starting patients to self-monitor.

## 24-HOUR CENTRAL BLOOD PRESSURE PROFILE IN TYPE 1 DIABETICS

P. Jankowski<sup>1</sup>, P. Kusak<sup>1</sup>, A. Bednarek<sup>1</sup>, T. Klupa<sup>2</sup>, M. Malecki<sup>2</sup>, A. Windak<sup>3</sup>, D. Czarnecka<sup>1</sup>. <sup>1</sup>Department of Cardiology, Interventional Electrophysiology and Hypertension, Jagiellonian University Medical College, Cracow, POLAND, <sup>2</sup>Department of Metabolic Diseases, Jagiellonian University Medical College, Cracow, POLAND, <sup>3</sup>Department of Family Medicine, Jagiellonian University Medical College, Cracow, POLAND

**Objective:** There is an increasing evidence that central blood pressure (CBP) is more strongly correlated with target organ damage and cardiovascular events than peripheral blood pressure (PBP). 24-hour profile of CBP differs significantly from PBP, however, 24-hour profile of CBP in subjects with type 1 diabetes has been never studies so far. Therefore our goal was to compare 24-hour profile of CBP and PBP in subjects with and without type 1 diabetes.

**Design and method:** The study group consisted of 60 patients with type 1 diabetes (age 40.0 ± 14.0 years, 20 men), whereas 86 subjects without diabetes (age 50.9 ± 15.8 years, 42 men) served as the control group. CBP and its 24-hour profile was measured using the MOBIL-O-GRAPH device, a validated oscillometric device, using a transfer function.

**Results:** The 24-hour PBP was 122.9 ± 9.5/79.3 ± 6.7 mmHg in diabetics vs. 128.5 ± 11.2/83.4 ± 8.8 mmHg in non-diabetics (p < 0.05 for both), whereas 24-hour CBP was 112.6 ± 8.5/77.4 ± 6.6 mmHg in diabetics vs. 118.2 ± 10.4/81.6 ± 8.9 mmHg in non-diabetics (p < 0.05 for both). The differences were not significant after adjustment for age and sex. The 24-hour systolic BP amplification was 10.5 ± 3.0 mmHg vs. 10.4 ± 3.1 mmHg (p = NS both in univariate and multivariate analysis). The nighttime drop in central systolic and diastolic BP did not differ between pts with and without diabetes (6.9 ± 6.3% vs. 6.6 ± 6.3% and 13.2 ± 6.2% vs. 13.2 ± 7.5%, p = NS both in univariate and multivariate analysis). Diabetes was not related to the 24-hour pulse wave velocity when adjusted for mean BP and age.

**Conclusions:** We did not find any significant relation between type 1 diabetes and 24-hour central hemodynamics.

### HYDRA: A WEB SYSTEM FOR THE ANALYSIS, DIAGNOSIS AND TREATMENT OF CARDIOVASCULAR DISEASES

A.Hermida Ameijeiras<sup>1</sup>, M. Ortega<sup>2</sup>, J.E. Lopez Paz<sup>1</sup>, J. Novo<sup>2</sup>, N. Barreira<sup>2</sup>, M.G. Penedo<sup>2</sup>, C. Calvo Gomez<sup>1</sup>. <sup>1</sup>Hospital Clínico Universitario. Hypertension and Vascular Unit, Santiago de Compostela, SPAIN, <sup>2</sup>Computer Science Department. University of Coruña, A Coruña, SPAIN

**Objective:** The cardiovascular risk (CV) assessment is a very complex process and requires a large set of data necessary for clinical decision (diabetes, obesity, clinical analysis, electrocardiogram, etc.). The web system, called Hydra, integrates a complete system and a set of functionalities for clinical decision making in order to improve the work of specialists in the analysis, diagnosis, risk assessment, treatment and monitoring throughout the time of cardiovascular patients.

**Design and method:** Hydra integrates different utilities:

- 1\_ Introduction of all the information collected by the specialists (physical examination, toxic habits, blood pressure measurements, blood analysis, electrocardiogram, etc.).
  - 2\_ An application to automatically determine the CV risk stratification and,
  - 3\_ Different tools designed for incorporate, analyze and graphically present the records of ambulatory BP monitoring (24 or 48 hours).
- In addition, the platform establishes a series of conclusions derived from all the information collected from the patient to support the specialists in their clinical decisions.

**Results:** Hydra was tested and validated in a real domain (Hypertension Unit of the University Hospital Santiago de Compostela) where the platform was validated and used in different research projects to demonstrate its usefulness. The platform clearly established that it contributes to increasing the productivity of physicians, to obtain greater precision in the management of the patient, as well as to reduce the costs of the unit in its clinical routine.

**Conclusions:** In this project we propose a complete platform that includes support services for cardiovascular clinical decision. This platform was born with the functions of a web application to facilitate its use by specialists who can access remotely from any terminal with Internet access. Hydra also includes different tools to facilitate the work of specialists and avoid possible bias in the analysis of patient data.

### RISK OF STROKE IN NORMOTENSIVE PATIENTS, BEYOND THE BLOOD PRESSURE TARGET

D. E.Ouail, M. Tebbani, O. Terra, L. Benzaid, D. Si Ahmed, F. Bouali. *University Abderrahmane Mira, Faculty of Medicine - CHU Béjaia, Bejaia, ALGERIA*

**Objective:** Hypertension is the main risk factor for cardiovascular disease. The risk of stroke is observed in blood pressure is greater than 115/75. Other parameters are associated with an increased risk of stroke, particularly morning surge > 23 mmHg, 24H systolic variability > 15 mmHg, Pulse Pressure > 65 mmHg, and non-dipper profile. The main objective of our work is to study the different parameters associated with an increased risk of stroke in normotensive patients.

**Design and method:** Prospective study of ABPM recordings of patients referred for diagnosis of hypertension or for evaluation of treatment. The patient is diagnosed normotensive if 24 H BP is < 130/80 mmHg. For each patient, we studied the different aspects: Pulse Pressure (SBP - DBP), 24H systolic variability, profile dipper {nondippers (nocturnal reduction of systolic pressure by < 10 % of awake systolic pressure), dippers (reduction by > 10 % to < 20 %)} and the morning surge (> 23 mmHg).

**Results:** Of the 88 patients included in our series, 34 patients had BP < 130/80 mmHg. These are 12 men and 22 women. The average age is 46 years old. Only 14 patients had BP < 115/75 mmHg. The blood pressure variability is greater than 15 mmHg in 22 patients (64.70%) {6 men and 16 women}. 44% of patients are non-dipper (11 women and 4 men). And 5 women had high variability and a non-dipper profile. morning surge is greater than 23 mmHg in 14 patients (08 women and 4 men). 11 of them [04 men and 07 women] have high variability and high morning surge. one man and one woman had high morning surge and non dipper profil. PP is normal in all patients.

**Conclusions:** In our series 65% of normotensive patients have high variability, 44% have a non-dipper profile and 41% have a high morning surge. These situations are associated with a high risk of stroke. Further studies are needed to assess the prognostic impact of these situations. The ABPM is essential for a better evaluation of stroke risk.

### FIRST RESULTS OF THE COMPARISON OF A CUFFLESS 24 HOUR BLOOD PRESSURE MEASUREMENT DEVICE WITH A CUFF-BASED STANDARD DEVICE IN A REAL LIFE SETTING

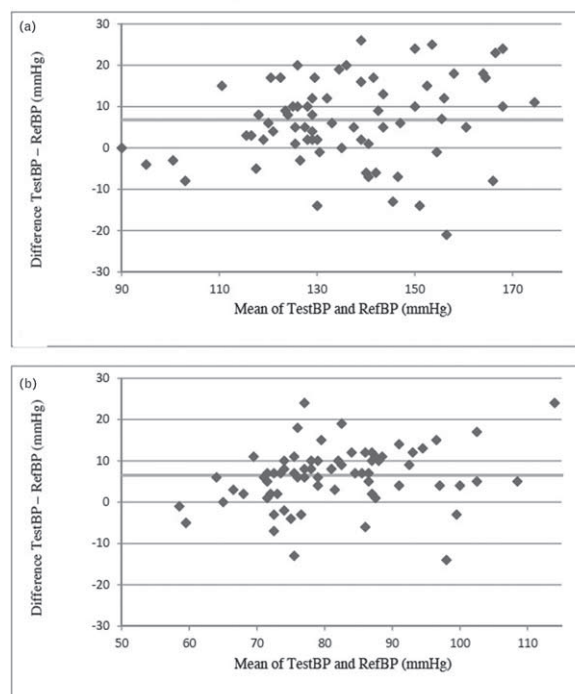
P. Krisai<sup>1</sup>, A. Vischer<sup>2</sup>, A. Meienberg<sup>2</sup>, M. Mayr<sup>2</sup>, T. Burkard<sup>2</sup>. <sup>1</sup>Department of Cardiology, University Hospital Basel, Basel, SWITZERLAND, <sup>2</sup>3 Medical Outpatient and Hypertension Clinic, ESH Hypertension Centre of Excellence, University Hospital Basel, Basel, SWITZERLAND

**Objective:** Recently, a cuffless blood pressure (BP) measurement device using the pulse-transit time (PTT) for beat-to-beat calculation of BP values initially calibrated to a single cuff-based measurement has been introduced and successfully validated over short term according to the ESH validation protocol. We evaluated this cuffless PTT device (TestBP) in a real-life setting compared to a validated, ambulatory, cuff-based standard BP device (RefBP) over 24 hours.

**Table 1.** Agreement between the TestBP and RefBP for mean systolic 24 h blood pressure values, stratified by mean systolic day-time blood pressure.

n (%)	<135 mmHg (n=37)	≥135 and <150 mmHg (n=16)	≥150 mmHg (n=20)
≤5 mmHg	15 (40.5%)	5 (31.3%)	3 (15%)
≤10 mmHg	25 (67.5%)	11 (68.8%)	7 (35%)
≤15 mmHg	28 (75.6%)	14 (87.6%)	12 (60%)

**Figure 1.** Bland Altman plots comparing TestBP and RefBP. (A) Systolic mean 24h blood pressure values. (B) Diastolic mean 24h blood pressure values. Horizontal lines indicate mean difference.



**Design and method:** Between May and December 2017, 71 individuals were prospectively enrolled and categorised into three groups according to mean daytime systolic BP (<135, 135–149, > = 150 mmHg). Main exclusion criteria were age < 25 years or a difference in blood pressure > 10 mmHg between both upper extremities. Cuffless (Somnotouch NIBP) and cuff-based, standard (Spacelabs 90217A) 24 h BP measurements were performed simultaneously on the left and right arm, respectively. The first cuff-based measurement was used as calibration measurement for the TestBP. We compared the systolic and diastolic mean 24h-BP values of the RefBP and TestBP.

**Results:** Mean age was 49 (±15) years and 51% were male. Mean (±standard deviation) 24 h BP for the TestBP and RefBP were 140.8 (±20) vs 134.0 (±17.3) mmHg for systolic ( $p < 0.0001$ ) and 85.8 (±14.1) vs 79.3 (±11.7) mmHg for diastolic ( $p < 0.0001$ ) BP values, respectively. Mean absolute systolic and diastolic differences were 10.2 (±7.2) and 8.2 (±5.5) mmHg, respectively. Comparing agreement between the mean 24 h BP values of the TestBP and RefBP, absolute difference was within 5, 10 and 15 mmHg in 23 (31.5%), 43 (58.9%) and 54 (74%) for systolic and 25 (34.3%), 52 (71.2%) and 66 (90.4%) for diastolic measurements. The agreement for systolic mean 24 h BP measurements stratified by daytime BP-groups are shown in Table 1. Bland-Altman plots comparing mean systolic and diastolic 24h-BP values between the two devices are shown in Figure 1.

**Conclusions:** In our study there was a significant difference between the TestBP and RefBP with an overestimation by the new cuffless PTT device. Best agreement for systolic BP was in the range of 135–149 mmHg. Reasons for this difference between the measurement techniques need to be investigated in further studies.

#### REPRODUCIBILITY OF BLOOD PRESSURE PHENOTYPES BY MEANS OF AMBULATORY BLOOD PRESSURE MONITORING

A. Lykka, K. Manousopoulos, F. Michas, E. Koroboki, A. Dimitriou, N. Zakopoulos, E. Manios. *National and Kapodistrian University of Athens, Medical School, Department of Clinical Therapeutics, Alexandra Hospital, Athens, GREECE*

**Objective:** It is well known that according to office and ambulatory blood pressure (BP) values there are four BP phenotypes (true normotension (TN), white-coat hypertension (WCH), masked hypertension (MH), sustained hypertension (SH)), which have different prognostic value in terms of cardiovascular outcome. Aim of our study was to investigate the reproducibility of these BP phenotypes.

**Design and method:** A total of 76 consecutive never treated individuals referred for evaluation at the Hypertension Unit of our department, underwent 24-h ambulatory BP monitoring at baseline and 1 month. All subjects were divided according to their office and daytime ambulatory BP values to TNday (office BP < 140/90mmHg and daytime BP < 135/85mmHg), WCHday (office BP > = 140/90mmHg and daytime BP < 135/85mmHg), MHday (office BP < 140/90mmHg and daytime BP > = 135/85mmHg), SHday (office BP > = 140/90mmHg and daytime BP > = 135/85mmHg). They were also divided according to office and 24-h BP values to TN24-h (office BP < 140/90mmHg and 24-h BP < 130/80mmHg), WCH24-h (office BP > = 140/90mmHg and 24-h BP < 130/80mmHg), MH24-h (office BP < 140/90mmHg and 24-h BP > = 130/80mmHg), SH24-h (office BP > = 140/90mmHg and 24-h BP > = 130/80mmHg). Statistical analysis was performed by means of kappa agreement coefficient (KAC).

**Results:** The baseline BP measurements revealed that our study population consisted of 13 NTday (17%), 14 WCHday (18%), 12 MHday (16%) and 37 SHday (49%) when daytime BP was used for the definition of the phenotypes and of 11 TN24-h (14.5%), 11 WCH24-h (14.5%), 14 MH24-h (18%) and 40 SH24-h (53%) when 24-h BP was used. The reproducibility of NTday (KAC 0.454), WCHday (KAC 0.259), MHday (KAC 0.334) as well as NT24-h (KAC 0.484), WCH24-h (KAC 0.308), MH24-h (KAC 0.235) was poor by both definitions. In contrast, SHday (KAC 0.577) and SH24-h (KAC 0.532) presented moderate reproducibility.

**Conclusions:** The reproducibility of BP phenotypes such as SN, WCH and MH is poor, whereas SH presents a moderate reproducibility.

#### PERIOPERATIVE ANAESTHESIA MANAGEMENT AND OUTCOMES IN PATIENTS WITH PRE INDUCTION HYPERTENSION FOR ELECTIVE CANCER SURGERY

M. Shetmahajan, D. Kagne. *Tata memorial hospital, Dept. of Anesthesiology, Critical care and pain, Mumbai, INDIA*

**Objective:** Uncontrolled hypertension is a known risk factor for perioperative complications though postponement of surgery is recommended only for blood pressure (BP) more than 180/110 mm Hg. These recommendations come from developed countries where on table hypertension in a previously normotensive individual may be the effect of anxiety.

There is not much literature on the impact of preoperative BP below these values on perioperative complications particularly in populations with inadequate primary health care where the hypertension may indicate inadequate treatment thereby increasing perioperative risk

Also in cancer surgery, due to extensive dissection the impact of hypertension on bleeding complications may be higher

The aim of this audit was to understand the impact of high preinduction blood pressure on the perioperative management and outcomes in intermediate risk cancer surgeries

**Design and method:** This was a single centre prospective observational study conducted in a tertiary care cancer hospital over 6 months.

All adult patients undergoing elective cancer surgery who had a preinduction blood pressure higher than 140/90 mm Hg and 150/90 in patients < 60 years of age and > 60 years of age respectively were studied. Perioperative complications in these patients were compared with those who were normotensive.

**Results:** Out of 509 patients studied in this period, 265 patients had preinduction hypertension (HT group)

As seen in the table, HT group had older patients, more patients who were known hypertensives and more patients on aspirin.

< IMAGE ABSTRACT >

The hypertensive group had a higher incidence of intraoperative and postoperative hypertension needing intervention, postoperative wound haematomas, need for re surgery and extended recovery room stay. None of the patients in either groups had significant perioperative arrhythmias or ECG changes. There were 3 in-hospital deaths in the HT group, and none in the non HT group.

**Conclusions:** Patients with preinduction hypertension had a higher risk of perioperative haemodynamic interventions, wound haematomas and repeat surgeries. Stricter control of preoperative blood pressure may be beneficial in reducing complications. However the risks and benefits of delaying surgery should be considered on an individual case basis.

#### THE STUDY OF MODERN APPROACHES TO THE THERAPY OF PATIENTS WITH ASSOCIATED ARTERIAL HYPERTENSION AND BRONCHIAL ASTHMA

À Odegova<sup>2</sup>, T. Chudinovskich<sup>2</sup>, E. Tarlovskaya<sup>1</sup>. <sup>1</sup>Kirov State Medical University - Department of Internal medicine, Kirov, RUSSIA, <sup>2</sup>Nizhny Novgorod State Medical Academy-department of Internal Medicine, Nizhny Novgorod, RUSSIA

**Objective:** To evaluate the effect of therapy by diltiazem-retard and ivabradine on morphological and functional changes of the heart muscle in patients with arterial hypertension (AH) associated with bronchial asthma (BA).

**Design and method:** 67 patients with mild and the average degree (1,2 degree) of AH associated with BA were involved in the study. All patients received baseline treatment of BA by inhaled glucocorticosteroids (IGCS) and beta2-agonists (beta2-AM) short-acting. There was treatment of AH with tablet of indapamide 2.5 mg, and patients observed the recommendations about non-treatment AH therapy. Echocardiography on Acuson 128XP/10c equipment (USA) was performed to all subjects. Patients were divided into 2 groups without significant difference by technique of random sampling. Group 1 involved 35 patients with average age is 58.5 ± 8.34 years, who received diltiazem - retard. Group 2 - 32 patients with average age is 55.2 ± 9.21 years, who received ivabradine (Coraxan). The treatment lasted for 24 weeks.

**Results:** There was improvement of morphological parameters of left heart (significant decrease of LVMMI (p = 0.01) and IVST (p = 0.012)), and also improvement of diastolic function parameters (E/Ap = 0.001, IVRT p = 0.015) during 24-weeks treatment with diltiazem-retard. The changes of systolic function left ventricle of the heart (LV) was not found in group 1 (p = 0.83). As a result of 24 weeks therapy there was decrease of IVST (p = 0.021), left ventricle end-diastolic diameter (p = 0.034), and also left ventricular posterior wall thickness (p = 0.001), LVMMI (p = 0.002) in comparison with baseline measures in group 2. It was noticed the improvement in left ventricular diastolic function as a result of LV hypertrophy regression, such as: increasing the E/A (p = 0.016) and decreasing IVRT (p = 0.011), as well as decrease of pulmonary artery systolic pressure (p = 0.015). The changes of systolic function LV was not found in group 2 (p = 0.58).

**Conclusions:** Result of 24 weeks treatment with ivabradine in patients with AH associated with BA there was more significant LV hypertrophy regression and improvement of LV diastolic function in comparison with diltiazem therapy.

#### A HEART BREAKING DIAGNOSIS

P. Pessanha<sup>1</sup>, H. Cordeiro<sup>1</sup>, S. Florim<sup>2</sup>, R. Mendonça e Moura<sup>1</sup>. <sup>1</sup>USF S. João do Porto, Porto, PORTUGAL, <sup>2</sup>Centro Hospitalar Vila Nova de Gaia/Espinho, VN Gaia, PORTUGAL

**Objective:** To report a case of a rare paraganglioma causing blood pressure variability and life-threatening events.

**Design and method:** Authorized consultation of the patient's medical records.

**Results:** A 20-year-old female with a medical history of migraines presented to the emergency department with a 2-day history of painless gross hematuria and dysuria. She denied fever, vomits and gastrointestinal symptoms.

During physical examination the patient was pale and sweaty, with tachycardia of 154bpm, temperature of 37.9°C and blood pressure of 110/65mmHg. Her abdominal exam was notable for moderate right flank and costovertebral tenderness. Blood tests revealed moderate leucocytosis and CRP of 92 mg/L. Reno-vesical radiography showed severe right ureterohydronephrosis and subsequent CT-scan revealed a bulky heterogeneous ovarian mass. Further evaluation revealed normal values of tumour markers. Due to persistent ureterohydronephrosis and an unidentified ovarian mass, an exploratory laparotomy was performed. Surgery came to an early stop as the patient suffered severe hemodynamic instability. The hypothesis of a retroperitoneal neuroendocrine was then confirmed by a five-fold increase in plasma free metanephrines and a positive 123-MIBG scintigraphy.

When asked, the patient reported several episodes of lipothymia and two episodes of syncope. She also noted an increased frequency of headache and palpitations episodes.

ABPM recording revealed a nondipper profile, with several non-sustained peaks of elevated blood pressure values as well as three severe hypotension records. Alpha-blockage was initiated, followed by beta-blockage. An ECG and echocardiography were performed and revealed no signs of chronic hypertension. The mass was excised by laparotomy and the diagnosis of paraganglioma was confirmed. In postoperative follow-up the patient's blood pressure and catecholamine levels had normalized.

**Conclusions:** Retroperitoneal malignant paragangliomas are rare neuroendocrine tumours. As with pheochromocytomas, tumour production of vasoactive catecholamines lead to symptoms of catecholamine excess of which hypertension is the most common feature. In this case, several hypotension episodes were also present, a common finding with dopamine-producing paragangliomas, which are quite rare and tend to present late with mass effect and malignant spread. Surgical resection is the mainstay of treatment but blood pressure fluctuates dramatically intra- and post-operatively, increasing the risk of cardiovascular complications.

### CHANGES IN PARAMETERS OF ARTERIAL STIFFNESS WITH POSTURE IN HYPERTENSIVE PATIENTS ON ANTI-HYPERTENSIVE TREATMENT

A. A. Sule<sup>1</sup>, Z. A. Azhar<sup>2</sup>, A. B. Cesar<sup>1</sup>. <sup>1</sup>Tan Tock Seng Department of General Medicine, Singapore, SINGAPORE, <sup>2</sup>Monash University, Melbourne, AUSTRALIA

**Objective:** 1. To determine if there is any postural variation in the parameters of arterial stiffness among hypertensive patients with anti-hypertensive treatment.

Table 1: Hypertensive subjects on anti-hypertensive medication			
Number	41		
Mean age in years (SD)	45.3 (19.5)		
Mean BMI (SD)	29.2 (7.4)		
Parameters	Supine	Sitting	P-value
Median Aortic SP mm Hg (Interquartile range)	119 (112-130)	119 (113-127)	0.74896
Median Aortic PP mm Hg (Interquartile range)	38 (35-54)	38 (31-48)	0.00578
Median AP Aortic Augmentation (Interquartile range)	6 (0-17)	4 (1-14)	0.79486
Median AI Aortic Augmentation Index (Interquartile range)	14 (2-28)	9 (2-28)	0.83366
Median SP mm Hg (Interquartile range)	136 (128-144)	138 (131-144)	0.71138
Median DP mm Hg (Interquartile range)	74 (69-83)	76 (69-87)	0.0226

**Design and method:** Postural variations of parameters of arterial stiffness are measured in hypertensive patients on anti-hypertensive medication (41 subjects). Operator index, central aortic systolic pressure (ASP), central aortic pulse pressure (APP), Augmentation Index (AI) and brachial systolic pressure (SP) and brachial diastolic pressure (DP) were measured in supine and sitting positions.

Hypertensive subjects were chosen based on their ambulatory blood pressure monitoring and had brachial blood pressure above 140/90 mmHg on at least two separate occasions in clinic. The BP characteristics were obtained through SphygmoCor device in the morning between 8am to 10am initially on supine position. After three minutes, values in sitting position were obtained. As per guidelines by European Society of Hypertension (ESH), subjects were advised to refrain from smoking, eating or drinking beverages three hours before the test and drinking alcohol 10 hours before the test. Informed verbal consent was obtained from all participants and ethics approval was taken before the start of the study.

Demographics such as age, race, gender height and BMI were noted. Differences between BP characteristics in supine and sitting were compared using non-parametric paired test of Wilcoxon Signed-rank test. A  $p < 0.05$  was accepted as statistically significant in the test.

**Results:** A statistically significant decrease in APP (38(35–54 vs 38(31–48),  $p = 0.0058$ ) and a significant increase in DP (74(69–83) vs 76(69–87),  $p = 0.023$ ) was observed when subjects were moved from the supine into sitting position (Table 1). There were no significant changes in other parameters of arterial stiffness and SP.

**Conclusions:** Postural variation had an effect on APP and DP in hypertensive subjects on anti-hypertensive medications. However, changes in AI were not statistically significant. Therefore the extent of its effect on arterial stiffness is inconclusive.

### DRUG UTILIZATION STUDY FOR AZILSARTAN MEDOXOMIL IN GERMANY

B. Ehlken<sup>1</sup>, M. Schlaen<sup>1</sup>, M.P. Lopez Fuensalida Torres<sup>2</sup>, M. Hisada<sup>3</sup>, D. Bennett<sup>4</sup>. <sup>1</sup>IQVIA (formerly QuintilesIMS), Munich, GERMANY, <sup>2</sup>IQVIA (formerly QuintilesIMS), Frankfurt/Main, GERMANY, <sup>3</sup>Takeda Development Center Americas, Inc, Deerfield, IL, USA, <sup>4</sup>Takeda Pharmaceuticals International Co, Boston, MA, USA

**Objective:** To evaluate azilsartan medoxomil (AM) utilization patterns in the primary care setting in Germany.

**Design and method:** This is a retrospective cohort study among patients initiated on AM in the primary care setting in Germany from 01/2012 to 12/2013 (first wave) and 01/2014 to 11/2016 (second wave) using a patient-level electronic medical records database.

Scientific data Prescription patterns—including patient demographics, off label use, use in patient populations with missing information, concomitant use of other antihypertensive drugs and drugs that may cause drug-drug interactions with AM—were analysed using the primary care physician panel of the IMS® Disease Analyzer database.

**Results:** A total of 852 of 1,159 (74%) and 696 of 811 patients (86%) met the inclusion criteria for the first and second waves of analysis (activity in database 12 months before and 6 months after first AM prescription), respectively. In both analyses, approximately 25% of patients (first wave: 23%, second wave: 24%) were aged 75 years or older and one patient (first wave) was younger than 18 years of age; 50% (first wave) and 46% (second wave) were females. AM was prescribed for the label indication (essential hypertension) in 83% (first wave) and 68% (second wave) of patients. Indication for use was missing in 12% (first wave) and 26% (second wave) of patients. Simultaneous prescription of AM with other antihypertensive drugs at exposure start of AM was recorded in 23% (first wave) and 37% (second wave) of patients. Drugs that might cause a drug interaction with AM were simultaneously prescribed in 3% of the study population in both waves; overlapping prescription periods at AM exposure start were detected in 14% (first wave) and 8% (second wave) of patients initiated on AM.

**Conclusions:** The results of the study show that AM has been used in the appropriate population for the approved indication in patients aged 18 years or older. Concomitant use with drugs that may cause a drug interaction decreased substantially during the second wave period. Use of dual RAAS blockade therapies was low in this population, which considerably decreased during the study.

### REPRODUCIBILITY OF BLOOD PRESSURE VARIABILITY INDICES IN NORMOTENSIVE AND HYPERTENSIVE SUBJECTS

A. Lykka, K. Manousopoulos, F. Michas, E. Koroboki, A. Dimitriou, N. Zakopoulos, E. Manios. National and Kapodistrian University of Athens, Medical School, Department of Clinical Therapeutics, Alexandra Hospital, Athens, GREECE

**Objective:** Several studies have demonstrated that increased short-term blood pressure (BP) variability is associated with target-organ damage development and poor cardiovascular outcome. However, the reproducibility of BP variability is unclear. Aim of our study was to evaluate the reproducibility of short-term BP variability in normotensive and untreated hypertensive subjects.

**Design and method:** A total of 81 consecutive never treated individuals referred for evaluation at the Hypertension Unit of our department, underwent 24-h ambulatory BP monitoring at baseline and 1 month. Subjects with 24-h BP values  $\geq 130/80$  mmHg were defined as hypertensives, whereas those with 24-h BP  $< 130/80$  mmHg as normotensives. Short-term BP variability was expressed by standard deviation (SD), time rate of BP variation (TR), average real variability (ARV) and coefficient of variation (CV) of systolic and diastolic BP for both 24-h, daytime and nighttime intervals. Statistical analysis was performed by means of reliability analysis (intraclass correlation coefficient (ICC)).

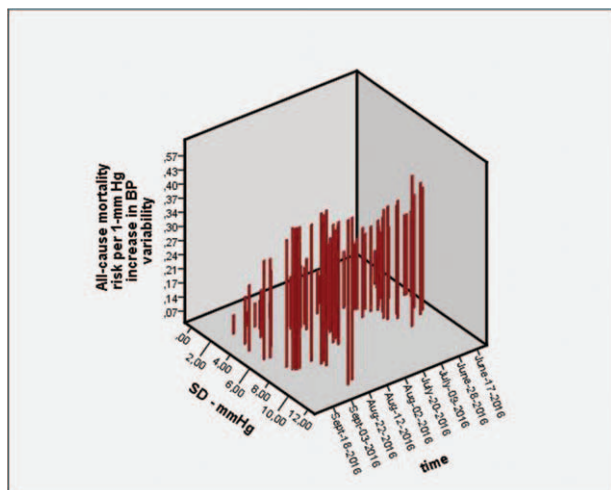
**Results:** Our study population consisted of 22 normotensive (27%) and 59 hypertensive subjects (73%). In normotensive individuals all 24-h and daytime systolic BP variability indices had moderate reproducibility (ICC 0.500–0.749). Good reproducibility was observed in 24-h SD (ICC 0.826,  $p < 0.001$ ), 24-h CV (ICC 0.832,  $p < 0.001$ ) and daytime CV (ICC 0.750,  $p = 0.002$ ) of systolic BP. Hypertensive patients presented moderate reproducibility in most of BP variability indices. Indices with good reproducibility were 24-h SD of systolic BP (ICC 0.751,  $p < 0.001$ ), 24-h SD of diastolic BP (ICC 0.750,  $p < 0.001$ ), 24-h CV of systolic BP (ICC 0.750,  $p < 0.001$ ) and 24-h CV of diastolic BP (ICC 0.765,  $p < 0.001$ ). In contrast, indices with poor reproducibility were daytime TR and AVR of systolic and diastolic BP and all nighttime BP variability indices, except for nighttime TR and ARV of systolic BP.

**Conclusions:** The reproducibility of short-term BP variability varies greatly. In hypertensive patients the most reproducible indices were 24-h SD and CV of systolic and diastolic BP.

### HOW WE CAN TRUST MEASURES OF BPV SINCE IT'S VALUE IS SO VARIABLE ITSELF?

E. Strocchi, M. Mastini, M. Rosticci, C. Borghi. <sup>1</sup>S.Orsola-Malpighi University Hospital - Department of Medical and Surgical Sciences, Bologna, ITALY

**Objective:** In recent years an increasing attention has been paid to blood pressure variability (BPV) because some evidence suggests that it is related to the presence of target organ damage and to the risk of cardiovascular events; home blood pressure (HOME BP) could be an easy way to evaluate medium-term variability as shown by the Ohasama study. However, very rarely HOME BP is measured regularly and/or recorded appropriately. One of our patient measured her BP almost every day for about 5 months (a total of 306 measures because some days she took more than one measurement); during this period the anti-hypertensive therapy was unchanged and the compliance was excellent (from the daily diary it was possible to confirm also a very regular life-style).



**Design and method:** We calculated average BP and BPV in subsets of these measures (morning vs evening and each month separately).

**Results:** Overall BP control was excellent (average systolic BP = 120 mmHg; average diastolic BP = 81.8 mmHg) and BPV, measured as SD was 6.56 mmHg (CV = 5.5%) for systolic and 4.99 mmHg (CV = 6.1%) for diastolic; while average BP was similar in the morning and in the evening, BPV was different (9.44 vs 8.46 mmHg) for systolic; moreover, BPV calculated on the HOME BP taken during each month was quite variable (from 5.15 to 8.5 mmHg, that is + 30% or - 21% from the mean for systolic and from 3.97 to 6.83 mmHg, that is +37% or - 20% from the mean for diastolic). We calculated also AVR (average real variability) in the different subsets with similar results. In Figure 1 we show the

variable all-cause-mortality risk-increment during BP follow-up according to the recent published literature.

**Conclusions:** We believe that the variability of BPV measures observed in this patient arises some doubts about its value as a prognostic index as it does not appear stable within the single patient. In other words BPV is too variable to be useful!

### SEASONAL CHANGES OF THE CIRCADIAN BLOOD PRESSURE RHYTHM IN HYPERTENSIVE PATIENTS

V. M. Gorbunov<sup>1</sup>, M. Smirnova<sup>1</sup>, D. Volkov<sup>1</sup>, Y. Koshelyaevskaya<sup>1</sup>, A. Deev<sup>1</sup>, S. Boytsov<sup>2</sup>. <sup>1</sup>National Medical Research Center for Preventive Medicine, Moscow, RUSSIA, <sup>2</sup>National Medical Research Center for Cardiology, Moscow, RUSSIA

**Objective:** The seasonal variability of ambulatory blood pressure (ABP) in hypertensive patients became the subject of multiple studies during the past decade. The investigation of the particular aspect of this problem, concerning the BP rhythm, could inform the development of a seasonal-tailored chronotherapeutic approach to antihypertensive treatment (AHT). The exploration of this problem in Russia is particularly promising due to the multitude of climate conditions across different regions. The aim of the study was to assess the seasonal changes of nocturnal blood pressure fall (NBPF) in hypertensive patients from two sites in the Russian Federation – Ivanovo (relative north) and Saratov (relative south).

**Design and method:** We included patients from the general population who visited ambulatory clinics for various reasons. The main inclusion criterion was office BP 130/85–139/89 mm Hg or long-term AHT. The ambulatory blood pressure monitoring (ABPM) was performed twice in each patient: in winter (December-February 2012–2014) and in summer (June-August 2012–2014). The interval between ABPMs was 6 months  $\pm$  7 days. The selection criteria for ABPM records were: duration  $> 23.5$  hours, absence of data gaps  $> 1$  hour,  $> 55$  readings per 24 hours. We analyzed the factors associated with the NBPF levels  $> 10\%$  in the whole sample. The stepwise multivariate logistic regression model was used to select the most valuable factors. The analysis was adjusted for age, sex, and AHT.

**Results:** 1,766 patients were enrolled, and 770 of them completed both visits - 499 from Ivanovo (mean age  $52 \pm 10$  years, 181 men), and 271 from Saratov (mean age  $58 \pm 11$  years, 151 men). The NBPF levels were higher in Ivanovo and in winter. We observed the average systolic NBPF values below 10% in Saratov within both seasons, which reflects the non-dipper tendency. According to the multivariate logistic regression analysis, the following factors were associated with both systolic and diastolic NBPF values ( $> 10\%$  - see table).

Factors associated with normal systolic/diastolic NBPF values

Factors	$\beta$	p
Ivanovo residency	0.439/0.838	0.0001/0.0001
Low physical activity	-0.415/-0.577	0.010/0.012
Diastolic BP in orthostasis	0.017/0.015	0.002/0.010
Outdoor temperature*	-0.015/-0.017	0.001/0.0001

\* Average temperature during the first and second days of ABPM

**Conclusions:** The nocturnal hypertension and non-dipper tendency were more typical for Saratov residents and may be explained by relatively hot summers and poor sleep quality. The direct association between outdoor temperature and NBPF warrants further research.

### ARTERIAL HYPERTENSION IN REMOTE PERIOD AFTER MYOCARDIAL INFARCTION AND ISCHEMIC STROKE: QUALITY OF CONTROL, ASSOCIATION WITH OTHER RISK FACTORS

M.Pavelko<sup>1</sup>, R. Zubyk<sup>2</sup>, N. Belikova<sup>3</sup>, S. Indyka<sup>4</sup>, O. Yakovenko<sup>5</sup>, I. Sichkaruk<sup>6</sup>, A. Yagensky<sup>7</sup>. <sup>1</sup>Lutsk City Hospital, Lutsk, UKRAINE, <sup>2</sup>Lesya Ukrainka Eastern European National University, Lutsk, UKRAINE, <sup>3</sup>Volyn Regional Hospital, Lutsk, UKRAINE

**Objective:** In Ukraine cardiovascular mortality is one of the highest in Europe. Arterial hypertension (AH) is one of the most important modifiable risk factors and its active control is a cornerstone of primary and secondary prevention.

**Design and method:** Secondary prevention assessment was performed in Ukrainian city Lutsk in representative sample of 166 patients after ischemic stroke (PostIS) (age  $66.1 \pm 9.0$  years, 98 men) and 265 patients after myocardial infarction (PostMI) (age  $64.9 \pm 9.8$  years, 181 men) randomly selected from 2200 consecutive patients hospitalized in one city hospital 1 to 5 years before inclusion. The home-based blood pressure (BP), anthropometric measurements, questionnaire, and laboratory tests were performed.

**Results:** The trend to higher AH prevalence was found in PostIS patients (77,7% vs 69,1%,  $p = 0,09$ ). This finding was associated with higher BP in PostIS patients

(systolic  $145.8 \pm 25.0$  vs  $140.0 \pm 22.8$  mmHg in PostIM,  $p = 0.014$ , diastolic  $86.8 \pm 13.8$  vs  $83.6 \pm 12.1$  mmHg,  $p = 0.013$ ), and smaller proportion of treated patients PostIS - 78.7 vs 86.7% PostMI. AH control was low in both groups: only 23.0% PostIS and 26.1% PostMI patients had BP < 140/90 mmHg ( $p = 0.18$ ). This finding corresponded with low mean number of antihypertensive drugs per patient -  $1.7 \pm 1.1$  vs  $1.8 \pm 1.1$  respectively;  $p = 0.28$ . Worse AH control in PostIS patients was associated with less tight physician control (57.1% vs 66.0% PostMI patients contacted to doctor during last 3 months,  $p = 0.05$ ), lower physical activity (29.9% in PostIS vs 37.4% in PostMI had regular activities;  $p = 0.04$ ). No difference in prevalence of obesity, smoking, diabetes, as well as lipids and glucose levels was detected.

**Conclusions:** Inadequate AH control was found in both PostIS and PostMI patients. The worse situation in PostIS patients was associated with lower number of patients who regularly took antihypertensive medications and worse physician control. It is necessary to take active efforts to improve the situation.

### CORRELATION OF OBSTRUCTIVE SLEEP APNOEA AND ARTERIAL STIFFNESS AS CARDIOLOGIC RISK FACTORS

S. Paffer Filho<sup>1,2</sup>. <sup>1</sup>UHCM, Recife, BRAZIL, <sup>2</sup>Universidade de Pernambuco, Recife, BRAZIL

**Objective:** The presence of hypertension is a very well established risk factor for the development of future cardiovascular complications, such as AMI and stroke. Recent data suggest a strong association of arterial stiffness as a new risk factor for cardiovascular disease. The presence of obstructive sleep apnea has a strong association with hypertension, especially on those with resistant hypertension. The aim of this study was to evaluate the association of obstructive sleep apnea and arterial stiffness as risk factors for future cardiovascular events in a population of patients at a hypertension clinic.

**Design and method:** We evaluated 14 patients at a private hypertension clinic using a home sleep test with a class 3 device type Resmed Apnealink Plus and an office assessment of arterial stiffness with Mobil O'Graph device and registered pulse wave velocity and Augmentation Index @75bpm. to observe the coexistence of obstructive sleep apnea and elevated pulse wave analyses, probably due to increased arterial stiffness. The data were analysed, including a subanalyses of the population according to BMI sex, and age.

**Results:** The group consisted of 14 patients. 21.4% were female, with age ranging from 33 to 80 years old (average of  $55.13 \pm 13$ ). The average BMI was  $28.9 \pm 5.4$ . 4 patients had mild obstructive sleep apnea (OSA), 5 had moderate OSA and 5 had severe OSA. 8 patients had type 2 D. mellitus. The mean pulse wave velocity was  $8.05 \pm 1.7$ , ranging from 5.8 to 11.4 m/s. The mean systolic central arterial pressure was  $131.2 \pm 15$  mmHg and  $84.8 \pm 15$  mmHg for diastolic central arterial pressure. In the subgroup with severe sleep obstructive apnea, the mean pulse wave analysis was 8.52 and apnea-hipopnea index was 49.6. There was no straight relationship of elevated apnea-hipopnea index and increased pulse wave velocity, representing increased arterial stiffness, including in the subgroup of diabetic patients.

**Conclusions:** Despite the presence of obstructive sleep apnea and increased arterial stiffness are both considered strong predictors of cardiovascular events, we found no correlation between these 2 findings in the studied population at the same time.

### COMPARISON OF NON-INVASIVE CENTRAL BLOOD PRESSURE MEASUREMENTS WITH PERIPHERAL BLOOD PRESSURE MEASUREMENTS IN THE DIAGNOSTIC, PROGNOSTIC AND THERAPEUTIC AREAS. SYSTEMATIC REVIEW

P. Botti, A. Elias. *Service of Vascular Medicine, Sainte Musse Hospital, Toulon, FRANCE*

**Objective:** Arterial hypertension is a major public health problem and current recommendations call for a review of the literature on the contribution of non-invasive central blood pressure (BP) estimation.

**Design and method:** We performed a systematic review of systematic reviews that compare non-invasive central BP with peripheral BP measurements in the diagnostic, prognostic and therapeutic areas, including a comprehensive research in databases and grey literature, and a qualitative analysis according to the ROBIS and AMSTAR tools.

**Results:** Among 1738 bibliographic references, 8 publications were selected. This systematic review shows for central BP, as compared to peripheral BP, in terms of the diagnosis the importance of the calibration method, and in terms of the prognosis the absence of a significant effect on clinical events but a significant effect on surrogate endpoints. In terms of the treatment, it shows that antihypertensive drugs, and in particular  $\beta$ -blockers and thiazide diuretics have a greater effect on the decrease in peripheral BP, than on non-invasive central BP, thus leading to a decrease in the arterial pressure amplification.

**Conclusions:** Basic research on calibration methods is essential to obtain a better estimation of the central BP and to propose clinical studies on a larger scale.

### BLOOD PRESSURE CHRONOSTRUCTURE IN ANGIOTENSIN CONVERTING ENZYME INHIBITOR THERAPY

L. Gapon, E. Semukhina. *Tyumen Cardiology Research Center, Tomsk, RUSSIA*

**Objective:** To estimate the effect of enalapril and captopril on blood pressure (BP) daily profile and correct drugs dosing according to 24-hour BP monitoring in patients with arterial hypertension (AH).

**Design and method:** The study included 73 male patients with diastolic BP (DBP) 90–109 mmHg without severe comorbidity and obesity (body mass index  $27.9$  kg/m<sup>2</sup>). Patients were randomized into two groups: 1: 37 patients (mean age  $38.8 \pm 1.3$  years) received enalapril, 2: 36 patients (mean age  $39.8 \pm 1.3$  years) received captopril. Adjustment of drug dosage was conducted under 24-hour BP monitoring at the 4th, 8th and 12th weeks of the therapy.

**Results:** Enalapril and captopril lead to statistic lowering of diurnal mean value (DMV) within 12 weeks of therapy (original data in enalapril group: DMV systolic BP (SBP)  $146.6 \pm 3.7$ , DMV DBP  $91.6 \pm 2.1$ ; 12th week DMV SBP  $130.2 \pm 2.2$ ; DMV DBP  $80.2 \pm 1.9$ ; all  $p < 0.001$ ; original data in captopril group: DMV SBP  $142.4 \pm 1.3$ , DMV DBP  $90.9 \pm 4.9$ ; 12th week DMV SBP  $129.3 \pm 1.5$ ; DMV DBP  $80.2 \pm 1.3$ ; all  $p < 0.001$ . Values of 24-hour range had no changes under treatment with enalapril and captopril. Estimation of hyperbaric index (HBI) and chronobiological index (CBI) in this category of AH patients showed significant decline of these values within 12 weeks of monitoring, but by 12th week of treatment degree of decline of HBI and CBI DBP was more significant in enalapril group (HBI DBP: group 1 – from  $90.4 \pm 14.8$  till  $12.6 \pm 2.5$ ; group 2 – from  $71.1 \pm 10.2$  till  $20.4 \pm 4.8$ ), all  $p < 0.001$ ; CBI DBP from  $44.9 \pm 3.8$  till  $9.0 \pm 1.6$  (%), from  $39.4 \pm 3.3$  till  $13.8 \pm 2.5$  (%), all  $p < 0.001$ . It is important that number of patients with increased HBI DBP > 20% and CBI > 20% was significantly lower in enalapril group (18.2 vs 33.3; 9.1 vs 22.0; all  $p < 0.05$ , and values of circadian hypo-amplitude-tension were more beneficial in captopril group (12 vs 0,  $p < 0.001$ ).

**Conclusions:** Changes of the main values of BP chronostructure have unidirectional character that shows positive physiological effect of both drugs. Enalapril has more significant impact on circadian rhythm and as a result it has more protective effect of target-organs in the prevention of cardiovascular severities in this group of patients.

### AMBULATORY BLOOD PRESSURE VARIABILITY- THE HIGHER THE WORST?

A. Magdás, A. Varga, C. Podoleanu, A. Tusa, A. Incze, G. Csiki. *University of Medicine and Pharmacy, Targu Mures, ROMANIA*

**Objective:** Our goal was to establish a normal range for blood pressure variability (BPV) defined by average real variability (ARV) and to assess whether it can be considered as an additional cardiovascular risk factor

**Design and method:** In contrast to one of our previously published study, which included 110 patients, we selected 80 inefficiently treated hypertensive patient, admitted to County Clinical Hospital Targu Mures, Romania to adjust hypertensive treatment. The definition of hypertension was based on 24-hour ambulatory BP monitoring (ABPM), by using a validate device (ABPM 05, Meditech Ltd, Hungary®), defined as mean 24-hour BP > 130 and/or > 80 mmHg. After calculating BP variability defined as average real variability (ARV), the median value was used to divide the study population in low (LV) or high variability (HV) group. We compared ABPM derived BP parameters, assessed if there is any correlation between pressure overload and variability.

**Results:** In both groups awake systolic BP was nearly equal  $143.7 \pm 10.5$  mmHg, versus  $142.4 \pm 12.2$  mmHg,  $p = 0.89$ . Nighttime diastolic BP was significantly higher in the LV group  $74.09 \pm 8.33$  versus  $69.02 \pm 10.22$  mmHg,  $p = 0.017$ . In the LV group pressure overload expressed as percent time elevation (PTE%) of systolic and diastolic values were  $75.2 \pm 15.6/45.21 \pm 29$  % vs.  $67.51 \pm 18.21/36.13 \pm 25.61$  % in the HV group,  $p < 0.0001$ . The systolic BP load was  $322.2 \pm 195.7$  mmHg vs.  $314.6 \pm 183.7$  mmHg in the HV group,  $p < 0.0001$ . The diastolic BP load was  $126.2 \pm 112.9$  mmHg vs.  $93.02 \pm 101.9$  mmHg in the HV group,  $p < 0.0001$ . No correlation was found between BP variability and systolic PTE or BP load in any of the groups,  $p > 0.05$ .

**Conclusions:** We found that patients with low variability presented higher BP values and greater pressure overload. High variability is not necessary a dangerous phenomenon if it is accompanied by low BP values without pressure overload. To appreciate the real efficacy of the antihypertensive treatment, a comprehensive assessment of BP values, variability and pressure overload parameters should be included.

## AUTOMATED OFFICE BLOOD PRESSURE (AOBP) IS LOWER THAN OFFICE BLOOD PRESSURE (OBP) BUT HOW IT COMPARES WITH AMBULATORY BLOOD PRESSURE MEASURES (ABPM)?

E. Strocchi, M. Mastini, M. Rosticci, C. Borghi. *S.Orsola-Malpighi University Hospital - Departement of Medical and Surgical Sciences, Bologna, ITALY*

**Objective:** Due to blood pressure (BP) variability it is difficult to define the most representative BP values of each patient and the limits of OBP are well known; even though OBP remains the usual reference for medical decisions, ABPM is increasingly preferred because it may supply a more informative picture of BP load. A new method of BP measurement, that is AOBP, it has been proposed after the impressive results of the SPRINT study that, however, raised quite a bit of discussions. The aim of this study was to compare the AOBP with ABPM in an unselected sample of subjects.

**Design and method:** Before starting the ABPM, AOBP was also measured on the same arm for 5 minutes after 10 minutes of rest in a quiet room with the patient alone. ABPM with less than 90% BP values were excluded; then the results of ABPM were analyzed taking into account the exact time the patient went to bed and raised as written on the diary. Therefore we calculated the daytime and night-time BP mean and we also averaged the lower tertile of BP measurements that we called "basal" BP. 100 unselected subjects were considered for the analysis.

**Results:** As expected systolic AOBP was on the average 15 mmHg lower than OBP and this was due to the presence of the physician and not to the measuring device. On average the AOBP was very similar to the "basal" BP but with wide variations in the individual patients.

**Conclusions:** The variables associated with such a different behavior of AOBP are being investigated.

## ASSESSMENT OF ARTERIAL STIFFNESS IN CLINICAL PRACTICE: REPORT OF A DATA BANK OF 150 PATIENTS AT A PRIVATE HYPERTENSION CLINIC

S. Paffer Filho<sup>1,2</sup>. <sup>1</sup>UHCM, Recife, BRAZIL, <sup>2</sup>Universidade de Pernambuco, Recife, BRAZIL

**Objective:** Arterial stiffness represents a new risk factor for the development of cardiovascular disease and is being used on clinical trials (such as CAFE trial), with a potential tool to be used in clinical practice to evaluate hypertensive patients. We report the findings of the first 150 patients evaluated with this technic in our institution.

**Design and method:** We performed the evaluation of 150 patients at a private hypertension clinic in our institution in order to assess the pressure wave velocity, augmentation index @75bpm and the central systolic and diastolic arterial pressure during the regular visits after explaining the process to the patients, using a Mobil O'Graph device with patients at rest according to the regular blood pressure assessment procedures. The data were collected and the analyzed.

**Results:** 150 patients were evaluated in our hypertension clinic using the Mobil O'Graph device in order to obtain the pulse wave velocity, central arterial pressure and augmentation index @75bpm. 45% of the sample were male, with average age of 55 years old and the vast majority were already taking antihypertensive drugs (69%). Only 9,3% of the patients had a prior cardiovascular event (AMI or stroke). The mean BMI was 29,6% The mean pulse wave velocity was 8,48±2,42m/s and was higher in the subgroup of patients who had suffered a previous cardiovascular event - 11,15±2,2m/s, confirming the relationship between arterial stiffness and increased cardiovascular risk. The augmentation index didn't show any relationship to cardiovascular risk. The mean central systolic pressure was 136,5mmHg and 83,5 for diastolic central pressure.

**Conclusions:** The assessment of arterial stiffness is a simple procedure that can easily be performed at a research center or clinical setting and can be very useful to verify this new risk factor for cardiovascular events. Several research clinical trials have been used this technic and further usage on clinical practice can be accepted, once there is a strong link between arterial stiffness and the possibility of cardiovascular events.

## HYPERTENSION IN RENAL TRANSPLANT PATIENTS: ROLE OF AMBULATORY BLOOD PRESSURE MONITORING

M. Mars, S. Yaich, Y. Elaouer, M. Masmoudi, K. Kammoun, H. Chaker, M. Ben Hmida, F. Jarraya, K. Charfeddine, J. Hachicha. *Nephrology department, Renal pathology unit UR12ES14, Hedi Chaker Hospital, Sfax, TUNISIA*

**Objective:** Hypertension is a major cardiovascular risk factor associated with loss of renal graft function. Ambulatory Blood Pressure Monitoring (ABPM) is one of the methods to evaluate this factor. The objective of our study is to evaluate the different indications and the results of the ABPM performed in renal transplant patients in our center.

**Design and method:** This is a retrospective study including ABPM performed in renal transplant recipients between January 2011 and December 2017. We reviewed the demographic, clinical, indications and outcomes of ABPM.

**Results:** We collected a total of 59 MAPA performed for 37 patients (21 men and 16 women), with a mean age of 40 ± 10 years. A known hypertension was observed in 62% of cases. Diabetes, dyslipidemia, chronic allograft nephropathy were observed respectively in 37%; 22% and 54% of cases. The indications for ABPM were: unbalanced hypertension in consultation (54.2%), borderline hypertension (25.4%), search for masked hypertension (22%), and BP control (3.4%). The unbalanced hypertension was confirmed in 81% of cases and white coat hypertension in 19% of cases. Among ABPM made for borderline BP, a confirmed hypertension was observed in 8% of cases, unbalanced hypertension in 58% and well-balanced hypertension in 33% of cases. The ABPM performed in search for a masked hypertension confirmed the hypertension in 77% of cases. The mean SBP and DBP in consultation were respectively 147 ± 26 mmHg and 86 ± 17 mmHg. The mean global, diurnal and nocturnal BP in ABPM were 140/84, 144/88 and 137 / 82mmHg respectively. The majority of patients (39 MAPA) had a non-dipper and riser profile.

**Conclusions:** ABPM has a much greater contribution than the office BP. It helps to better guide the treatment to avoid intensify or alleviate it for a better control of BP in transplant recipients.

## BLOOD PRESSURE CHANGES DURING MAXILLOFACIAL SURGERY

I.Mozos, H. Urechescu, C. Pricop, A. Banu, I. Vekic, M. Pricop. *Victor Babes University of Medicine and Pharmacy, Timisoara, ROMANIA*

**Objective:** To assess blood pressure changes during local and general anesthesia and maxillofacial surgery in patients with normal blood pressure and in hypertensive patients.

Variable	Before surgery (M1)	After local anesthesia (M2)	After general anesthesia (M3)	During surgery (M4)	After surgery (M5)
Systolic blood pressure (mmHg)	143±22	120±17	122±16	116±23	123±22
Diastolic blood pressure (mmHg)	82±11	70±11	72±10	69±13	72±12

**Design and method:** Blood pressure was monitored in 39 patients, aged 50 ± 17 years, 56% male, who underwent maxillofacial surgery. Systolic and diastolic blood pressure (SBP, DBP) were measured in each patient before surgery (M1), after local anesthesia (M2), after general anesthesia (M3), during surgery (M4) and after surgery (M5), in hypertensive and patients with normal blood pressure.

**Results:** Significant changes for both systolic and diastolic blood pressure were noticed from M2 to M5 compared to M1 (p by ANOVA < 0.0001 for both). SBP and DBP decreased especially during surgery and after local anesthesia. However, SBP and DBP were not significantly different when comparing M2-M5. A significant correlation was obtained only for articaine use, as a local anesthetic and SBP (point biserial correlation coefficient = -0.32, p < 0.022), but not for DBP or lidocaine use. Both SBP and DBP were significantly higher in hypertensive patients in M1-M5, despite antihypertensive therapy.

**Conclusions:** Blood pressure decreases during maxillofacial surgery, especially due to local anesthesia with articaine and the surgical procedure. Difficulties may occur in hypertensive patients in obtaining a controlled hypotension for maxillofacial surgery.

## EFFICACY OF EPROSARTAN AND RAMIPRIL ON BLOOD PRESSURE VARIABILITY, LV REMODELING AND INSULIN RESISTANCE IN ESSENTIAL HYPERTENSION

N. Sapojnic<sup>1</sup>, A. Caraush<sup>1</sup>, M. Caraush<sup>2</sup>, C. Roibu<sup>3</sup>. <sup>1</sup>Institute of Cardiology, Chisinau, REPUBLIC OF MOLDOVA, <sup>2</sup>Rehabilitation Hospital Cardiovascular recovery, Iasi, ROMANIA, <sup>3</sup>Institute of Neurology and Neurosurgery, Chisinau, REPUBLIC OF MOLDOVA

**Objective:** Summary: Hypertension (HT), left ventricular hypertrophy (LVH) and insulin resistance (IR) often coexist and represent an 'amorous triangle', amplifying development of TOD. Disrupted blood pressure variability (BPV) carry an worse prognosis. Left ventricular hypertrophy (LVH) is a cardinal maladaptive manifestation of hypertensive organ damage and an important biomarker of extra-cardiac alteration. Thus, there is a need for a well-tailored therapy aiming BPV profile, LVH and IR and RAAS inhibitors will be of peculiar utility for such conditions.

**Objective:** To compare the effect of eprosartan and ramipril on BP variability, LVH and IR in hypertensive patients.

Variables	Baseline	6 months	12 months	Group
<b>Systolic BPV (mmHg)</b>				
Day time period	25.07±2.36 25.13±2.38	19.94±1.81* 17.79±1.64*	14.99±1.02* 12.78±1.01*	R-gr E-gr
	p=0.05	p<0.01	p<0.01	
Night time period	22.11±2.07 22.43±2.10	16.77±1.82* 15.31±1.54*	14.71±1.29* 13.52±1.12*	R-gr E-gr
	p=0.05	p<0.01	p<0.01	
<b>Diastolic BPV (mmHg)</b>				
Day time period	18.68±2.43 19.99±2.78	16.61±1.49* 15.29±1.29*	14.02±1.11* 13.04±1.06*	R-gr E-gr
	p=0.05	p<0.01	p<0.01	
Night time period	16.61±2.08 17.03±2.11	14.74±1.19* 13.91±1.04*	13.76±1.03* 12.13±1.11*	R-gr E-gr
	p=0.05	p<0.01	p<0.01	
<b>LV remodelling indices</b>				
LVMi (g/m <sup>2</sup> )	140.42±15.54 143.76±13.81	136.27±11.41* 129.91±10.64*	117.09±8.02* 97.38±7.86*	R-gr E-gr
	p=0.05	p<0.01	p<0.01	
RTWT	0.46±0.04 0.46±0.03	0.45±0.03* 0.44±0.02*	0.43±0.03* 0.41±0.02*	R-gr E-gr
	p=0.05	p<0.05	p<0.01	
<b>Geometry of LV remodelling</b>				
Concentric LVH	52 (92.85%) 42 (93.33%)	44 (78.57%) 32 (71.12%)	32 (57.14%) 21 (46.67%)	R-gr E-gr
	p=0.05	p<0.01	p<0.001	
Eccentric LVH	4 (7.15%) 3 (6.67%)	6 (10.71%) 5 (11.12%)	10 (17.86%) 3 (6.66%)	R-gr E-gr
	p=0.05	p<0.05	p<0.01	
Normal geometry of LV	0 0	6 (10.71%) 8 (17.76%)	14 (25.00%) 21 (46.67%)	R-gr E-gr
		p<0.01	p<0.001	
<b>HOMA-IR values</b>				
	3.34±0.09 3.38±0.08	3.20±0.02* 3.05±0.09*	2.45±0.07* 2.21±0.08*	R-gr E-gr
	p=0.05	p<0.01	p<0.001	

Table 2. Evolution of blood pressure variability, echocardiographic indices of LV remodeling and HOMA IR during 6-months and 12-months of follow-up

Note: \* p<0.001 from baseline

**Design and method:** 101 hypertensives (48,51% of men; mean age 51,1 ± 0,71 yrs) with LVH and IR were randomly assigned to ramipril (R-gr; n = 56, mean dose = 15,3mg ± 1,2 mg/daily) or eprosartan (E-gr; n = 45, mean dose = 850 ± 12,4 mg/daily). Ambulatory blood pressure monitoring (ABPM), transthoracic echocardiography (TE), and HOMAIR were performed at baseline and after 6, 12- months period of treatment. LV mass index (LVMI) > 95 g/m<sup>2</sup> in women and > 115 g/m<sup>2</sup> in men identified LV hypertrophy. Relative wall thickness (RWT > 0.42) help to categorize geometry of LV remodeling. IR was defined by HOMAIR levels > 2.5.

**Results:** At baseline, group did not differ statistically with respect to clinic, hemodynamic and echocardiographic status (Tab. 1). After 6 months period, there was a statistical improvement (p < 0.01) in systolic and diastolic BPV in both treatments groups, and this tendency was even more evident at the end of the study (tab 2) with a greater improvement in E-gr (p < 0.01). LV geometry and remodeling indices have a beneficial evolution in both study groups, but more significant (p < 0.05) in the E-gr. At the end of follow-up, the number of patients in E-gr who expressed normal pattern of LV geometry appeared to be almost twice higher compared to R-gr (tab 2). Both therapeutic regimens have gradually improved HOMAIR values (p < 0.001), but with greater reduction in Egr (p < 0.001) (Tab.2).

**Conclusions:** Both drug-regiment progressively improve blood pressure variability, LV geometry and insulin resistance indices, but with greater efficiency in the Eprosartan-medicated arm, probably due to additional sympatholytic effect of its moiety.

# POSTER SESSION

## POSTERS' SESSION PS26:

### KIDNEY AND RAAS, ENDOCRINE HYPERTENSION

#### VASCULAR STIFFNESS IN TRUE RESISTANT HYPERTENSIVE PATIENTS AFTER RENAL DENERVATION: DOES PLASMA ALDOSTERONE MATTER?

N. Avdonina<sup>1</sup>, M. Ionov<sup>1</sup>, S. Mironova<sup>1</sup>, Y. Yudina<sup>1</sup>, I. Emelyanov<sup>1</sup>, D. Zverev<sup>1</sup>, E. Kitaeva<sup>1</sup>, N. Zvartau<sup>1,2</sup>, A. Konradi<sup>1,2</sup> <sup>1</sup>Almazov National Medical Research Centre, Saint-Petersburg, RUSSIA, <sup>2</sup>ITMO University, Saint-Petersburg, RUSSIA

**Objective:** Patients with resistant hypertension (RHTN) are characterized by higher incidence and severity of vascular damage resulting in excess stiffness assessed by pulse wave velocity (PWV) and renal resistive index (RRI). RHTN is also associated with increased renin-angiotensin-aldosterone system (RAAS) activity promoting vascular and kidney fibrosis.

**Aim of the study** was to investigate the link between vascular damage and plasma aldosterone concentration (PAC) in severe hypertensive patients before and after renal denervation (RD).

**Design and method:** 25 patients (mean age  $56 \pm 10$  years, 9 males) with confirmed true RHTN with standardized multidrug combination treatment underwent renal denervation (Symplicity RDN System, Medtronic, USA) between January 2012 and October 2015. Markers of vascular damage, office blood pressure (BP) and PAC were evaluated before and twelve months after procedure. RRI was noninvasively assessed by ultrasonography (Vivid 7 Dimension, GE, USA), PWV was calculated by applanation tonometry (SphygmoCor XCEL, AtCor Medical, Australia). Aldosterone plasma concentration (normal limits 10–105 pg/ml) were determined by immunofluorescence method.

**Results:** There was a significant decrease of office systolic and diastolic BP ( $-24.5/-13.2$  mmHg, respectively,  $P < 0.05$ ) levels a year after RDN. Arterial stiffness measured by PWV improved significantly 12 months after procedure ( $10.1 \pm 1.8$  to  $9.3 \pm 2.0$  m/s,  $P < 0.05$ ). Patients with RHTN were characterized by rather high RRI at baseline and values remained mostly unchanged during follow-up ( $0.7 \pm 0.08$  and  $0.71 \pm 0.08$  respectively;  $P = 0.87$ ). PAC slightly but significantly decreased a year after procedure ( $-13.6 \pm 6$  pg/ml,  $P = 0.008$ ). Changes in PWV were associated both with decrease of PAC ( $r = 0.562$ ,  $P = 0.04$ ) and office BP levels ( $r = 0.546$ ,  $P = 0.03$ ). There was lack of association between RRI changes, office BP and PAC changes.

**Conclusions:** Effective treatment of resistant hypertension improves vascular stiffness partly through decrease of blood pressure and aldosterone levels. However renal RRI remains mostly unchanged without clear link to BP level and RAAS activity.

#### MEN 2A SYNDROME – A SURPRISING CAUSE FOR SECONDARY HYPERTENSION

R. Mihalcea<sup>1</sup>, C. Homencovschi<sup>1</sup>, O. Naidin<sup>2</sup>, C. Nicolita<sup>1</sup>, R. Siliste<sup>1</sup>, R. Ciomag<sup>1</sup>. <sup>1</sup>Coltea Clinical Hospital, Bucharest, ROMANIA, <sup>2</sup>Carol Davila Nephrology Hospital, Bucharest, ROMANIA

**Objective:** A 52 years old female, diagnosed for 4 years with hypertension, presents in the Emergency Department with headache and BP = 180/110 mmHg. Her past medical history included a LBBB diagnosed for 3 years (the patient denied any chest pain and/or proofs of myocardial ischaemia). Prior to this current presentation she received treatment with Perindopril 5 mg/dy, Trimetazidine 70 mg/dy, Acetylsalicylic acid 75 mg/dy.

**Design and method:** On admission no signs of heart failure, heart rate 80 bpm, BP = 180/110 mmHg (right and left arm).

The patient received treatment with i.v. Furosemide and i.v. Enalapril and as chronic treatment, Amlodipine 5 mg.

The ECG showed NSR with 76bpm and features consistent with LBBB.

Her echocardiogram showed changes consistent with hypertensive cardiomyopathy and paradoxical movement of the interventricular septum (given the presence of LBBB) with an EF of 55% and normal kinetics. Abdominal ultrasound showed normal kidneys and normal velocities in the renal arteries. Thyroid ultrasound showed multiple nodular lesions, findings that indicated polinodular goiter.

Lab tests were unremarkable, with the exception of a slightly increased calcium level, elevated PTH values, in a patient who was never investigated for a secondary etiology for hypertension. Calcitonin levels were normal.

**Results:** We suspected a secondary endocrine etiology for HBP and proceeded to measurements of renin, aldosterone and fractionated plasmatic metanephrens; pheochromocytoma was confirmed by higher levels of metanephrens and nor-metanephrens and also by the presence of a mass in the left adrenal gland at CT-scan. Serum calcium was high with a high PTH and borderline normal vitamin D levels prompted us to take into consideration the diagnosis of primary hyperparathyroidism. Given the presence of primary hyperparathyroidism and pheochromocytoma, even without medullary thyroid carcinoma, we diagnosed a MEN-2a syndrome. The patient received a dose of 2 mg daily of Doxazosin and referred for surgical resection of the adrenal mass, with a good postoperative evolution and no antihypertensive drugs needed.

**Conclusions:** This case is special because of the lack of suggestive symptoms for pheochromocytoma, that postponed the diagnosis; the entire picture is of a complex disease, that has to be properly managed

#### DOES ELEVATED ALDOSTERONE IN OBSTRUCTIVE SLEEP APNOEA REPRESS SURFACTANT PROTEIN-B IN MIDDLE-AGED MALES? A CROSS-SECTIONAL STUDY

A. Abulimiti, N. Li, Q. Luo. Hypertension Institute of Xinjiang, Hypertension Center of People's Hospital Of Xinjiang Uygur Autonomous Region, Urumqi, CHINA

**Objective:** To investigate the association of plasma aldosterone concentration and serum surfactant protein levels in middle-aged males with obstructive sleep apnea (OSA).

**Design and method:** This is a cross-sectional study. A total of 86 middle-aged males with OSA were enrolled (AHI > 5event/hour). Plasma aldosterone concentration (PAC) and surfactant proteins (SPs, including SP-A, B, C and D) were measured. Subjects were divided into two groups, based PAC median as higher (PAC > 15ng/dl, n = 54) and lower (PAC < 15ng/dl, n = 32) groups. Serum concentrations of SPs were compared between groups and the potential association of PAC with key variables was then evaluated by univariate and multiple linear regression analysis.

**Results:** Higher PAC group showed significantly lower serum concentration of SP-B ( $40.10 \pm 5.76$  vs  $43.16 \pm 6.89$  ng/L,  $p = 0.038$ ) compared with lower PAC group, whereas not in that of SP-A, SP-C, or SP-D. Correlation analysis showed that PAC was negatively correlated with serum concentration of SP-B ( $r = -0.361$ ,  $P = 0.043$ ), even after controlling for such co-founders as apnea-hypopnea index via multiple linear regression analysis. No significant difference in the level of was seen between groups.

**Conclusions:** Higher concentrations of PAC might repress synthesis of SP-B in condition of OSA, presented as decreased serum SP-B, which needs further confirmation.

#### ALBUMIN-TO-CREATININE RATIO AND SUBCLINICAL ORGAN DAMAGE IN HYPERTENSIVES

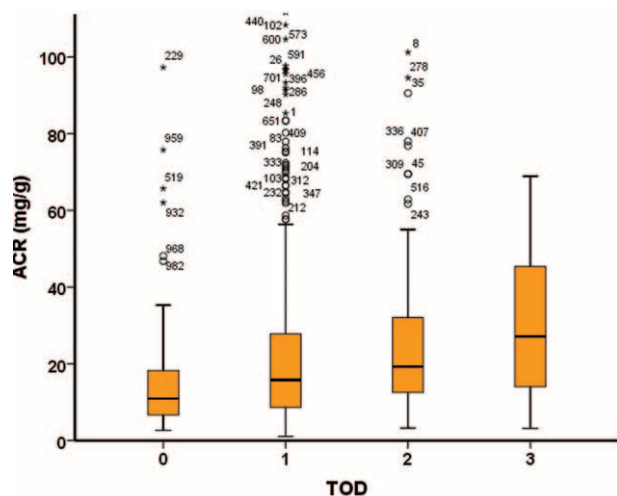
V. Gardikioti, C. Vlachopoulos, D. Terentes-Printzios, E. Sigala, S. Pantou, N. Ioakeimidis, K. Aznaouridis, P. Mitropoulou, G. Christopoulou, D. Tousoulis. First Department of Cardiology, Hippokraton Hospital, Athens Medical School, Athens, GREECE

**Objective:** Hypertension is associated with higher cardiovascular risk as well as several markers of subclinical target organ damage (TOD). Albumin to creatinine ratio (ACR) in urine has been recognised as an independent risk factor for cardiovascular events. We hypothesised that there is a relationship between ACR and markers of TOD in never-treated hypertensives.

**Design and method:** We enrolled 924 consecutive essential hypertensives (mean age  $53 \pm 12$  years, 486 males) without known cardiovascular disease (CVD). Markers of subclinical TOD [left ventricular mass index (LVMI), pulse wave velocity (PWV), ankle-brachial index (ABI) and estimated glomerular filtration rate (eGFR)] were evaluated in all patients. LVMI was assessed echocardiographically using the Devereux formula. Carotid-femoral PWV was estimated with the Complior device. eGFR was calculated by the Cockcroft-Gault formula. Wave reflections were assessed with aortic augmentation index corrected for heart rate (AIx@75). ABI was

calculated by dividing the highest ankle systolic blood pressure by the highest brachial systolic blood pressure. In a 24-hour urine collection, ACR was measured.

**Results:** ACR exhibited significant association with LVMI ( $r=0.277$ ,  $p<0.001$ ), PWV ( $r=0.123$ ,  $p<0.001$ ), ABI ( $r=-0.078$ ,  $p=0.018$ ) and eGFR ( $r=-0.100$ ,  $p=0.002$ ). In further analysis, ACR was associated with TOD as suggested by the 2013 European Guidelines for Hypertension [left ventricular hypertrophy (LVMI  $>115$  g/m<sup>2</sup> in men and  $>95$  g/m<sup>2</sup> in women), increased PWV (PWV  $>10$  m/s), decreased ABI (ABI  $<0.9$ ) and decreased renal function (eGFR  $<60$  ml/min)]. Specifically, ACR exhibited a significant association with the number of TOD and this association was independent of age and gender ( $p<0.05$ , Figure).



**Conclusions:** Our findings support the close relationship between ACR and TOD in hypertension, as well as, the predictive ability of ACR for TOD.

#### A NOVEL REGULATORY EFFECT OF AT1 RECEPTOR-INTERACTING MOLECULE ON VASCULAR SMOOTH MUSCLE CELLS

K. Azuma<sup>1</sup>, T. Taira<sup>2</sup>, K. Tamura<sup>3</sup>, <sup>1</sup>Asamizo Jin Clinic, Sagami-hara, JAPAN, <sup>2</sup>Aobadai jin clinic, Yokohama, JAPAN, <sup>3</sup>Dept. of Cardioresenal Med. Yokohama City Univ. Sch. of Med, Yokohama, JAPAN

**Objective:** Previous studies reported that the production of superoxide is modulated by many factors including Ang II - AT1 receptor signaling. One of the major sources of superoxide in the aorta is NADPH oxidase located in the smooth muscle cells. The NADPH oxidase complex in the vascular smooth muscle cells consists of p22phox, Rac1, and Nox1. Previous studies showed that the carboxy-terminal cytoplasmic domain of AT1 receptor is involved in the control of receptor internalization and in linking receptor-mediated signal transduction to the specific biological response.

**Design and method:** We previously cloned a novel molecule interacting with carboxy-terminal domain of AT1 receptor, which we named ATRAP (for AT1 receptor-associated protein), using the yeast two-hybrid strategy. In this study, we tested the hypothesis that vascular smooth muscle cells express ATRAP and that ATRAP modulates Ang II-induced proliferative activity and oxidative stress in vascular smooth muscle cells. We identified that the ATRAP mRNA and protein were endogenously expressed in VSMC, and found a colocalization of ATRAP and AT1 receptor in Ang II-stimulated VSMC.

**Results:** The results of gain-of-function studies by adenoviral gene transfer demonstrated that overexpression of ATRAP significantly inhibited Ang II-mediated increases in c-fos gene transcription, BrdU incorporation, and mRNAs expression of NADPH oxidase complex ( $p<0.05$ ,  $n=6$ ).

**Conclusions:** These results indicate that ATRAP significantly attenuates Ang II-mediated proliferative activity and oxidative stress in vascular smooth muscle cells, and may suggest a novel strategy to inhibit cardiovascular disease such as arteriosclerosis and hypertension.

#### CIRCADIAN VARIATION OF AORTIC AND BRACHIAL BLOOD PRESSURE IN PERITONEAL DIALYSIS PATIENTS

V. Vaios<sup>1</sup>, P. Georgianos<sup>1</sup>, G. Vareta<sup>1</sup>, A. Papagianni<sup>2</sup>, P. Zebekakis<sup>1</sup>, V. Liakopoulos<sup>1</sup>. <sup>1</sup>Peritoneal Dialysis Unit, 1st Department of Medicine, AHEPA

University Hospital, Thessaloniki, GREECE, <sup>2</sup>Department of Nephrology, Hippokratia University Hospital, Thessaloniki, GREECE

**Objective:** Hypertension among patients on peritoneal dialysis (PD) is common, difficult to diagnose and often poorly controlled. Diagnosis and the overall management of hypertension among these patients are routinely based on brachial blood pressure (BP) recordings taken either in the office or by the patients themselves at home. Studies in the general hypertensive population have shown that aortic pressures are lower, display different circadian variation and are prognostically more informative than brachial BP recordings. However, the circadian patterns and rhythms of aortic pressures in PD patients are unknown. The aim of this study is to evaluate the circadian variation of aortic and brachial BP among patients receiving PD.

**Design and method:** A cross-sectional analysis of 22 consecutive patients on long-term PD (mean age:  $62.7 \pm 15.5$  years; Gender: 16 male and 6 female) who underwent 24-hour brachial and aortic BP monitoring with the Mobil-O-Graph device (IEM, Germany). Herein, we provide a comparative analysis of central aortic versus brachial BP during the 24-hour, day-time and night-time periods.

**Results:** Aortic systolic BP (SBP) was significantly lower than brachial SBP during the 24-hour, day-time and night-time periods (24-hour period:  $118.0 \pm 14.1$  vs  $128.4 \pm 14.6$  mmHg,  $P<0.001$ ; day-time:  $118.9 \pm 13.5$  vs  $129.5 \pm 13.8$  mmHg,  $P<0.001$ ; night-time:  $116.5 \pm 17.3$  vs  $126.4 \pm 18.2$  mmHg,  $P<0.001$ ). Aortic pulse pressure (PP) was also significantly lower than brachial PP during the 24-hour, day-time and night-time periods (24-hour period:  $36.3 \pm 8.4$  vs  $45.2 \pm 9.6$  mmHg,  $P<0.001$ ; day-time:  $35.3 \pm 8.7$  vs  $46.3 \pm 9.5$  mmHg,  $P<0.001$ ; night-time:  $36.9 \pm 9.7$  vs  $44.8 \pm 12.0$  mmHg,  $P<0.001$ ). Aortic-to-brachial PP amplification was higher during day-time than during night-time ( $10.9 \pm 1.7$  vs  $7.9 \pm 1.9$  mmHg,  $P<0.05$ ). A similar pattern was evident when the analysis was performed separately for patients receiving continuous ambulatory PD and automated PD.

**Conclusions:** Ambulatory aortic SBP and PP is by  $\sim 10$  mmHg lower than ambulatory brachial SBP and PP. Additional studies are warranted to elucidate whether ambulatory aortic pressures are superior to brachial BP in detecting the presence of target-organ damage and prognosticating the mortality risk among patients on PD.

#### PRIMARY ALDOSTERONISM IN YOUNG PATIENT WITH RECURRENT RESISTANT HYPERTENSION AFTER SOLITARY ADRENAL ADENOMA SURGICAL RESECTION

M. Gavra<sup>1</sup>, H. Vasiliadi<sup>1</sup>, M. Chertsouk<sup>2</sup>, E. Manou<sup>1</sup>, D. Ravanis<sup>3</sup>, G. Tzatzagou<sup>1</sup>. <sup>1</sup>General peripheral hospital papageorgiou, Thessaloniki, GREECE, <sup>2</sup>National health center of Agios Nikolaos, Chalkidiki, GREECE, <sup>3</sup>Aristotel medical school, Thessaloniki, GREECE

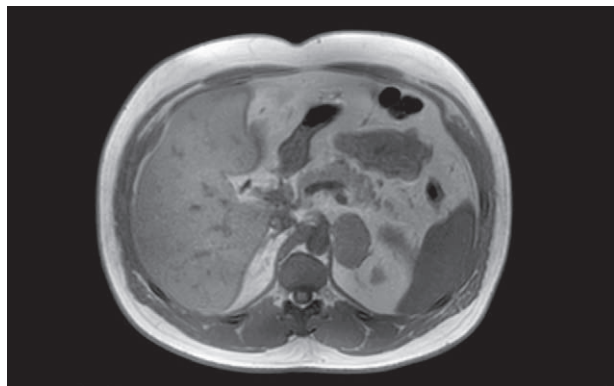
**Objective:** -the diagnostic workup of resistant hypertension in young patients  
-the therapeutic approach of patients with primary aldosteronism due to adrenal adenoma and contra-lateral adrenal hyperplasia  
-the diagnostic workup and reevaluation of aldosteronism recurrence after initial surgical treatment  
-the correlation between recurrent resistant hypertension and primary aldosteronism recurrence.

**Design and method:** A 34-year-old male was referred to our specialized department for second-degree arterial hypertension (mean readings 170/110 mmHg). The physical examination was normal, except his 31 kg/m<sup>2</sup> Body Mass Index. The ECG and cardiac ultrasound had normal findings. Basic laboratory studies were in physiological range. Secondary hypertension diagnostic workup was decided and initial treatment with two neutral antihypertensive agents. Specific hormonal profile revealed a plasma aldosterone (PA) level of 237.9 pg/ml and a plasma renin activity (PRA) of 0.23 ng/ml/h, resulting in a pathological plasma aldosterone/plasma renin activity (PA/PRA) ratio. The saline suppression test revealed a plasma renin activity of 0.02 ng/ml/h and a high plasma aldosterone level of 20.29 pg/ml. The serum levels of dehydroepiandrosterone sulfate, adrenocorticotropin, and cortisol were normal. The suprarenal magnetic resonance imaging illustrated a 46,3 × 31 mm left adrenal adenoma and contralateral adrenal hyperplasia. A surgical intervention was performed with adrenal adenoma enucleation.

**Results:** Postoperatively, the patient remained normotensive for about 14 months. He presented thereafter with a recurrence of resistant hypertension. New basic and hormonal laboratory studies revealed plasma renin activity levels of 0.4 ng/ml/h and plasma aldosterone levels of 381 pg/ml. After saline suppression test, plasma aldosterone levels remained high (163 pg/ml).

The magnetic resonance imaging illustrated a small left adrenal adenoma of 11 mm and constant right adrenal hyperplasia.

The patient was initially treated with 200 mg eplerenone/ day with subsequently dose adjustment to 100 mg/day resulting in mean blood pressure readings of 135/90mmHg and no concurrent hyperkalemia.



**Conclusions:** Primary hyperaldosteronism remains a challenging diagnosis. Unilateral adrenal hyperplasia is statistically rare, as well as the coexistence of contralateral big size adrenal adenoma. In young patients presenting with adrenal adenomas (especially big sized) and concurrent pathological hormonal profile, the surgical treatment is probably required, without however excluding new hormonal control for secondary hypertension in case of hypertension recurrence.

#### RESISTANT HYPERTENSION IN MOOD DISORDERS AND SLEEP DISTURBANCES: FROM THE THEORY TO THE PRACTICE

A. Mazza<sup>1</sup>, A. Armigliato<sup>2</sup>, A.P. Sacco<sup>3</sup>, L. Schiavon<sup>3</sup>, D. Rubello<sup>4</sup>. <sup>1</sup>Hypertension Centre and Dpt. of Medicine, Santa Maria della Misericordia General Hospital, Rovigo, ITALY, <sup>2</sup>Unit of Endocrinology, Dept. of Medicine, Santa Maria della Misericordia General Hospital, Rovigo, ITALY, <sup>3</sup>Dept. of Medicine, Santa Maria della Misericordia General Hospital, Rovigo, ITALY, <sup>4</sup>Nuclear Medicine, Santa Maria della Misericordia General Hospital, Rovigo, ITALY

**Objective:** A relationship between cardiovascular diseases and psychopathological symptoms has been described in the literature. However, few studies have reported mood disorders in patients with resistant hypertension (RH). We discuss a case of RH in a young otherwise healthy woman, and analyse the diagnostic and therapeutic approach followed.

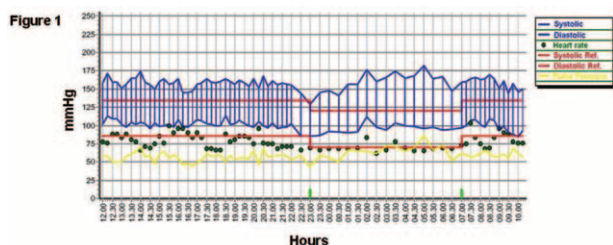
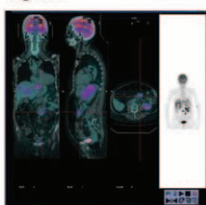


Figure 2



Figure 3



**Design and method:** A 52-year old woman referred to our Centre for hypertension (170/104 mmHg) uncontrolled by 10 mg/day amlodipine, 10 mg/day ramipril, 25 mg/day hydrochlorothiazide and 4 mg/day doxazosin. The 24h-ABPM showed a Reverse-Dipper profile of BP values (Figure 1). She referred a new onset diabetes, a rapid weight gain and new-onset personality disturbance with generalized anxiety, panic disorder, impairment of memory and asthenia for which she had been treated with sertraline 50 mg and alprazolam 1 mg daiy. She also had insomnia and alteration of dreams which became more bizarre and vivid.

Physical examination showed central obesity, supraclavicular fat pads, moon facies with easy bruising and mild hirsutism.

**Results:** Serum cortisol levels at the morning and at the evening and 24h-urinary free cortisol levels were increased (52.7/55.8 mcg/dL and 2450 mg respectively). Hypokalemia (2.6 mEq/L) was also found. A total-body TC scan (Figure 2) revealed a left adrenal gland mass (12 ' 13 ' 7.5 cm on size) and many nodular focal lesions in the liver suspected as replicating forms. A total body FDG-PET/CT scan (Figure 3) showed an increased uptake of the tracer (SUVmax 5.2) in the left adrenal gland with multiple liver metastases. Despite a therapy with ketoconazole and high doses of mitotane, 45 days after the admission the patient died for a cardio-circulatory arrest but autopsy was not performed by explicit family request. The clinical picture was suggestive for a primary adrenocortical carcinoma (ACC).

**Conclusions:** ACC is a rare and aggressive malignant neoplasm often diagnosed at an advanced stage. The combination of Cushing's syndrome is frequently found, but psychopathological symptoms are rare at the onset of ACC. We suggest not to consider as «depressed» and not to treat with antidepressant agents a young hypertensive subject with resistant HT without having ruled out an organic cause of psychiatric disease.

#### ASSESSMENT OF LEFT VENTRICULAR FUNCTION BY GLOBAL LONGITUDINAL STRAIN IN PATIENTS WITH PRIMARY ALDOSTERONISM AND ESSENTIAL HYPERTENSION

R. Holaj, J. Kvasnicka, J. Rosa, O. Petrák, B. Strauch, T. Zelinka, J. Widimský. <sup>1</sup>st Faculty of Medicine, Charles University in Prague and General University Hospital in Prague, Prague, CZECH REPUBLIC

**Objective:** A high level of aldosterone, leads, among others, to store collagen formations in the interstitium between myocardial fibers. Thereby, patients with primary aldosteronism (PA) have increased mass and stiffness of the left ventricle (LV) compared to patients with essential hypertension (EH). The aim of our paper was to evaluate the systolic function of LV in patients with PA compared to patients with EH.

**Design and method:** Echocardiographic examination was performed in 15 men with PA and 21 males with EH (aged 53 ± 8 v.s. 52 ± 8 years, NS). Due to well known sex differences in LV geometry, women were excluded from the analysis. In addition to standard echocardiographic analysis of LV geometry and function, global longitudinal strain (GLS) as a novel index of LV systolic function was evaluated.

**Results:** In patients with PA, significantly higher LV mass (indexed to the 2.7th power of height in meters and to the body surface area in square meters) was detected than in patients with EH (52 ± 7 vs. 43 ± 10 g/m<sup>2.7</sup>, P < 0.05 and 114 ± 15 vs. 99 ± 20 g/m<sup>2</sup>, P < 0.05), although no differences in the values of casual blood pressure between the two groups of patients (150/91 ± 14/8 vs. 145/92 ± 16/7 mmHg; NS, NS). However, differences in values of GLS in both patients groups were not significant (-18 ± 2 vs. -18 ± 2, NS).

**Conclusions:** Our paper did not confirm that aldosterone overproduction leading to LV hypertrophy should contemporary lead to a decrease in LV contractility expressed by the decrease of GLS. The deterioration of LV function in patients with arterial hypertension might be probably caused also by other pathophysiological mechanisms.

#### CHANGES OF BLOOD PRESSURE DURING ORTHOSTATISM AND ITS HEMODYNAMIC PROFILE IN PATIENTS IN DIALYSIS

M. A. Schiavone<sup>1</sup>, C. Castellaro<sup>2</sup>, M. Biain<sup>3</sup>, M. Magenta<sup>3</sup>, G. Laham<sup>3</sup>, C. Calegari<sup>3</sup>, C. Diaz<sup>3</sup>, F. Speranzoni<sup>2</sup>, J. Montagnana<sup>2</sup>, J. C. Pereira Redondo<sup>2</sup>. <sup>1</sup>Faculty of Bio-medical Science, Universidad Austral, Buenos Aires, ARGENTINA, <sup>2</sup>Hypertension Centre, CEMIC, Buenos Aires, ARGENTINA, <sup>3</sup>Renal Unit, CEMIC, Buenos Aires, ARGENTINA

**Objective:** 1- Analyze whether increases/decreases in BP during orthostatism are associated with characteristic hemodynamic profiles at rest.

2-To establish whether increases/decreases in BP during orthostatism are associated with specific hemodynamic changes by standing.

3-Determine independent hemodynamic predictors of orthostatic hypotension and hypertension

**Design and method:** We studied 74 patients within a program of cardiovascular evaluation of patients on dialysis of CEMIC (PRECADIA). BP and hemodynamics were determined by impedance cardiography in the supine position and after the third minute of standing. Patients were classified into 3 groups according to the presence of orthostatic hypotension, orthostatic hypertension and stable behavior of

blood pressure. The hemodynamic variables were analyzed according to: 1- basal conditions and 2-differences (Delta standing-lying), in each of them, according to the pressure changes with standing (ANOVA, Tukey). Independent hemodynamic predictors for orthostatic hypotension and orthostatic hypertension were determined

**Results:** In the supine position, the HypertOrt group was significantly younger ( $p = 0.018$ ), SBP and DBP much lower ( $p = 0.00067$  and  $p = 0.05$ ). I also present significantly less ejection period than the other two groups, accompanied by a tendency to a higher heart rate ( $p = 0.06$ ). The HipotOrt group presented SBP and DBP significantly higher than the other two groups.

Before standing, the HipotOrt group showed a general fall of the Delta-SVRI ( $p = 0.0182$ ). The HypertOrt group, on the other hand, presented a greater increase Delta-SVRI. There were no significant differences in volume changes as well as in heart rate.

In the logistic regressions, SBP turned out to be the only hemodynamic variable predictive of orthostatic hypotension (Odds ratio = 1.0288,  $p = 0.0019$ ). Predictors of orthostatic hypertension were age (OR = 0.922, 95% CI = 0.8669–0.9802) and SBP (OR = 0.958,  $p = 0.0001$ )

**Conclusions:** In basal conditions, patients with orthostatic hypotension showed a typical profile of supine hypertension-orthostatic hypotension, with a fall in vascular resistance during standing, commonly associated with dysautonomia. The orthostatic hypertension group presented a hyperdynamic tendency, with an increased heart rate with a lower ejection period, this associated with a greater increase in resistance during standing. This would justify the increase in blood pressure when standing

## **HYPERTENSION IN PRIMARY GLOMERULONEPHRITIS - REPORT FROM THE CROATIAN REFERRAL CENTRE FOR GLOMERULAR DISEASES**

L. Gellineo<sup>1</sup>, S. Bulimbašić<sup>2</sup>, M. Ćorić<sup>2</sup>, Ž. Dika<sup>3</sup>, A. Jelaković<sup>1</sup>, S. Karanović<sup>3</sup>, L. Katalinić<sup>1</sup>, T. Knežević<sup>1</sup>, M. Laganović<sup>1</sup>, V. Premužić<sup>1</sup>, I. Vuković Brinar<sup>3</sup>, T. Željko Vrkic<sup>1</sup>, B. Jelaković<sup>3</sup>. <sup>1</sup>University Hospital Centre Zagreb, Dept. of Nephrology, Hypertension, Dialysis and Transplantation, Zagreb, CROATIA, <sup>2</sup>School of Medicine, University of Zagreb, University Hospital Centre Zagreb, University Hospital Centre Zagreb, Dept. of Zagreb, CROATIA, <sup>3</sup>School of Medicine, University of Zagreb, University Hospital Centre Zagreb, Dept. of Nephrology, Hypertension, Dialysis, Zagreb, CROATIA

**Objective:** Hypertension (HT) is an important prognostic factor for renal impairment and it accelerates progression of chronic kidney disease (CKD) and vice versa CKD increases blood pressure (BP) and BP prevalence. There are scarce data on prevalence and characteristics of HT in patients with primary glomerulonephritis (PGN) and our aim was to analyse data on HT in this heterogeneous group of patients with renal impairment.

**Design and method:** In these analyses we included 708 subjects with PGN from the Croatian referral centre registry: 195 membranous glomerulopathy (MGN), 136 mesangiolipofibrillar GN (MSGN), 167 IgA nephropathy (IgAN), 154 focal-segmental-glomerulosclerosis (FSGS) and 56 membranoproliferative GN (MPGN). Data were collected from medical records.

**Results:** Prevalence of HT was 44.1%, 60.5%, 63.5%, 66.2% and 81.2% in MSGN, IgAN, MGN, FSGS and MPGN, respectively ( $p < 0.001$ ). MSGN were the youngest, had less CKD  $> 3$ , and had the shortest duration of HT and kidney impairment before the kidney biopsy. MPGN had the highest prevalence of CKD  $> 3$ , and the longest duration of HT before the kidney biopsy. In all PGN HT were older, had more CKD  $> 3$  and longer duration of HT before the kidney biopsy. There was no difference between HT and normotension (NT) in prevalence of obesity and duration of kidney impairment before the kidney biopsy. Significant difference in HT prevalence between patients with CKD  $< 3$  and  $> 3$  was observed in MGN, MSGN, IgAN, FSGS and MPGN (54.8% vs. 72.2%; 38.6% vs. 65.5%; 43% vs. 82.2%; 54.7% vs. 77.3%; 66.6% vs. 82.8%). We failed to find differences in HT prevalence among PGN when we analyzed only PGN with CKD  $> 3$  ( $p > 0.05$ ). However, in the subgroup with CKD  $< 3$  HT prevalence was significantly lower in IgAN and MSGN compared to MGN, FSGS and MPGN ( $p = 0.01$ ).

**Conclusions:** Age, CKD  $> 3$  and duration of HT before kidney biopsy are the most important determinants of HT in PGN at the time of kidney biopsy. In the subgroup of patients with CKD  $< 3$  observed higher prevalence of HT in MGN, FSGS and MPGN vs. IgAN and MSGN could be explained with differences in pathology and pathophysiology.

## **BLOOD PRESSURE BALANCE IN CHRONIC KIDNEY DISEASE**

M. Mars, K. Kammoun, R. Guesmi, H. Chaker, H. Mahfoudh, Y. Chaabouni, S. Yaich, M. Kharrat, M. Ben Hmida, F. Jarraya, J. Hachicha. *Nephrology department, Renal pathology unit UR12ES14, Hedi Chaker Hospital, Sfax, TUNISIA*

**Objective:** Hypertension is common in chronic kidney disease (CKD) and is a major determinant of CKD progression. Ambulatory blood pressure monitoring (ABPM) has been proposed as a better method to evaluate blood pressure (BP) in real life conditions. The objective of our study is to better specify the characteristics of ABPM in patients with CKD compared to the rest of the hypertensive population.

**Design and method:** We conducted a retrospective study including all patients who benefited from an ABPM between January 2014 and June 2017. The CKD was established based on the definitions of KDIGO 2012. We divided our patients into 2 groups: G1: patients with CKD and G2: patients without CKD. The comparison between the 2 groups was carried out by Chi-square test and one factor ANOVA.

**Results:** The study included 241 cases with a sex ratio of 0.84. The prevalence of CKD was 81% including 33 % stage 2, 56 % stage 3; 10 % stage 4 and 1% stage 5. Patients with CKD were older ( $55 \pm 16$  years vs  $42 \pm 15$  years;  $p < 0.001$ ). There were no significant difference regarding sex ( $p = 0.07$ ) and body mass index ( $p = 0.06$ ). The mean blood pressure (BP) in consultation was 157/85 (G1) and 145/ 86 (G2) ( $p = 0.03$ ;  $p = 0.5$ ). The indications of ABPM were different in the two groups: unbalanced hypertension (G1: 67%, G2: 37.5%), borderline hypertension (G1: 13.4%, G2: 22.5 % (G1: 1.7%, G2: 3%) and the search for masked hypertension (G1: 20%, 40%) with a significant difference ( $p = 0.002$ ). In the ABPM, there was no difference in systolic and diastolic BP, whereas the difference was significant comparing patients having stages 4 and 5 CKD with other patients (149/82 vs 136 /78;  $p = 0.016$ ;  $p = 0.3$ ). The mean number of antihypertensive drugs was greater in the presence of CKD ( $1.8 \pm 1.3$  vs  $0.8 \pm 0.9$ ;  $p < 0.001$ ).

**Conclusions:** BP should be monitored closely in hypertensive patients with CKD. ABPM seems to be the appropriate method in detecting hypertension and monitoring adequacy of treatment in patients with CKD.

## **INSULINE RESISTANCE AND CHRONIC RENAL DISEASE IN A HYPERTENSIVE POPULATION**

L. Vigil, R. Garcia Carretero, C. Rodriguez Castro, A. Colas, B. Vargas, M. Lopez Jimenez, M. Varela. *Hospital Universitario de Móstoles, Móstoles, SPAIN*

**Objective:** Both insulin resistance (IR) and metabolic syndrome (MS) has been related with the presence or the development of chronic renal disease (CRD). Our aim was to analyse this association in a hypertensive population.

**Design and method:** Prospective, observational study conducted in a Hypertension Unit. We defined MS by ATP-III criteria, IR as the presence of a HOMA-index  $> 75\%$  percentile (4.4) and the presence of CRD as an eGFR (EPI-creatinine equation)  $< 60$  ml/min /1.73m<sup>2</sup> and /or the presence of albuminuria ( $< 30$  mg/gr. creatinine, average of two consecutive days samples).

**Results:** We include 773 patients (50.8% males) with a mean age of 54 years. 54.7% had MS. 64% of the patients with MS presented IR and just 8.5% had IR without MS. 21% had CRD: 11.9% with albuminuria, 9.1% with eGFR  $< 60$  ml/min/1.73 m<sup>2</sup> and 2.5% with both criteria. In univariate analysis the presence of CRD was associated with MS (28% vs. 18%,  $p = 0.05$ ) and with IR (29% vs. 22%,  $p = 0.05$ ). In multivariate analysis (logistic regression), including in a first model the MS and IR and adjusted by sex and age, the MS but no IR was associated with the presence of CRD (OR = 1.63,  $p = 0.014$ ). In a second model, including as variables all the defining MS-criteria and adjusted as well by sex and age, the presence of CRD was independently associated with the abdominal circumference (OR = 1.020,  $p = 0.023$ ), HDL-cholesterol (OR = 0.980,  $p = 0.016$ ) and SBP (OR = 1.012,  $p = 0.039$ ). In this last model just the HOMA-index was independently associated with a eGFR  $< 60$  ml/min/1.73 m<sup>2</sup> (OR = 1.064,  $p = 0.042$ ) whereas the presence of albuminuria was associated with the abdominal circumference (OR = 1.022,  $p = 0.028$ ), HDL-cholesterol (OR = 0.976,  $p = 0.022$ ) and SBP (OR = 1.020,  $p = 0.002$ ).

**Conclusions:** In our hypertensive patients the simultaneous presence of MS and IR was frequent, resulting scanty the presence of IR without MS. An decreased eGFR was independently associated with HOMA-index and the presence of albuminuria with several components of MS. So, HOMA-index measurement can be an useful tool in the evaluation of renal prognosis of these patients.

## **PROGNOSTIC SIGNIFICANCE OF DIFFERENT BLOOD PRESSURE MEASUREMENT METHODS IN KIDNEY TRANSPLANT RECIPIENTS**

Z. Kendi Celebi<sup>1</sup>, S. Kutlay<sup>1</sup>, S. Turhan<sup>2</sup>, S. Erturk<sup>1</sup>, K. Keven<sup>1</sup>, S. Sengul<sup>1</sup>. <sup>1</sup>Ankara University School of Medicine Nephrology Department, Ankara, TURKEY, <sup>2</sup>Ankara University School of Medicine Cardiology Department, Ankara, TURKEY

**Objective:** Cardiovascular (CV) mortality in renal transplant recipients decreases compared to dialysis patients, but is still the most important cause of patient loss. In addition to traditional CV risk factors, the use of immunosuppressive drugs and high blood pressure (BP) increase cardiac mortality in these patients compared to normal population. The role of home, office, or ambulatory blood pressure monitoring (ABPM) in predicting CV risk and graft function in these patients is not known. In this study, we aimed to investigate the 3-year prognostic significance of these blood pressure measurement methods.

**Design and method:** We studied patients who were followed up at the Transplantation Unit of Ankara University Faculty of Medicine and who were on maintenance immunosuppressive medication for at least 6 months after renal transplantation. Patients' office, home and ABPM, Pulse wave velocity (PWV), echocardiographic measurements, age, sex, drug use and biochemical parameters were recorded. All patients were followed for 3 years for CV event, graft survival and graft function.

**Results:** 48 patients were enrolled at the study. After 3 year follow-up, 8 patients had CV event (NSTEMI-3, coronary artery bypass surgery -1, atrial fibrillation-2, sudden cardiac death-1, thoracic aortic aneurysm-1), 5 patients developed graft loss (B cell mediated acute rejection-2, chronic allograft nephropathy-1, patient loss-2) and 2 patients died (PTLD-1, sudden cardiac death-1). Significant compliance was observed between home, office, and ABPM (ICC systolic = 0.809, ICC diastolic = 0.795). Left ventricular mass index (LVMI) showed a positive correlation with home-office systolic BP and mean systolic and diastolic BP at ABPM. PWV showed a positive correlation with home-office-ABPM systolic BP. There was also a positive correlation between PWV and LVMI ( $p = 0.006, r = 0.435$ ). Blood pressure measurements, patient characteristics and risk factors are given in Table.

**Conclusions:** In this study, we found that the measurements of office, home and ambulatory blood pressures were correlated in renal transplant recipients. Lower nighttime diastolic BP with ABPM was independent risk factor for CV event and higher mean diastolic BP with ABPM was independent risk factor for graft loss. Long-term follow-up with more number of patients will better demonstrate the role of the ABPM in this high risk patient group.

Table 1. Blood pressure measurements and patient characteristics

Parameter	CV event (+) n=8	CV event (-) n=40	p	Graft loss (+) n=5	Graft loss (-) n=43	p
Gender (F / M)	3/5	21/19	0.701	3/2	21/22	0.005
Age (mean $\pm$ SD)	50 $\pm$ 11	44 $\pm$ 11	0.171	46 $\pm$ 8	45 $\pm$ 11	0.936
Living or cadaveric donor (n)	6/2	27/13	0.676	5/0	28/5	0.167
Diabetes Mellitus (n, %)	4/4	1/39	0.002	3/3	3/40	0.077
Hypertension (n, %)	7/1	23/37	0.110	3/2	27/16	0.005
Hyperlipidemia (n, %)	4/4	3/17	0.002	1/4	6/37	0.562
History of heart disease (n, %)	3/5	3/37	0.019	0/5	6/37	0.372
Posttransplant follow-up period (months) (mean $\pm$ SD)	52 $\pm$ 68	54 $\pm$ 55	0.347	50 $\pm$ 51	54 $\pm$ 57	0.974
PWV (m/s) (mean $\pm$ SD)	9.4 $\pm$ 1.8	7.9 $\pm$ 1.6	0.164	8.9 $\pm$ 1.4	8.1 $\pm$ 1.8	0.736
eGFR (ml/min/1.73m <sup>2</sup> ) (mean $\pm$ SD)	71 $\pm$ 18	78 $\pm$ 24	0.456	52 $\pm$ 17	79 $\pm$ 22	0.013
Office SBP (mmHg) (mean $\pm$ SD)	126 $\pm$ 25	122 $\pm$ 17	0.571	123 $\pm$ 15	121 $\pm$ 11	0.415
Office DBP (mmHg) (mean $\pm$ SD)	78 $\pm$ 4	81 $\pm$ 11	0.453	82 $\pm$ 7	81 $\pm$ 10	0.764
Home mean SBP mmHg (mean $\pm$ SD)	125 $\pm$ 17	118 $\pm$ 12	0.943	122 $\pm$ 7	121 $\pm$ 13	0.890
Home daytime SBP mmHg (mean $\pm$ SD)	119 $\pm$ 4	121 $\pm$ 13	0.773	124 $\pm$ 9	120 $\pm$ 13	0.560
Home nighttime SBP (mean $\pm$ SD)	121 $\pm$ 15	121 $\pm$ 12	0.899	119 $\pm$ 6	122 $\pm$ 13	0.743
Home mean DBP (mean $\pm$ SD)	75 $\pm$ 7	81 $\pm$ 7	0.06	85 $\pm$ 6	80 $\pm$ 8	0.167
Home daytime DBP (mean $\pm$ SD)	76 $\pm$ 9	82 $\pm$ 9	0.145	86 $\pm$ 9	80 $\pm$ 8	0.167
Home nighttime DBP (mean $\pm$ SD)	74 $\pm$ 8	81 $\pm$ 7	0.033	82 $\pm$ 5	79 $\pm$ 8	0.502
ABPM mean SBP (mean $\pm$ SD)	120 $\pm$ 12	122 $\pm$ 11	0.796	123 $\pm$ 15	121 $\pm$ 11	0.726
ABPM daytime SBP (mean $\pm$ SD)	122 $\pm$ 11	123 $\pm$ 12	0.765	124 $\pm$ 20	123 $\pm$ 11	0.784
ABPM nighttime SBP (mean $\pm$ SD)	118 $\pm$ 14	120 $\pm$ 12	0.748	123 $\pm$ 11	119 $\pm$ 12	0.602
ABPM mean DBP (mean $\pm$ SD)	76 $\pm$ 3	82 $\pm$ 8	0.044	87 $\pm$ 8	80 $\pm$ 5	0.129
ABPM daytime DBP (mean $\pm$ SD)	78 $\pm$ 4	84 $\pm$ 9	0.083	87 $\pm$ 5	83 $\pm$ 9	0.142
ABPM nighttime DBP (mean $\pm$ SD)	73 $\pm$ 5	80 $\pm$ 9	0.045	85 $\pm$ 10	78 $\pm$ 8	0.148
LVMI (mean $\pm$ SD)	118 $\pm$ 21	105 $\pm$ 25	0.261	106 $\pm$ 19	107 $\pm$ 25	0.898

eGFR, estimated glomerular filtration rate; ABPM, ambulatory blood pressure monitoring; SBP, systolic blood pressure; DBP, diastolic blood pressure; LVMI, left ventricular mass index

Table 2 Cox regression analysis for predicting cardiovascular event development and graft loss.

CV Event	B	p	Hazard ratio	95% CI
ABPM nighttime DBP	-0.337	0.002	0.714	0.579-0.880
LVMI	0.073	0.004	1.075	1.024-1.129
Graft loss				
ABPM mean DBP	-0.133	0.048	1.142	1.001-1.303

## GENETIC VARIATION IN THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM AND RENAL SURVIVAL IN JAPANESE PATIENTS WITH DIABETIC NEPHROPATHY

Y. Makino, T. Konoshita, M. Fujii. Third Department of Internal Medicine, Fukui University School of Medicine, Eiheiji, JAPAN

**Objective:** Genetic polymorphisms of the renin-angiotensin-aldosterone system (RAAS) may play a pivotal role in the development and progression of diabetic nephropathy. Therefore, we aimed to investigate whether genetic variation in the RAAS is related to renal survival in patients with diabetic nephropathy.

**Design and method:** We enrolled 246 Japanese patients with diabetic nephropathy who consulted nephrologists in our hospital between January 1995 and December 2010. One hundred and fifty-three (62.2%) patients progressed to end stage renal disease (ESRD) at an average age of 63.8 years. We estimated the association between 5 polymorphisms of RAAS and cumulative renal survival. We investigated the following genetic polymorphisms: renin enhancer region (REN) C-5312T, angiotensinogen M235T, angiotensin converting enzyme (ACE) insertion/deletion, angiotensin II type I receptor A1166C, and aldosterone synthase CYP 11B2 C-344T. We used cumulative survival analysis using the Kaplan-Meier method with the log-rank test for statistical analysis of the time course of progression to ESRD.

**Results:** Cumulative renal survival in diabetic nephropathy was significantly lower in those with the DD/DI genotype of the ACE I/D polymorphism (log-rank,  $P = 0.038$ ;  $X^2 = 4.298$ ). There was no association between cumulative survival and the REN C-5312T, M235T, A1166C, and C-344T polymorphisms.

**Conclusions:** The ACE I/D polymorphism may play a role in diabetic nephropathy progression in that it may directly affect prognosis in these patients.

## VALUE OF PLASMA RENIN ACTIVITY CHANGES WITH DIFFERENT POSTURE ON IDENTIFICATION OF PRIMARY ALDOSTERONISM

M. Wang, Q. Luo, N. Li. Hypertension Institute of Xinjiang, Hypertension Center of People's Hospital Of Xinjiang Uygur Autonomous Region, Urumqi, CHINA

**Objective:** The aim of this study was to evaluate the diagnostic ability of primary aldosteronism (PA) via observing the changes of primary renin activity (PRA) with postural variation in hypertensive patients.

**Design and method:** 307 in-patients have finished the detection of PRA, aldosterone level on basal sitting posture and after 2 hours on upright, sitting and supine posture, and collection of other biochemistry measurements. PA group was defined according to aldosterone/renin activity ratio  $> 20 \text{ ng/dL [ng/(mL.h)]-1}$  and plasma aldosterone concentration  $> 10 \text{ ng/dL}$  after saline infusion test, remains were named as no-PA group. Related parameters were calculated to show the sensitivity and specificity, and so on.

**Results:** In PA group, the level of PRA upright, sitting, supine  $[0.61(0.30, 1.24) \text{ ng/(mL.h)}, 0.62(0.24, 1.17) \text{ ng/(mL.h)}, 0.31(0.19, 0.50) \text{ ng/(mL.h)}]$  was lower than that  $[1.42(0.51, 1.42) \text{ ng/(mL.h)}, 1.18(0.50, 2.54) \text{ ng/(mL.h)}, 0.51(0.27, 1.12) \text{ ng/(mL.h)}]$  in no-PA group, and the difference was statistically significant  $[F = 11.465, 12.052, 10.296, P = 0.001]$ . The level of PRA upright-PRA supine  $[0.24(0.11, 0.69) \text{ ng/(mL.h)}]$  in PA group was lower than that  $[0.78(0.26, 1.76) \text{ ng/(mL.h)}]$  in no-PA group, and the difference was statistically significant  $[F = 8.303, P = 0.004]$ . The sensitivity of PRA upright  $< 1.0 \text{ ng/(mL.h)}$  or PRA upright-PRA supine  $< 0.6 \text{ ng/(mL.h)}$  to diagnose PA were respectively 64% and 70%; the specificity of that were 62% and 68%; the negative predictive values were 91% and 93%, respectively. Using PRA upright  $< 1.0 \text{ ng/(mL.h)}$  and PRA upright-PRA supine  $< 0.6 \text{ ng/(mL.h)}$  as diagnostic criterion of PA, the sensitivity and specificity are 45% and 88%, respectively.

**Conclusions:** There is a low efficacy using the changes of PRA via posture alteration as a diagnostic standard, but it's brief and safe, it can provide some referenced information to doctors on the identification of PA.

## UNILATERAL STENTING OF RENAL ARTERY STENOSIS IN A PATIENT UNDERGOING HEMODIALYSIS TREATMENT IMPROVES RENAL FUNCTION AND DECREASES BLOOD PRESSURE – EIGHT YEARS LONG-TERM RESULTS

C.L. Neumann, E.G. Schulz. Nephrologisches Zentrum Göttingen GbR, Göttingen, GERMANY

**Objective:** The therapeutic procedure for the treatment of atherosclerotic renal artery stenosis is subject to controversy. Current guidelines however stipulate a consistent screening for indications of secondary hypertension.

**Design and method:** Case history: Female patient, 81 years old, blood pressure measured in practice: 130/70 mmHg, impaired general condition, lower leg edema, over the course of 6 months increasing uremia. 1998 Initial diagnosis of coronary heart disease, 1999 Initial diagnosis of hypertensive nephrosclerosis. Regular- and color-coded duplex-sonography of the kidneys: Left: Cirrhosis of the kidney, no flow signal. Right: 9.4 cm  $\times$  4.5 cm  $\times$  5.0 cm. Due to uremia initiation of hemodialysis treatment via implanted Demers-Catheter.

**Intervention/angiography:** Filiform, severely calcified ostial stenosis of right renal artery, functional subtotal occlusion. Profound ostial stenosis and cirrhosis

of left kidney. Blood pressure 190/105 mmHg. Multiple percutaneous transluminal catheter angioplasty/ cutting balloon intervention. Subsequent bare metal stent implantation (Liberte 5.0 mm × 16 mm), followed by immediate high-pressure post-dilatation. Post interventional abrupt drop in blood pressure to high-normal values.

**Results:** After three weeks hemodialysis treatments, therapy could be discontinued. After two years blood tests still provide stable laboratory values in the asymptomatic patient. Patient was free of symptoms. The required antihypertensives intake was significantly reduced (4-fold, mid-dose after one year and 3-fold mid-dose after two years) while maintaining optimal blood-pressure values. Color-coded duplex-sonography confirmed excellent perfusion of right kidney consistently over the course of one year and even eight years after dilatation. Even after eight years serum-creatinine is 1.2 mg/dl.

Tab.1 Laboratory values

Time point pre/post PTA	Pre	1 week post under HD	2 weeks post under HD	4 weeks post without HD	8 weeks post without HD	1 year post without HD	2 years post without HD	8 years post without HD
Serum creatinine (mg/dl)	3.8	1.4	1.5	1.6	1.0	1.0	1.3	1.2
Serum urea (mg/dl)	214	78	72	83	49	44	47	49
Uric acid (mg/dl)	10.7	7.1	6.7	8.2	6.3	6.3	6.7	6.6
Potassium (mmol/l)	5.2	4.2	4.3	3.6	3.6	4.1	4.0	4.0
Sodium (mmol/l)	139	131	127	130	133	135	142	143
Phosphate (mmol/l)	1.65	1.49	1.52	1.33	1.07	1.1	1.0	1.03
Hemoglobin (g/dl)	14.0	10.1	10.2	11.5	12.3	14.3	15.7	15.9
Parathormon intact (ng/l)	223			29	33.6			59
Cystatin C (mg/l)			1.87	2.14	1.34	1.52	1.68	1.68

Tab.2 Duplex parameters pre and post intervention right kidney (left kidney without flow signals)

Time point pre/post PTA	pre	4 weeks post	8 months post	2 years post	8 years post
Parachymal RI	0.4	0.8	0.76	0.79	0.78
Segmental RI	0.64	0.81	0.74	0.77	0.82
Segmental Vmax (cm/sec)	17.5	41.3	37.4	57.3	25.94
Segmental acceleration time (cm/m <sup>2</sup> )	255	645	632	rapid acc.	rapid acc.
Hilus RI	0.59	0.81	0.77	0.77	0.85
HILUS Vmax (cm/sec)	24.8	81.5	51.0	63.9	37.90

**Conclusions:** Our case confirms importance of a patient-centered, individual decision for or against interventional treatment of atherosclerotic renal artery stenosis. Here, both reduction of blood pressure and preservation of renal function have to be considered. On left handside cirrhosis of the kidney was diagnosed (< 8 cm) with a complete absence of perfusion signal. On contrary, parameters of right kidney (> 9 cm, Parenchyma-RI < 0.8) allowed hemodynamic as well as functional success of an intervention to be expected.

After eight years there are good results after intervention. Blood pressure is well controlled under reduced medication, dialysis is still not become necessary.

## ALTERED HRT AND ABPM IN MENOPAUSAL WOMAN

M. Stojanovic<sup>1</sup>, M. Ivovic<sup>1</sup>, M. Tancic<sup>1</sup>, M. Miletic<sup>1</sup>, L. Marina<sup>1</sup>, Z. Arizanovic<sup>1</sup>, S. Vujovic<sup>1</sup>, M. Stojkovic<sup>1</sup>, B. Beleslin<sup>1</sup>, J. Ciric<sup>1</sup>, M. Zarkovic<sup>1</sup>, V. Stojanov<sup>1</sup>, N. Radivojevic<sup>1</sup>, M. Marjanovic<sup>1</sup>, L. Lukic<sup>1</sup>, D. Lovic<sup>2</sup>, B. Parapid<sup>1</sup>. <sup>1</sup>Clinical Centre of Serbia, Belgrade, SERBIA, <sup>2</sup>Hypertension center Serbia, Nis, SERBIA

**Objective:** A 49-year-old female, presents with a complaint of “haven’t sleep well for years”. For the last three years, she noticed higher BP (blood pressure) despite taking beta blocker (BB). She also noticed that some nights she wakes up sweating. She reports being more tired and with difficulty concentrating at work. **MEDICAL HISTORY** Hypertension. Tobacco: smoking 8 cigarettes/day for 26 years. EtOH: 2–3 glasses of wine/week. Last menstrual period 2 years ago. **MEDICATION** BB once/day for hypertension. **PSYCHIATRIC HISTORY** No.

**SOCIAL HISTORY** Lives with a supportive husband. No pets. **FAMILY HISTORY** Mother 76 y.o. with history of hypertension.

**Design and method:** **PHYSICAL EXAM** Height = 172 Weight = 63. Ambulatory blood pressure monitoring (Meditech ABPM05) find mean daytime 138/87 mmHg P 76/min. Mean night-time 122/73 mmHg P 62/min. **LABORATORY** FSH = 44 LH = 34 IU/L Estrogen = 40 pmol/L

**Results:** **CLINICAL COURSE** Trisequens (estradiol-norethisteron) was recommend to alleviate her menopause-related symptoms. Patient developed increased dysphoria during the second month of treatment. After three months Trisequens was discontinued. At the time the Trisequens was discontinued, ABPM was performed for a second time and find slightly lower blood pressure values. Mean daytime 137/86 mmHg P 76/min. Mean night-time 120/72 mmHg P 62/min. **NEXT TRIAL** includes estradiol and drospirenone combined therapy (Angelique). **FOLLOW-UP** After six months on Angelique she noticed significant improvement of her vasomotor symptoms and her sleeping pattern. ABPM was performed yet again and find significantly lower BP values when compared with the first ABPM done before she starts taking Trisequens. Mean daytime 133/82 mmHg P 76/min. Mean night-time 116/66 mmHg P 58/min.

**Conclusions:** When adequate hormone replacement therapy is prescribed, ambulatory blood pressure monitoring confirm good regulation of blood pressure.

## HYPERTENSIVE EMERGENCY IN A DIALYSIS PATIENT

K. Zerva<sup>1</sup>, D. Papadopoulos<sup>1</sup>, G. Anastasiadis<sup>1</sup>, E. Sanidas<sup>1</sup>, C. Melexopoulou<sup>2</sup>, J. Boletis<sup>2</sup>, J. Barbetseas<sup>1</sup>. <sup>1</sup>ESH Excellent Center of Hypertension, Cardiology Department, Laiko University Hospital, Athens, GREECE, <sup>2</sup>Nephrology Department and Renal Transplantation Unit, Laiko University Hospital, Athens, GREECE

**Objective:** We present o clinical case of a patient in dialysis with a hypertensive emergency crisis, resistant in treatment.

**Design and method:** A 67 year old woman was presented in the emergency department with shortness of breath, vomiting, headache and dizziness. Her clinical examination revealed moderate dyspnea with bilateral rales, disorientation, reduced muscle strength in the left arm and leg and positive Barre sign. Her Systolic Blood Pressure was 240 mmHg and her Diastolic Blood Pressure was 120mmHg. Her medical history included chronic renal failure, in dialysis during the last 6 years, due to diabetic and hypertensive renal disease. A cranial computed tomography was performed with no signs of stroke or hemorrhage. The patient was classified as having a hypertensive emergency and was admitted in the cardiological intensive care unit. She was treated with intravenous glyceryl trinitrate up to the maximum dose of 0,2 mg/min for more than 30 minutes and intravenous esmolol without adequate control of the blood pressure and any clinical improvement. A combined medical council of nephrologists and cardiologists was held, in which the admission of intravenous nitroprusside of reduced dosage and under strict monitoring was decided.

**Results:** The patient showed a rapid clinical improvement and a fall in her blood pressure up to 170/100 mmHg. She was monitored for 24 hours and was released from the hospital with instruction for a different, more potent, regular medical treatment.

**Conclusions:** Discussion: Hypertensive emergencies are a clinical entity that requires particular alertness when treating dialysis patients. Pathophysiology includes a variety of mechanisms, such as increased vascular resistance, activation of the renin-angiotensin-aldosterone axis and hyperparathyroidism. Addressing hypertensive crises remains a matter of great importance in these patients. Administration of sodium nitroprusside remains a highly effective option, which can be done with careful monitoring of patients with end-stage renal failure.

# POSTER SESSION

## POSTERS' SESSION PS27:

### METABOLIC DISORDERS AND SLEEP APNOEA

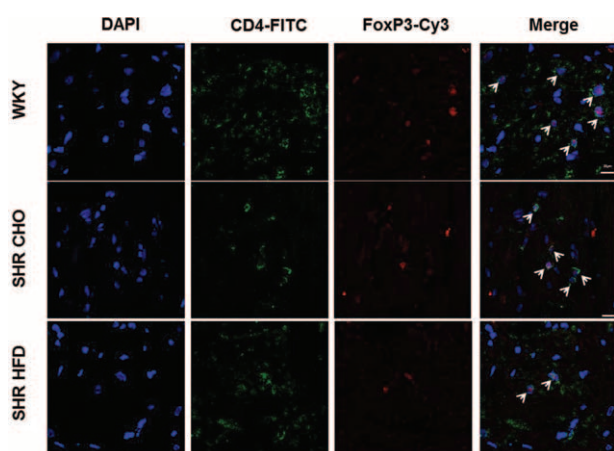
#### HIGH FAT DIET DOWNREGULATES REGULATORY T CELLS IN THE MYOCARDIUM OF SPONTANEOUS HYPERTENSIVE RATS

S.H. Ihm, S. Hong, K. Chang, *Division of Cardiology, The Catholic University of Korea, Seoul, SOUTH KOREA*

**Objective:** Obesity induced myocardial fibrosis may lead to diastolic dysfunction and ultimate heart failure. Cardiac inflammation may play a pivotal role in the pathogenesis of obesity-induced myocardial fibrosis. Regulatory T cells (Tregs) play an important role in cardiovascular complications and inflammatory action with the immune response. However, the role of Tregs and its associated anti-inflammation in obesity-induced myocardial fibrosis has not been elucidated to date. Therefore, we investigated whether high fat diet suppresses Tregs activation in the myocardium of spontaneously hypertensive rats (SHRs), which aggregates myocardial fibrosis.

**Design and method:** We assessed the extent of Tregs response and fibrosis in the myocardium. Eight-week-old male SHRs were fed to either high-fat diet (HFD) or control diet (CHO) groups for 12 weeks. We measured Tregs (CD4+FoxP3+) in the heart and mediastinal lymph nodes (LNs). In addition, the CD4 and FoxP3 antigens were used in the immunofluorescence microscopy of Tregs in the heart tissues.

**Results:** The flow cytometry analysis confirmed that the SHR-HFD exhibited a decreased Tregs compared with that of the WKY in the heart and mediastinal LNs. In contrast, the SHR-CHO exhibited an increased Tregs compared to that of the SHR-HFD in the heart. Furthermore, SHR-CHO slightly increased the Foxp3+ compared with that of the SHR-HFD in the mediastinal LNs. In the heart, dual staining for the Treg population was increased more in the SHR-CHO than it was in the SHR-HFD rats.



In line with these findings, SHR-HFD significantly exacerbated myocardial fibrosis.

**Conclusions:** We found that diet-induced obesity typically showed an exacerbated myocardial fibrosis and down-regulation of Tregs pathway in the heart and mediastinal LNs. Therefore, we suggest that the up-regulation of Tregs may be a promising therapeutic approach to preventing obesity induced heart failure.

#### THE PROGNOSTIC VALUE OF ARTERIAL STIFFNESS AT HYPERTENSIVE PATIENTS WITH OR WITHOUT DIABETES MELLITUS

A. Gavrilă, *Cardinvest Medical Office, Craiova, ROMANIA*

**Objective:** The objective of the study was to estimate how the arterial stiffness (AS) correlates with cardiovascular and renal events at hypertensive patients (pts) with or without diabetes mellitus (DM).

**Design and method:** 40 hypertensive pts (mean age = 59.5 ± 7.4 years, 52.5% males) group1 and 40 hypertensive pts with DM, matched for age and sex (mean age = 61.3 ± 6.8 years, 55% males) group2. AS was evaluated by measuring carotid-femoral pulse wave velocity (PWV) using SphygmoCor system. PWV greater than 10 m/s was considered abnormal. All pts were evaluated during one year in order to detect the following complications: unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI), ischemic stroke (IS), renal dysfunction (RD); microalbuminuria, proteinuria, chronic kidney disease.

**Results:** In group1, 24 pts (60%) had increased PWV: 10.7 ± 0.3 m/s. In group2, 27 pts (67.5%) had increased PWV: 11.1 ± 0.4 m/s. The difference is not significantly statistic between the two groups (p = 0.07). In group1, UA was significantly associated with increased PWV (10.4 ± 0.3 m/s vs 7.8 ± 0.5 m/s, p = 0.02). In the same group, RD was found in a significantly higher proportion at pts with increased PWV (10.9 ± 0.4 m/s vs 7.3 ± 0.7 m/s, p = 0.01). In group2, UA was also significantly associated with increased PWV (11.6 ± 0.4 m/s vs 8.1 ± 0.5 m/s, p = 0.02). RD was significantly more frequent at pts with increased PWV (12.2 ± 0.4 m/s vs 7.9 ± 0.6 m/s, p = 0.001). In the same group, NSTEMI was found in a significantly higher proportion at pts with increased PWV (11.7 ± 0.3 m/s vs 8.5 ± 0.4 m/s, p = 0.02). For IS, the difference is not significantly statistic (11.5 ± 0.4 m/s vs 9.7 ± 0.6 m/s, p = 0.06).

**Conclusions:** Hypertensive pts with DM have increased AS in a higher, but not significant proportion than hypertensive pts without DM. Increased AS seems to predict a worse mid term outcome (one year) concerning cardiovascular and renal events at hypertensive pts, especially with DM. Moreover, increased AS appears to have more powerful mid term prognostic value for incidence of acute coronary syndromes without ST-segment elevation at hypertensive pts with DM.

#### DOES THE PRESENCE OF ARTERIAL HYPERTENSION INFLUENCE THE PRESCRIPTION OF ANTIPLATELET DRUGS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS?

C. Diaconu<sup>1</sup>, M. Gaman<sup>2</sup>, E. Dobrica<sup>3</sup>, M. Cozma<sup>3</sup>, G. Dediu<sup>4</sup>, A. Gaman<sup>5</sup>, A. Arsene<sup>6</sup>, C. Dragoi<sup>6</sup>, A. Nicolae<sup>6</sup>, B. Velescu<sup>6</sup>, B. Paraschiv<sup>7</sup>, R. Tincu<sup>8</sup>, M. Iancu<sup>9</sup>. <sup>1</sup>Carol Davila University of Medicine and Pharmacy, Internal Medicine Department, Clinical Emergency Hospital of Bucharest, Bucharest, ROMANIA, <sup>2</sup>Carol Davila University of Medicine and Pharmacy, Facoltà/Scuola di Medicina e Chirurgia, Università degli Studi di Bari, Bucharest, ROMANIA, <sup>3</sup>Carol Davila University of Medicine and Pharmacy, Bucharest, ROMANIA, <sup>4</sup>Carol Davila University of Medicine and Pharmacy, Internal Medicine Department, Clinical Emergency Hospital Sf. Ioan, Bucharest, ROMANIA, <sup>5</sup>University of Medicine and Pharmacy of Craiova, Department of Hematology, Filantropia City Hospital, Craiova, ROMANIA, <sup>6</sup>Carol Davila University of Medicine and Pharmacy, Faculty of Pharmacy, Bucharest, ROMANIA, <sup>7</sup>Carol Davila University of Medicine and Pharmacy, Pneumology Department, Sf. Stefan Hospital, Bucharest, ROMANIA, <sup>8</sup>Carol Davila University of Medicine and Pharmacy, Department of Intensive Care, Clinical Emergency Hospital, Bucharest, ROMANIA, <sup>9</sup>Carol Davila University of Medicine and Pharmacy, Family Medicine Department, Bucharest, ROMANIA

**Objective:** Patients with type 2 diabetes mellitus (T2DM) have an increased disease burden due to the high number of comorbidities. The increased atherothrombotic risk of these patients requires the use of antiplatelet drugs, in order to prevent the occurrence of cardiovascular events. The aim of our study was to investigate the prescription patterns of antiplatelet drugs in T2DM patients, the type of antiaggregant selected and if the presence of arterial hypertension influenced the choice of medication.

**Design and method:** We conducted a retrospective study of T2DM cases from two tertiary hospitals in Romania. Diagnostic codes of discharge diagnoses were used to identify eligible patients and to retrieve their data from medical records.

**Results:** We included 221 T2DM patients (52.49% female, mean age 68.7 years). In total, 123 patients (55.66%) received antiplatelet drugs. Acetylsalicylic acid was selected in 93 cases (75.61%), followed by clopidogrel (39 cases, 31.71%) and ticagrelor (3 cases, 2.44%). In one case, the type of antiaggregant used could not be retrieved from the medical records. Acetylsalicylic acid was prescribed alone in 80 cases (65.04%) or in combination with either clopidogrel (10 cases, 8.13%) or ticagrelor (3 cases, 2.44%). Clopidogrel was the medication of choice in 29 cases (23.59%) without any other association of antiplatelet therapy. Ticagrelor was solely prescribed in combination with acetylsalicylic acid in our study group. Out of the patients that underwent antiplatelet therapy, 107 suffered from arterial hypertension (87.00%). In the hypertensive patients' group, acetylsalicylic acid

was prescribed in 79 cases (73.83%), alone or in association with clopidogrel or ticagrelor. Acetylsalicylic acid was prescribed alone in 74 cases (69.16%), in combination with clopidogrel in 7 cases (6.54%) and in 1 case (0.93%) in association with ticagrelor.

**Conclusions:** Our study revealed that in patients with T2DM, acetylsalicylic acid remains the most prescribed medication for the prevention and treatment of atherothrombotic events. Newer drugs, such as clopidogrel and ticagrelor, are less prescribed in Romania, mainly due to their increased cost that poses difficulty to many patients undergoing antiplatelet therapy. The presence of arterial hypertension did not influence the prescription pattern of antiplatelet drugs.

#### THE POSSIBLE RELATIONSHIP BETWEEN AIRWAY RESISTANCE AND SURFACTANT PROTEIN IN OBSTRUCTIVE SLEEP APNOEA, A COMPLEMENTARY STUDY

N. Li, X. Li, X. Yao, L. Shao, M. Heizhati, Y. Wang. *Peoples Hospital Of Xinjiang Uygur Autonomous Region, China. Hypertension Institute of Xinjiang, China, Urumqi, CHINA*

**Objective:** 1) to assess the potential relationship between parameters of airway resistance measured by impulse oscillometry and serum concentrations of surfactant proteins (SPs) in OSA patients; 2) to further investigate possible involvement of airway resistance in OSA pathogenesis.

**Design and method:** This is a complementary cross-sectional study. 46 subjects who performed overnight polysomnography, plethysmograph, impulse oscillometry and measurement of serum SPs were enrolled. Subjects with apnea/hypopnea index more than and equal to 10 events/h were defined as OSA group. Parameters of lung volume (FVC, FEV1, TLC) and airway resistance properties (Zrs5, R5-35, X5-35) were measured by plethysmograph and impulse oscillometry respectively and SP-A, B, C and D by ELISA.

**Results:** OSA patient whose apnea/hypopnea index more than and equal to 10 events/h was diagnosed in 22 patients (47.8 %). Mean age and BMI was  $45.6 \pm 6.73$  years and  $28.3 \pm 3.22$  kg/m<sup>2</sup> respectively. 1) non-smoking OSA subjects displayed significantly lower serum SP-A ( $133.37 \pm 29.43$  vs  $162.54 \pm 24.96$  ng/L,  $p = 0.021$ ), SP-B ( $40.78 \pm 4.28$  vs  $48.89 \pm 6.37$  ng/L,  $p = 0.002$ ) and SP-D ( $15.68 \pm 2.73$  vs  $19.32 \pm 3.51$  ng/L,  $p = 0.016$ ), and significantly larger R5-R20 ( $0.08 \pm 0.04$  vs  $0.05 \pm 0.03$  kPa/L/s,  $p = 0.035$ ) than did non-OSA subjects; 2) significant negative correlation was observed between SP-D and respiratory system resistance at 5–20 Hz ( $r = -0.438$ ,  $p = 0.041$ ) in non-smoking subjects, which was even stronger among obese subjects.

**Conclusions:** OSA patients showed decreased serum SP-A, B and D and increased airway resistance. Serum SPs, particularly SP-D, were associated with increased airway resistance and might be involved in the pathogenesis of OSA in non-smoking patients.

#### EFFECT OF ANTIHYPERTENSIVE THERAPY ON PSYCHOLOGICAL AND COGNITIVE STATUS IN PATIENTS WITH ARTERIAL HYPERTENSION, OBESITY AND OBSTRUCTIVE SLEEP APNOEA

E. Elfimova, A. Litvin. *National Medical Research Center of Cardiology of the Ministry of Healthcare of the Russian Federation, Moscow, RUSSIA*

**Objective:** To investigate the effect of antihypertensive therapy (AHT) on psychological and cognitive status of middle aged male patients with mild arterial hypertension (AH), obesity and obstructive sleep apnea (OSA).

**Design and method:** We included 43 middle aged ( $42.8 [40.0; 45.6]$ ) newly diagnosed male patients with AH, obesity (BMI  $35.8 [34.2; 37.4]$  kg/m<sup>2</sup>) and severe OSA (AHI  $52.4 [46.1; 58.6]$ /h). Patients didn't have excessive daytime sleepiness (ESS  $8.8 [7.6; 10.0]$ ) and were otherwise healthy in terms of chronic conditions which may affect psychological and cognitive status.

Patients underwent sleep study and ambulatory blood pressure (BP) monitoring. Our study consisted of 2 stages, initially all patients underwent AHT up-titration with a fixed dose combination of angiotensin-converting enzyme inhibitor and calcium antagonist (Perindopril arginine + Amlodipine), and diuretics (Indapamide) if needed (visit 1- baseline, after 4–6 weeks when reaching target BP -visit 2), then patients were randomized to CPAP-therapy or continuation of solely AHT (visit 3). We present data solely on effect of AHT (visit 1 and visit 2).

On all visits patients completed a series of self-report questionnaires: Epworth Sleepiness Scale (ESS), Karolinska Sleepiness Scale (KSS); Taylor Manifest Anxiety Scale adapted by Nemchinov T.A. (TMAS); Spielberg's State-Trait Anxiety Inventory (STAI) (S-STAI, state anxiety, T-STAI, trait anxiety); Zung Self-rating Depression Scale (SDS), the Short Form Health Survey (SF-36), Mini Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA) and Frontal Assessment Battery (FAB).

**Results:** On visit 2 - 95% of patient achieved target BP and additional 13% of patients achieved "dipper" BP profile. We didn't observe changes in daytime sleepiness and psychosomatic status. We showed significant improvement in physical and mental aspects of quality of life and improvement in cognitive function according to MoCA and FAB questionnaires.

	Visit 1	Visit 2	p
<b>Blood pressure control</b>			
office SBP mmHg	148,7 [145,6;151,9]	131,0 [128,9;133,0]	<0,001
office DBP mmHg	90,9 [88,3; 93,5]	79,2 [77,5;80,9]	<0,001
mean BP (diurnal) mmHg	108,2 [104,9; 111,5]	94,2 [92,4; 95,9]	<0,001
mean SBP (diurnal) mmHg	144,6 [141,6; 147,7]	127,2 [125,9; 128,6]	<0,001
mean DBP (diurnal) mmHg	87,8 [84,7; 91,9]	77,2 [75,6; 78,9]	<0,001
<b>Quality of life SF-36</b>			
PH (z)	48,9 [46,6; 51,3]	51,9 [49,0; 54,8]	0,003
MH (z)	44,5 [41,3; 47,7]	48,3 [44,7; 51,9]	0,001
<b>Psychosomatic status</b>			
TMAS	15,2 [12,9;17,5]	14,2 [12,0;16,4]	0,061
S-STAI	37,6 [35,5; 39,8]	38,0 [36,3;39,7]	0,367
T-STAI	42,3 [40,1; 44,6]	41,0 [38,8; 43,1]	0,111
SDS	33,4 [31,1; 35,8]	32,6 [29,9; 35,2]	0,223
<b>Cognitive function</b>			
MMSE	29,0 [27,2;29,0]	28,6 [28,2; 29,0]	0,018
MoCA	25,9 [25,0; 26,7]	26,8 [25,9; 27,7]	0,001
FAB	15,5 [14,9; 16,1]	17,0 [15,0; 18,0]	0,010

**Conclusions:** In middle-aged newly diagnosed patients with AH, obesity and severe OSA, but without excessive daytime sleepiness, administration of antihypertensive therapy with a fixed-dose combination even in a short period of time showed a significant improvement in quality of life and cognitive function even before adding of CPAP-therapy.

#### CARDIOVASCULAR AUTONOMIC NEUROPATHY IN HYPERTENSIVE PATIENT WITH PREDIABETES

G. D. Sin Sitorus<sup>1</sup>, M. Pangaribuan<sup>2</sup>, I. Ismug<sup>2</sup>, R. Soerarto<sup>1</sup>, N. Hersunarti<sup>1</sup>, B. Siswanto<sup>1</sup>. <sup>1</sup>National Cardiovascular Center Harapan Kita, Jakarta, INDONESIA, <sup>2</sup>National Police Hospital Raden Said Sukanto, Jakarta, INDONESIA

**Objective:** The highest prevalence of prediabetes is in patients with hypertension. Furthermore, prediabetes has a higher risk of developing complications such as retinopathy, cardiomyopathy, and neuropathy. One of the complications that is often underdiagnosed is Cardiovascular Autonomic Neuropathy (CAN). CAN can lead to recurrent cardiovascular disease and silent myocardial ischemia. Until now, only a few studies have examined the association of prediabetes with CAN. The aim of this study is to determine the relationship between prediabetes and CAN in hypertensive patients.

<b>Multivariate analysis</b>				
Predictor	B	p	Odds Ratio	CI 95%
Age	0,111	0,013	1.118	1.023-1.221
IGT	1,912	0,020	6.767	1.349-33.941
Konstan	-6,969			

**Design and method:** This cross sectional study was conducted at National Police Hospital, Raden Said Sukanto Jakarta on subjects with hypertension. All subjects had their blood sugar profile (OGTT and HbA1C) and Heart Rhythm Variability (deep breathing, standing, and valsalva) examined. Based on the blood sugar profile, subjects were diagnosed with prediabetes (IFG, IGT, and high risk based on HbA1C level). Subjects presenting with a minimum 2 out of 3 abnormal RR ratio were diagnosed with CAN. Subjects with diabetes will be excluded.

**Results:** There were 96 subjects included, with 18% (n = 18) were subjects with CAN and 39% (n = 38) were prediabetic. After adjusted with other factors (BMI, triglyceride and LDL level, IFG, and resting heart rate), age and IGT were significantly increase the incidence of CAN. ( $p = 0.013$ , OR 1.1, CI95% 1.023–1.221, and  $p = 0.020$ , OR 6.767, IK95% 1.349–33.94 respectively). In subjects with prediabetes, RR ratio were significantly lower in deep breathing test.

**Conclusions:** Subjects with prediabetes especially IGT have a higher risk of developing CAN. This finding shows acute episodes of hyperglycaemia in hypertensive patients have a major role in the development of CAN. Early sign of autonomic imbalance was already found in patients with prediabetes, indicated with a lower RR ratio, hence emphasizing the importance of screening and comprehensive management of prediabetes in hypertensive patients.

## BETABLOCKERS' PRESCRIPTION PATTERNS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND CARDIOVASCULAR COMORBIDITIES

C. Diaconu<sup>1</sup>, M. Gaman<sup>2</sup>, E. Dobrica<sup>3</sup>, M. Cozma<sup>3</sup>, G. Dediu<sup>4</sup>, A. Gaman<sup>5</sup>, A. Arsene<sup>6</sup>, A. Nicolae<sup>6</sup>, C. Dragoi<sup>6</sup>, B. Velescu<sup>6</sup>, B. Paraschiv<sup>7</sup>, R. Tincu<sup>8</sup>, M. Iancu<sup>9</sup>. <sup>1</sup>Carol Davila University of Medicine and Pharmacy, Department of Internal Medicine, Clinical Emergency Hospital, Bucharest, ROMANIA, <sup>2</sup>Carol Davila University of Medicine and Pharmacy, Facoltà/Scuola di Medicina e Chirurgia, Università degli Studi di Bari, Bucharest, ROMANIA, <sup>3</sup>Carol Davila University of Medicine and Pharmacy, Bucharest, ROMANIA, <sup>4</sup>Carol Davila University of Medicine and Pharmacy, Internal Medicine Department, Clinical Emergency Hospital Sf. Ioan, Bucharest, ROMANIA, <sup>5</sup>University of Medicine and Pharmacy of Craiova, Department of Hematology, Filantropia City Hospital, Craiova, ROMANIA, <sup>6</sup>Carol Davila University of Medicine and Pharmacy, Faculty of Pharmacy, Bucharest, ROMANIA, <sup>7</sup>Carol Davila University of Medicine and Pharmacy, Pneumology Department, Sf. Stefan Hospital, Bucharest, ROMANIA, <sup>8</sup>Carol Davila University of Medicine and Pharmacy, Department of Intensive Care, Clinical Emergency Hospital, Bucharest, ROMANIA, <sup>9</sup>Carol Davila University of Medicine and Pharmacy, Family Medicine Department, ROMANIA

**Objective:** Patients with type 2 diabetes mellitus (T2DM) are often treated with beta-blockers (BB), due to associated arterial hypertension and/or coronary heart disease. The objective of the study was to investigate the prescription of BB in T2DM patients, the type of BB selected and whether the presence of arterial hypertension (AH) or coronary heart disease influenced the BB choice.

**Design and method:** We conducted a retrospective study of T2DM cases hospitalized in 2 tertiary hospitals from Romania. Diagnostic codes of discharge diagnoses were used to identify eligible patients and to retrieve their data from medical records.

**Results:** We included 221 T2DM patients (52.49% female, mean age 68.7 years, range 37–93 years). In total, 155 patients (70.14%) received beta-blockers. Metoprolol was the medication of choice in 85 cases (38.46%), followed by carvedilol (29 cases, 13.12%), bisoprolol (19 cases, 8.60%), and nebivolol (17 cases, 7.69%). Betaxolol and propranolol were prescribed in one case each (0.45%) and in three cases the choice of BB was undetermined. Of the study group, 180 patients suffered from arterial hypertension (81.45%): grade I = 3 cases (1.36%), grade 2 = 53 cases (23.99%), grade 3 = 113 cases (51.13%), and unspecified = 11 cases. Beta-blockers were prescribed in 126 patients with arterial hypertension (70.00%). Metoprolol was the medication of choice in 69 cases (54.76%), followed by carvedilol (18 cases, 14.29%), bisoprolol (17 cases, 13.49%), and nebivolol (17 cases, 13.49%). In three cases, the choice of BB was unspecified and propranolol/betaxolol were prescribed in one case each. Coronary heart disease was found in 104 patients (47.06%), out of which 81 patients (77.88%) received BB. Metoprolol was the medication of choice in 44 cases (54.32%), followed by carvedilol (17 cases, 20.99%), bisoprolol (11 cases, 13.58%), and nebivolol (8 cases, 9.88%). In one case, the choice of BB was unspecified.

**Conclusions:** In our study group, 70.14% of patients with T2DM received beta-blockers. Nonselective agents were far less used (19.35%) than beta 1-selective antagonists (80.65%). We found no significant differences between the prescription patterns of patients that associated arterial hypertension or CHD and the general group.

## RELATIONSHIPS BETWEEN HYPERTENSION CONTINUOUS POSITIVE AIRWAY PRESSURE CARDIOVASCULAR EVENTS AND OBSTRUCTIVE SLEEP APNOEA IN GUADELOUPE (FRENCH WEST INDIES)

R. Billy Brissac<sup>1</sup>, S. Phirai<sup>2</sup>. <sup>1</sup>Unité Médecine Vasculaire, Pôle Médecine, CHU Guadeloupe BP 465, Guadeloupe, <sup>2</sup>Laboratoire du Sommeil, les Ahymes 97139, Guadeloupe

**Objective:** In Guadeloupe, a cross-sectional study was realized in 204 adult patients identified obstructive sleep apnea (OSA)/ non-OSA. Our data highlighted

raised frequency of cardiovascular metabolic factors in patients with OSA. Hypertension frequency and non dipper pattern evaluated by 48 hour-ambulatory blood pressure monitoring (ABPM) was 84.5 and 77.5 respectively in OSA group.

The aim of this prospective follow-up study was:

- To evaluate the effect of continuous positive airways pressure (CPAP) on BP and non dipper pattern evaluated by ABPM in OSA group.
- To compare the incidence of cardiovascular events in the two groups OSA/ non-OSA.

### Design and method

- 48 hour-ABPM was performed after at least 3 months of uninterrupted CPAP therapy in patients with severe OSA in OSA group.
- Follow up was at least 3 years to assess and compare the incidence of cardiovascular events in the two groups OSA/ non-OSA.

### Results:

- 57 patients suffering from severe OSA underwent 48 hour-ABPM. 56% of men, mean age  $56.4 \pm 9.9$  years, BMI  $31.8 \pm 5.5$  kg/m<sup>2</sup>, homa-IR index  $4.43 \pm 3.01$ , dyslipidemia 42%, and 26% type 2 diabetes, mean AHI  $39.2 \pm 13.1$ . Forty patients had antihypertensive medications (mean 1.74) and 8 were normotensive. Daytime and night time BP were 137/84 and 131/78 mmHg respectively. The mean duration of adherence of CPAP therapy was 3.30 hours per night. After a period of 3 months under CPAP, BP decreased by 5.82 and 4.48 mmHg during the day, by 6.02 and 4.48 mmHg during the night, and by 5.74 and 4.48 mmHg over 48 hours, respectively for systolic and diastolic BP. Dipper profile was 28 vs 19.25% for systolic BP, and 44 vs 42% for diastolic BP.

-After a follow-up of three years 6 cardiovascular events occurred in OSA group: 4 ischemic strokes and 2 distal arterial thrombosis (8.46%) and 2 deaths by pneumopathies. One ischemic stroke was related to non-OSA group.

**Conclusions:** Antihypertensive medications and CPAP have additional benefits on BP in hypertensive patients with severe OSA and influence cardiovascular morbidity-mortality in these high risk patients.

## ISSUE ON ANGIOTENSIN RECEPTOR BLOCKER VALSARTAN AS APPLIED TO ARTERIAL HYPERTENSION PATIENTS WITH TYPE II DIABETES MELLITUS

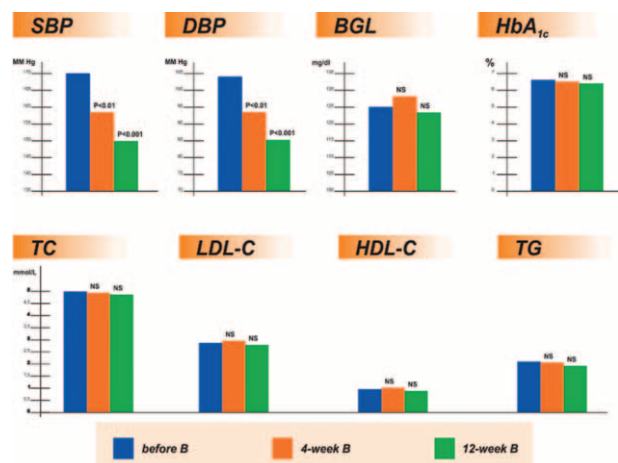
Z. Musayev, Scientific Research Institute of Traumatology and Orthopedics, Baku, AZERBAIJAN

**Objective:** The problem of interrelation between long-term antihypertensive Angiotensin Receptor Blockers (ARB) treatment and basic metabolism indices alterations, including estimated Glomerular Filtration Rate (GFR) in Arterial Hypertension (AH) patients with concomitant type II Diabetes Mellitus (DM) is rather debatable. Aim of this study was all-round appreciation of antihypertensive and metabolic actions to ARB Valsartan (V) application in AH patients with concomitant type II DM during long-term 12–24 weeks treatment.

**Design and method:** 135 examined, I-II WHO classification AH patients without marked clinical symptoms of congestive heart failure and coronary artery disease with type II DM were investigated (87 male and 48 female, 41–69 aged, mean age  $53 \pm 1.8$  years, body mass index  $29 \pm 1.9$  kg/m<sup>2</sup>, systolic and diastolic blood pressure (SBP and DBP) range 150/95–180/110 mm Hg, mean blood pressure (MBP) > 115 mm Hg. V has been prescribed once daily in average of 80–320 mg in a course of 12–24 weeks combined with basic DM management. SBP, DBP, MBP, heart rate (HR), blood and urine glucose level, HbA1c, oral glucose tolerance test, postprandial blood glucose test, cholesterol, triglycerides, lipid and lipoprotein fractions, blood creatinine level, estimated GFR (CKD-EPI equation) were evaluated at the baseline and twice after 4 and 12–24 weeks V treatment.

**Results:** After 4-week treatment SBP, DBP, MBP significantly decreased ( $p < 0.01$ ), after 12–24 weeks treatment further increase of antihypertensive effect was noted ( $p < 0.001$ ). There were not observed any marked significant changes of HR, GFR, metabolism indices, besides it 12–24 weeks V management resulted in trend to slight improvement of blood and urine glucose level, lipid and lipoprotein fractions, cholesterol and triglycerides indices.

**Conclusions:** ARB V 12–24 weeks treatment resulted in significant antihypertensive effect, the study did not reveal any significant negative changes of HR, metabolism indices, GFR. Moreover a slight trend to metabolism indices normalization was noted perhaps on account of V's atherosclerosis preventing actions and BP level decrease. Thus ARB V considerably improves complex management in AH patients with type II DM preventing early complications and target organs damages. Extensive long-term V application in aforesaid patients should to be explored further for possible impact on GFR.



### ISOSORBIDE DINITRATE SPRAY FOR THE TREATMENT OF DIABETIC FOOT ULCERS: A DOUBLE-BLIND, RANDOMIZED, CLINICAL TRIAL

L. Garcia Benavides<sup>2</sup>, L. Garcia Valdes<sup>1</sup>, S. Pascoe Gonzalez<sup>1</sup>, M. Mendez del Villar<sup>2</sup>, S. Totsuka Sutto<sup>1</sup>, D. Hernandez Molina<sup>1</sup>, J. Barajas Vega<sup>1</sup>. <sup>1</sup>CUCS, Universidad de Guadalajara, Guadalajara, MEXICO, <sup>2</sup>CUTONALA, Universidad de Guadalajara, Tonalá, MEXICO

**Objective:** to evaluate if Isosorbide Dinitrate spray topically applied for management of diabetic foot ulcers take advantage over conventional management using cleaning and metabolic control

**Design and method:** A randomized, placebo-controlled, double-blinded clinical trial was designed, 34 patients were divided into two groups: Group 1; treated with Isosorbide Dinitrate spray, Group 2; placebo. All them received conventional management with cleaning (microdacyn spray) and glycemic control

**Results:** Images showed a notable regeneration before and after treatment in all groups; ( $P < 0.001$ ). The final assessment of the ulcer achieved  $70 \pm 27$  of progress using Isosorbide Dinitrate spray and  $50 \pm 16$  placebo. The number of patients that had achieved complete closure was 4 with Isosorbide Dinitrate spray and 1 with placebo. The progression in the healing process of the ulcer, produced marked immunohistochemical differences of Von Willebrand Factor, desmin, vascular endothelial growth factor-A and alpha-smooth muscle actin in all groups ( $P < 0.001$ ), but without notable changes between groups.

**Conclusions:** The progress of the ulcerated area using ISDN was higher than placebo

### APNOGRAPH – A PROMISING METHOD FOR DIAGNOSING SLEEP APNOEA

A. Kiss<sup>1</sup>, A. Nagy<sup>1</sup>, Z. Szakacs<sup>2</sup>. <sup>1</sup>County Hospital Kecskemet, Department of Cardiology, Kecskemet, HUNGARY, <sup>2</sup>Sleep Diagnostic Center, Budapest, HUNGARY

**Objective:** Sleep-related breath disorders are associated with impaired vitality and reduced life expectancy. In this respect particularly important role is played by obstructive sleep apnea syndrome (OSAS) causing higher cardiovascular morbidity: hypertension, heart failure, increased risk of myocardial infarction and stroke. OSAS can result in early dementia, traffic and working injuries in connection with daytime falling asleep. Average prevalence is 2–4% (30% among hypertensive patients). Diagnostic gold standard is polysomnography (PSG) in special sleep-laboratories. Due to its complexity and price few laboratories are available in Hungary. Apnograph is a promising method of diagnosing OSAS. Device has 3 parts: ABPM, full-day 3-lead ECG-Holter (with HRV-analysis) and pulsoxymetry.

**Design and method:** Authors made 41 measurements with card(X)plore Apnograph (Meditech Ltd. Hungary) in patients snoring during sleep. 32 male (M), 9 female (F) patients were investigated, mean age of 51,1 (35–63) and 52,2 (49–59) years respectively.

**Results:** Beyond 4 known OSAS patients (2 M, 2F) 8 cases (5 M, 3F) were OSAS-negative (4 patients – 3 M, 1F –otorhinolaryngologic cause), slight abnormalities were revealed in 5 men (snoring diminished by theophyllin). In 4 patients (3 M, 1F) authors had no reliable data (atrial fibrillation and/or poor compliance). Significant abnormalities (repetitive desaturational episodes, increased nighttime BP-variability, non-dipper pattern) confirmed suspicion of OSAS in 20 cases (17 M, 3F), for whom PSG were suggested in sleep-laboratory, all of them proved OSAS indicating CPAP or BiPAP therapy.

**Conclusions:** Obstructive sleep apnea syndrome is an independent factor for cardiovascular morbid-mortality. Apnograph is a simply ambulanter method that can provide important parallel measured parameters which precise pre-diagnostic steps. By using this device active screening can be achieved and number of habitual snorers revealed. For really OSAS-suspected patients optimal time of PSG can be determined and urgent cases selected.

### CHANGES OF PULSE WAVE VELOCITY AND THE EFFECTIVENESS OF BLOOD PRESSURE CONTROL IN PATIENTS WITH HYPERTENSION AND MORBID OBESITY AFTER BARIATRIC SURGERY

E. Kolesnik<sup>1</sup>, T. Kolesnyk<sup>2</sup>, R. Duka<sup>3</sup>, H. Kosova<sup>2</sup>, A. Nadiuk<sup>2</sup>. <sup>1</sup>SE Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine - Department of Internal Medicine<sup>2</sup>, Dnipro, UKRAINE, <sup>2</sup>SE Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine - Department of Propedeutics of Internal Medicine, Dnipro, UKRAINE, <sup>3</sup>SE Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine - Department of Surgery #1, Dnipro, UKRAINE

**Objective:** Research objective was studying of pulse wave velocity (PWV) changes and the effectiveness of blood pressure (BP) control in obese patients after bariatric treatment.

**Design and method:** It were surveyed 22 untreated patients (11 males) with morbid obesity. The body mass index before the surgery was  $47.6 \pm 2.14$  kg/m<sup>2</sup>. Hypertension was detected in 20 (90.9%) patients: grade 1 was established in 9 (40.9%), grade 2 - in 8 (36.4%) and grade 3 - in 3 (13.6%) patients. According to target organ damage stage I hypertension was established in 4 (18.2%), stage II in 16 (72.7%) patients. Low cardiovascular (CV) risk was established in 1 (4.55%) patient, moderate CV risk in 1 (4.55%) patient, high CV risk in 16 (72.7%) patients, very high CV risk in 4 (18.2%) patients.

The combined antihypertensive therapy was prescribed to all patients with hypertension and obese before surgery to reach normal BP values. As a result 2-component therapy was prescribed to 6 (27.3%) patients, 3-component therapy - to 8 (36.4%), 4-component therapy - to 5 (22.7%), 5-component therapy - to 1 (4.55%) patient. The effectiveness of the prescribed antihypertensive therapy was evaluated using office BP measurement. BP control in all patients was repeated after bariatric treatment.

**Results:** Systolic BP level significantly decreased from  $152.60 \pm 5.71$  mm Hg to  $121.70 \pm 3.02$  mmHg ( $p < 0.001$ ) after bariatric surgery. Diastolic BP also declined during estimated period from  $86.20 \pm 3.13$  to  $69.0 \pm 2.92$  mm Hg ( $p < 0.001$ ). PWV levels decreased from  $8.66 \pm 0.27$  to  $7.14 \pm 0.46$  ( $p < 0.005$ ). Significant positive results achieved after bariatric treatment allowed 5 (22.7%) patients first to reduce dosages, and subsequently to stop taking antihypertensive therapy in order to achieve normotension, and 15 (68.2%) patients - significantly to reduce dosages and quantity of taken drugs.

**Conclusions:** Weight loss as a result of surgical treatment of obesity significantly improves BP control and PWV level in patients with morbid obesity, allows to reduce doses and the number of taken medications, to achieve not only long-term weight loss, but also to reduce the risk of serious CV events. This category of patients requires careful further dynamic monitoring by a multidisciplinary team of specialists.

# POSTER SESSION

## POSTERS' SESSION PS28:

## LARGE ARTERIES AND MICROCIRCULATION

### THE RELATIONSHIP BETWEEN ENDOTHELIAL FUNCTION AND MICROVASCULAR REMODELLING

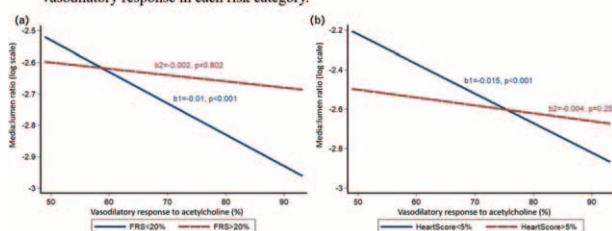
S. Masi<sup>1</sup>, G. Georgiopoulos<sup>1</sup>, G. Grassi<sup>1</sup>, G. L. Serravalle<sup>1</sup>, C. Savoia<sup>1</sup>, S. Taddei<sup>1</sup>, D. Rizzoni<sup>1</sup>, A. Virdis<sup>1</sup>. <sup>1</sup>Department of Clinical and Experimental Medicine, University of Pisa, Italy, Pisa, ITALY, <sup>2</sup>First Department of Cardiology, Hippokratia Hospital, University of Athens, Athens, GREECE, <sup>3</sup>Clinica Medica, University of Milano Bicocca, Milan, ITALY, <sup>4</sup>Cardiologia, Ospedale S. Luca, IRCCS Istituto Auxologico Italiano, Milan, ITALY, <sup>5</sup>Clinical and Molecular Medicine Department, Cardiology division, Sapienza University of Rome, Rome, ITALY, <sup>6</sup>Department of Clinical and Experimental Medicine, University of Pisa, Pisa, ITALY, <sup>7</sup>Clinica Medica, Department of Clinical and Experimental Sciences, University of Brescia, Brescia, ITALY, <sup>8</sup>Department of Clinical and Experimental Medicine, University of Pisa, Pisa, ITALY

**Objective:** Remodelling of small resistance vessels has been linked with cardiovascular outcomes and is facilitated by exposure to cardiovascular risk factors and endothelial dysfunction. Several studies have shown that endothelial dysfunction can provide additional information on the severity of vascular remodelling in large vessels. However, whether endothelial function can add additional information than common cardiovascular risk factor scores on the severity of remodelling indexes in small arteries remains unknown. We assessed the relationship between common cardiovascular risk scores and severity of microvascular remodelling as well as the influence of microvascular endothelial function on these relationships.

**Design and method:** Small resistance arteries were isolated from biopsy of subcutaneous tissue obtained from laparoscopic procedures of 188 patients and used for micromyography experiments, where severity of microvascular remodelling was assessed by media:lumen ratio (M/L) and media cross-sectional area (MCSA), while endothelial-dependent vasodilation (EDD) was assessed by dose-response curves to acetylcholine. The Framingham and Heart Scores (FRS & HS) were calculated to assess the association between cardiovascular risk factors and severity of microvascular remodelling.

**Results:** In a multivariable model including EDD, age, sex, smoking history, total cholesterol, BMI and hypertension, EDD ( $\beta = -0.009$ ,  $p < 0.001$ ), and ageing ( $\beta = 0.005$ ,  $p = 0.033$ ) were significantly associated with M/L ratio. A higher FRS was associated with a greater M/L ratio ( $\beta = 0.086$ ,  $p < 0.001$ ) and MCSA ( $\beta = 0.093$ ,  $p = 0.020$ ). Slightly weaker associations were obtained between HS vs M/L ratio ( $\beta = 0.058$ ,  $p = 0.018$ ) and HS vs MCSA ( $\beta = 0.066$ ,  $p = 0.077$ ). Neither the FRS, nor the HS showed significant association with M/L and MCSA when endothelial function was added to the models, while EDD remained strongly associated with both ( $p < 0.001$  in both FRS and HS models). The association of EDD with M/L and MCSA was stronger in subjects with low compared to high cardiovascular risk at the FRS and HS (Figure 1).

**Figure 1. Scatter plots showing the association between endothelial function and media:lumen ratio in subjects at high (red line) and low (blue line) risk for cardiovascular disease according with the Framingham (panel A) and Heart (panel B) cardiovascular risk score. The thresholds of 20% for the Framingham and 5% for the Heart scores were used to stratify the population in high or low cardiovascular disease risk categories.  $\beta$  represents the slope of the linear regression and indicate the difference in units of the media:lumen ratio for 1 unit increase in acetylcholine vasodilatory response in each risk category.**



**Conclusions:** The FRS seems to have a stronger relationship with parameters of microvascular remodelling than the HS. Endothelial function completely explains the association between FRS or HS with indexes of microvascular remodelling, representing the strongest predictor of microvascular remodelling, particularly in subjects at low risk of cardiovascular disease.

### SCREENING OF PERIPHERAL ARTERY DISEASE AMONG HYPERTENSIVE AND DIABETIC PATIENTS

L. Maroda<sup>1</sup>, A. Koncz<sup>2</sup>, T. Kobling<sup>2</sup>, M. Zrinyi<sup>1</sup>, M. Semjani<sup>1</sup>, E. Katona<sup>2</sup>, S. Lengyel<sup>2</sup>, D. Pall<sup>1,2</sup>. <sup>1</sup>Coordination Center for Drug Development, University of Debrecen, Debrecen, HUNGARY, <sup>2</sup>Department of Medicine, University of Debrecen, Debrecen, HUNGARY

**Objective:** Both hypertension and diabetes lead to accelerate atherosclerosis. Moreover, most of the peripheral arterial atherosclerosis of the lower extremities are without any symptoms for a long period. There is a need for screening examinations because otherwise it would be recognized only several years later. Screening of peripheral atherosclerosis of lower extremities at high cardiovascular risk patients and determining the prevalence of the silent peripheral atherosclerotic disease.

**Design and method:** 430 consecutive out-patients were involved in this study suffering from both hypertension and type 2 diabetes. With the help of a validated BOSO ABI-100 we measured ankle-brachial index (ABI). Based on recent guidelines we considered abnormal if ABI < 0.9.

**Results:** The mean age was  $68.6 \pm 8.1$  years, 202 males and 228 females were involved. 80.9% of the patients were on pharmacological treatment of hypertension. Diabetes was treated only with lifestyle-therapy in 5.1%, while 62.6% were exclusively on oral antidiabetics and 23.7% on insulin therapy. 8.6% of the patients were administered with both oral and insulin therapies. Less than half of the patients were on statins (48.4%). The antihypertensive therapy was more frequent among females, while statins among males (77.2% vs. 84.2%;  $p < 0.01$  and 50.5% vs. 46.5%;  $p < 0.05$ ). 17.8% of the patients had previously acute coronary syndrome, whereas 5.3% had stroke.

Among the 202 male patients we observed ABI < 0.9 at least on one side in 60 cases (29.7%) while in 35 patients (17.3%) ABI was less than 0.9 on both sides. 39 females (17.1%) had ABI < 0.9 and in 18 cases (7.9%) this result was found in both sides. The ABI < 0.9 was slightly more frequent on the right side (males: 50 vs. 45 cases, females: 30 vs. 27 cases).

**Conclusions:** This painless and easy-to-do screening examination is a useful tool especially at high cardiovascular risk (eg. hypertensive diabetic patients) because in 23% of all cases we observed abnormal data, suggesting the presence of the peripheral atherosclerosis. Early diagnosis, conscious lifestyle and aggressive pharmacological therapy can improve the prognosis and decrease the progression of the atherosclerosis.

### ASCENDING AORTA WALL DEFORMATION IN ESSENTIAL HYPERTENSIVE. A SPECKLE TRACKING IMAGING STUDY

M. Marketou, A. Patrianakos, S. Maragkoudakis, M. Vernardos, D. Lempidakis, J. Konstantinou, D. Vougia, J. Logakis, K. Fragkiadakis, G. Kochiadakis, F. Parthenakis. Heraklion University Hospital, Heraklion, GREECE

**Objective:** Aortic stiffness plays an important prognostic role in essential hypertension. Arterial wall tissues are sensitive to their mechanical surroundings and remodel their structure and mechanical properties when subjected to mechanical stimuli such as increased arterial pressure. The aim of this study is to determine the longitudinal strain (LS) of aortic wall using 2D-strain in hypertensive patients.

**Design and method:** Forty five subjects, 24 without any sign of cardiovascular disease, (13 men, aged  $52 \pm 13$  years) and 21 patients with well controlled essential hypertension (12 men, aged  $55 \pm 15$  years) were included in our study. All participants underwent a complete echocardiographic study and local aortic deformation was studied as followed: Tracking of the anterior aortic wall from the left parasternal long axis view, started from the sinotubular junction and 3 cm thereafter and postprocessing analyzed with 2D-strain (Echopac v.11, GE). Aortic distensibility (AoD) was studied with the M-mode 3 cm after the sinotubular junction and was calculated as (End-systolic-End-diastolic) / end-systolic diameter \* 100.

**Results:** There were no significant differences in mean age, blood pressure and ejection fraction between the two groups. Aortic wall tracking were feasible in 14

normal and 15 patients. Although there were no significance difference in AoD between the 2 groups ( $9.8 \pm 1.8\%$  vs  $6.7 \pm 1.8\%$ ,  $p = 0.08$  in controls and hypertensives respectively) a significant difference was in aortic segmental ( $p < 0.01$  for each segment) and averaged LS (averaged LS was  $-26.3 \pm 6.9\%$  vs  $-20.4 \pm 2.5\%$ ,  $p = 0.007$  in controls and pts respectively). A significant negative correlation between AoD and averaged aortic LS ( $r = -0.495$ ,  $p = 0.01$ ) was found.

**Conclusions:** Our preliminary results suggest that essential hypertension is associated with a profound change in aortic wall mechanical properties. Speckle tracking promises new insights into aortic mechanics and can be evaluated in the daily clinical practice.

#### PULSE WAVE VELOCITY PROGRESSION OVER A 3.7 YEARS FOLLOW-UP: FOCUS ON URIC ACID

A. Maloberti<sup>1</sup>, P. Vallerio<sup>1</sup>, L. D'Angelo<sup>1</sup>, A. Luongo<sup>2</sup>, E. Qalliu<sup>2</sup>, M. Milani<sup>2</sup>, G. Magni<sup>2</sup>, J. Zanon<sup>2</sup>, M. Varrenti<sup>1,2</sup>, L. Giupponi<sup>1,2</sup>, P. Meani<sup>1,2</sup>, B. Lopez-Montero<sup>1</sup>, M. Casati<sup>3</sup>, S. Signorini<sup>4</sup>, G. Grassi<sup>2</sup>, C. Giannattasio<sup>1,2</sup>. <sup>1</sup>Cardiology IV, ASST Niguarda Ca Granda Hospital, Milan, ITALY, <sup>2</sup>School of Medicine and Surgery, Milano Bicocca University, Milan, ITALY, <sup>3</sup>Biochemical Laboratory, San Gerardo Hospital, Monza, ITALY, <sup>4</sup>Biochemical Laboratory, Desio Hospital, Desio, ITALY

**Objective:** The role of Uric Acid (UA) on the arterial stiffness progression in prospective studies has been evaluated only in three studies. Our aim was to evaluate the role of UA as a possible determinants of the Pulse Wave Velocity (PWV) progression over a  $3.7 \pm 0.5$  years follow-up period in hypertensive subjects.

**Design and method:** We enrolled 431 consecutive hypertensive outpatients 18–80 aged, followed by the Hypertension Unit of St. Gerardo Hospital (Monza, Italy). At baseline anamnestic, Blood Pressure (BP) and laboratory data as well as PWV were assessed. PWV was performed again at follow-up. We analysed data separately for gender with hyperuricemia defined as a UA  $> 6$  mg/dL for women and  $> 7$  mg/dL for men

**Results:** Baseline age was  $53.2 \pm 13.1$  years, 43% were female, Systolic and Diastolic BP  $141.8/86.8 \pm 17.5/10.8$  mmHg, UA  $5.2 \pm 1.4$  mg/dL and PWV  $8.5 \pm 2.0$  m/s. At follow-up, despite better BP values ( $132.5/78.8 \pm 17.4/10.7$  mmHg,  $p < 0.001$ ), PWV increases to  $9.15 \pm 2.3$  m/s ( $p < 0.001$ ) with mean deltaPWV of  $+0.56 \pm 2.2$  m/s. 66 patients were hyperuricemic (15%) and when compared to normouricemic were older ( $58.3 \pm 11.6$  vs  $52.3 \pm 13.1$ ,  $p < 0.001$ ) with superimposable baseline and follow-up BP with a higher PWV baseline and follow-up ( $9.1 \pm 2.7$  vs  $8.4 \pm 1.8$  and  $9.9 \pm 3.2$  vs  $9.0 \pm 2.1$ ,  $p < 0.05$ ). Despite this, similar deltaPWV were found ( $0.8 \pm 3.4$  vs  $0.5 \pm 1.9$ ,  $p = ns$ ). Hyperuricemic female (6.8%, 12 subjects) were older ( $63.1 \pm 10.6$  vs  $53.1 \pm 13.4$ ,  $p < 0.001$ ), with similar baseline and follow-up BP and, despite similar baseline PWV, a higher follow-up PWV ( $11.1 \pm 2.5$  vs  $8.7 \pm 2.2$ ,  $p < 0.001$ ) and deltaPWV ( $2.1 \pm 3.5$  vs  $0.5 \pm 1.9$ ,  $p = 0.01$ ). In males no differences were showed in arterial stiffness in hyperuricemic (21%, 54 subjects). UA correlate with age, sex and baseline and follow-up PWV ( $r = 0.13$  and  $0.19$ ) in the whole population but not with deltaPWV. In females UA significantly correlate with age, follow-up PWV ( $r = 0.31$ ) and deltaPWV ( $r = 0.26$ ). Contrariwise in male no significant correlation were seen. At multivariate analysis UA were not a significant predictor of arterial stiffness, also for gender analysis.

**Conclusions:** in HT, arterial stiffness showed some sign of correlation with UA particularly in women. Despite this it were not a significant predictor of arterial stiffness and its progression. A strong limitation of the present work is the low number of hyperuricemic female subjects.

#### REFERENCE VALUES OF DIFFERENT PARAMETERS OF VASCULAR STRUCTURE AND FUNCTION IN CAUCASIAN POPULATION WITHOUT CARDIOVASCULAR DISEASES. EVA STUDY

M. Gomez-Sanchez, L. Gómez-Sánchez, R. Alonso-Domínguez, J. Gonzalez-Sanchez, C. Agudo-Conde, J. Recio-Rodriguez, C. Rodríguez-Martin, M. Patino-Alonso, N. Sanchez-Aguadero, C. Castaño-Sánchez, J. Maderuelo-Fernandez, E. Rodríguez-Sanchez, M. Gomez-Marcos, L. Garcia-Ortiz. Primary Care Research Unit, the Alamedilla Health Center: Biomedical Research Institute of Salamanca (IBSAL), Salamanca, SPAIN

**Objective:** To describe the mean values of different parameters of vascular structure and function, evolution with age and differences by gender in the general population without cardiovascular diseases.

**Design and method:** Cross-sectional study in a general population cohort without cardiovascular diseases. Scope and Subjects: 360 subjects aged between 35 and 75 years old (51% female) were included, selected by random sampling stratified by age groups (35, 45, 55, 65 and 75 years) and gender using the base of Health Card of 4 urban Health Centers.

Using ultrasonography, we measured the thickness of the intima media of the carotid artery (IMT). With the VaSera device, the Cardio Ankle Vascular Index

(CAVI) and the pulse wave velocity ankle arm (aaPWV) were measured. With the Sphygmocor we measured the pulse wave velocity femoral carotid (cfPWV).

**Results:** The mean values were: age  $56.8 \pm 14.9$  years (males =  $57.1 \pm 14.4$  and women =  $56.6 \pm 15.4$ ,  $p = 0.730$ ). GIM =  $0.688 \pm 0.114$  mm (males =  $0.708 \pm 0.119$  mm and females =  $0.661 \pm 0.108$  mm,  $p = 0.020$ ), CAVI =  $8.19 \pm 1.45$  (males =  $8.39 \pm 1.44$  and females =  $8.02 \pm 1.45$ ,  $p = 0.015$ ), aaPWV =  $13.18 \pm 2.81$  m/sec (males =  $13.46 \pm 2.52$  m/sec and women =  $12.93 \pm 3.02$  m/sec,  $p = 0.070$ ) and cfPWV =  $6.63 \pm 2.04$  m/sec (males =  $6.97 \pm 2.15$  m/sec and females =  $6.34 \pm 1.91$  m/sec,  $p = 0.004$ ).

For each year that the age increases, an increase of the IMT of  $0.006$  mm ( $y = 0.364$  mm +  $(0.006$  mm \* age)), in males  $0.006$  ( $y = 0.365$  mm +  $(0.006$  mm \* age)) and in women ( $y = 0.363$  mm +  $(0.005$  mm \* age)) An increase in CAVI of  $0.070$  ( $y = 4.212 + (0.070$  \* age)), in males  $0.071$  ( $y = 4.340 + (0.071$  \* age)) and in women  $0.069$  ( $y = 4.113 + (0.069$  \* age)) An increase in aaPWV of  $0.139$  m/sec ( $y = 5.276$  m/sec +  $(0.139$  m/sec \* age)), in males  $0.117$  ( $y = 6.785$  m/sec +  $(0.117$  mm \* age)) and in women  $0.155$  ( $y = 4.140$  m/sec +  $(0.155$  m/sec \* age)) and an increase in cfPWV of  $0.088$  m/sec ( $y = 1.655$  m/sec +  $(0.088$  m/sec \* age)), in males  $1.458$  ( $y = 1.458$  m/sec +  $(0.097$  m/sec \* age)) and in women  $0.081$  ( $y = 1.784$  m/sec +  $(0.081$  m/sec \* age))

**Conclusions:** All the parameters of structure and function analyzed, except for aaPWV, show average values and a greater annual increase in males comparing with females.

#### SODIUM-SENSITIVE BLOOD PRESSURE RESPONSE IN TYPE 1 DIABETES IS ACCOMPANIED BY IMPEDED SKIN LYMPHANGIOGENESIS

E. Wenstedt, N. M. G. Rorije, R. H. G. Olde Engberink, B. J. H. van den Born, J. Aten, L. Vogt. Academic Medical Center, Amsterdam, THE NETHERLANDS

**Objective:** Studies showed that sodium can be non-osmotically stored within the skin. In response to high sodium diet (HSD), skin sodium content increases and macrophages are attracted, inducing lymphangiogenesis. Disruption of this system has been shown to lead to sodium-sensitive hypertension. This study investigates the effects of HSD on skin lymphatic and blood capillaries as well as blood pressure (BP) in type 1 diabetic patients (DM1).

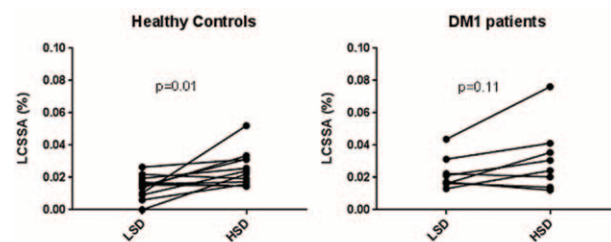


Fig 1A. Lymphatic cross sectional surface area (LCSSA) expressed as a percentage of the histological slice. LSD = low sodium diet, HSD = high sodium diet.

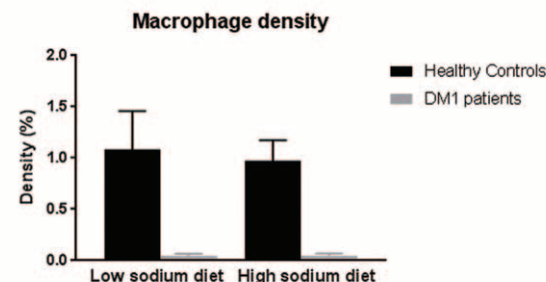


Fig 1B. Macrophage density in healthy controls and DM1 patients after low and high sodium diet, expressed as the percentage of the histological slice that is positively stained with CD68. Data are presented as median with interquartile range.

**Design and method:** We performed a randomized crossover study in males with DM1 and healthy controls. All subjects pursued an 8-day low sodium diet (LSD:  $< 50$  mmol Na+/day) and HSD ( $> 200$  mmol Na+/day). Diet order was randomized and time in-between diets was 1–2 weeks. After each diet, BP measurements and skin biopsies were obtained. Macrophages (CD68), vascular en-

dothelium (CD31) and lymphatic endothelium (D2-40) were identified through immunohistochemistry.

**Results:** This study included 8 patients with DM1 and 12 controls who were similar regarding age, BMI and eGFR. In DM1 patients, mean arterial pressure was higher after HSD as compared to LSD (mean (SE) 85(2) vs. 80(1) mmHg,  $p = 0.03$ ) whereas in controls no differences were observed (78(1) vs. 78(2) mmHg,  $p = 0.66$ ). HSD increased lymphatic cross sectional surface area in controls ( $p = 0.01$ ) but not in DM1 patients (fig 1a). Less CD68+ macrophages were present in DM1 patients compared to controls ( $p < 0.001$ ) (fig 1b). In both groups, there was a strong association between lymphatic capillary density and macrophage density (DM1  $r = 0.57$   $p = 0.02$ ; controls  $r = 0.71$   $p = 0.02$ ).

**Conclusions:** The sodium-sensitive BP increase in DM1 patients is accompanied by impeded skin lymphangiogenesis and reduced skin macrophage content. Lymphangiogenesis may help to prevent sodium-sensitive hypertension.

## THE EFFECTS OF NEBIVOLOL AND IRBESARTAN ON CENTRAL BLOOD PRESSURE AND ARTERIAL STIFFNESS PARAMETERS IN HEMODIALYSIS PATIENTS WITH INTRADIALYTIC HYPERTENSION

A. Bikos<sup>1,2</sup>, C. Loutradis<sup>1</sup>, E. Aggeloudi<sup>1</sup>, A. Karpetas<sup>3</sup>, V. Raptis<sup>4</sup>, J. Alexiadis<sup>5</sup>, I. Balaskas<sup>6</sup>, V. Liakopoulos<sup>6</sup>, A. Papagianni<sup>1</sup>, P.A. Sarafidis<sup>1</sup>. <sup>1</sup>Department of Nephrology, Hippokraton Hospital, Aristotle University of Thessaloniki, Thessaloniki, GREECE, <sup>2</sup>Protypo Hemodialysis Unit, Thessaloniki, GREECE, <sup>3</sup>Therapeutiki Hemodialysis Unit, Thessaloniki, GREECE, <sup>4</sup>Pieria Hemodialysis Unit, Katerini, GREECE, <sup>5</sup>Department of Nephrology, General Hospital of Alexandroupoli, Alexandroupoli, GREECE, <sup>6</sup>Section of Nephrology and Hypertension, 1st Department of Medicine, AHEPA Hospital, Aristotle University of Thessaloniki, Thessaloniki, GREECE

**Objective:** Intradialytic hypertension is associated with increased cardiovascular risk. The exact mechanistic background of intradialytic hypertension is not yet fully elucidated. This study aimed to evaluate the effects of nebivolol and irbesartan in 24-hour ambulatory central BP, arterial stiffness and wave reflection parameters in hemodialysis patients with intradialytic hypertension.

**Design and method:** In a cross-over fashion 38 hemodialysis patients (age:  $60.4 \pm 11.1$  years, male: 65.8%) with intradialytic hypertension (mean intradialytic rise  $> 10$  mmHg in systolic BP (SBP) over 6 consecutive hemodialysis sessions) were randomly assigned to receive nebivolol 5 mg and subsequently irbesartan 150 mg, or vice versa. Half of the patients received a single drug-dose 1 hour before hemodialysis ( $n = 19$ ) and half received the drug for a whole week before evaluation ( $n = 19$ ). A two-week wash-out period took place before the initiation of the second drug. Ambulatory central BP, arterial stiffness and wave reflection parameters were estimated with the Mobil-O-Graph NG device, during a midweek dialysis-on day (24 hours).

**Results:** In total, 20 (52.6%) patients received nebivolol first and 18 (47.4%) received irbesartan first. Weekly administration of either nebivolol or irbesartan reduced 24-hour central SBP and DBP ([Baseline:  $135.50 \pm 10.09/92.03 \pm 9.1$  8; Nebivolol:  $126.65 \pm 8.40$  ( $p < 0.001$ ),  $87.22 \pm 7.05$  ( $p = 0.004$ ); Irbesartan:  $128.93 \pm 10.76$  ( $p = 0.058$ ),  $87.32 \pm 9.34$  ( $p = 0.056$ ) mmHg], while nebivolol also reduced central pulse pressure (cPP) ([Baseline:  $43.48 \pm 12.04$ , Nebivolol:  $39.87 \pm 8.56$  ( $p = 0.021$ ); Irbesartan:  $41.77 \pm 8.22$  ( $p = 0.377$ ) mmHg] and pulse wave velocity (PWV) ([Baseline:  $9.96 \pm 2.45$ ; Nebivolol:  $9.73 \pm 2.48$  ( $p = 0.016$ ); Irbesartan:  $9.72 \pm 2.72$  ( $p = 0.073$ ) m/s). Neither drug affected heart rate-adjusted augmentation index (AIx(75)). Patients receiving a single dose of nebivolol had significantly lower 24-hour central DBP [Baseline:  $89.32 \pm 12.16$ ; Nebivolol:  $85.45 \pm 11.37$  ( $p = 0.032$ )], but similar 24-hour central SBP, cPP, AIx(75) and PWV. No significant differences were observed in patients receiving a single dose of irbesartan.

**Conclusions:** Weekly administration of both nebivolol and irbesartan reduce central BP and PWV, but not AIx(75). The above suggest that development of intradialytic hypertension may be primarily attributed to abnormal vasculature response to volume changes affecting both SBP and DBP.

## HIGHER MYOCARDIAL OXYGEN CONSUMPTION DURING SUBMAXIMAL EXERCISE IN SUBJECTS WITH ELEVATED PULSE WAVE VELOCITY

C. Lizenberg<sup>1</sup>, R. Ketelhut<sup>2</sup>, R. Ketelhut<sup>3</sup>. <sup>1</sup>Otto-von-Guericke-University, Magdeburg, GERMANY, <sup>2</sup>Medical Center Berlin (MCB), Berlin, GERMANY, <sup>3</sup>University Hospital Charité, Berlin, GERMANY

**Objective:** Blood pressure (BP) during standardized workload has prognostic value regarding future cardiovascular (cv) morbidity and mortality independent of BP at rest. Pulse wave velocity (PWV) as a marker of arterial stiffness has independent prognostic value for future cv events. This study was designed to

compare BP response to exercise and myocardial oxygen consumption in subjects with elevated PWV with normal subjects.

**Design and method:** In 103 subjects (72 males, aged  $50.4 \pm 13.3$  years, BMI  $25.3 \pm 3.4$  kg/m<sup>2</sup>) without antihypertensive medication, PWV was measured at rest and non-invasively by Mobil-O-Graph® (I.E.M. GmbH, GERMANY). During and after standardized exercise (50–100 watts, increments 10 watts/minute) BP was measured with the cuff method and the product of heart rate during exercise and systolic BP at 100 watts (BP100W, HR100W) was calculated as a usual measure of myocardial oxygen consumption.

**Results:** Mean PWV at rest was  $7.6 \pm 1.7$  m/sec and correlated significantly with systolic BP100W ( $176.6 \pm 22.2$  mmHg,  $p < 0.01$ ,  $r = 0.51$ ) and systolic BP 3 minutes after exercise ( $146.7 \pm 19.7$  mmHg,  $p < 0.01$ ,  $r = 0.37$ ). In subjects with elevated PWV, both mean HR100W and mean BP100W were higher ( $p < 0.01$ ) when compared with the normal subjects. Subjects with a pathological PWV presented a 23% ( $p < 0.05$ ) higher myocardial oxygen consumption than normals.

**Conclusions:** There is a considerably stronger correlation between PWV at rest and systolic BP during submaximal exercise compared to BP measurements at rest. Subjects with elevated PWV as an early sign of hemodynamic alterations, have already a considerably higher HR and systolic BP (sBP) during submaximal exercise. Therefore, the product of both HR and sBP as a measure of myocardial oxygen consumption during submaximal exercise is considerably higher in those with the elevated PWV, thus resulting in a lower total physical capacity.

## INTER-ARM DIFFERENCE IN SYSTOLIC BLOOD PRESSURE AND ARTERIAL STIFFNESS

J.H. Lee<sup>1</sup>, K. Hwang<sup>1</sup>, M. Cho<sup>1</sup>, M. Rhee<sup>2</sup>. <sup>1</sup>Chungbuk National University Hospital, Cheongju, SOUTH KOREA, <sup>2</sup>Dongguk University Ilsan Hospital, Goyang, SOUTH KOREA

**Objective:** A significant inter-arm difference in systolic blood pressure (IBPD) has recently been associated with worse cardiovascular outcome. We hypothesized that part of this association is mediated by arterial stiffness, and examined the relationship between significant IBPD and brachial-ankle pulse wave velocity (BA-PWV).

**Design and method:** A representative population (aged 20–65 years) was selected by list-assisted random-digit dialing method from a city with a population of one million. The BP of two arms was simultaneously measured using validated automatic BP measurement devices for 3 times and PWV was measured in all included subjects. An increased IBPD was defined as  $> 10$  mmHg using the average of 3 BP differences obtained simultaneously in both arms.

**Results:** We examined 488 subjects. Mean age was  $46.9 \pm 9.4$  years and 309 participants were female (63.3%). Overall systolic BP and diastolic BP were  $118.5 \pm 13.4$  mmHg and  $75.1 \pm 10.3$  mmHg. Mean systolic IBPD was  $5.7 \pm 4.0$  mmHg and 66 subjects (13.5%) had an increased systolic IBPD. Mean BA-PWV was 1307 cm/s and BA-PWV was significantly higher in subjects with an increased IBPD ( $1357.8 \pm 210.3$  vs.  $1299.6 \pm 201.3$  cm/s,  $P = 0.030$ ). The subjects with increased IBPD also had higher body mass index ( $25.0 \pm 3.3$  vs.  $23.7 \pm 3.2$  Kg/m<sup>2</sup>,  $P = 0.003$ ) and waist circumference ( $87.6 \pm 9.7$  vs.  $83.2 \pm 9.3$  cm,  $P < 0.001$ ). There was no significant difference in ankle-brachial index.

**Conclusions:** Significant IBPD is associated with increased arterial stiffness in community dwelling adults. IBPD could potentially be considered as a marker of increased arterial stiffness.

## REAL TIME ASSESSMENT OF MICROCIRCULATION IN HYPERTENSION USING LASER SPECKLE CONTRAST ANALYSIS

A. Lazaridis<sup>1</sup>, E. Gkaliagkousi<sup>1</sup>, N. Koletsos<sup>1</sup>, B. Nikolaidou<sup>1</sup>, P. Anyfanti<sup>1</sup>, P. Dolgyras<sup>1</sup>, A. Vamvakis<sup>1</sup>, A. Triantafyllou<sup>1</sup>, K. Diplas<sup>2</sup>, S. Douma<sup>1</sup>. <sup>1</sup>3rd Department of Internal Medicine, Papageorgiou General Hospital, Aristotle University of Thessaloniki, Thessaloniki, GREECE, <sup>2</sup>Exercise Physiology & Biochemistry Laboratory, Department of Sport Sciences, Aristotle University of Thessaloniki, Serres, GREECE

**Objective:** Skin microcirculation has been suggested as a model of generalized microvascular function. It has also been used as a window to access endothelial function in the microvasculature. In this study we evaluated endothelial dysfunction of skin microcirculation in hypertensive patients compared to healthy, normotensive individuals using Laser Speckle Contrast Analysis (LASCA), a novel tool to assess microcirculation non-invasively, in real time and with high reproducibility.

**Design and method:** We studied a group of 26 untreated hypertensive patients with new-onset essential hypertension without cardiovascular comorbidities, mean age  $50.5 \pm 15.7$  years and 13 healthy individuals matched for age, sex and

body mass index. In all subjects, forearm skin blood flow was recorded under standardized conditions using a laser speckle contrast imager (PeriCam PSI NR System, Perimed, Järfälla, Sweden). Post-occlusive reactive hyperemia (PORH) was assessed following a standardized protocol and data were analyzed with signal processing software (PIMSoft, Perimed). The amplitude of PORH responses was expressed as a percentage increase between peak and baseline perfusion (%), baseline Cutaneous Vascular Conductance (CVC), peak CVC and peak CVC minus baseline CVC. The CVC was calculated as the flux divided by mean arterial pressure and expressed in perfusion units (PU)/mmHg.

**Results:** Baseline perfusion was similar between the two groups. However, during PORH patients with hypertension showed significantly lower percentage increase from baseline to peak perfusion ( $145.9 \pm 9.72$  vs  $181.68 \pm 12.35$  %,  $p = 0.019$ ). In addition, baseline CVC ( $0.34 \pm 0.019$  vs  $0.43 \pm 0.03$  PU/mmHg,  $p = 0.009$ ) and peak CVC ( $0.82 \pm 0.04$  vs  $1.2 \pm 0.06$  PU/mmHg,  $p < 0.001$ ) were significantly lower in hypertensive patients compared to controls. Finally, PORH amplitude as expressed by peak CVC minus baseline CVC ( $0.48 \pm 0.03$  vs  $0.76 \pm 0.04$  PU/mmHg,  $p < 0.001$ ) was significantly lower in hypertensive patients compared to normotensives.

**Conclusions:** Using LASCA, a non-contact, real-time, highly reproducible and sensitive technique for the assessment of skin microcirculation, we showed that hypertensive patients demonstrate impaired microvascular responses to stimulation tests. Endothelial dysfunction is present in the very early stages of essential hypertension, long before the establishment of overt cardiovascular disease, and LASCA may represent a novel, valuable tool for its assessment.

### MACRO- AND MICROCIRCULATORY ABNORMALITIES OF VASCULAR WALL IN HYPERTENSIVE PATIENTS

A. Kvasnikov, V. Podzolkov, A. Bragina, N. Druzhinina, M. Pisarev, D. Bayutina, A. Murashko. *First Sechenov Moscow State Medical University, Moscow, RUSSIA*

**Objective:** To study arterial wall elasticity and stiffness in hypertensive's patients with moderate and high cardiovascular risk not receiving antihypertensive treatment.

**Design and method:** The study included 41 hypertensive's patients (16 male and 27 female) with mean age of  $61.1 \pm 10.7$  years, systolic, diastolic blood pressure ( $162.7 \pm 20.8$  mm Hg,  $98.6 \pm 11.2$  mm Hg), hypertension duration  $9.3 \pm 7.2$  years. Obesity was found in 32% of participants, 21% of patients were smokers. Carotid Doppler ultrasound study with intima-media thickness (IMT) measurement (using Aloka SSD 2000 ultrasound system) and photoplethysmography with augmentation index (AI), stiffness index (SI), delay in time between early and late systolic waves (dTPP), vascular age (VA) and stress index (SI) scores assessment (using Angioscan Professional system, Russia, 2015) were performed on all patients. Statistical analysis was done using Statistica 10.0 software.

**Results:** There were 3 groups of patients: I (N = 14) with normal IMT ( $<0.9$  mm) and no carotid atherosclerotic plaque present, II (N = 13) with increased IMT ( $>0.9$  mm) and no plaques, and III (N = 14) with carotid atherosclerotic plaques (average number  $2.0 \pm 1.6$  with the mean % narrowing of  $32.4 \pm 12.6$ ). There were no differences in age, hypertension grade, obesity and smoking prevalence between the groups. With the increase in carotid atherosclerosis, a significant rise in AI was seen ( $-1.3 \pm 19.7\%$  in group I,  $10.5 \pm 12.7\%$  in group II and  $18.6 \pm 13.8\%$  in group III;  $p < 0.05$ ), whereas dTPP was significantly lower in group III than in groups II and I ( $90.5 \pm 30.7$  vs  $89.2 \pm 17.2$  ms vs  $96.5 \pm 29.3$  ms, respectively;  $p < 0.05$  between groups I and III). Significant difference in SI was found only between groups I and II ( $7.4 \pm 1.07$  m/s vs  $8.2 \pm 0.88$  m/s, respectively;  $p < 0.05$ ), while this parameter was  $7.6 \pm 1.09$  m/s in group III. Patients from groups I, II, and III demonstrated a significant elevation of VA ( $44.7 \pm 14.9$  vs  $58.3 \pm 7.4$  vs  $63.5 \pm 12.9$  years, respectively;  $p < 0.05$ ) and SI ( $3.1 \pm 1.2$  vs  $3.5 \pm 1.04$  vs  $3.9 \pm 0.95$ , respectively;  $p < 0.05$ ). A correlation between VA and carotid diameter ( $R = -0.7$ ;  $p < 0.05$ ), AI and the number of atherosclerotic plaques ( $R = 0.73$ ;  $p < 0.05$ ) was revealed in hypertensive's.

**Conclusions:** Carotid atherosclerosis in hypertensive's is associated with microcirculatory abnormalities and increased vascular age and stress index scores.

### APPLICATION OF LEUKOCYTIC-AND-PLATELET AGGREGATION, HEMOLYSATE-AGGREGATION TEST, PARAMETERS OF ERYTHROCYTES IN DIAGNOSIS OF BLEEDING RISKS IN PATIENTS WITH ARTERIAL HYPERTENSION

M.V. Kruchinina<sup>1</sup>, A.A. Gromov<sup>1</sup>, V.M. Generalov<sup>2</sup>, V.N. Kruchinin<sup>3</sup>. <sup>1</sup>Research Institute of Internal and Preventive Medicine -Branch of the Institute of Cytology and Genetics, SB RAS, Novosibirsk, RUSSIA, <sup>2</sup>The State Research Center of Virology and Biotechnology VECTOR, Koltsovo, Novosibirsk Region, RUSSIA, <sup>3</sup>Institute of Semiconductor Physics named after A.V. Rzhanov, Novosibirsk, RUSSIA

**Objective:** This study aims to ascertain the possibility of application of hemostasis parameters, electrical, viscoelastic properties of red blood cell (RBC) in diagnosis of the risk of development of bleeding in patients with arterial hypertension (AH).

**Design and method:** Total 110 patients with AH (stages I-II;  $57.0 \pm 0.9$  years) were included into the study. Standard methods of studies, modified by Barkagan Z.S. (1980), were used to evaluate the findings of the hemostasis system. RBC parameters were studied using the dielectrophoresis techniques on various frequencies of non-uniform alternating electric field.

**Results:** Based on HAS-BLED scale all patients were divided into the three groups: the ones with low risk (n = 22); average (n = 48), high risk of bleeding (n = 40). Evaluation of hemostasis enabled us to reveal a highly significant increase in hemolysate-aggregation test findings in various samples, the rate of leukocytic-and-platelet aggregation in the study groups which was getting higher along with the increase of bleeding risk ( $p = 0.0001-0.032$ ). The prothrombin index tended to be lower in the group with high risk of bleeding as compared to the one with average risk ( $p = 0.04$ ) while the international normalized ratio tended to increase. The patients with high risk revealed significantly higher fibrinogen level as compared to the groups of patients with lower risk ( $p = 0.048$ ). Evaluation of parameters of RBC revealed the decrease in cell polarizability at 106 Hz that would go down from the patients with low risk to the ones with high bleeding risk ( $p < 0.0001$ ). This speaks in favor of the significantly decreased adaptation capabilities of RBC in patients with high risk of bleeding. The results obtained correlated well with the increased hemolysis of RBC (destruction index) at various frequencies which is not registered in patients with low risk but would appear at 105, 5' 104 Hz in patients with medium risk ( $p < 0.01$ ) and would be registered at all frequencies in group with high risk of bleeding ( $p < 0.001$ ).

**Conclusions:** Combined application of parameters of hemostasis, RBCs in diagnosis of bleeding risk in AH patients demonstrated high value of sensitivity (90.9%), specificity (100%), prognostic value of positive (100%) and negative results (95.3%), accuracy index (90.8%).

### HIGH CAROTID RADIAL PULSE WAVE VELOCITY MAY BE CONNECTED TO LOWER QUALITY OF LIFE MEASURED BY SF-36 QUESTIONNAIRE

I. Kantola, J. Tervo, L. Koskio, J. Haijanen, H. Hermansson, T. Kantola, M. Merikari, P. Mäkelä, S. Rehunen, J. Varis. *Division of medicine Turku university hospital, Turku, FINLAND*

**Objective:** To clarify correlation of carotid-femoral (C-F) and carotid-radial (C-R) pulse wave velocity (PWV) to quality of life measured by SF-36 questionnaire and the explanatory factors of C-F and C-R PWV in Finnish drug-treated hypertensive patients.

**Design and method:** A Doppler ultrasonography device (Micro Medical PulseTrace PWV, Micro Medical Ltd, Rochester, Kent, UK) was used to measure C-F and C-R PWV in 133 Finnish drug-treated hypertensive patients. The mean age was 65.0 (8.8) years (59 females and 74 males). 24 hour ambulatory blood pressure monitoring (ABPM) was performed with a portable device (90207 Ambulatory Blood Pressure Monitor, SpaceLabs Inc., Washington, U.S.). SF-36 questionnaire was used in calculating quality of life. Fasting plasma glucose, GHbA1c, lipids and urine albumin/creatinine ratio were measured.

**Results:** C-F PWV did not correlate to any SF-36 parameter. C-R PWV correlated inversely to SF-36 vitality, social functioning and mental health. The mean 24 hour systolic blood pressure (SBP) was 132.5 (12.1) and diastolic blood pressure (DBP) 76.4 (6.9) mmHg. The mean C-F PWV was 11.4 (3.8) m/s and C-R PWV 11.5 (2.5) m/s. C-F PWV correlated positively to age, office systolic blood pressure and serum creatinine. C-R PWV correlated positively to height, weight, waist-hip ratio, male gender and glycosylated haemoglobin A1c (GHbA1c) and negatively to SF-36 questionnaire vitality, social functioning and mental health, female gender, plasma total and LDL-cholesterol. According to stepwise linear regression analysis C-F PWV was explained by SF-36 bodily pain ( $t = 2.141$ ,  $p = 0.038$ ), office SBP ( $t = 3.056$ ,  $p = 0.04$ ) and 24 hour heart rate standard deviation ( $t = -2.244$ ,  $p = 0.030$ ) and C-R PWV by weight ( $t = 2.898$ ,  $p = 0.005$ ), GHbA1c ( $t = 2.700$ ,  $p = 0.009$ ) and male gender ( $t = 2.077$ ,  $p = 0.041$ ).

**Conclusions:** Among treated Finnish hypertensive patients C-R PWV was correlated to SF-36 questionnaire parameters vitality, social functioning and mental health which may suggest that high C-R PWV may decrease quality of life of these patients. Also C-F PWV was partly explained by SF-36 bodily pain which suggest that C-F PWV might be high in patients with less pain.

## ARTERIAL STIFFNESS ASSESSMENT BY TONOMETRY IN PATIENTS WITH PHENYLKETONURIA

A. H. Ameijeiras<sup>1</sup>, P. Sanchez Pintos<sup>2</sup>, V. Crujeiras<sup>2</sup>, J.E. Lopez Paz<sup>1</sup>, M. Couce Pico<sup>2</sup>, C. Calvo Gomez<sup>1</sup>. <sup>1</sup>Hospital Clínico Universitario. Hypertension and Vascular Unit, Santiago de Compostela, SPAIN, <sup>2</sup>Unit of Diagnosis and Treatment of Congenital Metabolic Diseases, Department of Pediatrics, Hospital clínico Universitario, Santiago de Compostela, SPAIN

**Objective:** Dietary treatment in patients with phenylketonuria (PKU) leads to overweight and is associated with an elevation of inflammatory markers, which may increase risk of atherosclerosis.

However, the elastic properties of the great arteries in patients with PKU have not been previously studied.

The aim of the present study is to evaluate the rigidity of the arterial wall by tonometry in phenylketonuric patients

**Design and method:** Cross-sectional study in 41 phenylketonuric patients (age range: 6–50 years) and 43 healthy controls matched by age and sex. The variables included include sex, anthropometric parameters (weight, height, body mass index, cranial perimeter, brachial and waist circumference, blood pressure, phenotype (classic or moderate PKU), mean annual plasma levels of phenylalanine (Phe), degree of metabolic control (considered appropriate if the annual Phe levels were under 360mcmol/L in children under 6 years, or lower than 480mcmol/L between 6–10 years and lower than 600mcmol/L over 10 years) and the treatment or not with sapropterin.

Arterial stiffness was evaluated non-invasively by tonometry, measuring the central blood pressure, the augmentation index (Aix), the augmentation pressure (AP) and the pulse wave velocity (PWV).

**Results:** Patients with phenylketonuria have a marked elevation of AP and Aix compared to controls (5.09mmHg vs 2.65mmHg,  $p = 0.046$  and 14.85% vs 9.1%,  $p = 0.034$  respectively), as well as PVW in patients affected by PKU in a classical way (6.60m/sec vs. 5.36m/sec,  $p = 0.001$ ).

We observed a linear correlation between the annual mean of Phe and PWV ( $r = 0.610$ ,  $p = 0.000$ ).

In patients treated with sapropterin, the pulse velocity was lower (PWV: 4.85 m/sec vs. 6.23m/sec,  $p = 0.034$ ).

**Conclusions:** Our data demonstrated a marked increase in arterial stiffness in patients with phenylketonuria measured by tonometry that manifests itself from the pediatric age.

Patients with adequate dietary adherence and those treated with sapropterin have a lower risk of developing atherosclerosis as they showed lower PWV.

These results may contribute to improving the assessment of cardiovascular risk in patients with PKU.

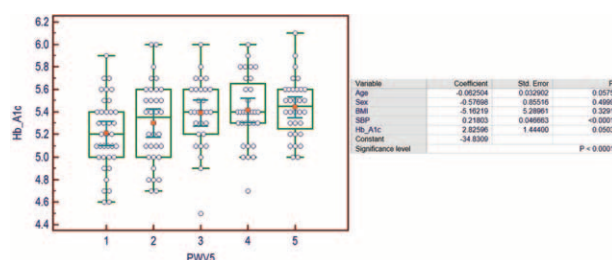
## METABOLIC PROFILE AND VASCULAR STIFFENING: RELATIONSHIPS IN MIDDLE-AGE NORMOTENSIVE PATIENTS

S. A. Gonzalez, J. Chiabaut Svane, P. Kempny, M. Schiavone, C. Castellaro. *Centro Cardiometabolico, Hospital Austral, Pilar, ARGENTINA*

**Objective:** a-To determine univariate associations between lipid metabolism markers (LMM) and glucose metabolism markers (GMM) with pulse wave velocity (PWV) in normotensive subjects (NT) and b-To evaluate independent relationships between LMM, GMM with PWV in NT.

**Design and method:** 380 subjects were evaluated consecutively during a primary prevention programme, that includes blood sample and arterial stiffness evaluation. After applying exclusion criteria (age below 18/above 80 years, hypertension, previous diagnostic of diabetes, glucose > 126 mg/dl and/or HbA1c > 6.4%, cardiovascular event) 165 NT were included (49.8 ± 10.7 years, 120 ± 12/79 ± 10 mm Hg, 57% male sex). BP was measured (ESH) prior to PWV determinations (Mobil-O-Graph PWA monitor, I.E.M. GmbH, Germany). Low-density cholesterol (LDLc), high-density cholesterol (HDLc), triglycerides (TG), glucose (GLU), HbA1c and insulin (INS) were determined, and HOMA index and body mass index (BMI) were calculated. LMM and GMM markers were tested according to quintiles of PWV (ANOVA). Elevated PWV (ePWV) was defined as > percentile 90% by age (Arterial Stiffness' Collaboration database). Age, sex, BMI, systolic BP, and metabolic markers -those were significantly different in univariate analysis- were tested in a logistic regression, with ePWV as dependent variable.

**Results:** LMM (HDLc, LDLc and TG) showed no associations through quintiles of PWV ( $p > 0.05$  in all cases). GLU and HbA1c showed significant increments across quintiles of PWV ( $p < 0.001$  and  $p = 0.01$ , respectively), while INS and HOMA did not ( $p = 0.24$  and  $p = 0.12$ , respectively). Of the entire NT population, 16% presented ePWV. In logistic regression, age, systolic BP and HbA1c were independent predictors of ePWV (fig).



**Conclusions:** HbA1c, a marker of glucose metabolism, was a predictor of early vascular stiffening in this cohort of middle-age normotensive patients, beyond other established factors, as age and blood pressure. This finding could be showing an early enzymatic glycation of arterial wall proteins in normotensives, with AGE's formation and progressive stiffening of conductance arteries.

## ENDOTHELIAL FUNCTION IS ASSOCIATED WITH TRIPLE SIGNAL IN FIBROMUSCULAR DYSPLASIA: THE MEDYA STUDY

R. M. Bruno<sup>1</sup>, L. Marais<sup>2</sup>, H. Khettab<sup>3</sup>, C. Boulanger<sup>2</sup>, X. Jeunemaitre<sup>3</sup>, P. Plouin<sup>3</sup>, S. Laurent<sup>3</sup>, P. Boutouyrie<sup>3</sup>, M. Azizi<sup>3</sup>. <sup>1</sup>University of Pisa, Pisa, ITALY, <sup>2</sup>INSERM, Paris, FRANCE, <sup>3</sup>Hopital Européen George Pompidou, APHP, Paris, FRANCE

**Objective:** Triple signal (TS) is a subclinical lesion were found in the common carotid artery of individuals with renal fibromuscular dysplasia (FMD). However, the mechanisms underlying this alteration in FMD patients are still unknown and might involve endothelial and/or smooth muscle cell dysfunction. We aimed at investigating whether FMD or triple signal, is associated with systemic vascular dysfunction.

**Design and method:** The MEDYA study is a case-control, cross-sectional study, enrolling 47 individuals with renal FMD, 47 matched individuals with essential hypertension (HT) and 50 healthy controls (C). All individuals underwent an assessment of endothelium-dependent dilation (EDD) of the brachial artery by the flow-mediated dilation technique and endothelium-independent dilation (EID) by sublingual administration of glyceryl trinitrate 150 mcg. EDD and EID were allometrically corrected for baseline diameter. Triple signal score was also computed in the common carotid arteries bilaterally, based on B-mode and RF images. A cut-off of 8 was used to discriminate TS carriers.

**Results:** FMD, but not HT, showed impaired EID in comparison to controls ( $p = 0.003$ ). FMD (but not TS) was among the determinants of EID\_corr in a multiple linear regression model ( $\beta = -0.03$ ,  $p = 0.005$ ).

TS prevalence (FMD 48.9%, HT 31.9%, C 16.0%) was higher in FMD than in C ( $p < 0.001$ ), but tended to be increased in HT as well ( $p = 0.07$ ). In a multiple logistic regression model adjusted for confounders, FMD (OR 4.54, CL95% 1.56–13.23) but not HT, was independently associated with TS.

In the FMD subgroup, TS was associated with older age, higher peak shear stress and lower EDD. EDD was still reduced in FMD patients with TS after correction for confounders ( $1.14 \pm 3.59$  vs  $3.55 \pm 4.18$ ,  $p = 0.035$ ). In the HT subgroup, TS was independently associated only with older age and hypercholesterolemia.

**Conclusions:** FMD is characterized by impaired smooth muscle cell function and increased TS prevalence, subclinical alterations independent from each other. TS might have a different pathophysiological significance in FMD and HT. Indeed, among FMD patients TS is associated with impaired endothelial function. Conversely, in HT TS seems to be associated only with classical CV risk factors.

## DAY/NIGHT DIFFERENCES IN PARAMETERS OF VENTRICULAR EJECTION FROM OSCILLOMETRIC PULSE WAVE MEASUREMENTS

A. Bauer<sup>1</sup>, B. Hametner<sup>1,2</sup>, V. Dornberger<sup>3,4</sup>, S. Wassertheurer<sup>1</sup>, M. Dörr<sup>3,4</sup>. <sup>1</sup>AIT Austrian Institute of Technology, Center for Health & Bioresources, Vienna, AUSTRIA, <sup>2</sup>TU Wien, Institute for Analysis and Scientific Computing, Vienna, AUSTRIA, <sup>3</sup>University Medicine Greifswald, Department of Internal Medicine B, Greifswald, GERMANY, <sup>4</sup>German Centre for Cardiovascular Research (DZHK), partner site Greifswald, Greifswald, GERMANY

**Objective:** The ejection duration (ED) is an important indicator of both ventricular function and ventriculo-arterial coupling. Wave intensity analysis (WIA) is a promising technique for assessment of the cardiovascular performance based on pulse wave analysis (PWA). Previous studies have indicated that 24-hour PWA measurements with oscillometric devices may provide important additional information on cardiac function compared to single measurements. Thus, the aim of this study was to perform PWA with additional ED calculation and WIA on 24-hour pressure wave measurements and to analyse differences between day and night.

**Design and method:** 24 h PWA measurements were carried out on 84 patients (age: 62 years (10 SD), 25 female/59 male) with the Mobil-O-Graph device (IEM, Germany). Wave intensity was determined using central pressure derived from brachial recordings and a model-based blood flow. The SD-ratio (SDR) was defined as the ratio of the first and second peak of the forward wave intensity. Day-time (9–21 h) and nighttime (0–6 h) means were calculated and compared.

**Results:** Peripheral and central systolic blood pressure dropped at night from 124 to 114 mmHg and from 114 to 105 mmHg, respectively ( $p < 0.001$ ), and the heart rate was significantly higher during nighttime (70 vs 63 bpm,  $p < 0.001$ ). The ejection duration was shorter during nighttime (310 vs 343 ms,  $p < 0.001$ ) and the SDR was lower during nighttime (2.54 vs 3.21,  $p < 0.001$ ), see Table. The differences between day and night averages of heart rate were inversely correlated to those in ejection duration ( $r = -0.49$ ,  $p < 0.001$ ) and not correlated with those in SDR ( $r = 0.07$ ,  $p = 0.55$ ).

**Conclusions:** Determination of ejection duration and wave intensity analysis from oscillometric 24-hour PWA measurements is feasible. We observed diurnal trends, particularly there were significant differences in ejection duration and SDR between day- and nighttime. The prolongation of the ejection duration during nighttime was partly related to a decreased heart rate, while no relation between the changes in heart rate and SDR could be found. Further studies should investigate how the day/night changes differ between particular patient groups.

Table: Mean day and night values and p-values (t-test) for central systolic (cSBP) and diastolic blood pressure (pDBP), peripheral systolic (pSBP) and diastolic blood pressure (cDBP), heart rate (HR), ejection duration (ED) and SD-ratio (SDR).

Parameter (Unit)	Day Mean (SD)	Night Mean (SD)	p-value of difference
pSBP (mmHg)	124 (11)	114 (15)	<0.001
pDBP (mmHg)	77 (8)	67 (9)	<0.001
cSBP (mmHg)	114 (10)	105 (13)	<0.001
cDBP (mmHg)	78 (8)	68 (10)	<0.001
HR (bpm)	70 (10)	63 (9)	<0.001
ED (ms)	310 (22)	343 (29)	<0.001
SDR (-)	2.54 (0.65)	3.21 (1.25)	<0.001

## CARDIOVASCULAR RISK LOWERING THERAPY IS UNDERUTILIZED IN LOWER EXTREMITY ARTERY DISEASE PATIENTS TREATED FOR ACUTE MYOCARDIAL INFARCTION

V. Baracsi-Botos<sup>1</sup>, V. Szoke<sup>1</sup>, T. Palfi<sup>1</sup>, K. Stampfel<sup>1</sup>, Z. Jara<sup>1,2</sup>, <sup>1</sup>Szent Imre University Teaching Hospital, Cardiology, Budapest, HUNGARY, <sup>2</sup>Semmelweis University, Angiology, Budapest, HUNGARY

**Objective:** Previous studies have demonstrated the prognostic significance and high prevalence of lower extremity artery disease (LEAD) in the population. The prevalence of LEAD highly depends on risk factors, as hypertension and other concomitant atherosclerotic diseases. Cardiovascular preventive treatment is more frequently utilized in patients with coronary heart disease than in patients with LEAD. Our aim was to characterize the LEAD patients who were admitted with acute myocardial infarction (AMI) to our center between January 2013 and June 2016 and to determine the use of cardiovascular risk reduction therapy among them.

**Design and method:** We collected data from the Hungarian National Myocardial Infarction Registry. In our center a total of 339 patients had ankle-brachial index screening within one year of the myocardial infarction (139 female /41%, mean age of 72.2 years (range 33–95 years). Chi-squared test has been used to analyze categorical data.

**Results:** Low ABI ( $\leq 0.9$ ) was detected in 132 persons (39%), while high ABI ( $> 1.3$ ) in 28 persons (8%). 36% of the patients (48 persons) diagnosed with LEAD was previously unaware of it. Majority of the patients were hypertensive (82% of the whole patient population and 90% of the LEAD population). 4% of the hypertensive subjects were untreated. Positive smoking history was more frequent in LEAD patients (75% versus 54%,  $p < 0.01$ ), although in 34% of the cases there was no information available regarding smoking habits. Diabetes occurrence tended to be higher in LEAD patients (49% versus 37%, NS). Only 54% of PAD patients were treated with antiplatelet therapy and 41% received statin at the time of myocardial infarction. There was no difference in antiplatelet and statin therapy in patients with and without LEAD.

**Conclusions:** Peripheral arterial disease is common in patients with acute myocardial infarction. In our study more than a third of the patients were unaware of LEAD. Approximately one in two LEAD patients did not receive the risk reduction therapy recommended by the current guidelines.

## SOME SITES OF INTIMATE MECHANISMS OF MYOCARDIAL ISCHEMIA IN MACRO AND MICROVASCULAR DYSFUNCTION: POSSIBLE ESTROGEN INDEPENDENT ACTIVATION OF ALFA-ESTROGEN RECEPTOR

S. Tsonev<sup>1</sup>, I. Petrov<sup>1</sup>, N. Zlateva<sup>1</sup>, T. Donova<sup>2</sup>, M. Niyagolov<sup>3</sup>, <sup>1</sup>University Hospital Acibadem City Clinic, Sofia, BULGARIA, <sup>2</sup>Sofia University, Sofia, BULGARIA, <sup>3</sup>Bulgarian Academy of Sciences, Sofia, BULGARIA

**Objective:** Microvascular dysfunction is the major mechanism of proven myocardial ischemia in patients with Cardiac syndrome X (CSX). Most of the patients with CSX are female and estrogen deficit is major factor for endothelial dysfunction.

**Aim:** Our aim is to investigate the correlation between hormonal dysbalance and myocardial ischemia in patients with CSX and obstructive ischemic heart disease (IHD). We compare 17beta-Estradiol levels, alfa-estrogen receptor (alfa-ER) activity and marker for myocardial ischemia vascular endothelial growth factor (VEGF).

**Design and method:** In the main group of patients with CSX (30 woman) and in patients with IHD (30 women) are measured the levels of VEGF, 17beta-Estradiol in serum by "sandwich" ELISA and rtPCR for alfa-ER activity. Control group of healthy subjects was used for VEGF analysis.

**Results:** Comparing the levels of VEGF in main group with CSX and IHD and control group we found that the investigated growth factor as marker for ischemia has serum levels statistically higher as well as in group with CSX ( $57.94 \pm 13.92$  pg/ml) and in group with IHD ( $69.03 \pm 10.10$  pg/ml) than in health controls ( $47.68 \pm 8.66$  pg/ml): respectively 0.040 and 0.046.

As expected, mean levels of 17beta-Estradiol are higher in IHD group than in CSX ( $12.21$  vs  $7.55$  pg/ml) but unacceptably to that activity of alfa-ER is higher in the group of IHD than in CSX (1.4).

This result could be explained by estrogen independent path for activation of alfa-ER, that is ischemia driven and mediated by growth factors as VEGF. Currently only in animal models this pathway is proven.

**Conclusions:** In myocardial ischemia due to macro or microvessels disease endothelial dysfunction has proven role. Estrogen deficiency is leading cause for microvascular dysfunction in women with CSX, but alfa-ER could have hormone independent role in myocardial ischemia and further investigations are needed.

## PARAMETERS DERIVED FROM RESERVOIR PRESSURE ANALYSIS INDEPENDENTLY PREDICT CARDIOVASCULAR EVENTS IN A MULTI-CENTRE STUDY OF INDIVIDUALS WITH TYPE 2 DIABETES

K. Aizawa<sup>1</sup>, F. Casanova<sup>1</sup>, D.M. Mawson<sup>1</sup>, K.M. Gooding<sup>1</sup>, W.D. Strain<sup>1</sup>, P.E. Gates<sup>1</sup>, G. Östling<sup>2</sup>, J. Nilsson<sup>2</sup>, F. Khan<sup>3</sup>, H.M. Colhoun<sup>4</sup>, C. Palombo<sup>5</sup>, K.H. Parker<sup>6</sup>, A.C. Shore<sup>1</sup>, A.D. Hughes<sup>7</sup>, <sup>1</sup>Diabetes and Vascular Medicine, NIHR Exeter Clinical Research Facility, University of Exeter Medical School, Exeter, UNITED KINGDOM, <sup>2</sup>Department of Clinical Sciences, Lund University, Malmö, SWEDEN, <sup>3</sup>Division of Molecular & Clinical Medicine, University of Dundee, Dundee, UNITED KINGDOM, <sup>4</sup>Centre for Genomic and Experimental Medicine, University of Edinburgh, Edinburgh, UNITED KINGDOM, <sup>5</sup>Department of Surgical, Medical, Molecular and Critical Area Pathology, University of Pisa, Pisa, ITALY, <sup>6</sup>Department of Bioengineering, Imperial College London, London, UNITED KINGDOM, <sup>7</sup>Institute of Cardiovascular Science, University College London, London, UNITED KINGDOM

**Objective:** Central haemodynamic parameters derived from reservoir pressure analysis (RPA) possess prognostic utility in several populations. However, evidence in type 2 diabetes (T2DM) remains scarce. We determined if these parameters would be associated with T2DM, and whether they would predict cardiovascular events in individuals with T2DM.

**Design and method:** We studied 313 T2DM individuals with CVD (DMCVD:  $70.5 \pm 7.9$  yrs, 96F), 367 T2DM individuals without CVD (DM:  $67.7 \pm 8.3$  yrs, 148F) and 185 individuals without T2DM or CVD (CONT:  $67.1 \pm 8.8$  yrs, 88F). RPA-derived parameters including reservoir pressure integral (INTPR), peak reservoir pressure (MAXPR), excess pressure integral (INTXSP), systolic rate constant (SRC) and diastolic rate constant (DRC) were obtained by radial artery tonometry.

**Results:** Parameters of RPA stratified by group are presented in the Table. INTPR was lower in DMCVD and DM than CONT. MAXPR and SRC were lower, and INTXSP was greater in DMCVD compared to DM and CONT. DRC was greater in DMCVD than CONT. In a subgroup of individuals with T2DM ( $n = 666$ ,  $69.1 \pm 8.2$  yrs, 237F, 308CVD), 14 deaths (6 cardiovascular and 8 non-cardiovascular causes) and 104 cardiovascular events occurred during a 3-yr follow-up period. Although baseline clinical characteristics of individuals who experienced a cardiovascular event ( $n = 85$ ) and those who did not ( $n = 581$ ) were similar, INTPR ( $83.0 \pm 16.2$  vs  $87.6 \pm 16.6$  mmHg·s) was lower, and INTXSP [ $7.5(6.5-9.8)$  vs  $7.3(5.8-9.1)$  mmHg·s] and DRC [ $2.7(2.1-3.2)$  vs  $2.4(1.9-2.9)$  s<sup>-1</sup>] were greater at baseline in individuals who had cardiovascular events than those without (all  $p < 0.05$ ). Logistic regression analysis revealed that INTPR and DRC were independent predictors of cardiovascular events during follow-up after adjusting for conventional risk factors [INTPR, odds ratio 0.97 (95%CI: 0.95–0.99); DRC, odds ratio 4.95 (95%CI: 2.10–11.65)]. Further adjustments for body mass index,

renal function, T2DM duration or previous CVD history had no substantial influence on associations.

**Conclusions:** These findings demonstrate that altered RPA-derived parameters are associated with T2DM. Furthermore, baseline values of INTPR and DRC independently predict cardiovascular events in individuals with T2DM, indicating a potential clinical utility of these parameters for risk stratification in T2DM.

Table. Parameters of reservoir pressure analysis stratified by group

	DMCVD (n=313)	DM (n=367)	CONT (n=185)	p
INTPR, mmHg·s	86.4 ± 16.6	87.2 ± 16.7	94.9 ± 15.6	<0.001
MAXPR, mmHg	105.2 ± 15.1	107.5 ± 13.6	109.0 ± 13.4	<0.001
INTXSP, mmHg·s	7.8 (6.2-9.6)	6.9 (5.7-8.5)	6.6 (5.4-8.1)	<0.001
SRC, s <sup>-1</sup>	6.4 (5.4-7.5)	7.0 (6.0-8.0)	7.4 (6.5-8.4)	<0.001
DRC, s <sup>-1</sup>	2.5 (2.0-3.0)	2.3 (1.9-2.9)	2.2 (1.8-2.7)	0.005

Data are shown as means ± SD or median (interquartile range), and age and sex-adjusted.



component was lower in ARAS compared to EH ( $p = 0.002$ ). Mono-exponential decay values did not differ significantly between groups ( $p = 0.088$ ). Oscillations in curves were lesser in EH as compared to both FMD ( $p = 0.004$ ) and ARAS ( $p < 0.001$ ).

**Conclusions:** A fall in the fast blood flow component in FMD and ARAS may be due to either redistribution of blood flow from cortical nephrons with a high perfusion rate to deeper nephrons with slower flow rates or to possible recruitment of 'dormant' cortical nephrons. Differences between ARAS and FMD groups in fast and slow flow could mean that the responsible pathophysiological process has proceeded further in ARAS compared to FMD. Enhanced oscillation patterns may be due to an increase in local vasomotor activity. Lesser oscillation in EH patients could mean that this pathophysiological process is not activated in this group.

## GLOMERULAR HYPERFILTRATION AS AN EARLY MARKER OF RENAL DYSFUNCTION IN MASKED HYPERTENSION

C.S. Sheng, D.Y. Zhang, Q.H. Guo, Y.B. Cheng, Q.F. Huang, Y. Wang, J.G. Wang, Y. Li. *The Shanghai Institute of Hypertension, Ruijin Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, CHINA*

**Objective:** Glomerular hyperfiltration, an early marker of renal dysfunction, is prevalent in the early stage of hypertension but had not been investigated in masked hypertension. The aim of the present study is to investigate the association of hyperfiltration with masked hypertension.

**Design and method:** We recruited consecutive untreated outpatients who were referred for 24-h ambulatory blood pressure monitoring to the Hypertension Clinic. Masked hypertension was defined as an elevated 24-hour ambulatory blood pressure ( $\geq 130/80$  mm Hg) with a normal office blood pressure ( $<140/90$  mm Hg). Glomerular hyperfiltration was defined as estimated glomerular filtration rate (eGFR) above the sex-and age- specific 95th percentile of normotensive subjects.

**Results:** Among the 1768 participants (mean age, 50.9 years; 52.9% women), 646 (36.5%) had masked hypertension, 88 (5.0%) had microalbuminuria, and 176 (10.0%) had glomerular hyperfiltration. In multivariate analyses, glomerular hyperfiltration was independently associated with younger age, female sex, increased body mass index, 24-h systolic blood pressure and heart rate, and the presence of diabetes mellitus. The prevalence of glomerular hyperfiltration was significantly higher in masked hypertension compared with that in normotensives (12.2% vs. 5.1%,  $P < 0.001$ ), with an adjusted odds ratio of 2.42 (95% CI: 1.20–4.89,  $P = 0.01$ ). The corresponding difference in prevalence (12.4% vs. 5.2%,  $P < 0.001$ ) and the adjusted odds ratio (2.33, 95%CI, 1.44–3.76,  $P = 0.005$ ) remained significant after excluding 88 patients with microalbuminuria.

**Conclusions:** In conclusion, glomerular hyperfiltration was prevalent in masked hypertension as an early marker of renal damage.

## HYPERTENSION AND KIDNEY DISEASE: EFFECT OF INTENSIVE BLOOD PRESSURE INTERVENTION

S. Rayamajhi, L. Wang, P. Dhaka, V. Atti, X. Ling, D. Wang. *Michigan State University, East Lansing, MI, USA*

**Objective:** To analyze the effect of intensive blood pressure (BP) control on renal outcomes among non-CKD and CKD patients at baseline.

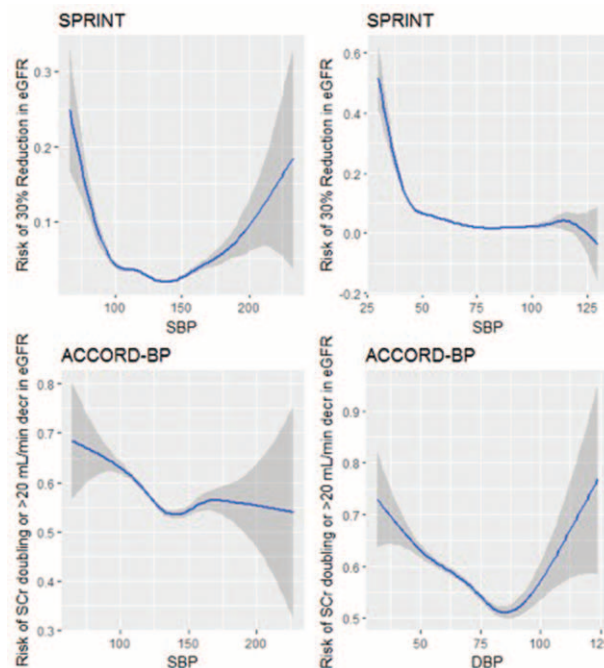
**Design and method:** We conducted a post-hoc analysis on the data set from two landmark studies - SPRINT and ACCORD-BP. Hypertensive patients were randomly assigned to a systolic BP (SBP) treatment target of  $<120$  (intensive treatment) or  $<140$  (standard treatment). In SPRINT, there were 4678 patients in intensive as compared to 4683 in standard group. In ACCORD-BP, we included only those with standard glycemic control (glycated hemoglobin of 7.0–7.9%) that resulted in 1184 patients on intensive arm and 1178 patients on standard arm. We further categorized BP over time into 3 tiers, by low (SBP  $<120$  and DBP  $<70$ ), medium (SBP = 120–140 and DBP = 70–85) and high (SBP  $>140$  and DBP  $>85$ ) and compared the renal outcomes. Generalized Estimating Equation and smoothing spline fitting method was used to find the relationship between BP and renal outcomes over time.

**Results:** In SPRINT, non-CKD patients in intensive group had a higher chance of 30% reduction of eGFR (OR = 3.68, 95% CI = 2.51–5.40) than in standard group. Medium DBP (71–85), in comparison to low DBP ( $<70$ ), significantly decreased 30% reduction in eGFR in non-CKD patients (OR = 0.63,  $P$ -value  $< 0.01$ ) and significantly decreased 50% reduction in EGFR (OR = 0.55,  $p = 0.01$ ) as well as CKD composite (OR = 0.53,  $p < 0.01$ ) among CKD patients. In ACCORD-BP, patients in intensive group had higher chance of doubling of serum creatinine or  $>20$  mL/min decrease in eGFR (OR 1.83, 95% CI = 1.76–1.90) than in standard treatment group. Both high SBP ( $>140$ ) and medium SBP (120–140) as compared to low SBP ( $<120$ ) level, significantly reduced the chance

of serum creatinine doubling or  $>20$  mL/min decrease in eGFR (OR = 0.79,  $p < 0.0001$ ).

Curve fitting the results are illustrated in figure.

**Conclusions:** Post-hoc analyses of both SPRINT and ACCORD-BP dataset show that intensive BP management consistently increases the risk of 30–50% reduction in eGFR, and interestingly, the major driver of this outcome was low DBP in SPRINT study where as it was low SBP in ACCORD study. It further highlights the importance of optimizing DBP among patients with CKD at baseline.



## WITHDRAWAL OF ANGIOTENSIN ANTAGONISTS IN ELDERLY CHRONIC KIDNEY DISEASE PATIENTS

V. Petkov Stoyanov, M.C. Jimenez Herrero, M. J. Gutierrez Sanchez, J.A. Martin Navarro. *Hospital Universitario Del Tajo - Department of Nephrology, Aranjuez, SPAIN*

**Objective:** Hypertension guidelines worldwide recommend first-line treatment with Angiotensin Convertor Enzyme Inhibitors (ACEI) or Angiotensin II Receptor Blockers (ARBs) in almost all groups of patients. Nevertheless, some population as elderly or CKD patients at high risk to develop renal complications may benefit from avoidance of these commonly used drugs.

**Design and method:** We reviewed our registry of out-hospital patients who had to suspend ACEI or ARBs treatment selecting those without kidney loss, known renal artery stenosis, active neoplasms or drug withdrawal in a condition of Acute Kidney Injury and we performed 12 months follow up. Finally, 36 resulting patients completed the one year period and data of basal, three months and 12-month visits have been compared. A case-control study examining the glomerular filtration rate (GFR), first-day urine albuminuria, blood pressure control and plasmatic potassium has been performed.

**Results:** Baseline characteristics: 17 males and 19 females both with an average age of 78.3 (SD 7.7) years, Charlson's comorbidity index of 6.8 (SD 2), 14 treated previously with ACEI and 22 with ARBs. Comparison of average blood pressure, GFR, proteinuria and potassium levels showed:

1. There were no significant variations in blood pressure at 3 and 12 months.
2. GFR increased at 3 and 12 months from 31.9 (SD 9.4) to 39.6 (SD 14.9) and 43.1 (SD 17.3) mL/min/1.73m<sup>2</sup> [ $p < 0.001$ ]
3. Plasma potassium level decreased at 3 and 12 months from 5.1 (SD 0.6) to 4.7 (SD 0.5) and 4.6 (SD 0.5) mg/dl respectively [ $p < 0.001$ ]
4. First-day urine albuminuria increased significantly at the 12-month visit in the overall group (from 127.4 (SD 301.8) to 233 (SD 557) mg/g,  $p < 0.05$ ). Nevertheless, no significant change was observed in the group of 27 patients without significant previous proteinuria (from 13.9 (SD 16.8) to 21.5 (SD 24.8),  $p = 0.1$  NS).

**Conclusions:** Elderly patients with prolonged hypertension are at risk to develop slowly progressive kidney failure associated with the use of ACEI and ARBs, es-

pecially if renal atrophy is present. These patients without previous proteinuria would benefit from the first-line use of antihypertensive drugs without suppressive effect over the renin-angiotensin system.

### ADVANCED GLYCATION END-PRODUCTS, NUTRITION AND AORTIC STIFFNESS IN END-STAGE RENAL DISEASE

G. Vandal-Gélinas, R. Larivière, K. Marquis, F. Mac-Way, C. Fortier, V. Couture, M. Agharazii. *CHU de Québec-Université Laval, Québec City, CANADA*

**Objective:** Advanced glycation end-products (AGEs) are a heterogeneous group of uremic toxins, which are acquired via endogenous pathways and through absorption of AGE-modified peptides found in food. Through modification of extracellular structural proteins of the arterial wall, AGEs can lead to vascular stiffness. In this study, we aimed to examine the association of serum fluorescent AGEs with aortic stiffness, tissue AGEs and protein intake in a cohort of subjects undergoing chronic hemodialysis.

**Design and method:** In 166 subjects with a mean age of  $65 \pm 15$ , 55% male, 48% diabetic and 59% with established cardiovascular disease, serum AGEs was determined by total serum and molecular weight based serum autofluorescence (HPLC), tissue levels of AGEs was measured by skin autofluorescence (AF), aortic stiffness was measured by determination of carotid-femoral pulse wave velocity (cfPWV).

**Results:** Despite higher levels of HbA1C in diabetic patients ( $0.063 \pm 0.011$  vs  $0.052 \pm 0.004$ ,  $p = 0.001$ ) and higher cfPWV ( $14.9 \pm 3.7$  vs  $12.4 \pm 3.8$ ,  $p < 0.001$ ), total serum AGEs was lower in diabetic subjects ( $3.47 \pm 0.77$  vs  $2.97 \pm 0.76$ ,  $p < 0.001$ ). There was a positive association between total serum AGEs and normalized protein nitrogen appearance rate in both diabetics ( $r = 0.337$ ,  $p = 0.004$ ) and non-diabetics ( $r = 0.362$ ,  $p < 0.001$ ). There were no correlations between skin AF and total serum AGEs or any of the fractions of molecular weight using various cut-offs (2, 5, 10 and 30 kd). In non-diabetics, there was a consistent negative association between serum AGEs and aortic stiffness (even after adjustments for confounding factors), but there was not any associations between serum AGEs and aortic stiffness in diabetics.

**Conclusions:** Serum measurements of AGEs based on serum auto-fluorescence is better correlated to protein intake and is not associated with tissue levels of AGEs or aortic stiffness.

### PRELIMINARY ANALYSIS OF THE BELGIAN MULTICENTRIC COHORT OF PATIENTS WITH FIBROMUSCULAR DYSPLASIA (BEL-FMD)

S. Di Monaco<sup>1,11</sup>, T. De Backer<sup>2</sup>, P. Delmotte<sup>3</sup>, H. Heuten<sup>4</sup>, J.-M. Krzesinski<sup>5</sup>, J.-P. Lengelé<sup>6,1</sup>, L. Toubiana<sup>7</sup>, P. Verhamme<sup>8</sup>, J.-C. Wautrecht<sup>9</sup>, P. Van Der Niepen<sup>10</sup>, A. Persu<sup>1</sup>. <sup>1</sup>Cliniques Universitaires Saint-Luc, Brussels, BELGIUM, <sup>2</sup>Universitaire Ziekenhuis Gent, Gent, BELGIUM, <sup>3</sup>Centre Hospitalier Universitaire Ambroise Paré, Mons, BELGIUM, <sup>4</sup>Universitair Ziekenhuis Antwerpen, Antwerpen, BELGIUM, <sup>5</sup>Centre Hospitalier Universitaire Sart-Tilman, Liège, BELGIUM, <sup>6</sup>Grand Hôpital De Charleroi, Gilly, BELGIUM, <sup>7</sup>INSERM UMRS 1142 LIMICS/IRSAN, Paris, FRANCE, <sup>8</sup>UZ-Gasthuisberg, Leuven, BELGIUM, <sup>9</sup>Hôpital Erasme, Brussels, BELGIUM, <sup>10</sup>Universitair Ziekenhuis Brussel, Brussels, BELGIUM, <sup>11</sup>Division of Internal Medicine and Hypertension Unit, University of Turin, Turin, Italy

**Objective:** Fibromuscular dysplasia (FMD) has been defined as an idiopathic, segmental, non-atherosclerotic and non-inflammatory disease of the musculature of arterial walls. It may affect renal, cervico-cephalic and, less often, visceral, limb or coronary arterial beds. Up to now, most data on the presentation of the disease were derived from the French, United States and, more recently, European registries. We report here the main characteristics and clinical presentation of patients with FMD from Belgium.

**Design and method:** We analysed the main characteristics of 151 patients enrolled in 7 Belgian Academic centres from November 2015 to January 2018.

**Results:** Patients were predominantly women (88%) and Caucasians (95%). Age at diagnosis was  $49.0 \pm 13.7$  years, 90% of patients were hypertensive, 85% had multifocal FMD and 31% multivessel FMD. Family history of FMD was reported in 4% of cases. Compared to patients with multifocal FMD, patients with focal FMD were younger ( $36.4 \pm 9.8$  vs.  $51.2 \pm 13.1$  years,  $p = 0.004$ ) and had less often multivessel FMD (5% vs. 35%,  $p = 0.002$ ). Compared to patients with single-vessel FMD, patients with multivessel FMD were more frequently of the multifocal subtype (98% vs. 80%,  $p = 0.009$ ). Compared with prevalent patients, incident patients, i.e. patients diagnosed after December 2015 were characterized by a significantly higher age at diagnosis ( $52.1 \pm 9.7$  vs.  $47.2 \pm 15.4$  years,  $p = 0.02$ ), lower systolic blood pressure ( $132.2 \pm 17.6$  vs.  $140.2 \pm 22.8$  mmHg,  $p = 0.02$ ) and higher eGFR ( $94.6 \pm 33.2$  vs.  $80.3 \pm 33.3$  mL/min,  $p = 0.01$ ). Finally, revascularisation interventions tended to be less frequent in incident patients (55% vs. 39%,  $p = 0.07$ ).

**Conclusions:** The main characteristics of patients with FMD in Belgium are in line with the overall results of the European/International FMD registry. Furthermore, our findings confirm previously reported differences between focal and multifocal FMD, as well as between single vessel and multivessel FMD. The differences between prevalent and incident cases likely reflect increased physician awareness over time, leading to inclusion of less symptomatic forms of FMD in older patients.

### APPLICATION OF NEW HYPERTENSION GUIDELINES TO RENAL TRANSPLANT RECIPIENTS: IMPACT ON CARDIOVASCULAR OUTCOME AND GRAFT SURVIVAL

N. Pagonas<sup>1,2</sup>, F. S. Seibert<sup>1</sup>, F. Bauer<sup>1</sup>, A. Doevelaar<sup>1</sup>, T. Klein<sup>1</sup>, N. Babel<sup>1</sup>, R. Viebahn<sup>3</sup>, T. H. Westhoff<sup>1</sup>. <sup>1</sup>Medical Department I, University Hospital Marien Hospital Herne, Ruhr-University Bochum, Herne, GERMANY, <sup>2</sup>Department of Cardiology and Angiology, Medical University Brandenburg, Brandenburg, GERMANY, <sup>3</sup>Department of Surgery, University Hospital Knappschaftskrankenhaus Bochum, Ruhr-University Bochum, Bochum, GERMANY

**Objective:** Background: Based on data of the SPRINT trial, American national guidelines recently reduced the blood pressure goal from 140/90 mm Hg to 130/80 mm Hg for subjects with increased cardiovascular risk, e. g. those with chronic kidney disease. To date it remains elusive whether renal transplant recipients benefit from these goals as well.

**Design and method:** Methods: We performed a retrospective analysis of 877 patients who underwent kidney transplantation between 1997 and 2011 in three transplant centers in Germany (Berlin and Bochum) with a follow-up of 12 - 120 months. Blood pressure was obtained at regular follow-up examinations in the transplant outpatient clinic. Patient and graft survival was defined as composite endpoint. Subjects were stratified according to mean systolic blood pressure values  $< 130$  mmHg, 130-139 mmHg, or  $> 140$  mmHg.

**Results:** Results: Mean SBP of the overall follow-up period was significantly associated with patient and graft survival. Cumulative survival was significantly higher for those patients with a systolic blood pressure (SBP)  $< 130$  mmHg than those with 130-140 mmHg. Survival was lowest in renal transplant recipients with a mean SBP  $> 140$  mmHg. Analogously, mean SBP of the first 12 months post-transplant  $< 130$  mmHg was associated with better cumulative patient and graft survival than higher blood pressure values in Kaplan Maier analyses.

**Conclusions:** Conclusion: Renal transplant recipients who achieve a mean systolic blood pressure  $< 130$  mmHg have a significantly lower mortality and a better allograft outcome than with the conservative blood pressure goal  $< 140$  mmHg. The new blood pressure targets should be considered suitable for renal transplant recipients as well.

### BLOOD PRESSURE CONTROL ANALYSIS IN PATIENTS WITH CHRONIC KIDNEY DISEASE, CONSERVATIVELY TREATED

A. Bazyluk, E. Zbroch. *2-nd Department of Nephrology and Hypertension with Dialysis Unit, Medical University, Białystok, POLAND*

**Objective:** Treatment of hypertension is important in patients with chronic kidney disease to protect against progressive renal function loss and cardiovascular disease. The aim of the study was to assess blood pressure control in patients with chronic kidney disease, conservatively treated.

**Design and method:** The retrospective analysis of 80 patients with chronic kidney disease was made based on the medical documentation. The medical history, blood pressure measurements, laboratory tests were taken. The studied cohort was divided according to blood pressure rate into two groups: 1 – patients with uncontrolled blood pressure ( $\geq 140/90$  mmHg) and 2 – patients with controlled blood pressure ( $< 140/90$  mmHg). Blood pressure rate was analysed according to hypotensive therapy, the stage and aetiology of chronic kidney disease. Due to small sample size the 1st and 5th stage was excluded.

**Results:** Hypertension was presented in 88,75% patients. Mean blood pressure was  $135,96 \pm 19,75,46 \pm 11$  mmHg. 63% of patients with estimated glomerular filtration rate  $< 60$  ml/min demonstrated poor blood pressure control. The higher mean blood pressure ( $139,68 \pm 20,76,53 \pm 11$ ) and higher uncontrolled blood pressure ratio was in stage 4 of chronic kidney disease. The lowest mean blood pressure ( $129,44 \pm 16,77,44 \pm 10$  mmHg) and lowest uncontrolled blood pressure ratio - in stage 2. There was higher prevalence of uncontrolled blood pressure and diastolic blood pressure rate in men ( $p < 0,05$ ). Significant relationship between uncontrolled blood pressure and diabetic nephropathy was found ( $p = 0,003$ ). Proteinuria was significantly more frequent in group 1. The most used hypotensive drug was b-blocker (69%). Patients with uncontrolled blood pressure used calcium antagonist more often (80% vs 52%). There was no difference in the presence of diabetes and cardiovascular diseases between studied groups.

**Conclusions:** The advanced chronic kidney disease, especially due to diabetic nephropathy is associated with poor blood pressure control. As higher proteinuria is associated with a more rapid decline in GFR, ACEI and ARBs should be used more often. Wide use of  $\beta$ -blockers may relate to hyperactivity of sympathetic nervous system seen in that population. Poorer blood pressure control in males may result from lower compliance. Combined drug therapy may increase adherence and then reduce cardiovascular risk.

#### CHANGING ARTERIAL STIFFNESS GRADIENT BY NITROGLYCERIN AND ITS RELATION TO CENTRAL PRESSURE WAVE ANALYSIS

C. Fortier<sup>1</sup>, B. Hametner<sup>2</sup>, G. Vandal-Gelinas<sup>1</sup>, K. Marquis<sup>1</sup>, S. Wassertheurer<sup>2</sup>, T. Weber<sup>3</sup>, F. Mac-Way<sup>1</sup>, M.-P. Desjardins<sup>1</sup>, M. Agharazii<sup>1</sup>. <sup>1</sup>CHU de Québec-Université Laval, Québec City, CANADA, <sup>2</sup>Austrian Institute of Technology, Vienna, AUSTRIA, <sup>3</sup>Klinikum Wels-Grieskirchen, Wels, AUSTRIA

**Objective:** We have previously shown that administration of nitroglycerin (NTG) reduced femoral pulse wave velocity without affecting aortic stiffness, which results in an increase in aortic-femoral (AF) PWV ratio (a measure of arterial stiffness gradient). In this study, we examined the impact of post-NTG changes of AF-PWV ratio on wave reflection using wave separation analysis.

**Design and method:** In 20 treated hypertensive subjects with or without kidney disease, carotid-femoral (CFPWV) (aortic) and femoral-distal (FDPWV) were determined as respective measures of aortic and femoral stiffness. Aortic-femoral PWV ratio (AF PWV ratio) was used as a measure of arterial stiffness gradient. Aortic pressure waveform was obtained through generalized transfer function applied to the radial artery pressure waveform after calibration with systolic and diastolic blood pressures (SBP and DBP). Using GEE, we examined the extent of association between changes in aortic-femoral (AF) PWV ratio, and augmentation index (Aix), pressure forward (Pf), pressure backward (Pb) and reflection magnitude (RM).

**Results:** After administration of NTG, SBP and mean BP (area under the curve) decreased ( $114 \pm 19$  vs  $107 \pm 15$  and  $89 \pm 11$  vs  $85 \pm 9$  mm Hg,  $p < 0.01$ ) without changes in DBP. The CFPWV remained unchanged ( $12.2 \pm 2.2$  vs  $12.3 \pm 2.9$  m/s), whereas FDPWV decreased ( $8.7 \pm 1.5$  vs  $7.2 \pm 1.1$  m/s,  $p < 0.001$ ). Accordingly, AF PWV ratio increased ( $1.42 \pm 0.25$  vs  $1.73 \pm 0.41$ ). Aix declined as expected ( $20.1 \pm 11.9$  vs  $7.7 \pm 12.8$  %,  $p < 0.001$ ). There was a slight but not statistically significant reduction in Pf ( $27.7 \pm 10.7$  vs  $25.4 \pm 7.9$  mmHg,  $p = 0.068$ ), while Pb decreased ( $17.2 \pm 8.1$  vs  $13.4 \pm 6.6$  mmHg), resulting in a reduction in RM from  $0.61 \pm 0.10$  to  $0.51 \pm 0.13$  ( $p < 0.001$ ). There was a significant association between the extent of changes in AF PWV ratio and changes in Aix ( $\beta = -15$ ,  $p < 0.001$ ), Pb ( $\beta = -9.5$ ,  $p < 0.001$ ) and RM ( $\beta = -0.21$ ,  $p < 0.001$ ).

**Conclusions:** This study shows that alteration of arterial stiffness gradient with nitroglycerin is associated with changes in arterial wave reflection indices.

#### CAROTID-FEMORAL PULSE WAVE VELOCITY AND ITS ASSOCIATED RISK FACTORS IN TWO COMMUNITY-BASED COHORT STUDIES FROM CHINA AND SWEDEN

Q. Guo<sup>1</sup>, I. F. Muhammad<sup>2</sup>, Y. Borné<sup>2</sup>, C. Sheng<sup>1</sup>, M. Persson<sup>2</sup>, J. Wang<sup>1</sup>, G. Engström<sup>2</sup>, Y. Li<sup>1</sup>, P. M. Nilsson<sup>2</sup>. <sup>1</sup>Shanghai Institute of Hypertension, Shanghai Jiaotong University School of Medicine, Shanghai, CHINA, <sup>2</sup>Department of Clinical Sciences, Lund University, Malmö, SWEDEN

**Objective:** Carotid-femoral pulse wave velocity (cfPWV) and its risk factors may differ among populations. However, few studies have compared the absolute value of cfPWV, and its associated risk profiles, in different ethnicities.

**Design and method:** The study population included 1272 community-dwelling residents (age  $75.0 \pm 6.5$  years, female 57.3%) from Qingpu district, Shanghai, China, and 3049 subjects (age  $72.5 \pm 5.5$  years, female 60.4%) from the Malmö Diet and Cancer Study re-examination, Sweden. cfPWV was assessed by the SphygmoCor device in the same way in all subjects

**Results:** Multivariate linear regression analyses showed that cfPWV was positively associated with male sex, older age, body mass index (BMI), mean arterial pressure (MAP), heart rate, fasting glucose and triglycerides ( $P < 0.03$ ) in both populations. The effect size associated with age was greater in Swedish than in Chinese subjects ( $\beta$ , 0.09 vs 0.04,  $P < 0.001$ ), while those associated with BMI ( $0.05$  vs  $0.01$ ,  $P < 0.001$ ), MAP ( $0.08$  vs  $0.07$ ,  $P = 0.02$ ), and heart rate ( $0.06$  vs  $0.04$ ,  $P = 0.001$ ) were larger in Chinese. No difference was observed in the effect size associated with sex, fasting glucose and triglycerides. cfPWV was associated with anti-hypertensive therapy, total cholesterol and serum uric acid only in Swedish subjects ( $P < 0.02$ ), and eGFR only in Chinese subjects ( $P = 0.03$ ). Multivariate-adjusted cfPWV was higher in Swedish than in Chinese (adjusted mean  $\pm$  SE,  $10.6 \pm 0.1$  vs  $9.2 \pm 0.1$  m/s,  $P < 0.001$ ), and the ethnic difference

remained significant in subgroups stratified by age, blood pressure, BMI and blood glucose.

**Conclusions:** Although Chinese and Swedish subjects shared similar major risk factors associated with arterial stiffness, ethnic differences existed in cfPWV and its associations with risk factors.

#### SUSTAINED POTENTIATION OF $< \alpha_1$ -ADRENERGIC VASOCONSTRICTION BY SPHINGOSINE 1-PHOSPHATE

C. R. Panta<sup>1</sup>, É. Ruisanchez<sup>1</sup>, D. Moré<sup>1</sup>, P. Dancs<sup>1</sup>, A. Balogh<sup>1</sup>, S. Offermanns<sup>2</sup>, G. Tigyi<sup>3</sup>, Z. Benyó<sup>1</sup>. <sup>1</sup>Institute of Clinical Experimental Research, Semmelweis University, Budapest, HUNGARY, <sup>2</sup>Max Planck Institute for Heart and Lung Research, Bad Nauheim, GERMANY, <sup>3</sup>Department of Physiology, University of Tennessee Health Science Center, Memphis, TN, USA

**Objective:** In our present project we aimed to examine the vasoactive effects of sphingosine 1-phosphate (S1P) by evaluating its capability to alter the basal vascular tone and to influence vasoconstriction mediated by  $\alpha_1$ -adrenoreceptors

**Design and method:** Effects of S1P and the  $\alpha_1$ -adrenoreceptor agonist phenylephrine (PE) on the tone of the mouse thoracic aorta have been determined under isometric conditions with myography. Responses of vessels isolated from wild type (WT), S1P1, S1P2, and S1P3 receptor-, or G12/13-KO mice were measured and tone changes were normalized to vasoconstriction induced by 124 mM K<sup>+</sup>.

**Results:** Addition of 5 mM S1P, which is in the concentration range reported in the human serum, did not cause significant change in the resting vascular tone. In contrast, EC50 of the vasoconstrictor effect of PE decreased, whereas Emax increased following 20 min incubation with 5 mM S1P in WT vessels, indicating a marked potentiating effect. Similar enhancement of the vascular reactivity was detected in S1P1- and S1P3-KO segments. In S1P2-KO vessels, however, this phenomenon was absent. In addition, the potentiating effect of S1P was also lacking in vessels of G12/13-KO mice and after inhibition of the Rho-kinase by Y27632 in WT vessels.

In further experiments we aimed to evaluate the duration of the S1P-induced enhancement of  $\alpha_1$ -adrenoreceptor-mediated vasoconstriction. Therefore, contractions evoked by 100 nM PE determined every 20 minutes, repeatedly, following a 20-min incubation with S1P. Reactivity remained enhanced for 3 hours in WT segments, whereas this increase could not be detected in S1P2-KO vessels.

**Conclusions:** Although S1P does not modify directly the resting vascular tone by itself, yet it significantly enhances  $\alpha_1$ -adrenoreceptor-mediated vasoconstriction even at three hours after exposure. The S1P2 receptor/G12/13 / Rho-kinase pathway appears to be responsible for this potentiating effect of S1P. The sustained enhancement of vascular reactivity detected underlines the potential pathophysiological significance of this phenomenon in diseases associated with enhanced S1P production.

#### FINGER-TOE PULSE WAVE VELOCITY (fPWV) MEASURED BY POPMÈTRE® DEVICE IN PATIENTS WITH ANKYLOSING SPONDYLITIS

G. Alanis-Sanchez<sup>4,5</sup>, M. Hallab<sup>3</sup>, P. Boutouyrie<sup>1,2</sup>, S. Laurent<sup>1,2</sup>, H. Obeid<sup>1,2</sup>, H. Khettab<sup>1,2</sup>, D. Cardona-Müller<sup>4</sup>, D. Montes-Martinez<sup>4</sup>, C. Murguía-Soto<sup>4</sup>, D. Castañeda-Zaragoza<sup>4</sup>, E. Cardona-Muñoz<sup>4</sup>, C. Ramos-Becerra<sup>1,4</sup>. <sup>1</sup>Inserm U970, Paris, France, Paris, FRANCE, <sup>2</sup>Paris Descartes University and HEGP, Paris, France, Paris, FRANCE, <sup>3</sup>Nantes University, Nantes, France, Nantes, FRANCE, <sup>4</sup>Arterial Stiffness Laboratory, Department of Physiology, University of Guadalajara, Guadalajara, México, Guadalajara, MEXICO, <sup>5</sup>University of British Columbia, Vancouver, Canada, Vancouver, CANADA

**Objective:** Ankylosing spondylitis (AS) is an inflammatory autoimmune disease. AS is a prototype form of spondyloarthropathies (SpA). The precise etiology of AS has not been fully understood. But Inflammation has a critical role in the pathogenesis of the disease. The immune system by various cells, secreted-mediators and markers manage and regulate the immune responses and inflammation. Every factor which disturbed this regulation and hemostasis can cause chronic inflammation. Extraskelatal organs may also be affected by this disease and is also associated with an increased of cardiovascular risk. The effect of large arteries appears by a stiffness that can be an element of disease monitoring. The aim of this study was to evaluate the finger-toe Pulse Wave Velocity (fPWV) in patients with AS.

**Design and method:** It was a descriptive and prospective study carried out in patients with ankylosing spondylitis and control subjects. Finger-toe pulse wave velocity (f-PWV) was measured by pOpmetre® allowed to explore arterial stiffness.

**Results:** The results are expressed as mean  $\pm$  standard deviation for continuous variables. Demographic and clinical characteristics are presented in Table 1. Twenty-two patients with AS and 24 controls were included in our study, subjects with AS exhibited greater pSBP ( $p < 0.001$ ), pDBP ( $p < 0.001$ ), pPP ( $p < 0.001$ ) and MBP ( $p < 0.001$ ) compared to controls.

Moreover, in the AS group we observed a higher ftPWV with a mean difference of 1.63 ( $p < 0.006$ , 95% CI of .50 to 2.7) (Figure 1). No significant difference was observed in pPP.

**Conclusions:** We conclude that individuals with ankylosing spondylitis showed increased ftPWV, central and peripheral blood pressure, this contributes to explain the higher risk of cardiovascular disease in this condition. pOpmètre® is a no operator dependant, simple and practical device, highlighted an increase in arterial stiffness in patients with AS by measuring the ft-PWV. It could play a role in this disease monitoring and in prediction of cardiovascular complications.

Table 1. Demographic and clinical characteristics of patients with ankylosing spondylitis and controls.

	AE	Controls	p
Age (years)	42.4±12.1	40±9.9	.45
Males/Females	3/15	6/17	.36
BMI	25.5±3.9	27.1±3.5	.16
cSBP (mmHg)	116.4±14	102.5±7	<.01
pSBP (mmHg)	127.6±13	113.8±8	<.01
pDBP (mmHg)	78.3±7	67.7±8	<.01
MBP (mmHg)	98.0±8	85.1±4	<.01
pPP (mmHg)	47±7	46.8±9.3	.94
ftPWV	7.8±2.3	6.1±1	<.006

AE, ankylosing spondylitis; BMI, body mass index; cSBP, central systolic blood pressure; pSBP, brachial systolic blood pressure; pDBP, brachial diastolic blood pressure; MAP, mean diastolic blood pressure; pPP, peripheral pulse pressure; ftPWV finger-toe pulse wave velocity

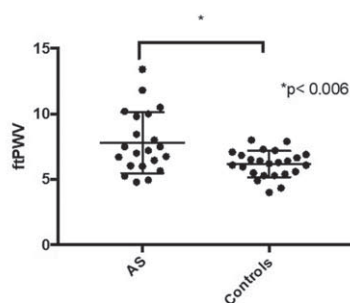


Figure 1. finger-toe Pulse Wave Velocity (ftPWV) in patients with Ankylosing Spondylitis (AS) compared with controls

## APPLICATION OF AN EXPERT SYSTEM TO IMPROVE CARDIOVASCULAR RISK IN THE WORKPLACE

L. M. Ruilope<sup>1</sup>, L. Quevedo-Aguado<sup>2</sup>, C. Fernández-Labandera<sup>2</sup>, P. Martínez-Muñoz<sup>2</sup>, C. Catalina-Romero<sup>2</sup>, A. Fernández-Meseguer<sup>2</sup>, M.-Á. Sánchez-Chaparro<sup>3</sup>, P. Valdivielso-Felices<sup>3</sup>, E. Calvo-Bonacho<sup>2</sup>. <sup>1</sup>Hypertension Unit, Instituto de Investigación en Medicina, Hospital Universitario 12 de Octubre, Madrid, SPAIN, <sup>2</sup>Ibermutuamur, Mutua Colaboradora con la Seguridad Social 274, Madrid, SPAIN, <sup>3</sup>Department of Internal Medicine, University Hospital Virgen de la Victoria and University of Málaga, Málaga, SPAIN

**Objective:** The aim of this study was to design, develop and test an expert system to help professionals in clinical decision-making as providing an assessment of the health of workers at very high CVR.

**Design and method:** It was designed and developed an operational web-expert system in ASP language, which gathers information on risk factors and returns an output with recommendations for management of risk factors based on the 2012 European Guidelines on Cardiovascular Disease Prevention criteria. In the case of needing an intervention or modification of drug treatment, the expert system helps to plan them. The CVR was stratified by the European SCORE system for low-risk countries. A test was conducted with a pilot program providing workers with very high CVR (SCORE > 10). The adherence to the Mediterranean diet was assessed by a 14-item questionnaire and physical activity by the International Physical Activity Questionnaire (IPAQ).

**Results:** This pilot study included 148 patients (mean age: 64.5 ± 8.3 years). All the participants were men, 73.6% and 55.2% had hypertension and dyslipidaemia, but only 50.7% and 34.3% of them were receiving anti-hypertensive treatment and lipid-lowering therapy at baseline, respectively. The participants were mostly manual workers (63.5%). 91.8% of them knew they had cardiovascular risk factors. 73.0% were smokers, of which 34.3% expressed their intention to give up smoking in the coming months. The mean BMI was 28.5 kg/m<sup>2</sup> and the mean waist circumference was 100.5 cm. After 1-year follow-up, the percentage of patients who met the therapeutic objective for total cholesterol levels (<175 mg/dl) significantly increased ( $p = 0.03$ ). The percentage of subjects with moderate-to-high adherence to the Mediterranean diet increased from 77.0% to 88.7% ( $p < 0.001$ ). The percentage of subjects with sufficient-to-high physical activity also increased but not significantly ( $p = 0.547$ ).

**Conclusions:** Our preliminary results suggest that there is a high potential for improvement in lifestyle and CVR control among patients at very high cardiovascular risk. The availability of an expert system could facilitate decision-making when providing medical advice. An expert system could be a value-added service in order to standardize health care and to promote the best clinical practice

## REGRESSION OF RETINAL MICROVASCULAR ALTERATIONS IN PATIENTS WITH RHEUMATOID ARTHRITIS TREATED WITH ABATACEPT, AN INHIBITOR OF LYMPHOCYTIC CO-STIMULATION

S. Caletti<sup>1</sup>, S. Piantoni<sup>2</sup>, C. De Ciuceis<sup>1</sup>, M. A. Coschignano<sup>1</sup>, C. Rossini<sup>1</sup>, P. Airò<sup>2</sup>, A. Tincani<sup>2</sup>, C. Agabiti Rosei<sup>1</sup>, R. Kumar<sup>2</sup>, D. Rizzoni<sup>1,3</sup>. <sup>1</sup>Clinica Medica, Department of Clinical and Experimental Sciences, University of Brescia, Brescia, ITALY, <sup>2</sup>Rheumatology, Department of Clinical and Experimental Sciences, University of Brescia, Brescia, ITALY, <sup>3</sup>Istituto Clinico Città di Brescia, Division of Medicine, Brescia, ITALY

**Objective:** It has been previously demonstrated that T lymphocytes may be involved in the development of hypertension and microvascular remodeling, and that circulating T effector lymphocytes may be increased in hypertension (De Ciuceis C et al, Am J Hypertens 2017, 30:51–60; Itani HA et al. Hypertension 2016; 68:123–132). In particular, Th1 and Th 17 lymphocytes may contribute to the progression of hypertension and microvascular damage. Abatacept is a fusion protein composed of the Fc region of the immunoglobulin IgG1 fused to the extracellular domain of CTLA-4 that binds to the CD80 and CD86 molecule, and prevents activation of T cells, avoiding CD28 repetitive engagement. Abatacept is presently indicated for treatment of moderate to severe active rheumatoid arthritis in adults (aged 18 years or over) who have not had an adequate response to other drugs. The aim of our study was to non-invasively investigated morphological characteristics of retinal arterioles in patients with rheumatoid arthritis before and after treatment with abatacept.

**Design and method:** In the present study we enrolled 5 patients with rheumatoid arthritis. The wall to lumen ratio (WLR) of retinal arterioles was measured by adaptive optics (RTX-1, Imagine Eyes, Orsay, France), a recently validated technique (De Ciuceis C, in press in J Hypertens) for non-invasive assessment of retinal arteriolar morphology, providing also an estimation of internal and external diameters and wall cross-sectional area. Morphological evaluations were performed at baseline, after 6 months and after 12 months of treatment

**Results:** The results obtained are reported in the Table (\* < 0.05, \*\*p < 0.01 vs. baseline).

	Baseline	6 months	12 months
WLR	0.31±0.03	0.29±0.05	0.26±0.03 *
Internal diameter (µm)	95.0±9.36	95.7±16.3	101±14.4
External diameter (µm)	125±11.0	123±18.0	127±16.7
Wall thickness (µm)	14.6±1.55	13.6±1.82	12.8±1.84 *
Wall cross-sectional area (µm <sup>2</sup> )	5073±959	4708±1128 **	4631±1107 *

**Conclusions:** Our data suggest that a reduction in WLR, wall thickness and wall cross-sectional area was observed after treatment for 12 months with abatacept, thus suggesting the possibility to induce a regression of microvascular abnormalities through a modulation of the immune system.

## ROSTAFUROXIN AMELIORATES THE INWARD REMODELING AND STIFFNESS IN RESISTANCE ARTERIES FROM DEOXYCORTICOSTERONE ACETATE-SALT HYPERTENSIVE RATS

F. M. Ishikawa, C. Tomazelli, G. K. Couto, L. V. Rossoni. Department of Physiology and Biophysics, Institute of Biomedical Sciences, University of Sao Paulo, Sao Paulo, Brazil, São Paulo, BRAZIL

**Objective:** We have shown that rostafuroxin (ROSTA), an antagonist of endogenous ouabain (OUA), block the binding of OUA to Na<sup>+</sup> K<sup>+</sup> -ATPase and inhibits the cSRC downstream activation in mesenteric resistance arteries (MRA), which ameliorates endothelial dysfunction and oxidative stress, as reduces hypertension in deoxycorticosterone acetate (DOCA)-salt rats. In addition, MRA of DOCA-salt rats also present the hypertrophic inward remodeling with stiffness. Moreover, the chronic treatment with OUA induces hypotrophic inward remodeling with stiffness in MRA. In line with these results we investigate the role of endogenous OUA on remodeling and stiffness in MRA of DOCA-salt rats.

**Design and method:** A hypertensive model was established in uninephrectomized Wistar rats using DOCA-salt. After 5 weeks DOCA-salt treatment, with high systolic blood pressure (SBP) stabilization, this hypertensive model was divided into two groups: DOCA-salt and DOCA-salt co-treated with ROSTA (1 mg/kg per day gavage, 3 weeks). The SBP was measured using the tail-cuff method, and

vascular remodeling was assessed in MRA using a pressure myograph. Histological and western blot analysis were performed in MRA.

**Results:** Our results reinforce that ROSTA treatment reduces SBP in DOCA-salt rats, but did not restore it to control levels. For the first time, the results suggest that ROSTA ameliorates the remodeling and stiffness observed in MRA of DOCA-salt rats, enhancing the luminal diameter and distensibility, reducing the cross-section area and wall/lumen ratio as well as shifting to the right the stress-strain curve in MRA. ROSTA restores collagen type I/III ratio, internal elastic lamina thickness, tyrosine kinase Src phosphorylation (Tyr418), as well EGFR, cRaf, ERK, p38MAPK, TGF $\beta$ 1, CTGF, and collagen I protein expression in MRA from DOCA-salt rats.

**Conclusions:** The results suggested that ROSTA reduces hypertension, the hypertrophic inward remodeling and the augmented wall/lumen ratio in MRA of DOCA-salt rats. In addition, endogenous OUA emerges as an important mechanism to induce vascular stiffness via Na<sup>+</sup> K<sup>+</sup> -ATPase/ cSRC/ EGFR/ cRas/ ERK/ p38MAPK/ CTGF/ TGF $\beta$ 1 pathway in MRA. These results reinforce the idea that endogenous OUA is a putative target for the treatment of vascular adjustments present in hypertension.

### THE RELATIONSHIP OF GLUCOSE TOLERANCE TEST RESULTS WITH MAJOR CARDIOVASCULAR EVENTS AND NEUROPSYCHIATRIC DISORDERS BY MINI INTERNATIONAL NEUROPSYCHIATRIC INTERVIEW IN PRIMARY CARE

J. Peceliuniene<sup>1</sup>, L. Kazlauskienė<sup>2</sup>, I. Zukauskaitė<sup>3</sup>, A. Norkus<sup>4</sup>, J. Butnoriene<sup>4</sup>.  
<sup>1</sup>Vilnius University Faculty of Medicine, Vilnius, LITHUANIA, <sup>2</sup>Raseiniai hospital, Raseiniai, LITHUANIA, <sup>3</sup>Vilnius University Faculty of Philosophy, Vilnius, LITHUANIA, <sup>4</sup>Institute of Endocrinology, Lithuanian University of Health Sciences, Kaunas, LITHUANIA

**Objective:** To evaluate the relationship of glucose tolerance test (GTT) results with major cardiovascular events (MCVEs) and neuropsychiatric disorders in primary care (PC).

**Design and method:** 516 subjects, older than 45 years from one PC institution took part in a study. Among the other different measures the data about their neuropsychiatric disorders (MINI) were collected. GTT was conducted during initial meeting and according to GTT results all patients were grouped into 4 groups: normal glucose results (NGR) (N = 322), impaired fasting glucose (IFG) (N = 60), impaired glucose tolerance (IGT) (N = 105) and diabetes mellitus (DM) (N = 22). The data about MCVEs which happened during 10 years of follow up were analysed. The relationship of MCVEs with different MINI diagnosis was analysed using Fisher's exact test.

**Results:** 100 (19.4%) patients had MCVEs during analysed period, several of them not once. We analysed cases of the first event as acute coronary syndrome, which were acute myocardial infarction (35) and unstable angina (31), also transient ischemic attack (16), stroke (14), deep venous thrombosis (4). Major depression episode (MDE) was found in 86 (16.7%) cases, dysthymia in 43 (8.3%), suicide ideation - 36 (7.0%), post traumatic stress disorder- 55 (10.7%), generalized anxiety disorder (GAD) - 119 (23.1%). Comparison of MCVEs rate between GTT groups revealed that most often MCVEs happened in IGT and DM group (18.6 % and 18.2%), while in NGR and IFG group - only 10.1% and 9.9%, respectively (p = .030). While analysing only NGR group, we found that 28.4% of patients who had GAD, had MCVEs compared to 16.9% of patients, who had no GAD diagnosis (p = .028). While analysing IGT group, 36.4% of patients, having MDE had MCVEs compared to 16.9% of those who had no MDE (p = .049). Moreover, in IGT group GAD was also related with MCVEs: 40.0 % of those with GAD, had MCVEs compared to 13.3%, who had no GAD.

**Conclusions:** Our data suggest that MCVEs more often happen in IGT and DM groups, but neuropsychiatric disorders are related with NGR and IGT groups only in PC. The further studies are needed to evaluate this relationship.

### THE INFLUENCE OF COCONUT MILK ON THE INTESTINAL STRUCTURE OF BALB/C MICE IMMUNIZED WITH COW'S MILK PROTEINS

Y. Benaissa, S. Addou, O. Kheroua, D. Saidi. *Universite Ahmed ben bella oran1 departement de biology, Oran, ALGERIA*

**Objective:** In the last few years a new preparation with coconut milk proteins was introduced and marketed as a useful alternative in the cases of cow's milk allergy. The objective of our work is to study the consequences of coconut milk on the structure of the intestinal epithelium.

**Design and method:** For the histological study, 21 week-old mice Balb/c were used and distributed in three groups of 7 mice each. Group 1, received a standard

feed with no treatment (Negative control), group 2 and 3 received respectively a standard feed (Positive control) and coconut milk for a period of 28 days after being immunized with alpha Lactalbumin.

**Results:** Coconut milk also causes an increase of the intestinal villi height at the structure level of the intestinal mucous membrane of mice fed with coconut milk proteins compared to the positive control groups. The lymphocytic infiltration of mice fed with coconut milk proteins is similar to the one in negative control group.

**Conclusions:** The preliminary results show that the coconut milk is a possible alternative to the cow's milk formula in case of allergy. Further studies are needed to prove its nutritional efficacy.

### COLA BEVERAGE-INDUCED METABOLIC SYNDROME IS CHARACTERISED BY ALTERED LEVELS OF LEPTIN, GHRELIN AND OBESTATIN

M. Marusakova, K. Galkova, P. Krenek, J. Klimas. *Faculty of Pharmacy, Comenius University, Bratislava, SLOVAK REPUBLIC*

**Objective:** Coca cola is known to establish metabolic syndrome (MetS) as it represents a high fructose diet and therefore is closely connected to increased body weight and adiposity. Adipose tissue plays a significant role in manifestations of MetS due to its direct effect on energy expenditure, food intake and metabolism through production of adipokines, such as leptin and adiponectin. Accumulated and enlarged adipocytes in obesity produce these adipokines in altered manner and together with circulating hormones produced in gastro-intestinal tract, namely ghrelin and obestatin, are responsible for insulin resistance.

**Design and method:** Male Wistar rats had access to Coca Cola<sup>®</sup> beverage (CC) or water (CON) ad libitum for 6 months while being fed a standard chow diet. Collected visceral adipose tissue (VAT) samples were afterwards examined for gene expression of leptin (Lep), leptin receptor (Lepr), adiponectin (AdipoQ) and peroxisome proliferator-activated receptor gamma (PPAR $\gamma$ ) by means of RT q-PCR. Levels of leptin, adiponectin, ghrelin and obestatin were determined by ELISA in plasma.

**Results:** 6 months-long intake of cola beverage was not only exhibited in increased body weight and liquid intake, but also led to significantly decreased levels of leptin in plasma (by 26%) when compared to healthy controls. This finding was however not supported by any significant change in values of gene expression of leptin or leptin receptor in VAT. Similarly, we did not observe any significant changes in adiponectin on protein nor gene expression levels. Plasma levels of ghrelin were significantly decreased (by 48%) and obestatin levels, on the other hand, were significantly increased (by 20%) in animals drinking cola beverage (CC) when compared to healthy controls (CON). Gene expression of PPAR $\gamma$  in visceral adipose tissue was increased (by 21%).

**Conclusions:** Regular and long term consumption of Coca Cola<sup>®</sup> established signs of metabolic syndrome, which was evident from altered levels of its plasma markers – decreased levels of leptin and ghrelin and increased obestatin levels. These together are responsible for metabolic changes seen in a subject with insulin resistance and metabolic syndrome.

### AT1 RECEPTOR BLOCKADE AND AT2 RECEPTOR STIMULATION EFFECT ON THE RAS PEPTIDE LEVELS IN THE PREVENTION AND TREATMENT OF EXPERIMENTAL AUTOIMMUNE MYOCARDITIS (EAM) IN MALE LEW

L. Paulis<sup>1</sup>, R. Rajkovicova<sup>1</sup>, O. Domenig<sup>2</sup>, S. Trubacova<sup>1</sup>, E. Kashina<sup>3</sup>, U. Kintcher<sup>3</sup>, T. Unger<sup>4</sup>, M. Steckelings<sup>5</sup>, M. Poglitsch<sup>6</sup>, P. Schmerler<sup>3</sup>. <sup>1</sup>Institute of Normal and Pathological Physiology, Slovak Academy of Sciences, Bratislava, SLOVAK REPUBLIC, <sup>2</sup>Altarras Therapeutics, Vienna, AUSTRIA, <sup>3</sup>Center for Cardiovascular Research, Charité-University Medicine, Berlin, GERMANY, <sup>4</sup>Cardiovascular Research Institute, Maastricht University, Maastricht, THE NETHERLANDS, <sup>5</sup>IMM-Department of Cardiovascular and Renal Research, University of Southern Denmark, Odense, DENMARK, <sup>6</sup>Attoquant Diagnostics, Vienna, AUSTRIA

**Objective:** EAM is characterized by transient myocarditis (peak at day 21), progressive fibrosis, hypertrophy (evolving from concentric to dilation type), dysfunction and subsequent heart failure (day 35).

**Design and method:** We have investigated the effects of the AT2 receptor agonist, compound 21 (C21) and olmesartan on RAS peptide and receptor levels when given in prevention (day 0–21 post EAM-induction) or reversion (day 21–35 post EAM-induction) of EAM.

C21 prevented myocardial infiltration and reversed hypertrophy without affecting blood pressure, while olmesartan prevented myocardial infiltration, fibrosis and dysfunction and reversed hypertrophy, dilation and dysfunction. Only the combination of C21 and olmesartan significantly reversed already established myocardial fibrosis.

**Results:** Our EAM model demonstrated high renin, Ang I and II levels, with transient (day 21) decline of angiotensinogen (AGT) levels. The tissue Ang II levels were exceptionally increased in EAM, putatively due to higher ACE activity or increased AT1 receptor expression. Olmesartan augmented AGT depletion (at day 21 and causing depletion at day 35), with consequent absence of reactive plasma Ang II, observed in other models. Moreover, olmesartan strongly reduced myocardial Ang II levels. C21 prevented AGT decline, with consequent increase in Ang II concentration despite increased aminopeptidase-dependent degradation. The LV AT2 receptor expression increased progressively with the evolvement of the EAM-induced heart failure.

**Conclusions:** In conclusion, C21 prevented AGT exhaustion in EAM rats. The consequently higher Ang II levels might have offset the beneficial effects of the AT2 receptor stimulation in EAM. Particularities of the RAS modulation affect the therapeutic outcome in distinct cardiovascular pathologies that appear clinically similar. (VEGA 1/0127/17)

## PREDICTORS OF BLOOD PRESSURE RESPONSE TO ANATOMICALLY OPTIMIZED DISTAL RENAL DENERVATION

S. Pekarskiy, A. Baev, V. Mordovin, T. Ripp, A. Falkovskaya, V. Lichikaki, E. Sitkova. *Cardiology Research Institute, Tomsk NRC, Tomsk, RUSSIA*

**Objective:** Percutaneous renal denervation (RDN) has emerged as new breakthrough therapy of hypertension, but failed to show consistent efficacy in clinical trials. We recently demonstrated that the proper anatomical optimization of RDN by shifting treatment from main trunk to segmental branches of renal artery significantly increases the efficacy of the procedure. Aim of this study was to find predictors of blood pressure response to this optimized distal RDN allowing selection of best candidates for this treatment.

**Design and method:** We evaluated relationships between BP change and baseline clinical characteristics in 24 patients with resistant hypertension who undergone distal RDN and completed 12 month FU in course of our trial of the distal vs conventional mode of the procedure (NCT02667912). Office and ambulatory blood pressure, heart rate, age, gender, weight, height, left ventricular mass, 24 h urine volume, 24 h proteinuria, 24 h excretion of sodium and potassium, serum creatinine, and eGFR (MDRD formula) were included in the initial model as explanatory variables. All study variables except gender were continuous, therefore, a multiple regression analysis was used for maximal sensitivity. The manual backward stepwise technique was applied - independent variables with lowest level of significance were excluded step by step until only those with significant effect remained in the equation.

**Results:** Statistically significant predictors of the 12 month decrease in 24 h systolic BP were its baseline level (part. corr. coefficient = 0.85,  $p < 0.01$ ), eGFR (part. corr. coefficient = -0.45,  $p = 0.03$ ), and weight (part. corr. coefficient = -0.44,  $p = 0.03$ ). Final model with above 3 indices as independent predictors was highly significant with a multiple  $R = 0.86$ ,  $R^2 = 0.73$ , adjusted  $R^2 = 0.69$ ,  $p = 0.0006$ .

**Conclusions:** Thus, in addition to the trivial dependence on baseline BP level, the effect of distal RDN was also related to renal function, but inversely, which is in full agreement with renal pathophysiology linking renal function decline to sympathetic hyperactivity and hypertension. Independently of that, overweight and obesity demonstrated the ability to reduce the efficacy of RDN.

## MULTIDISCIPLINARY CONSENSUS ON THE MANAGEMENT OF UNCONTROLLED HYPERTENSION IN INDIA

S. Es<sup>1</sup>, S. Fulmali<sup>1</sup>, R. Gopal Singh<sup>2</sup>, G. Unni<sup>3</sup>, R. Padmanabhan<sup>4</sup>, B. Desai<sup>5</sup>, S. K. Hiremath<sup>6</sup>, V. Jain<sup>7</sup>, S. Bhawal, S. Gulati<sup>8</sup>, M. Shete, R. Nair, S. Prakash<sup>9</sup>, B. Bhattacharya<sup>11</sup>, V. Kher<sup>10</sup>. <sup>1</sup>Pfizer India, Ltd. Medical, Mumbai, INDIA, <sup>2</sup>Banaras Hindu University, Department of Medicine, Varanasi, INDIA, <sup>3</sup>Jubilee Mission Medical College & Research Institute, Dept. of Cardiology, Thrissur, INDIA, <sup>4</sup>SRM Medical College and Hospital, Department of Nephrology, Chennai, INDIA, <sup>5</sup>Karuna Hospital, Department of Cardiology, Mumbai, INDIA, <sup>6</sup>Sagar Hospitals, Department of Nephrology, Bangalore, INDIA, <sup>7</sup>Choithram Hospital and Research Center, Department of Cardiology, Indore, INDIA, <sup>8</sup>Fortis Escorts Heart Institute, Department of Nephrology, New Delhi, INDIA, <sup>9</sup>BLK Super Specialty Hospital, Department of Nephrology, New Delhi, INDIA, <sup>10</sup>Fortis Escorts Kidney and Urology Institute, Department Nephrology and Renal Transplant Medicine, New Delhi, INDIA, <sup>11</sup>Department of Nephrology, Ruby General Hospital, Kolkata, INDIA

**Objective:** Cardiovascular disease is predicted to be the largest cause of death and disability in India by 2020. Hypertension (HT), one of the main contributing factors, presents a significant public health burden. Inability to achieve adequate blood pressure (BP) control results in Uncontrolled Hypertension (UHT). The prevalence of UHT is high in India, with only about 9–20% of patients achieving target BP goals. Presently, there are no guidelines specific to UHT, which if left

uncontrolled can lead to resistant HT, chronic kidney disease and other complications of HT

**Design and method:** A Multidisciplinary Panel, comprising of specialists in Cardiology, Nephrology and Internal Medicine, was convened to address the diagnosis and management of UHT in the Indian population. The Panel identified key points concerning UHT and discussed management recommendations in the Indian clinical setting

**Results:**

- UHT can be defined as the inability to achieve BP control with the use of three medications in optimal doses, with three BP readings taken in three weeks. The condition can be further classified as causative and therapeutic UHT.
- The high prevalence of UHT was attributed to the high salt content in the Indian diet (particularly from preserved foods), a lack of awareness and poor adherence to medication.
- Diagnosis of UHT involves screening for the following: sleep apnea, cardiac and renal abnormalities, and hyperaldosteronism. Investigations recommended were micro-albumin, blood sugar, kidney function tests, urinalysis, echocardiogram, 24-hour ambulatory BP reading, waist-to-hip ratio, serum potassium and lipid profile.
- A detailed algorithm was proposed for management of UHT based on its causes, specific to the presence of cardiac/renal disease, and co-morbidities like Diabetes Mellitus. Recommendations from the panel can rationalize the clinicians' approach in the management of UHT in India.
- A prevention strategy for UHT requires the participation and joint responsibility of clinicians, patients and policymakers.

**Conclusions:** Appropriate treatment recommendations by clinicians, with simplified medication regimens can help improve patient adherence. Identification and reversal of lifestyle factors by patients through education and counselling, and better health literacy through public health campaigns can aid the control of HT in India.

## IS IT RESISTANT HYPERTENSION?

I. Pintassilgo, F. Abecasis, P. Beirao, C. Bekerman, V. Cunha. *Hospital Garcia de Orta, Almada, PORTUGAL*

**Objective:** Characterization of patients referred by their general practice physician to our hypertension (HTN) clinic with the diagnosis of resistant HTN.

**Design and method:** Retrospective study of patients with the diagnosis of resistant HTN referred to the HTN clinic from primary care between 2012 and 2017. Data was obtained from electronic medical records and analyzed with SPSS software.

**Results:** From a total of 213 patients presently followed in our HTN clinic, 37 were referred due to resistant HTN. Female sex was slightly more prevalent (51.4%) and the average age was 64 years (with a minimum of 18 and a maximum of 84 years). Patients had a mean duration of HTN of 20 years (ranging from 2 months to 50 years). At the time of referral 41% had grade 1, 27% grade 2 and 22% grade 3 HTN. Other contributing factors to global vascular risk were sedentary lifestyle (68%), excess weight (68%), dyslipidemia (46%), diabetes (38%) and past or current smoking habits (32%). With regard to therapy only 43.2% could formally be deemed resistant HTN according to the current definition (high blood pressure values despite treatment with a diuretic and two other antihypertensive drugs of different classes at adequate dose) and 8% had no diuretic in their prescription. The most prescribed class was angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (67%) followed by diuretics (49%), calcium channel antagonists (43%) and beta-blockers (27%). There was a strong suspicion of non-compliance to the prescribed regimen in 11% of patients. Secondary causes of HTN were found in 24.3% of cases: hyperaldosteronism in 4 patients, hyperthyroidism in 1 and sleep apnea in 4.

**Conclusions:** Defining resistant hypertension remains a clinical problem and an update on its definition should be considered. Patients' education is of foremost importance in promoting compliance to prescribed therapy and reducing concomitant risk factors. Regarding therapy, clinical inertia should be avoided, promoting optimization of anti-hypertension drugs dosages and implementing diuretics as third class, when indicated, in the primary care setting.

## BENEFITS OF MINDFULNESS MEDITATION IN REDUCING BLOOD PRESSURE AND STRESS IN PATIENTS WITH ARTERIAL HYPERTENSION

P. Ponte<sup>1</sup>, M. Castella<sup>1</sup>, D. Filella<sup>1</sup>, A. Feliu<sup>2</sup>, L. Matas<sup>1</sup>, J. Soler<sup>1</sup>, M. Ruiz<sup>1</sup>, M. J. Sole<sup>1</sup>, M. Ferrero<sup>1</sup>, M. Aguilera<sup>1</sup>, A. Roca-Cusachs<sup>3</sup>, J. A. Arroyo<sup>1</sup>. <sup>1</sup>Hospital de la Santa Creu i Sant Pau, Barcelona, SPAIN, <sup>2</sup>Parc sanitari Sant Joan de Deu, Barcelona, SPAIN, <sup>3</sup>Universitat Autònoma de Barcelona, Barcelona, SPAIN

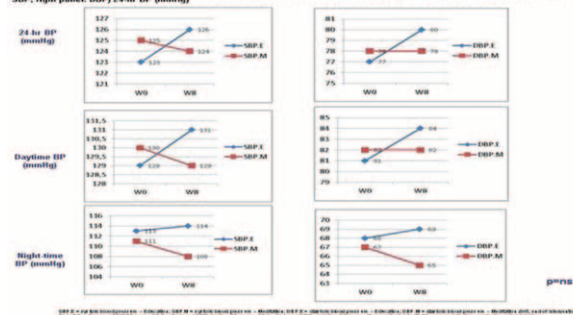
**Objective:** To evaluate the benefits of mindfulness meditation in the control ambulatory blood pressure (BP) and the impact of the intervention on levels of anxiety, stress and depression

Table 1. Clinically measured blood pressure (BP) values

	GROUP	Baseline (n=42)	8	Mid-point (n=42)	8	Final (n=42)	8	Follow-up (n=42)	8	TOTAL
SBP*	Education	131.26 (0.41)		127.11 (0.13)		126.25 (0.44)		126.70 (0.36)		
		[97.18-137.35]		[118.08-133.15]		[117.84-138.66]		[107.19-137.26]		
SBP**	Meditation	134.61 (0.88)	0.34	129.30 (0.36)	0.13	126.54 (0.43)	0.82	127.30 (0.48)	0.34	0.24
		[119.09-140.13]		[118.08-139.65]		[117.26-139.82]		[116.67-139.93]		
DBP*	Education	81.00 (0.32)		81.33 (0.77)		81.12 (0.49)		81.40 (0.35)		
		[81.13-80.86]		[79.76-82.90]		[80.89-81.55]		[80.86-82.02]		
DBP**	Meditation	87.00 (0.36)	0.80	81.26 (1.41)	0.27	80.23 (0.80)	0.80	79.34 (0.48)	0.27	0.44
		[84.24-89.42]		[77.38-91.14]		[80.43-80.02]		[77.23-81.45]		

Expressed as mean (SD), CI 95%. Mean adjusted to 65 years and diastolic in diastolic administration. \*Mean clinically measured and adjusted. \*\*ANOVA for clinically measured and BP. The between-subjects were age, in addition to the within-subjects.

Figure 1. 24-hour ambulatory blood pressure monitoring (ABPM) evolution from pre-intervention (W0) to final visit (W8) (left panel: SBP; right panel: DBP). 24-hr BP (mmHg).



**Design and method:** Randomized controlled trial of a Mediterranean population with high-normal BP or grade I hypertension. 24 and 18 patients [n = 42; mean age 56.5(7.7) years; similar proportions of men and women] were enrolled to an intervention and a control group, respectively. For 2 hours/week over 8 weeks, the intervention group received mindfulness training and the control group attended health education talks. The patients attended pre-intervention (baseline), week 4, week 8 and week 20(follow-up) visits.

**Results:** 61.9% of the patients had anxiety, 21.4% depression, 19.0% were smokers and 14.2% were diabetic (no significant differences between the 2 groups). At baseline, the intervention group had non-significant higher clinically measured BP values, whereas both groups had similar ambulatory BP monitoring (ABPM) values. At week 8, the intervention group had statistically significant lower ABPM

scores than the control group [124/77 mmHg vs 126/80 mmHg ( $p < 0.05$ ) and 108/65 mmHg vs 114/69 mmHg ( $p < 0.05$ ) for 24-hour and night-time systolic BP (SBP), respectively] and also had lower clinically measured SBP values (130 mmHg vs 133 mmHg;  $p = 0.02$ ). At week 20 (follow-up), means were lower in the intervention group (although not statistically significant). Improvements were observed in the intervention group in terms of being less judgemental, more accepting and less depressed. The results are shown in the table 1 and Figure 1.

**Conclusions:** By week 8 the mindfulness group had lower clinically measured SBP, 24-hour SBP, at-rest SBP and diastolic BP values.

## BLOOD PRESSURE CONTROL AND ASSOCIATED FACTORS IN A REAL WORLD MULTIDISCIPLINARY TREATMENT CENTER

T. Veiga Jardim, A. L. Sousa, W.Barroso, P. C. Jardim. *Hypertension League - Federal University of Goias, Goiania, BRAZIL*

**Objective:** Although multidisciplinary treatment is recommended for patients with hypertension (HTN), results of this intervention in a real world setting are missing in the literature. Aiming to report the results of a real world long-term multidisciplinary treatment for hypertensive patients we conducted this study.

**Design and method:** Data of hypertensive patients with regular follow-up visits in a multidisciplinary HTN treatment center from Brazil's Midwest were retrospectively assessed. Hypertensive patients  $\geq 18$  years enrolled in the service by June 2017 with a minimum of two visits were included. Anthropometric, blood pressure (BP), follow-up time, pharmacological treatment, diabetes and lifestyle data were collected from the most recent visit to the service. BP values  $< 140/90$  mmHg in non-diabetics and  $< 130/80$  mmHg in diabetic patients were defined as controlled. A logistic regression model was built to identify variables independently associated to BP control.

**Results:** A total of 1,548 patients were included, with a mean follow-up time of 7.6 ( $\pm 7.1$ ) years. The majority of the population was female (73.6%; n = 1,139) with a mean age of 61.8 ( $\pm 12.8$ ) years. BP control rate in all study population, non-diabetics and diabetics were 68%, 79%, and 37.9%, respectively. Diabetes was inversely associated with BP control (OR 0.16; 95%CI 0.12–0.20;  $p < 0.001$ ) while age  $\geq 60$  years (OR 1.48; 95%CI 1.15–1.91;  $p = 0.003$ ) and female sex (OR 1.38; 95%CI 1.05–1.82;  $p = 0.020$ ) were directly associated.

**Conclusions:** Blood pressure control rates found in a real world multidisciplinary treatment center setting are higher than conventional treatment rates commonly reported. Focus on patients with diabetes, younger than 60 years and males should be given to further improve these results.

# ORAL PRESENTATIONS IN POSTER AREA

## COMPLICATIONS AND COMORBIDITIES

### NONALCOHOLIC STEATOHEPATITIS IN A HYPERTENSIVE POPULATION

L. A. Vigil, R. Garcia Carretero, C. Rodriguez Castro, A. Colas, B. Vargas, M. Lopez Jimenez, M. Varela. *Hospital Universitario de Móstoles, Móstoles, SPAIN*

**Objective:** Nonalcoholic steatohepatitis (NASH) is strongly associated with overweight or obesity, the Metabolic Syndrome (MS) and type 2 diabetes mellitus (DM2). Our objective was to analyse their relationship with essential hypertension, a condition frequently linked to these pathologies.

**Design and method:** Prospective, cross-sectional study conducted in a Hypertension Unit. We defined NASH as the presence of ultrasound hepatic steatosis with the increase in AST > 1.5 times high-reference laboratory values, in the absence of other causes of hepatopathy and with an alcohol intake less of 30 g/day (males) and 15 g/day (females).

**Results:** We included a total of 2251 patients (51.3% males), with an average age of 56 years and a BMI of 30. 57% had MS and 11.5% DM2. 91 patients (4%) presented NASH criteria (4.9% males and 3.1% females,  $p = 0.032$ ). Patients with NASH had higher abdominal circumference (106 vs. 100 cm,  $p < 0.0001$ ), uric acid (6.4 vs. 5.8 mg/dl,  $p = 0.002$ ), triglycerides (162 vs. 128 mg/dl,  $p = 0.005$ ), basal glycaemia (116 vs. 107 mg/dl,  $p = 0.026$ ), HbA1c (6.5% vs. 6.1%,  $p = 0.015$ ), basal insulin (18.4 vs. 13 mU/ml,  $p = 0.025$ ), DBP (83 vs. 80 mmHg,  $p = 0.036$ ), ferritin (365 vs. 157 mg/dl,  $p < 0.0001$ ), prevalence of MS (78% vs. 56%,  $p < 0.0001$ ) and DM2 (20% vs. 11%,  $p = 0.017$ ). NASH also correlated with the number of MS factors ( $r = 0.045$ ,  $p = 0.035$ ). In the multivariate analysis, the variables independently associated with NASH were the abdominal circumference (Exp.(B) = 1034, 95%CI: 1001–1.068,  $p = 0.042$ ), uric acid (Exp.(B) = 1.263, 95%CI: 1.005–1.588,  $p = 0.045$ ), ferritin (Exp.(B) = 1.003, 95%CI: 1.002–1.005,  $p < 0.0001$ ), the presence of MS (Exp.(B) = 4.358, 95%CI: 1.001–19.529,  $p = 0.005$ ) and DM2 (Exp.(B) = 2.399, 95%CI: 1.040–5.537,  $p = 0.04$ ). Triglycerides, basal glycaemia, HbA1c, basal insulin and DBP resulted excluded in the final model (model R2: 0.49).

**Conclusions:** In our patients NASH was independently associated with the presence of DM2 and MS and with several of the defining or related components of MS. Thus NASH can represent the hepatic correlation of MS in essential hypertension.

### DYNAMICS OF CENTRAL HEMODYNAMICS PARAMETERS IN STEMI PATIENTS DEPENDING ON THE ACHIEVING THE TARGET LEVEL OF ATHEROGENIC LIPIDS WITH ATORVASTATIN THERAPY

A. Khromova, L. Salyamova, Y. Tomashevskaya, V. Oleynikov. *Penza State University, Penza, RUSSIA*

**Objective:** to study the dynamics of the central (aortic) hemodynamics parameters in patients with STEMI, depending on the achieving the LDL-C target values at the 48-weeks atorvastatin therapy.

**Design and method:** The study included 97 patients (mean age  $47.9 \pm 6.2$  years) with STEMI confirmed by biomarkers, ECG, coronary angiography. An applanation tonometry by Sphygmocor device (AtCorMedical, Australia) was performed at 7–9th day from the disease onset and after 48 weeks of follow-up. Parameters were analyzed: SBPao, DBPao, PPao and cFPWV. Patients were treated with atorvastatin throughout the follow-up period. The patients were divided into two groups depending on the LDL-C level after 48 weeks. Group 1 consisted of 49 patients with LDL-C < 1.5 mmol/L and/or a reduction by 50% of the baseline values. The second group - 48 people who did not achieve target LDL-C level.

**Results:** The aortic pressure parameters increased in group 1 after 48-weeks therapy: SBPao from  $102 \pm 8.9$  to  $108.5 \pm 11$  mmHg ( $p = 0.001$ ), PPao from  $29.5 \pm 6.8$  to  $32.7 \pm 7.8$  mmHg ( $p = 0.01$ ). DBPao initially - 71 (66; 81) mmHg; after therapy - 73 (66; 81) mmHg ( $p = 0.05$ ). An increase of SBPao from  $102.4 \pm 10.9$  to  $109.9 \pm 11.8$  mmHg ( $p = 0.001$ ), PPao from 26(22; 31) to  $32.1 \pm 7.9$  mmHg ( $p = 0.001$ ) was found in group 2. DBPao has not changed: from 75(70; 81); to 76(71; 81) mmHg. Initially low SBPao in group 1 was diagnosed in 46.9%, PPao

in 36.7%, normal values - in 53.1% and 63.3%; after 48 weeks a low SBPao and PPao level was in 30.6% and 20.4%, normal - in 69.4% and 79.6%. In group 2 initially low SBPao was in 57.3%, PPao in 44.8%, normal in 42.7% and 55.2%. Low values were observed in 25% and 18.8%, normal - in 66.7% and 72.9%, high values - in 8.3% and 8.3% ( $p < 0.05$ ) in 48 weeks. PWV decreased from 6.9 (6.1, 8.3) m/s to 6.1 (5.4, 7.8) m/s ( $p = 0.01$ ). In Group 2 PWV initially - 7.1 (6.2, 7.7) m/s, follow-up - 6.9 (6.1, 7.8) m/s ( $p = 0.2$ ).

**Conclusions:** In group 2 an increase of central pressure is associated with normalization of the parameters and pathological values appearance. While in group 1 an increase of SBPao and PPao was due to their normalization, with a favorable decrease of cFPWV.

### VALIDATION OF A BRACHIAL OSCILLOMETRY AND MODEL-BASED ESTIMATE OF STROKE VOLUME AGAINST MAGNETIC RESONANCE IMAGING

T. Weber<sup>1</sup>, H. Feistritzer<sup>2</sup>, G. Klug<sup>2</sup>, B. Hametner<sup>3</sup>, S. Wassertheurer<sup>3</sup>, B. Metzler<sup>2</sup>. <sup>1</sup>Klinikum Wels-Grieskirchen, Wels, AUSTRIA, <sup>2</sup>Medical University Innsbruck, Innsbruck, AUSTRIA, <sup>3</sup>Austrian Institute of Technology, Vienna, AUSTRIA

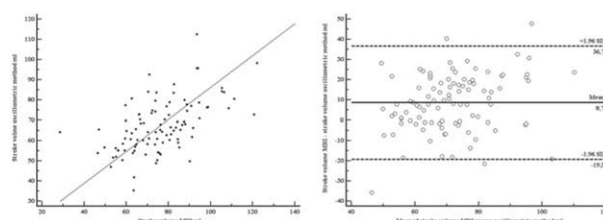
**Objective:** Technological progress recently facilitated 24 hour measurement of central blood pressure and pulsatile hemodynamics, using brachial blood pressure cuffs and dedicated software. A complementary estimate of cardiac function is desirable.

**Design and method:** Our proposed method mathematically describes left ventricular outflow during systole according to a given pressure wave. The model combines a modified 3-element like Windkessel system and transmission line theory, and provides an estimate of stroke volume (SV). For this study, pulse waves, recorded with a brachial cuff at the level of diastolic blood pressure, are utilized. In 97 patients with reperfused acute myocardial infarction and in 2 healthy controls, cardiac magnetic resonance imaging (CMRI; 1.5 Tesla Magnetom, Siemens, Germany) was performed, and SV was measured with standard protocols from short axis cine images (11 slices). Images were acquired using breath hold, retrospective ECG triggered TrueFISP bright blood sequences, and evaluated with standard software (ARGUS, Siemens, Erlangen, Germany). SV from both methods were compared with Pearson's correlation coefficients and Bland Altman Plots.

**Results:** Mean age of participants was 56.8 years, 21 were women, 56 smokers, mean nt-proBNP was 1350 pg/ml, mean EF 54% (range 28–76). MRI-derived SV was 76 ml (range 28.5–122), oscillometric device-derived SV was 67 ml (range 35–113).

Both SVs was moderately correlated ( $r = 0.54$  (CI 0.39–0.67),  $p < 0.001$ ). Using the method of Bland-Altman, mean difference between both methods was 8.7 ml (1.96 limits of agreement were 36.7 and -19.3 ml), with no systematic bias - Figure. Both MRI-based and oscillometric method-based SV were inversely related to nt-proBNP levels ( $r = -0.31$ ,  $p = 0.002$  and  $r = -0.25$ ,  $p = 0.01$ , respectively).

**Conclusions:** Brachial oscillometry and mathematical modeling provide a reasonable estimate of stroke volume, which may be a useful addition to 24 hour measurements of blood pressure and pulsatile hemodynamics.



### VITAMIN D DEFICIENCY CAUSES INWARD HYPERTROPHIC REMODELING AND ALTERS VASCULAR REACTIVITY OF RAT CEREBRAL ARTERIOLES

E. Pal<sup>1</sup>, L. Hadjadj<sup>1</sup>, Z. Fontanyi<sup>2</sup>, A. Monori-Kiss<sup>1</sup>, Z. Mezei<sup>3</sup>, N. Lippai<sup>4</sup>, A. Magyar<sup>5</sup>, A. Heinzlmann<sup>5</sup>, G. Karvaly<sup>6</sup>, E. Monos<sup>1</sup>, G. Nadasy<sup>3</sup>, Z. Benyo<sup>1</sup>, S. Varbiro<sup>2</sup>. <sup>1</sup>Semmelweis University - Institute of Clinical Experimental Research, Budapest, HUNGARY, <sup>2</sup>Semmelweis University - Department of Obstetrics and Gynecology, Budapest, HUNGARY, <sup>3</sup>Semmelweis University - Department of

Physiology, Budapest, HUNGARY, <sup>4</sup>Jasz-Nagykan-Szolnok County Hetenyi Geza Hospital - Department of Pathology, Szolnok, HUNGARY, <sup>5</sup>Semmelweis University - Department of Anatomy, Histology and Embryology, Budapest, HUNGARY, <sup>6</sup>Semmelweis University - Department of Laboratory Medicine, Budapest, HUNGARY

**Objective:** Vitamin D deficiency (VDD) is a global health problem, which can lead to several pathophysiological consequences including cardiovascular diseases. Its impact on the cerebrovascular system is not well understood. The goal of the present work was to examine the effects of VDD on the morphological, biomechanical and functional properties of cerebral arterioles.

**Design and method:** Four-week-old male Wistar rats (n = 11 per group) were either fed with vitamin D deficient diet or received conventional rat chow with per os vitamin D supplementation. Cardiovascular parameters and hormone levels (testosterone, androstenedione, progesterone and 25-hydroxyvitamin D) were measured during the study. After 8 weeks of treatment anterior cerebral artery segments were prepared and their morphological, biomechanical and functional properties were examined using pressure microangiometry. Resorcin-fuchsin and smooth muscle actin staining were used to detect elastic fiber density and smooth muscle cell counts in the vessel wall, respectively. Sections were immunostained for eNOS and COX-2 as well.

**Results:** VDD markedly increased the wall thickness, the wall-to-lumen ratio and the wall cross-sectional area of arterioles as well as the number of smooth muscle cells in the tunica media. As a consequence, tangential wall stress was significantly lower in the VDD group. In addition, VDD increased the myogenic as well as the uridine 5'-triphosphate-induced tone and impaired bradykinin-induced relaxation. Decreased eNOS and increased COX-2 expression were also observed in the endothelium of VDD animals.

**Conclusions:** VDD causes inward hypertrophic remodeling due to vascular smooth muscle cell proliferation and enhances the vessel tone probably because of increased vasoconstrictor prostanoid levels in young adult rats. In addition, the decreased eNOS expression results in endothelial dysfunction. These morphological and functional alterations can potentially compromise the cerebral circulation and lead to cerebrovascular disorders in VDD.

#### EFFECT OF VITAMIN D DEFICIENCY IN AN ANIMAL MODEL OF POLYCYSTIC OVARY SYNDROME - IMPAIRED CORONARY RELAXATION DETECTED, AS A CARDIOVASCULAR RISK FACTOR

L. Hadjadj<sup>1</sup>, E.M. Horvath<sup>2</sup>, M. Torok<sup>3</sup>, A. Monori-Kiss<sup>3</sup>, E. Pal<sup>3</sup>, A. Novak<sup>3</sup>, G.L. Nadassy<sup>2</sup>, S. Varbiro<sup>1</sup>. <sup>1</sup>Semmelweis University - 2nd Department of Gynecology and Obstetrics, Budapest, HUNGARY, <sup>2</sup>Semmelweis University - Department of Physiology, Budapest, HUNGARY, <sup>3</sup>Semmelweis University - Institute of Clinical Experimental Research, Budapest, HUNGARY

**Objective:** Polycystic ovarian syndrome (PCOS) one of the most frequent gynecological illnesses fluencing about 8% of fertile women worldwide. Beyond hyperandrogenic state, vitamin D hypovitaminosis occurs in 70–80% of women suffering from PCOS. Our aim was to investigate the combined effect of these hormonal alterations, considering insulin and testosterone induced relaxation of coronary arterioles.

**Design and method:** 46 adolescent (21–28 day-old), 90–110 gram-weighted female Wistar rats were grouped randomly in 4 groups: vitamin D supplemented groups with (n = 12) and without transdermal testosterone treatment (n = 12) and vitamin D deficient groups with (n = 11) and without transdermal testosterone treatment (n = 11).

After 8 weeks of treatment, arterioles (in vivo diameter of 100–200 micrometre) from left anterior coronary artery were obtained and examined in physiological circumstances with pressure miography. With videomicroscopic angiometry the inner and outer radii of the arteriole was evaluated. Insulin and testosterone induced relaxation of the arterioles were obtained and statistically analysed. Immunhistology was used to detect insulin and vitamin D receptor density of coronary arterioles.

**Results:** Insulin induced relaxation was only in vitamin D supplemented, testosterone free group preserved. In the other groups insulin induced relaxation was significantly damaged on a dose dependent manner. Testosterone induced relaxation was reduced in testosterone treated groups regardless to vitamin D status.

**Conclusions:** In hyperandrogenic females both insulin resistance and androgen access results impaired relaxation of coronary arterioles.

#### THE IMPACT OF EXAGGERATED BLOOD PRESSURE RESPONSE DURING TREADMILL EXERCISE TEST ON OUTCOME IN MODERATE TO SEVERE ASYMPTOMATIC AORTIC STENOSIS PATIENTS

S. Saeed<sup>1</sup>, G. Mancias<sup>3</sup>, R. Rajani<sup>2</sup>, S. Reinhard<sup>1</sup>, D. Parkin<sup>2</sup>, J. Chambers<sup>2</sup>. <sup>1</sup>Department of Heart Disease, Haukeland University Hospital, Bergen, NORWAY, <sup>2</sup>Cardiothoracic Centre, Guy's & St Thomas' Hospital, London, United Kingdom, <sup>3</sup>University of Milano-Bicocca, Milan, ITALY

**Objective:** Exaggerated blood pressure (BP) response (EBPR) during exercise predicts future hypertension and cardiovascular events in different patients groups and general population. However, the clinical and prognostic implications of EBPR during exercise treadmill test (ETT) in patients with aortic stenosis (AS) have not been tested before.

Table: Baseline characteristics

	Normal BP response	Exaggerated BP response	p Value
Age (years)	65±12	67±11	0.187
Men (%)	66	73	0.261
Body mass index (kg/m <sup>2</sup> )	28±8	28±5	0.838
Resting systolic BP (mmHg)	138±18	153±18	<0.001
Resting diastolic BP (mmHg)	85±11	87±12	0.216
Hypertension (%)	69	83	0.033
Antihypertensive treatment (%)	62	70	0.322
Treadmill exercise test duration (min)	9.8±4.4	9.9±3.4	0.889
Metabolic equivalents (METs)	8.8±4.5	8.7±4.3	0.881
LV ejection fraction (%)	60±7	62±5	0.035
LV mass index (g/m <sup>2.7</sup> )	49±16	59±19	0.001
Aortic valve area (cm <sup>2</sup> )	0.93±0.22	0.97±0.22	0.255

**Design and method:** We retrospectively assessed 316 patients with moderate (66%) or severe (34%) asymptomatic AS (age 65 ± 12 years) who underwent echocardiography and modified Bruce ETT at a specialist valve clinic. EBPR was defined as peak systolic BP 190mmHg or above.

**Results:** The prevalence of EBPR was 22%. There was no difference in exercise duration, metabolic equivalents or severity of AS between patients with normal BP response and EBPR (all p = NS). Patients with EBPR were more likely to have hypertension, higher pre-test systolic BP, left ventricular (LV) ejection fraction and increased LV mass (all p < 0.05) (Table). A total of 264 events occurred during a mean follow up period of 34.9 ± 35.1 months. 234 patients reached an indication for aortic valve replacement (AVR), 75% in patients with normal BP response vs. 73% in patients with EBPR, p = NS). Among 30 (9%) deaths, 9.4% occurred in patients with normal BP response vs. 8.1% in EBPR group, p = NS). In univariate Cox regression analysis, the presence of EBPR was neither associated with all-cause mortality {HR 0.89, 95%CI 0.33–2.36, p = 0.814} nor AVR {HR 0.96, 95%CI 0.69–1.33, p = 0.785}.

**Conclusions:** EBPR during treadmill exercise test in moderate to severe asymptomatic AS patients was strongly associated with hypertension and increased LV mass, but could not predict adverse outcomes.

# ORAL PRESENTATIONS IN POSTER AREA

## DIAGNOSIS AND TREATMENT

### COULD THE ADDITION OF STATINS TO ANTIHYPERTENSIVE MONOTHERAPY PROVIDE THE EFFECT OF COMBINATION TREATMENT IN HYPERTENSIVE PATIENTS WITH MODERATE RISK

D. Nebieridze, A. Safarian. *National Medical Research Center for Preventive Medicine, Moscow, RUSSIA*

**Objective:** We tested the hypothesis that the addition of statins to the antihypertensive treatment of hypertensive pts with dislipidemia, having moderate risk, by monotherapy would promote not only lowering of lipid variables but also to more effective BP control.

**Design and method:** 210 hypertensive males aged 40–55 with systolic BP within 140–179 mmHg and diastolic BP within 90–109 mmHg, low-density cholesterol more or equal to 3,5 mmol/l and one additional risk factor without signs of atherosclerotic disease not achieving BP goals (<140/90 mmHg) during one month of healthy life-style changes were included in the trial. All pts were placed on antihypertensive monotherapy. Following four weeks 88 pts (40%) achieved BP goals. The rest 122 pts (60%) were randomly divided in two groups by 61 persons in each. In the first group (main group) low dose statins was added to antihypertensive therapy. In the second group (reference group) pts were switched to combination antihypertensive treatment (as it is recommended by ESH guidelines). The duration of trial was 3 months

**Results:** In the main group systolic BP decreased by 24,2mmHg (from 162,4 mmHg to 138,2 mmHg),  $p < 0,005$ . In the reference group systolic BP decreased by 24,1 mmHg (from 160,8 mmHg to 136,7 mmHg),  $p < 0,005$ . The decrease of diastolic BP in the main group was 13,8 mmHg (from 100,4 mmHg to 86,6 mmHg) and in the reference group - 13,3 mmHg (from 101,2 mmHg to 87,9 mmHg),  $p < 0,005$ . The difference between the decreases of both systolic and diastolic BP in two groups was non significant,  $p > 0,05$ . As a result, the achievement of BP goals by the end of the study was similar in two groups - 77% (48 pts) in the main group and 75% (46 pts) in the reference group,  $p > 0,05$ .

**Conclusions:** Results show, that statins, due to additional BP-lowering effect, in combination with antihypertensive monotherapy could provide BP control similar to that of combination antihypertensive treatment.

### BLOOD PRESSURE VARIABILITY AND CLINICAL CHARACTERISTICS OF PATIENTS HOSPITALIZED FOR ACUTE MYOCARDIAL INFARCTION

K. Konstantinou, K. Tsioufis, M. Mantzouranis, A. Koumeli, C. Fragoulis, N. Vogiatzakis, K. Dimitriadis, A. Kasiakogias, D. Tousoulis. *First Cardiology Clinic, Medical School, National and Kapodistrian University of Athens, Hippokraton Hospital, Athens, GREECE*

**Objective:** The aim of the present study was to assess blood pressure variability (BPV) in patients hospitalized for acute myocardial infarction.

**Design and method:** We studied 75 patients (76% males, age  $65 \pm 13$  years) who were hospitalized because of ST-elevation myocardial infarction (STEMI) and Non ST-elevation myocardial infarction (NSTEMI). All patients underwent baseline estimation of clinical and laboratory parameters during their hospitalization. Additionally, BPV was estimated based on double daily measurements of BP during hospitalization and with 24-hour ambulatory BP monitoring during the third day of hospital stay. The parameters of BPV analyzed were: a) standard deviation (SD) of systolic BP (24-h, daytime and nighttime), b) SD of diastolic BP (24-h, daytime and nighttime) and c) the coefficient of variation (CV) of systolic BP (24-h, daytime) and d) the average real variability (ARV) of systolic and diastolic BP across 24-h.

**Results:** From the total population, 20% had family history of cardiovascular events, 72% were hypertensives, 32% had diabetes, 51% were smokers and 32% had previous history of coronary artery disease. Regarding the type of myocardial infarction, 37% were admitted for STEMI and 55% had coronary revascu-

larization. Focusing on the mean systolic and diastolic BP and their SD the values were  $72 \pm 6.1$ mmHg,  $127 \pm 11.4$ mmHg and  $74.5 \pm 6.5$ mmHg, respectively. From the ambulatory BP the daytime, nighttime and total SD of systolic BP was  $11.3 \pm 2.8$ mmHg,  $9.8 \pm 3.1$ mmHg and  $11.7 \pm 2.9$ mmHg, respectively. Moreover, ARV was  $9.31 \pm 2.1$ mmHg while CV was  $10.21 \pm 26$  %. The type of MI (STEMI and NSTEMI) was significantly related to systolic and diastolic ARV ( $r = 0.29$ ,  $p = 0.012$  and  $r = 0.28$ ,  $p = 0.014$ , respectively).

**Conclusions:** In patients admitted for acute myocardial infarction there is a relationship between the ARV and the type of myocardial infarction. These findings suggest differential impact of hemodynamic load on the cardiovascular system in patients with STEMI and NSTEMI.

### MMP-9 ACTIVITY DETERMINES THE EARLY RESPONSE TO TREATMENT WITH SPIRONOLACTONE IN RESISTANT HYPERTENSION

E. Rodríguez-Sánchez<sup>1</sup>, J.A. Navarro-García<sup>1</sup>, J. Aceves-Ripoll<sup>1</sup>, G. Álvarez-Llamas<sup>2</sup>, F. De La Cuesta<sup>3</sup>, J. Segura<sup>4</sup>, M.G. Barderas<sup>3</sup>, L.M. Ruilope<sup>1,4</sup>, G. Ruiz-Hurtado<sup>1,4</sup>. <sup>1</sup>Cardiorenal Translational Laboratory - Institute of Research Hospital 12 de Octubre, Madrid, SPAIN, <sup>2</sup>Department of Immunology - IIS-Fundación Jiménez Díaz, Madrid, SPAIN, <sup>3</sup>Department of Vascular Physiopathology - Hospital Nacional de Paraplégicos, Toledo, SPAIN, <sup>4</sup>Hypertension Unit - Hospital Universitario 12 de Octubre, Madrid, SPAIN

**Objective:** Fourth-line treatment with spironolactone significantly ameliorates blood pressure (BP) in resistant hypertension (RH), although not all patients have the desired response. Mechanisms specifically related to RH remain unknown but pathophysiological mechanisms altered in hypertension cause the dysregulation of other processes including vascular remodelling. One of the mechanisms related to vascular remodelling is the activation of the matrix metalloproteinase (MMP)-9. The purpose of this study was to evaluate the MMP-9 profile in RH patients and its predictive value as biomarker of responsiveness to treatment with spironolactone.

**Design and method:** This retrospective study included 36 patients with an office BP above 140/90mmHg and the concomitant use of 3 or more antihypertensive drugs. 24-hours BP was monitored by ambulatory blood pressure measurement (ABPM). Patients above 135/80mmHg were considered as RH and those below, pseudoresistant hypertensives (PRH). Spironolactone was prescribed to patients with RH at 25–50 mg/day, and early response was assessed after 2 months by ABPM. Patients with 24-h BP below 135/85mmHg were reclassified as controlled RH (CRH), and patients above were considered non-controlled RH (non-CRH). MMP-9 activity was assessed by zymography in polyacrylamide gel and by commercial ELISA (QuickZyme Biosciences).

**Results:** MMP-9 activity is significantly increased in patients with RH compared with PRH ( $P < 0.05$ ) at baseline, and positively correlates with 24-h systolic BP ( $r = 0.43$ ;  $P = 0.009$ ) and central systolic BP ( $r = 0.48$ ;  $P = 0.003$ ). Reanalysis of baseline parameters after assessing the early response to treatment with spironolactone indicates that non-CRH patients have a significant increase in MMP-9 activity, 24-h pulse pressure and pulse wave velocity (PWV) compared to CRH patients ( $P < 0.05$ ). In fact, if patients are classified according to MMP-9 activity, 61% of CRH are below the median and 67% of non-CRH are above the median. Before starting treatment with spironolactone, MMP-9 activity ( $AUC = 0.75$ ;  $P = 0.046$ ) and 24-h pulse pressure ( $AUC = 0.81$ ;  $P = 0.009$ ) effectively discriminate between CRH and non-CRH patients, with a cut-off value of 14.8ng/ml and 51mmHg respectively.

**Conclusions:** Early response to spironolactone as add-on treatment in RH is determined by the basal level of arterial stiffness estimated by the marker of extracellular matrix remodelling MMP-9 and pulse pressure.

### PREVALENCE AND CHARACTERISTICS OF RESISTANT HYPERTENSIVES IN A GREEK POPULATION

E. Andreadis, A. Georgantoni, C. Geladari, F. Savva, K. Apeiranthiti, E. Pantikidi, I. Papakonstantinou. *Fourth Department of Internal Medicine, Hypertension Center, Evangelismos General Hospital, Athens, GREECE*

**Objective:** Resistant hypertension (RH) is a common problem encountered in clinical practice and obscures to the uncontrolled office hypertension. We investigated subjects with controlled (<140/90 mmHg) and uncontrolled ( $\geq 140/90$  mmHg) office blood pressure (OBP) on three drugs, one of those being a diuretic.

**Design and method:** Blood pressure (BP) was measured twice in the office with a validated oscillometric device, after a 5-min rest period in a sitting position, on two consecutive visits. Consequently, all participants underwent 24 h ambulatory blood pressure monitoring (24h-ABPM), using the Microlife O3 Afib device, programmed to record BP at 20 min intervals for the 24 h period, so as to segregate those with pseudo- and true RH (tRH) and distinguish the clinical and laboratory differences among them. Data are presented as frequencies and percentages for qualitative variables and as mean  $\pm$  SD for quantitative variables.

**Results:** A total of 162 individuals, mean age  $63.54 \pm 10.41$  years, 71 women were included in the analysis. Of those, 54 (33.3%) were controlled in the office, in contrast to 108 (66.7%) who remained uncontrolled. Specifically, 40 (24.7%) had tRH with OBP  $> 140/90$  mmHg and 24h-ABPM  $\geq 130/80$  mmHg, 68 (42%) had pseudoresistance or white coat effect (WCE), with OBP  $\geq 140/90$

mmHg and 24h-ABPM  $< 130/80$  mmHg. Likewise, 11 (6.8%) participants had office BP controlled and 24h-ABPM uncontrolled (masked uncontrolled hypertensives, MUH). WCE and MUH reached of 48.8% of the whole population. tRH was prominent among younger males ( $p$  0.013 and 0.042, for age and sex, respectively). Furthermore, subjects with tRH had higher mean OBP values ( $p < 0.001$ ). They also had higher frequency of dyslipidemia ( $p < 0.05$ ) and diastolic dysfunction ( $p < 0.001$ ), compared to the other groups. In contrast, pseudoresistants had more frequently carotid plaques ( $p < 0.05$ ). Masked RH was most commonly observed among smokers ( $p < 0.05$ ).

**Conclusions:** MUH and WCE constituted a large proportion of the studied population. Moreover, subjects with tRH had a higher likelihood of diastolic dysfunction that may be due to the higher BP values, whereas pseudoresistants exhibited frequently carotid atherosclerosis.

# ORAL PRESENTATIONS IN POSTER AREA

## EPIDEMIOLOGY AND MANAGEMENT

### HIGH CARDIOVASCULAR RISK IN MILITARY VETERANS; CARDIOVASCULAR HEALTH IN CROATIAN VETERANS PROJECT; RESULTS OF THE PILOT STUDY

E. Catic Cuti<sup>1</sup>, Z. Dika<sup>2</sup>, L. Druzinec Hrsak<sup>1</sup>, A. Jelakovic<sup>3</sup>, M. Mikulec<sup>1</sup>, F. Pozgaj<sup>1</sup>, S. Roginic<sup>1</sup>, N. Tolj Karaula<sup>1</sup>, B. Jelakovic<sup>2</sup>. <sup>1</sup>General Hospital Zabok and Hospital of Croatian Veterans, Dept. of Internal Medicine and Dept. of Anesthesiology, Zabok, CROATIA, <sup>2</sup>School of Medicine University of Zagreb, UHC Zagreb, Dept. Of Nephrology, Hypertension, Dialysis and Transplantation, Zagreb, CROATIA, <sup>3</sup>UHC Zagreb, dept. Of Nephrology, Hypertension, Dialysis and Transplantation, Zagreb, CROATIA

**Objective:** Severe burden of chronic comorbid conditions and associated cardiovascular (CV) risk among military veterans was reported by majority of authors. So far, no national estimates of CV disease risk factors have been reported in Croatian military veterans, and the purpose of the present study was to describe the prevalence of CVD risk factors in middle-aged veterans. We are presenting results of a pilot study of larger ongoing project on cardiovascular health in Croatian veterans organized by the Croatian Veterans Hospital Zabok and Croatian Society of Hypertension.

**Design and method:** In this prospective study consecutive sample of military veterans (mean age  $54.6 \pm 7.1$ ; 93% men) undergoing general yearly examination was included. Mental health, life-style, socioeconomic status and CV risk were evaluated. Veterans were divided in two subgroups depending on time spent at the battle field (< or > 500 days). Structured questionnaire was applied and all subjects undergone physical examination. Blood pressure (BP) was measured using Omron M6 device following ESH/ESC guidelines, while central BP and PWV were determined by Mobilograph. CV risk was calculated using Heart Score chart for high-risk countries where Croatia belongs.

**Results:** Compared to the results obtained in Croatian nationwide study (EHUH) prevalence of hypertension was higher in veterans (65% vs. 37%) who were less treated (52% vs. 65%) with poorer BP control (15% vs. 22.5%). High proportion of veterans had heart rate > 85 bpm (34%), while PWV > 10m/s and central systolic BP above cut-off values were found in 16.7% and 22.8%, respectively. We observed high prevalence of diabetes (26%), obesity (53%), smokers (76%), hypercholesterolemia (75%) and hypertriglyceridemia (42%) in veterans. The prevalence of all risk factors was higher in veterans who spent longer time at the battle field. When calculating CV risk we found that 13.8% and 12.8% had Heart Score 10–14 and > 15, respectively.

**Conclusions:** CV risk factors are common among middle-aged Croatian veterans and they are at significantly higher CVD risk than general population. Better prevention, more frequent examinations, more aggressive and multidisciplinary approaches are needed.

### BLOOD PRESSURE PHENOTYPE AS A DETERMINANT OF AORTIC PULSE WAVE VELOCITY IN CHILDREN AND ADOLESCENTS – AN UPDATE OF THE PORT-VASPH COHORT

J. Maldonado<sup>1</sup>, T. Pereira<sup>2</sup>, J. Martins<sup>1</sup>, M. Carvalho<sup>1</sup>. <sup>1</sup>Clinica da Aveira, Coimbra, PORTUGAL, <sup>2</sup>Instituto Politécnico de Coimbra - Coimbra Health School, Coimbra, PORTUGAL

**Objective:** The PORT-VASPh Cohort was designed to contribute to a better understanding of vascular function in children and adolescents, mostly focusing PWV and other complementary aspects of arterial hemodynamics. This updated analysis is aimed at analyzing the PWV as a function of the individual blood pressure (BP) phenotype.

**Design and method:** Prospective and observational study, with 953 children and adolescents enrolled, 40% females, age ranging from 5 to 17 years (mean age:  $12.08 \pm 2.92$  years). About 8.3% had family history of cardiovascular disease and overweight and at-risk weight classification accounted respectively for 5.5% and 11.8%. The overall health profile for each participant was defined based on three

clinical evaluations, in which blood pressure (BP) was measured under standard conditions over the brachial artery with a clinically validated automatic sphygmomanometer (OMRON 705IT) and an appropriately sized cuff. Gender-specific percentiles were used for the definition of the individual BP phenotype. Carotid-femoral PWV was measured to all participants at the third clinical evaluation, with the Complior SP device, complying with the methodological recommendations. All participants were evaluated by the same experienced clinician.

**Results:** Mean systolic (SBP) and diastolic (DBP) blood pressure were  $116.03 \pm 35.04$  mmHg and  $66.82 \pm 8.73$  mmHg, respectively. Mean PWV was  $6.20 \pm 0.95$  m/s. BP distribution was 20.5% hypertensive (Ht), of which 14.1% stage 1, 6.4% stage 2, 11.8% high-normal, and 67.8% normal. The majority of the Ht presented isolated systolic (ISH) Ht (14.8%), with 3.1% presenting systolic-diastolic (SDH) Ht, and 2.6% isolated diastolic (IDH) Ht. Mean PWV was higher in Ht compared with normotensive ( $6.63 \pm 1.02$  m/s versus  $6.08 \pm 0.89$  m/s, respectively;  $p < 0.0001$ ), and a significant increase in PWV was observed in accordance with the classification of BP: normal-  $6.02 \pm 0.87$  m/s; high-normal-  $6.41 \pm 0.97$ ; stage 1 Ht-  $6.60 \pm 1.01$ ; stage 2 Ht-  $6.68 \pm 1.05$ ;  $p = 0.001$  for trend. PWV was also significantly higher in ISH compared with SDH and IDH ( $6.71 \pm 1.03$  versus  $6.38 \pm 1.06$  versus  $6.51 \pm 0.92$ , respectively).

**Conclusions:** In children and adolescents, aortic PWV is strongly influenced by the BP phenotype, with an increase in PWV for higher stages of the BP classification and particularly associated with ISH.

### RANDOMIZED STUDY OF THE ACUTE EFFECTS OF COCOA-RICH CHOCOLATE ON THE VASCULAR FUNCTION AND COGNITIVE PERFORMANCE OF YOUNG AND HEALTHY ADULTS

T. Pereira<sup>1</sup>, C. Vieira<sup>1</sup>, V. Pavlovskyy<sup>1</sup>, J. Maldonado<sup>2</sup>, J. Conde<sup>1</sup>. <sup>1</sup>Instituto Politécnico de Coimbra - Coimbra Health School, Coimbra, PORTUGAL, <sup>2</sup>Clinica da Aveira, Coimbra, PORTUGAL

**Objective:** To evaluate the acute effects of cocoa-rich chocolate consumption on the vascular function and cognitive performance of healthy young adults.

**Design and method:** A randomized study was conducted in 30 healthy participants aged 18 to 27 years. Half of the participants ingested a 20 g single dose of low cocoa chocolate (LCC:~55%;  $12.61 \pm 1.35$  mg equivalent of epicatechin/g) and the others ingested a single dose of 20 g of high cocoa chocolate (HCC:~90%;  $18.19 \pm 2.64$  mg equivalent of epicatechin/g). A baseline evaluation was performed after which the participants ingested the assigned chocolate, and two hours after a post-intervention evaluation was repeated. Each evaluation included heart ultrasonography, carotid-femoral pulse wave velocity (PWV) and carotid pulse wave analysis (PWA) with the Complior Analyse device, flow mediated slowing (FMS), cognitive testing and functional near-infrared (fNIR) screening of the prefrontal cortex perfusion.

**Results:** The baseline evaluation presented similar values within normal range in both groups. Memory scores were similar in both groups. A positive vascular effect was depicted in both groups, but was more distinct in the HCC group. A statistically significant decrease of brachial and central systolic and pulse pressures were observed, with greatest effect size in the HCC group. A trend for improvement in the AiX and the FMS was observed in the HCC group only. Improvement in the memory scores (speed and accuracy) was observed in both groups, with a larger improvement in the HCC group, and related with an improvement in the pre-frontal cortex perfusion as assessed with the fNIR method. Dilation of the proximal segment of the right and left coronary arteries, assessed with transthoracic echocardiography (Parasternal short axis - aortic valve level) was also found, with greatest effect size in the HCC group.

**Conclusions:** Acute intake of cocoa-rich chocolate improves vascular function and cognitive performance in healthy young adults, by reducing central brachial artery pressures, promoting vascular dilation, and improving brain perfusion over the prefrontal cortex.

### EXAGGERATED EXERCISE BLOOD PRESSURE RESPONSE IS ACCOMPANIED BY SYMPATHETIC OVERDRIVE AND ARTERIAL STIFFNESS IN SUBJECTS WITH HIGH NORMAL BLOOD PRESSURE

T. Kalos, K. Tsioufis, K. Dimitriadis, D. Konstantinidis, M. Tambaki, I. Liataakis, E. Koutra, D. Tousoulis. *First Cardiology Clinic, Medical School, National and Kapodistrian University of Athens, Hippokraton Hospital, Athens, GREECE*

**Objective:** The clinical importance of a hypertensive response to exercise (HRE) in subjects with high normal blood pressure (BP) is not fully elucidated, while sympathetic overactivity and arterial stiffening are linked with adverse cardiovascular prognosis. The aim of this study was to assess the relation of HRE with sympathetic drive as assessed by muscle sympathetic nerve activity (MSNA) and arterial stiffness in subjects with high normal BP.

**Design and method:** 42 subjects with high normal office BP [defined as office systolic BP = 130–139 mmHg and office diastolic BP = 85–89 mmHg (age:  $53 \pm 9$  years, 29 males, office BP: 134/84 mmHg, 24-hour BP: 114/72 mmHg)] with a negative treadmill exercise test (Bruce protocol) were divided into those with HRE ( $n = 12$ ) (peak exercise systolic BP  $\geq 210$  mmHg in men and  $\geq 190$  mmHg in women) and those without HRE ( $n = 30$ ). Arterial stiffness was evaluated on the basis of carotid to femoral pulse wave velocity (PWV) values. In all participants sympathetic drive was assessed by MSNA estimations based on established methodology (microneurography).

**Results:** Subjects with a HRE compared to those without exhibited higher waist circumference ( $108.2 \pm 5.3$  vs  $94.7 \pm 9.2$  cm,  $p = 0.001$ ) and were characterized by greater levels of carotid to femoral PWV ( $8.5 \pm 0.8$  vs  $7.0 \pm 0.9$  m/sec,  $p < 0.001$ ) and sympathetic nerve traffic as reflected by MSNA levels ( $41.1 \pm 1.5$  vs  $32.1 \pm 1.9$  bursts per 100 heart beats,  $p < 0.001$ ), while did not differ regarding metabolic profile and left ventricular mass index ( $p = \text{NS}$ ). In the total population, peak exercise systolic BP was related to 24-h systolic BP ( $r = 0.229$ ,  $p < 0.05$ ), PWV ( $r = 0.218$ ,  $p = 0.002$ ), and MSNA ( $r = 0.214$ ,  $p < 0.05$ ). Moreover, MSNA was related to waist circumference ( $r = 0.33$ ,  $p = 0.004$ ) and office systolic BP levels ( $r = 0.31$ ,  $p < 0.05$ ) but there was no association with PWV values ( $p = \text{NS}$ ).

**Conclusions:** In subjects with high normal BP, a HRE identifies a state of arterial stiffening and sympathetic overdrive, as reflected by increased PWV and MSNA levels respectively. These findings suggest that exercise testing provides additional clinical information regarding the vascular status and modulation of sympathetic tone in this setting.

#### PHYSICAL ACTIVITY ACROSS THE WHOLE-OF-DAY AND VASCULAR STRUCTURE AND FUNCTION: THE PARIS PROSPECTIVE STUDY III

R. Climie<sup>1</sup>, P. Boutouyrie<sup>2</sup>, E. Chaussade<sup>3</sup>, M. Plichart<sup>3</sup>, L. Offredo<sup>1</sup>, C. Guibout<sup>1</sup>, F. Thomas<sup>4</sup>, B. Pannier<sup>4</sup>, S. Laurent<sup>2</sup>, X. Jouven<sup>1</sup>, J.-P. Empana<sup>1</sup>. <sup>1</sup>INSERM, U970,

Paris Cardiovascular Research Center, Department of Epidemiology, France; Paris Descartes university, Paris, FRANCE, <sup>2</sup>INSERM, U970, Paris Cardiovascular Research Center, Department of Pharmacology; Paris Descartes university, Paris, FRANCE, <sup>3</sup>APHP, Broca Hospital, Department of Geriatrics; Paris Descartes university, Paris, France, Paris, FRANCE, <sup>4</sup>Investigations Préventives et cliniques (IPC), Paris, FRANCE

**Objective:** Habitual physical activity (PA) may be beneficial for reducing risk related to cardiovascular (CV) disease by attenuating age-related changes in vascular structure and function. Most previous studies have focused on recreational PA and individual markers of vascular health. We aimed to extend this work by investigating habitual physical activity across the whole-of-day (at work, during leisure and sport time) and several markers of structural and functional vascular health.

**Design and method:** In 9277 adults aged 50 to 75 years from The Paris Prospective Study III, resting carotid artery structure (cross sectional area and external and internal diameters) and function (stiffness, Young's elastic modulus, distensibility and cross sectional compliance) were determined via high-precision echotracking. Whole-of-day PA was self-reported using the validated Baecke score as overall PA (OPA), work PA (WPA), leisure time PA (LPA) and sport PA (SPA). The associations between PA (exposure) and vascular parameters (outcomes) were quantified using multivariate linear regression adjusted for age, sex, body mass index, total cholesterol and antihypertensive medication use.

**Results:** OPA was associated with lower stiffness ( $B = -0.03$  (0.009),  $p = 0.01$ ) and Young's ( $B = -3.59$  (1.57),  $p = 0.02$ ) and borderline higher distensibility ( $B = 0.12$  (0.05),  $p = 0.05$ ) and compliance ( $B = 0.003$  (0.002),  $p = 0.07$ ). WPA was significantly related to elevated stiffness and Young's and decreased compliance ( $p < 0.05$  for all) and borderline decreased distensibility ( $p = 0.11$ ); these associations were mediated by how physically demanding the work was (i.e. lifting heavy loads). LPA and SPA were significantly associated with lower stiffness and Young's and higher distensibility and compliance ( $p < 0.05$  for all, the magnitude of the effect being greater for SPA). Light-moderate intensity SPA, but not high intensity, was associated with more favorable functional parameters ( $p < 0.05$  for all) and lower wall cross sectional area ( $B = -0.12$  (0.07),  $p < 0.01$ ), external artery diameter ( $B = -28.4$  (13.9),  $p = 0.04$ ) and borderline lower internal diameter ( $B = -27.2$  (14.9),  $p = 0.07$ ).

**Conclusions:** PA during leisure time and sport is associated with favorable vascular function and to a lesser degree, structure. However, PA at work (i.e. physically demanding work) is related to adverse changes in vascular function.

# ORAL PRESENTATIONS IN POSTER AREA

## MECHANISMS OF HYPERTENSION

### ENDOTHELIAL BENEFITS OF ANGIOTENSIN-(1-7) IN HUMAN OBESITY

F. Schinzari<sup>1</sup>, M. Tesaro<sup>2</sup>, A. Veneziani<sup>3</sup>, N. Mores<sup>3</sup>, C. Cardillo<sup>3</sup>. <sup>1</sup>*Policlinico A. Gemelli, Rome, ITALY*, <sup>2</sup>*Università Tor Vergata, Rome, ITALY*, <sup>3</sup>*Università Cattolica del Sacro Cuore, Rome, ITALY*

**Objective:** Obese patients have vascular dysfunction related to impaired insulin-stimulated vasodilation and increased endothelin-1-mediated vasoconstriction. In contrast to the harmful vascular actions of angiotensin (Ang) II, the angiotensin converting enzyme 2 product Ang-(1-7) has shown to exert cardiovascular and metabolic benefits in experimental models through stimulation of the Mas receptor. In this study, therefore, we examined the effects of exogenous Ang-(1-7) on vasodilator tone and endothelin-1-dependent vasoconstriction in obese patients.

**Design and method:** Patients with central obesity (n = 24) participated in 4 different protocols involving the assessment of vascular reactivity by use of the forearm perfusion technique (strain-gauge plethysmography). Endothelium-dependent and -independent vasodilator responses were assessed by infusion of acetylcholine and sodium nitroprusside, respectively. Endothelin-1-dependent vasoconstrictor tone was determined by measuring the vasodilator response to endothelin A receptor blockade by means of nitric oxide synthase antagonism.

**Results:** Intra-arterial infusion of Ang-(1-7) (10 nmol/min) resulted in significant increase in unstimulated forearm flow (P = 0.03), an effect that was not affected by the Mas receptor antagonist A779 (10 nmol/min; P > 0.05) (Protocol 1, n = 5). In the absence of hyperinsulinemia (Protocol 2, n = 6), however, forearm flow responses to graded doses of acetylcholine and sodium nitroprusside were not different during Ang-(1-7) administration compared with saline (both P > 0.05). During infusion of regular insulin (0.15 mU/kg per minute; Protocol 3, n = 5), by contrast, endothelium-dependent vasodilator response to acetylcholine was significantly enhanced by Ang-(1-7) (P = 0.04 versus saline), whereas endothelium-independent response to sodium nitroprusside was not modified (P = 0.91). Finally (Protocol 4, n = 8), Ang-(1-7) decreased the vasodilator response to endothelin A receptor blockade (BQ-123; 10 nmol/min) compared with saline (6 ± 1% versus 93 ± 17%; P < 0.001); nitric oxide inhibition by L-N-monomethylarginine (4 mmol/min) during concurrent endothelin A antagonism resulted in similar vasoconstriction in the absence or presence of Ang-(1-7) (P = 0.69).

**Conclusions:** Our findings indicate that in obese patients Ang-(1-7) has favorable effects not only to improve insulin-stimulated endothelium-dependent vasodilation but also to blunt endothelin-1-dependent vasoconstrictor tone. These findings provide support for targeting Ang-(1-7) to counteract the hemodynamic abnormalities of human obesity.

### HYPERTENSION AND HEART FAILURE COMORBIDITY IN CENTENARIANS: A LONGITUDINAL COHORT STUDY ANALYZING CARDIOVASCULAR PHARMACOTHERAPY TRAJECTORIES IN THREE GROUPS OF VERY OLD PATIENTS

I.M. Schmidt<sup>1</sup>, R. Kreutz<sup>1</sup>, D. Draeger<sup>2</sup>, C. Zwillich<sup>3</sup>, S. Hoerter<sup>3</sup>, A. Kuhlmeier<sup>2</sup>, P. Gellert<sup>2</sup>. <sup>1</sup>*Charité Universitätsmedizin Berlin, Department of Clinical Pharmacology and Toxicology, Berlin, GERMANY*, <sup>2</sup>*Charité Universitätsmedizin Berlin, Department of Medical Sociology, Berlin, GERMANY*, <sup>3</sup>*Institute for Health Care Research of the Knappschaft, Bochum, GERMANY*

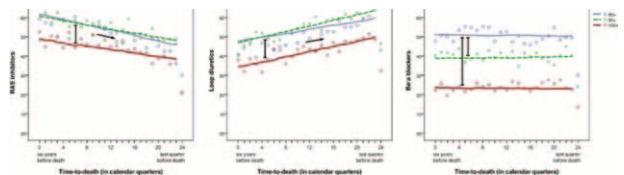
**Objective:** Hypertension (HTN) and heart failure (HF) share a similar basis of pharmacotherapy, while the presence of HF dominates the selection of drugs. The aim of this study was to analyze HF and HTN comorbidity and cardiovascular pharmacotherapy trajectories in centenarians compared to nonagenarian (90–99 years) and octogenarian (80–89 years) individuals.

**Design and method:** This cohort study used quarterly-structured routine data from N = 1,398 German insurants over six years prior to death (n = 398 centenarians were compared with n = 500 nonagenarians and n = 500 octogenarians). Of

those, n = 525 individuals were diagnosed with HF before death. Diagnoses of HTN, HF and comorbidities were associated with prescriptions of medications using Generalized Estimation Equations.

**Results:** Across age groups, HF was significantly more prevalent in centenarians compared to octogenarians and nonagenarians. HTN was the most commonly associated comorbidity with HF (OR = 1.52, p < 0.001). Overall, HF treatment changed significantly over time with an increased prescription rate of loop diuretics and a decreased prescription rate of renin-angiotensin-system (RAS) inhibitors. Centenarians were significantly less likely to receive treatment with either RAS inhibitors, loop diuretics or beta blockers compared to nonagenarians and octogenarians. Furthermore, aldosterone inhibitors, If-channel, and neprilysin inhibitors were not routinely used in our sample.

**Conclusions:** Prescriptions rates for corresponding cardiovascular pharmacotherapy are lower in centenarians, while HF prevalence shows a continuous increase with age. Our data highlight the need for further studies considering quality of pharmacotherapy and outcomes in the population of very old patients.



### SLEEP DISORDERED BREATHING IN RENAL TRANSPLANT PATIENTS: A LONGITUDINAL STUDY

F. Mallamaci, R. Tripepi, G. D'Arrigo, G. Porto, C. Marino, M.C. Sanguedolce, G. Tripepi, C. Zoccali. *CNR-IFC & Nephrology, Dialysis and Transplantation Unit, Reggio Calabria, ITALY*

**Objective:** Sleep disordered breathing (SDB) is a pervasive problem in stage 5 CKD patients maintained on regular dialysis treatment. Renal transplantation improves SDB but the longitudinal, long term evolution of SDB after kidney grafting has not been investigated. The issue is relevant because renal transplantation abolishes uremic toxicity but introduces classical risk factors for SDB, like overweight and obesity.

**Design and method:** We investigated the long term evolution of polysomnographic recordings in 221 stable renal transplant patients. Overall 404 recordings over a median time of 3 years (interquartile range 2 – 4) were performed. Longitudinal analysis was performed by the linear mixed model (LMM).

**Results:** The apnea-hypopnea index (AHI) in renal transplant patients was  $5.44 \pm \text{SD } 0.75$  and the corresponding number of O2 desaturation (Des O2) episodes was  $4.40 \pm 0.60$ . The number of patients with AHI > 5 (the threshold for identifying mild SDB) rose from 25% at baseline to 43% at the end of the follow up. Over follow-up the AHI rose to  $9.94 \pm 2.37$  (P < 0.001) and the number of desaturation episodes to  $5.55 \pm 2.1$  (P = 0.010) which went along with a decline in the mean O2-saturation overnight (Mean SatO2: from  $95.08 \pm 0.14$  to  $94.64 \pm 0.32$ , P = 0.001). LMM showed that age, sex, BMI, ESA treatment but neither eGFR nor the presence of proteinuria associated with the AHI. On multivariate analyses only male gender (3.42; 95%CI: 0.35 to 6.49; P = 0.003) and BMI (0.87; 95% CI 0.46 to 1.27; P < 0.001) associated with the AHI evolution over follow-up. Similar associations were registered also for the other parameters of SDB (Des O2, Mean Sat O2).

**Conclusions:** Even though renal transplantation produces an early improvement in SDB in renal transplant patients, this treatment does not stabilize the disturbance which gradually re-emerges over longitudinal observation. Among risk factors underlying the risk of SDB re-emergence after transplantation the rise in BMI, i.e. a modifiable risk factor, appears to be of paramount importance. Tackling the surge of SDB after transplantation is of obvious relevance because this disturbance is a potent driver of sympathetic over-activity and of the attendant risk of cardiovascular events in this population.

## ASSOCIATION OF ASYMPTOMATIC TARGET ORGAN DAMAGES WITH SECRETED FRIZZLED RELATED PROTEIN 5 IN THE ELDERLY: THE NORTHERN SHANGHAI STUDY

J. Teliewubai, B. Bai, Y. Lu, Y. Zhou, S. Yu, C. Chi, Y. Xu, Y. Zhang, H. Ji. *Department of Cardiology, Shanghai Tenth People's Hospital, Tongji University School of Medicine, Shanghai, CHINA*

**Objective:** Secreted frizzled related protein 5 (SFRP5) is a novel anti-inflammatory adipokine which is implicated in metabolic and cardiovascular disease (CVD). However, little is known about the relevance of SFRP5 with asymptomatic hypertensive target organ damages (TOD). We aimed to investigate the association between SFRP5 and TOD in a large population study.

Table4. Association of SFRP5 with TOD in total population, hypertensives and diabetes

TOD	Total (n=1745)		HTN (n=1114)		DM (n=337)	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
<b>Cardiac TOD</b>						
LVH	0.99 (0.95-1.03)	0.74	1.01 (0.97-1.06)	0.64	1.04 (0.96-1.14)	0.32
LVDD	1.01 (0.96-1.06)	0.81	1.03 (0.98-1.09)	0.28	1.11 (1.01-1.23)	0.04
<b>Vascular TOD</b>						
Arteriosclerosis	0.83 (0.71-0.99)	0.04	0.79 (0.65-0.96)	0.02	0.69 (0.50-0.97)	0.03
Atherosclerosis	1.02 (0.97-1.06)	0.39	1.01 (0.96-1.06)	0.75	1.07 (0.96-1.20)	0.21
Increased CIMT	0.76 (0.58-1.02)	0.06	0.65 (0.45-0.96)	0.03	0.86 (0.46-1.61)	0.64
<b>Renal TOD</b>						
CKD	1.03 (0.97-1.10)	0.34	1.04 (0.96-1.11)	0.36	0.97 (0.85-1.12)	0.73
Microalbuminuria	1.00 (0.97-1.04)	0.99	0.98 (0.94-1.03)	0.43	0.97 (0.90-1.05)	0.49

LVH: Left ventricular hypertension; CIMT: Carotid intima-media thickness; LVDD: Left ventricle diastolic dysfunction; CKD: Chronic kidney disease; OR: odds ratio; CI: confidence interval.

Values are given as ORs with 95% CIs per SD increase in plasma SFRP5.

Multiple logistic regression analysis included age, gender, smoking status, cardiovascular disease history, sport time per week, low-density lipoprotein cholesterol, systolic blood pressure.

**Design and method:** Associations between plasma SFRP5 and cardiovascular risk factors as well as TOD were investigated in 1745 participants from Northern Shanghai Study. Plasma SFRP5 level was measured by an enzyme-linked immunosorbent assay.

**Results:** Plasma SFRP5 level was negatively associated with body mass index, waist/hip ratio and fasting blood glucose (all  $P < 0.001$ ). Lower plasma SFRP5 level was observed in men than in women (4.19 vs 5.13 ng/ml,  $P < 0.001$ ), in smokers than in nonsmokers (4.34 vs 4.78 ng/ml,  $P < 0.05$ ). Additionally, plasma SFRP5 level was also lower in diabetes than those without diabetes (4.30 vs 4.81 ng/ml,  $P < 0.05$ ). Further, an inverse association was observed between SFRP5 and pulse wave velocity as well as carotid intima-media thickness (both  $P < 0.05$ ). Moreover, multivariate logistic regression analysis showed lower SFRP5 level was associated with increased arterial stiffness in the elderly (OR 0.83, 95% CI 0.71 to 0.99 per 1-SD increase,  $P < 0.05$ ).

**Conclusions:** Plasma SFRP5 level was inversely correlated with conventional cardiovascular risk factors and low plasma SFRP5 was also significantly associated with arterial stiffening in the elderly Chinese population.

## APPLICATION OF A NOVEL EQUILIBRIUM ANGIOTENSIN II ASSAY IN SCREENING AND CONFIRMATORY TESTING FOR PRIMARY ALDOSTERONISM: A PILOT STUDY

Z. Guo<sup>1</sup>, M. Poglitsch<sup>2</sup>, B. McWhinney<sup>3</sup>, J. Ungerer<sup>3</sup>, A.H. Ahmed<sup>1</sup>, R.D. Gordon<sup>1</sup>, M. Wolley<sup>1</sup>, M. Stowasser<sup>1</sup>. <sup>1</sup>Endocrine Hypertension Research Centre, Univ of Qld School of Medicine, Greenslopes and Princess Alexandra Hospitals, Brisbane, AUSTRALIA, <sup>2</sup>Attoquant Diagnostics, Vienna, AUSTRIA, <sup>3</sup>Department of Chemical Pathology, Pathology Queensland, Royal Brisbane and Women's Hospital, Brisbane, AUSTRALIA

**Objective:** Although recommended for screening for primary aldosteronism (PA), many medications and physiological factors affect the aldosterone/renin ratio (ARR). The aldosterone/angiotensin II (AngII) ratio (AA2R), with quantification of AngII using a novel Renin-Angiotensin-System Equilibrium Analysis based on liquid chromatography-tandem mass spectrometry (LC-MS/MS) technology (rather than detection of its upstream regulator renin as used in the ARR), may be less prone to interference.

**Design and method:** Of 68 patients undergoing confirmatory fludrocortisone suppression testing (FST) and demonstrating conclusive results, PA was excluded in 20 and confirmed in 48. Peripheral aldosterone (PAC), equilibrium AngII (eqAngII) and direct renin (DRC) concentrations were measured at 7 AM (recumbent) and 10 AM (upright) basally (day 0) and on day 4 of FST.

**Results:** Basally, PA patients displayed higher ( $p < 0.01$ ) PAC, ARR and AA2R than non-PA patients, and lower ( $p < 0.01$ ) DRC and eqAngII. Levels of each were higher ( $p < 0.01$ ) upright than recumbent. On day 4, upright DRC and eqAngII were suppressed ( $p < 0.01$ ) in both groups whereas upright PAC in PA patients failed to suppress. DRC and eqAngII displayed positive correlation (correlation coefficient 0.641,  $p < 0.01$ ) among the 272 blood samples collected; the non-PA group showed stronger correlation (0.840,  $p < 0.01$ ) than PA (0.479,  $p < 0.01$ ). DRC was below the lower limit of quantification (LLOQ) in 125 (46.0%) samples versus eqAngII in only 24 (8.8%). Areas under the receiver operation characteristic curve for ARR and AA2R on day 0 were similar (7 AM 0.918 vs 0.927; 10 AM 0.932 vs 0.916).

**Conclusions:** Dynamic changes of DRC and eqAngII show good consistency during FST. EqAngII displays a better performance at low concentrations. The AA2R appears to perform at least as well as ARR and may have the potential for future application in PA screening.

## DO WE HAVE TO SCREEN PATIENTS WITH ADRENAL INCIDENTALOMA FOR PRIMARY ALDOSTERONISM?

K. Stavropoulos<sup>1</sup>, K. Imprialos<sup>1</sup>, K. Petidis<sup>1</sup>, A. Kamparoudis<sup>2</sup>, P. Petras<sup>2</sup>, I. Zografou<sup>1</sup>, N. Katsiki<sup>1</sup>, G. Kerpiniotis<sup>1</sup>, A. Manafis<sup>1</sup>, S. Bouloukou<sup>1</sup>, G. Lales<sup>1</sup>, C. Mitas<sup>1</sup>, V. Georgopoulou<sup>3</sup>, V. Athyros<sup>1</sup>, A. Karagiannis<sup>1</sup>, M. Doumas<sup>1</sup>. <sup>1</sup>2nd Propedeutic Department of Internal Medicine, Aristotle University of Thessaloniki, Thessaloniki, GREECE, <sup>2</sup>Fifth Department of Surgery, Aristotle University of Thessaloniki, Thessaloniki, GREECE, <sup>3</sup>Department of Radiology, Hippokrateion Hospital, Thessaloniki, GREECE

**Objective:** Incidentally discovered adrenal masses are found in 4–8% of adult population. Current guidelines recommend to screen all patients with incidentaloma for primary aldosteronism (PA). The aim of the study was to investigate the prevalence and the characteristics of PA in patients with incidentaloma.

**Design and method:** Consecutive patients with incidentaloma referred to our department from January 2013 to August 2017. Patients with radiographic characteristics of malignancy or angiomyolipoma were excluded from the analysis. All patients underwent screening for PA with the determination of aldosterone to plasma rennin activity ratio and confirmatory test with iv saline, after appropriate preparation as indicated by current guidelines.

**Results:** Overall, 269 consecutive patients (122 male) with adrenal incidentaloma were included in the study. Study participants' age was  $62.3 \pm 11.9$  years, blood pressure was  $138.7 \pm 16.5/79.6 \pm 10.5$  mmHg, body mass index was  $30.4 \pm 5.6$  kg/m<sup>2</sup>, and serum potassium was  $4.33 \pm 0.51$  mg/dl. Adrenal incidentaloma was located on the left side in 139 patients and was unilateral in 219 participants, while hypertrophy of the contralateral adrenal was found in 41 patients and a contralateral mass in 9 patients. The diagnosis of PA was confirmed in 9 patients (3.3%). However, all PA patients had several/resistant hypertension and/or hypokalemia, which are current indication for PA assessment.

**Conclusions:** PA is not common in patients with incidentaloma, and was diagnosed only in patients with concomitant severe/resistant hypertension and/or hypokalemia. These findings casts doubts about current recommendations for PA screening in all individuals with adrenal incidentaloma, and suggest screening only in patients with severe/resistant hypertension and/or hypokalemia.