POSTER SESSION

POSTERS’ SESSION P011:
EPIDEMIOLOGY AND RISK FACTORS

CARDIOVASCULAR RISK PREDICTION - A SYSTEMS MEDICINE APPROACH

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Objective: During the last decade, more attention has been paid on the development of risk scores in primary prevention, while patients with established cardiovascular disease are usually categorized into a clinically high risk population without further stratification. Even those high risk patients show heterogeneity in their individual risk. Therefore further risk stratification might identify those with benefit from specific risk reduction strategies the most. We have developed the first long-term risk prediction model of cardiovascular mortality in patients with established coronary heart disease and in patients with an experienced myocardial infarction based on newly available machine learning techniques.

Design and method: 2879 patients from the LURIC study who have presented in hospital were included in this analysis. Over a medium follow-up of 9.9 years, 540 patients had died of cardiovascular causes. 184 biomarkers and 21 clinical data were ranked according to the prediction accuracy using three different ranking methods (correlation, information gain and information gain ratio). Seven different predictors (random forest, random tree, naïve bayes predictor, rule based predictor, linear regression, polynomial and radial basis function support vector machine) were used to generate risk models.

Results: The main predictive biomarker was NT-proBNP, CT-proAVP followed by TrxT and estimated GFR. Using more than five biomarkers lead to a comparatively high increase in cost and effort without further improving the accuracy of the generated models. Comparing all biomarkers over all prediction algorithms with respect to the area under the curve, we found that the random forest approach yielded the best results followed by the rules based approach, logistic regression and the radial basis function support vector machine. Adding clinical variables further improved the models. Generally the machine learning risk models predicted five- and ten-year cardiovascular mortality better than the conventional statistical approaches.

Conclusions: We have developed the first CV mortality prediction model based on machine learning techniques, (1) on an extensive database of clinical, routinely and non-routinely measured laboratory data, (2) created a fully automatic and self-validated framework, (3) which is easily to apply on all spectra of population, events and time frames.

INCIDENTAL RISK OF HYPERTENSION ACCORDING TO THE CHANGE OF BODY WEIGHT IN KOREAN MEN

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Objective: Despite accumulated evidence of strong relationship between obesity and hypertension, risk for hypertension according to the change of body weight (BW) is not clearly identified. Therefore, this study was to evaluate the incidental risk of hypertension according to the change of BW.

Design and method: 26.483 normotensive Korean men had been followed up from 2005 to 2010. Based on baseline BW in 2005, the changes of BW ([BW at censoring time – BW at baseline]/follow-up period [person-years]) were categorized into 5 groups according to their change levels from the lowest to the highest quintile (1st – 5thquintile). On the base of 3rd quintile, 1st and 2nd quintile had negative changes of BW, and 4th and 5th quintile had positive changes of BW. Cox proportional hazard models and spline-smoothing method were used to evaluate the effect of BW change on the incidental risk of hypertension.

Results: During follow-up, 4,445 (16.8 %) cases of hypertension newly developed (quintile 1: 19.0%, quintile 2: 12.9%, quintile 3: 12.4%, quintile 4: 14.8%, quintile 5: 24.8%). When quintile 3 was set as a reference in adjusted model, the hazard ratios (HRs) for incidental hypertension exhibited a J-shaped relationship with the BW changes (quintile 1: 1.66 [95% confidence interval (CI): 1.41–1.95], quintile 2: 0.96 [95% CI: 0.80–1.14], quintile 3: 1.00 [reference], quintile 4: 1.30 [95% CI: 1.10–1.54], and quintile 5: 3.39 [95% CI: 2.91–3.96], respectively).

Conclusions: The incidental risk of hypertension increased in weight loss as well as weight gain, which demonstrated J-shaped relationship. This finding warrants further studies to investigate the incidental relationship between BW changes and hypertension.

URIC ACID PREDICTS CORONARY ARTERY DISEASE BUT NOT STROKE IN ESSENTIAL HYPERTENSION: DATA FROM A GREEK 8-YEAR-FOLLOW-UP STUDY

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Objective: The aim of the present study was to assess the predictive role of uric acid for the incidence of coronary artery disease (CAD) as well as stroke in essential hypertensive patients.

Design and method: We followed up 2415 essential hypertensives (mean age 58.4 years, 1208 males, office blood pressure (BP) = 143/88 mmHg) for a mean period of 8 years. All subjects had at least one annual visit and at baseline underwent echocardiographic study and blood sampling. Moreover, CAD was defined as the history of myocardial infarction or significant coronary artery stenosis and stroke was defined as rapid onset of a new neurological deficit persisting at least 24 hours unless death supervened confirmed by imaging findings.

Results: The incidence of CAD and stroke was 2.2% and 1% respectively. Hypertensives who developed CAD (n = 53) compared to those without CAD at follow-up (n = 2362) had at baseline higher baseline uric acid levels (5.8 ± 1.8 vs 5.2 ± 1.5 mg/dl, p = 0.011) and left ventricular mass index (LVM)(115.7 ± 27.1 vs 103.7 ± 27.1 g/m2, p = 0.001), whereas no difference was observed with respect to baseline office BP, renal function and lipid levels (p = NS for all). Hypertensives who developed stroke (n = 24) compared to those without CAD at follow-up (n = 2391) were older (63 ± 8 vs 58 ± 11 years, p = 0.006), whereas no difference was observed with respect to baseline office BP, uric acid, renal function and lipid levels (p = NS for all). Univariate Cox regression analysis revealed that baseline uric acid levels predicted CAD (hazard ratio = 1.219, p = 0.013) but not stroke. In multivariate Cox regression model baseline glomerular filtration rate (hazard ratio = 1.018, p = 0.017) LVM (hazard ratio = 1.010, p = 0.026) and uric acid (hazard ratio = 1.226, p = 0.016) turned out to be independent predictors of CAD, while age (hazard ratio = 1.058, p = 0.014) predicted stroke.

Conclusions: In essential hypertensive patients uric acid predicts future development of CAD, whereas exhibits no prognostic value for stroke. These findings further support that uric acid estimation could improve overall risk stratification in essential hypertension.

CARDIOVASCULAR RISK FACTORS AND ARTERIAL STIFFNESS IN MEN AGED 41-43 YEARS

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Objective: To study the relationship of individual cardiovascular risk factors with arterial stiffness and subclinical atherosclerosis.

Design and method: The study is the part of a 32-year prospective cohort monitoring, beginning with childhood (11–12 years). The present cohort included 303 male subjects aged 41–43 years. Arterial stiffness (AS) was measured by aortic pulse wave velocity (PWV) and arterial wave reflections (augmentation index, AIx) with the use of SphygmoCor (AtCor Medical). Intima-media thickness (IMT) and subclinical atherosclerosis were estimated by ultrasonography methods both in left and right carotid arteries.
BACKGROUND: Hypertension (H) was detected in 37.9%. PWV was significantly higher in the group with H. The risk of H development depended on hypertension presence in mother and did not depend on the presence of H in father. H was associated with the development of obesity, especially of the abdominal type and increased level of triglycerides. PWV was positively correlated with systolic (r = 0.248, p < 0.001) and diastolic blood pressure (BP) (r = 0.220, p < 0.001) measured on the brachial artery and with heart rate (r = 0.164, p < 0.01). A statistically significant positive correlation of the central aortic pressure (r = 0.326, p < 0.001) and central pulse pressure (r = 0.225, p < 0.001) with PWV was noted. When comparing arterial stiffness (AS) and duplex scan a correlation of mean IMT with the AIX (r = 0.134, p < 0.05) and augmentation pressure (r = 0.127, p < 0.05) was obtained, but no correlation between IMT and PWV was found. Correlation of AS with total cholesterol and glucose was also shown.

Conclusions: The AS is closely related with H and develops already in the early stages, in a fairly young age. The AS in men group was not associated with the presence of dyslipidemia and diabetes mellitus. The interrelation of arterial stiffness and the degree of early atherosclerotic vascular lesions is ambiguous.

ACUTE DIETARY SALT MODULATION INDUCES CHANGES IN DYNAMICS OF MONOCYTES SUBSETS IN YOUNG HEALTHY WOMEN

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Objective: Our earlier studies have demonstrated that 7-days high-salt (HS) intake alters micro- and macrovascular response, and increases oxidative stress level in young healthy women independently of blood pressure (BP) changes. Still, it is not clarified whether such HS-induced endothelial dysfunction also involves changes in the immune system response which finally leads to vascular inflammation. Thus, the aim of this study was to assess the effect of 7-days salt intake modulation on monocyte subpopulations distribution and its activation in peripheral blood of young healthy women.

Design and methods: 15 young healthy women who all took 7-days low-salt (LS) diet (<3.2 g salt/day) followed by 7-days HS diet (~14 g salt/day) participated in this study. Blood pressure (BP) was measured, and 24 h urine samples were analyzed for sodium, potassium, urea and creatinine levels before and after diet protocols. Flow cytometry analysis of circulating monocyte subpopulations distribution was assessed by determination of ‘classical’, ‘non-classical’ and ‘inflammatory’ monocytes based on CD14 and CD16 molecule expression in peripheral blood of young healthy women. Also, monocytes activation was measured by measuring the surface expression of the CD11a which is known as ligand for endothelial cell adhesion molecules (ICAM-1).

Results: Changes in 24 h urinary sodium confirmed subjects conformed to the diet protocol. There was no change in BP after HS diet. CD14+CD16+ gated (non-classical) monocytes from peripheral blood significantly decreased after HS diet compared to the LS diet. Distribution of CD14++CD16+ (intermediate) and CD14+CD16+ (classical) gated monocytes from peripheral blood did not change after HS diet compared to the LS diet. CD11a expression on all three gated monocyte subpopulations was significantly decreased after HS diet compared to LS diet measurement.

Conclusions: The results of the present study demonstrated that 7-days HS load decreases CD14+CD16+ mono- cytes subpopulation (non-classical monocytes) which usually acts as endothelium housekeepers, and also decreased total monocytes (all three subpopulations) expressing high level of CD11a in young healthy women, probably due to activated monocytes adhesion and migration through endothelium layer to the place of endothelial injury.

IMPACT OF SLEEP DISORDERS ON THE PREVALENCE OF TARGET ORGAN DAMAGE IN ADULT HYPERTELNSIVE PATIENTS

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Objective: Prolonged short sleep duration and poor sleep quality may lead to the onset and/or maintenance of arterial hypertension. Patients with obstructive sleep apnoea (OSA) and high blood pressure (BP), compared with hypertensive subjects without OSA, show increased prevalence of left ventricular hypertrophy (LVH) and increased urinary albumin excretion (UAE). Nevertheless, data linking other common sleep disorders, such as insomnia and restless legs syndrome (RLS) and the onset of hypertensive-related organ damage (OD) are lacking. The aim of the present study was to assess the association of OSA, insomnia, and RLS with cardiac and renal OD in a cohort of adults with hypertension.

Design and method: In a prospective-observational study, we enrolled 160 consecutive patients aged between 18 and 60 years old, who underwent full assessment for OD by means of transthoracic echocardiography, UAE, and estimated glomerular filtration rate measurement. All patients were also screened to evaluate the risk of insomnia with the Insomnia Severity Index (ISI), OSA with the STOP-Bang, and RLS using the RLS Rating Score.

Results: 99 males and 61 females, with median age 47(11) years, body mass index 25.5(5.8) kg/m², office systolic BP 144(24) mmHg and diastolic BP 92(12) mmHg, have been studied. In the group with high risk of OSA (STOP-Bang score > or = 4) we observed an increased left ventricular mass index (LVMi) [119(35)] vs. 104(26) g/m², p = 0.002] and diastolic dysfunction parameters [left atrium volume index 27.5(6.0) vs. 24.0(5.0) ml/m², p = 0.005; mitral E/A ratio 1.10(0.2) vs. 1.01(0.5), p = 0.001]. At multivariate analysis office systolic BP values and STOP-Bang score were independent predictors of LVMi (b = 0.18, p = 0.023 and b = 0.23, p = 0.003, respectively). No association with cardiac OD was seen in patients at increased risk of insomnia and RLS. No correlation was observed with renal OD for all subgroups.

Conclusions: The STOP-Bang, a simple, validated, and reproducible questionnaire, which predicts a high risk of OSA, is associated with hypertension-related heart remodeling in a cohort of hypertensive subjects and might be used to predict patients at risk of developing cardiac OD.

BLOOD PRESSURE CONTROL IN HYPERTELNSIVE OUTPATIENTS: RESULTS OF A 2-YEAR OBSERVATIONAL STUDY

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Objective: Antihypertensive treatment lowers blood pressure (BP) and reduces cardiovascular, cerebral and renal risk of hypertension. In developed countries, BP control has increased over the past few decades and is now approaching 70% of patients. Herewith we report the results of an observational study carried out on hypertensive outpatients.

Design and method: In a cohort of 1,422 consecutive hypertensive outpatients (793 females, 629 males; mean age: 60.2 ± 12.3 years) evaluated from January 2015 to December 2016, the following parameters were assessed: age, sex, body mass index (BMI), waist circumference (WC), smoking status, BP in the sitting position, estimated glomerular filtration rate (eGFR), serum glucose, glycylated haemoglobin, lipid profile, antihypertensive drugs prescribed. In agreement with the European guidelines, hypertension was defined as sitting BP equal or higher than 140/90 mmHg or use of antihypertensive drugs. Patients whose sitting BP was lower than 140/90 mmHg were considered as having achieved BP control. Furthermore, in compliance with the new definition of hypertension suggested by the American College of Cardiology/American Heart Association (ACC/AHA), a second level of BP control (sitting BP below 130/80 mmHg) was evaluated.

Results: Overall, 76.3% of hypertensive patients achieved BP lower than 140/90 mmHg; 51.5% of them achieved BP lower than 130/80 mmHg. In both contexts, compared with patients whose BP was not controlled, those achieving the BP targets were younger, mainly females and showed a significantly lower BMI. No differences were in WC and eGFR. With regard to the major cardiovascular risk factors (smoking, diabetes mellitus and hypercholesterolemia), only diabetes resulted significantly higher in patients not achieving BP control. Finally, all patients achieving the BP target were prescribed significantly fewer antihypertensive drugs in comparison to those in whom BP was not controlled.

Conclusions: More than 76% of our outpatients achieved BP target of less than 140/90 mmHg, a figure that is higher than the objective of 70% of treated and controlled hypertensive patients set in Europe. Under the new definition of hypertension proposed by ACC/AHA, only 51.5% of our patients were below the threshold of 130/80 mmHg, a result that is however better than those recently reported.

HYPERTENSION AND CARDIOVASCULAR RISK FACTORS IN CROATIA. DATA FROM THE 2017. WORLD HYPERTENSION DAY

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The concept of early vascular aging syndrome acquires clinical significance. The aim of the study was to assess correlation between vascular stiffness, endothelial dysfunction, vascular age and biological age in healthy volunteers and patients with arterial hypertension (AH).

**Design and method:** Group I includes 63 healthy volunteers 24 M/39F, 33–55 years old, mean age 48.5 ± 7.6. Group II includes 135 patients with AH 64 M/71F, 30–89 years old, mean age 54.8 ± 9.1, duration of hypertension 8.6 ± 7.7 years. The following were measured: cardio-ankle vascular index (CAVI) and vascular age using VaSera VS-1500N (Fukuda Denshi, Japan); carotid femoral pulse wave velocity (PWV) and forearm blood flow (FBF) using Impedance (Belmar).

**Results:** CAVI in group I – 7.59 ± 0.6, in group II – 8.4 ± 1.31, P < 0.001; PWV in group I – 5.6 ± 3.3 ml/s, in group II – 12.3 ± 8.7 ml/s, P < 0.0001. Vascular age in group II was 47.5 ± 10.4 years. In group I was 58.3 ± 11.1 years, it is differ from biological age. P < 0.05. CAVI in group I correlated with age (R = 0.47, P < 0.0001), number of cigarettes (R = 0.27, P < 0.05), vascular age (R = 0.38, P < 0.0001) and SCORE rate (R = 0.56, P < 0.05). CAVI in group II correlated with age (R = 0.54, P < 0.0001), duration of AH (R = 0.26, P < 0.01), systolic blood pressure (SBP) (R = 0.32, P < 0.0001), vascular age (R = 0.85, P < 0.0001), PWV in group II correlated with duration of AH (R = 0.36, P < 0.0001). The multivariate analysis of variance in group I performed with vascular age as the dependent factor and CAVI (F = 63.9, P = 0.0001), h – 64.1%; SBP (F = 27.7, P = 0.048) – h – 29.2%. The multivariate analysis of variance in group II performed with vascular age as the dependent factor and CAVI (F = 83.4, P = 0.0001), h – 63.5%; SBP (F = 5.1, P = 0.0003), h – 21.7%.

**Conclusions:** CAVI and vascular age increase in patients with AH. CAVI is more closely related to aging than PWV and FBF. Thus CAVI may be useful predictor of vascular aging.

**THE RELATIONSHIPS BETWEEN RENAL RESISTIVE INDEX AND CORONARY RISK FACTORS AND CORONARY HEART DISEASE**

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**Objective:** Renal resistive index (RI) can be measured in renal vascular echography and is reported to be associated with renal parenchymal damage. However, little is known about its clinical importance. In the present study, we investigated the relationships between RI and coronary risk factors in the patients who were suspected or suffered from coronary heart disease (CAD) and stroke.

**Design and method:** We enrolled the patients who underwent renal vascular echography from September 2014 to August 2017, and excluded the patients with severe chronic kidney disease (estimated glomerular filtration rate (eGFR) < 15). The XarioXG (Toshiba Medical Systems, Tochigi, Japan) ultrasound device and a 3.5-MHz probe were used to obtain images for RI measurement. The RI was defined as (peak systolic velocity - end diastolic velocity)/peak systolic velocity. In each patient, RI at the interlobular was measured in the middle portions of the kidney in a supine position and was averaged for each kidney. The mean RI value of both kidneys was used for analysis. We also examined the association with intima media thickness (IMT) of carotid artery, pulse wave velocity (PWV), and underlying clinical features and parameters.

**Results:** The number of patients was 331 (male/female = 225/106), and the mean age was 66.4 years old. The RI was significantly increased with age, serum creatinine and decreased with eGFR. The patient with hyperlipidemia (n = 204, P < 0.05), hypertension (n = 276, P = 0.01), diabetes mellitus (n = 81, P < 0.01), CAD (n = 125, P = 0.01) or stroke (n = 70, P = 0.01) showed significantly higher RI than the patients without these diseases. Disease severity of CAD assessed by the number of diseased vessels significantly associated with the RI (P = 0.02).

Especially, the patients with three vessel diseases showed significantly higher RI however cyclothymic temperament score lost its predictive power (B = 0.010, p = 0.86).

**Conclusions:** Besides traditional factors, cyclothymic affective temperament might contribute to the initiation of hypertension, but not in the early decades of life.

**EARLY VASCULAR AGING SYNDROM: FROM RISK FACTORS TO THE DISEASE**

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**Objective:** A clear correspondence of the age and state of the arteries is not always observed. The concept of early vascular aging syndrome acquires clinical significance. The aim of the study was to assess correlation between vascular stiffness, endothelial dysfunction, vascular age and biological age in healthy volunteers and patients with arterial hypertension (AH).

**Design and method:** A total of 2175 subjects, 873(40.1%) men, 1211(59.9%) women were examined. Men were older, had higher BP, BMI and waist circumference (64.7(13.9)vs.61.8(14.5);142.9/85.4(19.8/11.7)vs.136.3/82.9 (21.2/11.3); 28.64(5.6)vs.26.7(4.6);92.8(10.2)vs.88.2(5.8).). Proportion of patients with BMI over 25 and 25–30 kg/m² was 32.4% and 20% respectively. In the whole group there were 53.4% subjects with BP 140/90 mmHg or higher (women vs.men 54.1% vs.45.9%, p < 0.001). 51.0% (vs.40.3%, p = 0.001) of women were smokers and 49.7% were never physically active (no gender differences). FH was more frequently positive in women than in men (51.0% vs.42.3%, p = 0.001, 28.3(4.4)vs.26.7(5.4);103(12.2)vs.92.8(15.7), respectively). Proportion of patients with at least one traditional cardiovascular risk factor (12.9% vs. 7.1%, P = 0.0001). Risk factors and FH were independent predictors of the age at onset of hypertension in the full model.

**Results:** The mean age of the subjects was 60.7 (±12) years. The independent predictors of the age at onset of hypertension were male sex (B = 4.67, 95%CI = 1.44–7.9 p = 0.005), smoking (B = −4.62, 95%CI = −7.77–1.46 p = 0.004) and positive family history (B = −6.94, 95%CI = −10.41–3.48, p = 0.001). High cyclothymic affective temperament score tended to be an independent predictor, however, the association was not significant (B = −0.48, 95%CI = −1.07–0.11, p = 0.110). When the subgroup of patients with early onset hypertension was studied (n = 73), male sex, smoking and positive family history remained independent predictors,
than the patients without coronary disease or with single/double vessel diseases (p < 0.01). Furthermore, the rRI significantly associated with IMT (p = 0.02) but not with PWV (p = 0.74).

Conclusions: In the present study, we found that the rRI significantly associated with not only clinical feature and parameters but also IMT. These results revealed that the rRI had close relationships with coronary risk factors.

LEFT ATRIAL SIZE : DETERMINANTS USING NON-CONSTRAINT ENHANCED CARDIAC COMPUTED TOMOGRAPHY

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Objective: Left atrial (LA) size is a marker of diastolic dysfunction and is associated with cardiovascular outcomes. A new method using a non-contrast-enhanced cardiac computed tomography realized for the quantification of coronary artery calcium (CAC) allows to measure left atrial volume. The aim of this study was to determine the cardiovascular risks factors associated with left atrial enlargement.

Design and method: 458 participants (mean age 59.4 years, 45.4% of women) at intermediate cardiovascular risk benefited from a non-contrast-enhanced cardiac computed tomography. Left atrial volume was performed by countouring the inner edges of LA in three shots of space.

Results: Mean LA volume was 76.6 ± 18.6 mL and 41.6 ± 10 mL/m² after adjustment with body area. Women had significantly largest LA volume (p < 0.0001). LA volume was strongly associated with body mass index and body area (βt coefficient = 0.27 et p < 0.0001 for both). Obesity (BMI > 30 kg/m²) was correlated with largest LA volume (p < 0.0001). Systolic blood pressure was associated with LA volume and adjusted LA volume (p < 0.01 et 0.01) but the association with hypertension was only found with non-adjusted LA volume (p = 0.003). Dyslipidemia was correlated with smaller LA (p < 0.01). Smoking, diabetes and CAD was not associated with LA size. In a fully adjusted model, hypertension, female sex and dyslipidemia was still associated with adjusted LA volume.

Conclusions: LA volume determined using non-contrast-enhanced computed tomography is associated with BMI, hypertension, female sex and dyslipidemia. This new technique allows to measure left atrial volume on a cardiac computed tomography.

CHARACTERISTICS OF PATIENTS WITH ATRIAL FIBRILLATION. ESF-FA PROJECT – DATA ON CROATIAN COHORT

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Objective: The aim of the study was to analyze clinical characteristics of the consecutive sample of patients with atrial fibrillation (AFib) who were admitted to the UHC Zagreb Cardiology Clinic, part of the ESH Excellence Centre of Hypertension. This cohort is part of the ESF – FA project.

Design and method: Consecutive sample of 201 patients with AFib (115 M, 86 F; averaged age 71.6) was enrolled in period 2014–2016. Data were collected from medical records. BP was measured following the ESF/ESC guidelines. Hypertension (HT) was defined as BP > 140/90 mmHg and/or antihypertensive drugs treatment, chronic kidney disease (CKD) was defined as eGFR (CKD Epi < 60 ml/min).

Results: Average BP values and heart rate were 133.5±80.2 mmHg, 82.2 bpm, and BMI was 31.1 kg/m², there were 19.6% and 11.5% smokers and ex-smokers, respectively. CHD, cerebrovascular disease, heart failure, valvular disease, PAD, hypothyrosis, and CKD were established in 52.7%, 17.9%, 49.3%, 29.3%, 13.9%, 14.4% and 52.5%, respectively. Family history for CVD was positive in 43.2% patients. Prevalence of HT was 83.5%, and 63.7% were treated, while 20% were newly diagnosed. Only 30.2% HT had IP < 140/90 mmHg. Most frequently used antihypertensive drugs were beta blockers (67.6%), loopD (54.7%), ACEI (50.7%), potassium-sparingD (22.8%) and thiazide-likeD (17.9%). LoopD were prescribed more frequently in patients with CKD than in non-CKD as well as in HF than in non-HF patients. Hypokalemia was noticed in 18.9% patients and was mostly reported in non-HF patients (41.1%); it was associated with overuse of loopD and underuse of potassium-sparingD. First diagnosed, paroxysmal, permanent and persistent AFib were diagnosed in 5.4%, 33.3%, 51.2% and 10.4%, respectively. CHA2D2VASC ≥ 2 was determined in 78.9%; varfarin and NOAC were administered in 64.4% and 35.6% patients, respectively. In patients treated with varfarin INR > 2 was achieved in only 35.4%.

Conclusions: Better BP control and anticoagulation with more frequent use of NOACs is needed. Physicians must be aware of high prevalence of CKD in AFib patients and consequent drug dose adjustments.

COPEPTIN AS A RESEARCH MARKER IN CARDIOVASCULAR DISEASE

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Objective: Arginine vasopressin (ADH) is released from the neurohypophysis and regulates intravascular volume status. ADH activity is reflected by copeptin, the C-terminal peptide of pro-vasopressin. Elevated copeptin levels are associated with increased cardiovascular and all-cause mortality. The aim of this study is to compare copeptin levels in patients with different cardiovascular diseases.

Design and method: In this cross-sectional analysis we measured copeptin concentrations in 69 patients with diabetes mellitus type 2 (T2DM), 30 patients with primary hypertension stage 1 or 2 (HT1–2), 34 patients with treatment resistant hypertension (TRH) (21 of them with T2DM), and 28 healthy individuals, who participated in clinical trials. In 2 study groups we analyzed changes after therapeutic interventions. Patients with T2DM received 6 weeks of treatment with 25 mg empagliflozin or placebo. Patients with TRH underwent full four quadrant renal denervation (RDN) by an experienced interventionalist. Copeptin concentrations were measured before and after treatment using Time Resolved Amplified Cysteine Emission method.

Results: Patients with TRH showed higher copeptin levels than patients with HT1–2 (median 8.4 [interquartile range 3.6–14] vs. 4.2 [2.8–6.3] pmol/l, p = 0.039), patients with T2DM (4.5 [3.3–7.2] pmol/l, p = 0.020) and healthy individuals (5.7 [2.9–9.2] pmol/l, p = 0.024). There was no significant change in copeptin levels in patients with TRH before and 6 month after RDN (8.4 [3.6–14] vs 8.5 [4.5–13] pmol/l, p = 0.334), even though 24 h ambulatory blood pressure decreased from 154 ± 15/87 ± 12 mmHg (p = 0.001) to 146 ± 13/83 ± 7.9 mmHg (p = 0.034). In patients with T2DM (double blind randomized cross-over trial), no significant change in copeptin levels was observed in the placebo group compared to baseline (6.87 ± 3.89 vs 5.76 ± 4.05 pmol/l, p = 0.09), whereas treatment with empagliflozin increased copeptin levels compared to baseline (6.87 ± 3.89 pmol/l, p = 0.001). Patients receiving empagliflozin showed higher copeptin levels (p < 0.001) compared to placebo.

Conclusions: Patients with TRH showed higher copeptin levels than patients with HT1–2, T2DM and healthy individuals. RDN did not lead to any change of copeptin levels in patients with TRH, but empagliflozin, as expected induced an increase in copeptin levels due to volume contraction in patients with T2DM. Copeptin emerged as a valuable research marker in cardiovascular disease.

RELATIONSHIP BETWEEN SMOKING, ANGIOGRAPHIC SUBTYPES AND VASCULAR INVOLVEMENT IN PATIENTS WITH FIBROMUSCULAR DYSPLASIA - THE ARCADIA-POL STUDY

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Objective: To assess the relationship between smoking and angiographic subtypes and vascular involvement in patients with fibromuscular dysplasia (FMD) enrolled into ARCADIA-POL study.

Design and method: Out of 250 patients enrolled into ARCADIA-POL study since January 2015 (instituted on the basis of Polish-French collaboration) we analyzed 183 patients with confirmed FMD in at least one vascular bed. A standardized FMD data form was used for data collection. All patients underwent detailed clinical evaluation including ABPM, biochemical evaluation, biobanking, duplex Doppler of carotid and abdominal arteries and whole body angio-CT. For the purpose of this analysis we divided 183 patients into two groups according to the status – 79 ever smokers (current or ex-smokers) (66F, 13M, mean age: 46.9 ± 12.9 years) and 104 non-smokers (84F, 20M, mean age: 45.2 ± 16.5 years).

Results: As we compared smokers to non-smokers we found no statistically significant differences between the groups in age, gender, hypertension status (94.9% vs 87.5%, p = 0.086, respectively), nor in blood pressure values. Both groups did not also differ in terms of localization of vascular beds, nor number of vascular beds affected with FMD lesions. The most frequently FMD lesions were present in renal arteries (89.9% vs 82.7%, p = 0.17, respectively). There were also no differences between smoker and non-smoker in the number of vascular complications such as dissections (7.6% vs 8.7%, p = 0.79, respectively) and aneurysms (35.4% vs 28.8%, p = 0.34). In further analysis we also analyzed 41 FMD patients currently smoking and compared them to the never smokers and similarly we did not find differences between these analyzed groups. We also analyzed separately 157 consecutive patients with renal FMD dividing them into smoking and non-smoking individuals. We found no differences in terms of angiographic subtypes of renal FMD, number of complication, nor number of patients with history or currently significant renal artery stenosis.

Conclusions: Although smoking has been implicated as a potential contributing factor to the development of FMD we did not found the relationship between the smoking and vascular involvement and complications in patients with FMD.

CARDIAC ULTRASONOGRAPHY FINDINGS RELATED TO PREVALENCE OF ARTERIAL HYPERTENSION IN PERIPHERAL ARTERIAL DISEASES-PATIENTS-HIGHLIGHT EVIDENCES

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Objective: The aim of this study was to evaluate the presence of cardiac ultrasound changes correlated with the prevalence of arterial hypertension (HT) in patients with peripheral arterial disease (PAD) with critical leg ischemia (CLI) comparative with patients without CLI. LV hypertrophic remodeling related to HT prevalence is underdiagnosed in PAD patients, in whom the arterial imaging evaluation it is priority made.

Design and method: Our study enrolled 197 patients with PAD patients: 142 pts (63.1 ± 9.4 yrs., 88.5% male, 70% smokers) with CLI and 55 pts. (60 ± 10.6 yrs., 85% male, 65% smokers) without CLI. After signing an informed consent, all patients were clinically evaluated, laboratory tested (glucose, cholesterol, triglyceride serum levels) and cardiac ultrasound was performed. The cardiac ultrasound parameters measurements were related to end-diastolic septum wall thickness (SWTd) and left ventricular (LV) posterior wall thickness (LVPWtd), LV relative wall thickness (RWT) and LV diastolic (LVD) function quantification. The study methodology was approved by the Ethical Committee. Statistical data processing was performed with SPSS.

Results: The prevalence of HT (66.3%) was higher than diabetes (50.2%, p < 0.01), hypercholesterolaemia (52.1%, p < 0.01), hypertriglyceridaemia (47.6%, p < 0.01) and it was higher in PAD patients with CLI (71.2%) comparative with PAD patients without CLI (53.4%, p < 0.001). We found symmetrical or asymmetric concentric LV hypertrophy (RWT > 0.42) in 51.5% of PAD patients (55.6% in PAD patients with CLI versus 47.7% in PAD patients without CLI, ns). The prevalence of increase SWTd thickness (53.2%) was higher (53.8% in PAD patients with CLI versus 52.7% in PAD patients without CLI, ns) vs. 10.6 ± 2.3 mm versus. 10.5 ± 2.4 mm) than increase LVPWtd thickness (41.3%, p < 0.01), (38% in PAD patients with CLI versus 51.8% in PAD patients without CLI, p < 0.001; 10.1 ± 1.69 mm versus 10.2 ± 2.2 mm). LVD dysfunction was present in 36.2% of PAD patients (37.4% versus 35.1%, ns). The prevalence of diagnosed hypertensive cardiovascular disease in PAD patients increased from 3,1% on admission to 32,4% (p < 0.001).

Conclusions: High prevalence of HT in PAD patients (especially with CLI), correlated with the LV hypertrophy and diastolic dysfunction presence, reveal the need for sustained antihypertensive treatment in this usually undertreated group of patients.

CLINICAL CHARACTERISTICS, VASCULAR BED INVOLVEMENT AND VASCULAR COMPLICATIONS IN PATIENTS WITH FIBROMUSCULAR DYSPLASIA - POLISH REGISTRY FOR FIBROMUSCULAR DYSPLASIA (ARCADIA-POL)

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Objective: To assess the clinical characteristics, vascular bed involvement and vascular complications in patients with fibromuscular dysplasia (FMD) enrolled into on-going ARCADIA-POL study.

Design and method: Out of 250 patients enrolled into ARCADIA-POL study since January 2015 (instituted on the basis of Polish-French collaboration) we present 183 patients with confirmed FMD in at least one vascular bed. A standardized FMD data form was used for data collection. All patients underwent detailed clinical evaluation including ABPM, biochemical evaluation, biobanking, duplex Doppler of carotid and abdominal arteries and whole body angio-CT. In the following presentation we focused on data on the prevalence of vascular bed involvement and complications.

Results: In our analysis we included 183 patients with confirmed FMD (150F[82.0%], 33M[18.0%]), mean age: 45.9 ± 15.0 years). 166 patients (90.7%) were hypertensives. The mean age at the diagnosis of hypertension was 35.6 ± 14.7 years and the FMD was diagnosed 6.8 ± 8.6 years later. In the analyzed group FMD was identified in renal arteries in 157 (85.8%) patients as well as in carotid, intracranial and vascular arteries in 28(15.3%), 116(6.0%) and 158(8.2%) patients, respectively. FMD was also identified in celiac trunk and mesenteric, iliac and splenic arteries in 18(9.8%), 18(9.8%), and 42(2.2) patients, respectively. Multisite FMD was found in 52 patients (28.4%). Two vascular beds were involved in 19.1(35 pts), three in 4.9%(9 pts), four in 3.3%(4 pts), five and more in 1.0%(2 pts). Arterial dissection(s) or aneurysms in various vascular beds were present in 15(8.2%) and in 38(21.7%) patients respectively. The most frequently dissections were found in carotid arteries (10 pts, 5.5%). Aneurysms were most often observed in renal and intracranial arteries, in 25(13.7%) and 21 patients (11.5%).

Conclusions: The data of ARCADIA-POL registry showed that renal FMD was the most frequent, but also cerebrovascular FMD was found in relatively large proportion of patients. Our data revealed high incidence of FMD lesions coexisting in different vascular beds as well as relatively frequent occurrence of vascular complications.
Objective: Little is known about the clinical significance and the management of isolated systolic hypertension in the young (ISHY). According to some authors ISHY is often associated with athletic participation and is considered at low cardiovascular risk whereas according to others ISHY subjects are characterized by increased BMI associated with metabolic abnormalities. The aim of the present study was to investigate whether in athletes ISHY different clinical characteristics and better long-term evolution than ISHY in sedentary subjects.

Design and method: We examined 35 male athletes with ISHY (ISHY-Athl), with a mean age of 23.6 ± 7.0 years and blood pressure of 152.7 ± 12.0 mmHg and 35 age-matched sedentary ISHY subjects (ISHY-Sed). Thirty-five age-matched normotensives (NTs), and 35 subjects with systolic-diastolic hypertension (SDH) were also enrolled. All these conditions were identified with ambulatory blood pressure monitoring. All data were re-measured after 8 years of follow-up.

Results: ISHY-Athl had lower 24 h heart rate than the other 3 groups (p for ANOVA = 0.001). In addition, they had higher stroke volume (89.2 ± 16.2 ml, p < 0.01 versus other 3 groups). Peripheral resistance was similar in ISHY-Athl and NT, whereas it was increased in the ISHY-Sed and SDH participants (p < 0.05). BMI and metabolic data at baseline did not differ between the 4 groups. After 8 years, changes in 24 h BP were similar in the ISHY-Athl and ISHY-Sed. Likewise, changes in BMI and metabolic data did not differ between these two groups.

Conclusions: Athletes with ISHY exhibited a different hemodynamic pattern characterized by elevated stroke volume and normal peripheral resistance compared to ISHY with sedentary habits. However, baseline BMI and metabolic profile and the evolution of BP and metabolic data in ISHY subjects did not differ according to physical activity habits.

ASSOCIATION OF NOVEL RISK FACTORS OF CARDIOVASCULAR DISEASE WITH BA PWV IN A LARGE COHORT OF ADULTS

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Objective: To clarify the association of triglyceride (TG), high- and low-density lipoprotein cholesterol (HDL-C and LDL-C), blood pressure, fasting plasma glucose (FPG), uric acid (UA), high sensitive C-reactive protein (hsCRP), and urine albumin-to-creatinine (UACR) with brachial ankle pulse wave velocity (baPWV), which has been reported as a potential surrogate marker of arterial stiffness, in the Japanese large cohort of adults.

Design and method: A total of 2,645 participants including 1,205 men (61.1 ± 9.9 years) and 1,440 women (61.2 ± 9.4 years) were enrolled in the present cross-sectional study. Systolic and diastolic blood pressure (SBP, DBP), DBP were measured to obtain pulse pressure (PP). baPWV was measured using automatic device (BP-203RPE II form PWV/ABI, Omron Colin, Tokyo). Stepwise multiple regression analyses were performed adjusted for age, BMI, current smoking status, exercise habit, habitual alcohol consumption, and medication for hypertension, diabetes mellitus and dyslipidemia, including all indices shown above.

Results: Mean ± SD of baPWV, SBP, DBP, PP, TG, FPG, hsCRP and UA were 1569.6 ± 366.1 (cm/sec), 131.2 ± 17.1 (mmHg), 77.3 ± 10.0 (mmHg), 54.0 ± 12.2 (mmHg), 139.8 ± 113.5 (mg/dL), 100.3 ± 20.3 (mg/dL), 0.09 ± 0.29 (mg/dL) and 5.8 ± 1.8 (mg/dL), respectively, in men, and 1486.6 ± 357.5 (cm/sec), 125.4 ± 18.1 (mmHg), 72.9 ± 10.0 (mmHg), 52.5 ± 12.5 (mmHg), 107.4 ± 68.2 (mg/dL), 94.7 ± 16.5 (mg/dL), 0.06 ± 0.19 (mg/dL) and 4.3 ± 1.3 (mg/dL), respectively, in women. In men and women, PP and FPG were significantly associated with baPWV (P < 0.001). In men, hsCRP showed significant association (P = 0.002). In women, TG showed significant association (P = 0.001). Since habitual alcohol consumption showed significant association in men (P = 0.002), those with or without this habit were analyzed separately. In men who drink alcohol beverage daily, UA showed significant association with baPWV besides PP and FPG (P = 0.008), whereas in women without this habit, hsCRP showed significant association besides PP and FPG (P = 0.011).

Conclusions: These results suggest that PP and FPG may correlate with arterial stiffness in both sex, and there may be sex differences in the influence-factors of arterial stiffness.
Objective: The aims of this public-funded and representative study were to assess prevalence diagnoses, treatment and control of hypercholesterolemia LDL in the adult population in France in 2015 and to describe temporal trends between 2006 and 2015.

Design and method: The Esteban survey is a cross-sectional survey based on a multistage sampling design and conducted in continental France in 2015–2016. The design was the same as the one of the 2006-survey. Both samples were representative of the French adult population (18–74 years). Lipids concentrations were measured in a national sample of non-institutionalized adults during a health examination. LDL-cholesterol (LDLc) was determined by the Friedewald equation only if triglycerides were lower than 3.4 g/l. Sociodemographic characteristics and risk factors were collected by questionnaires. Lipid-lowering treatments during the year preceding the survey came from the reimbursement databases of the national health insurance inter-scheme information system. Hypercholesterolemia LDL was defined as LDLc greater than 1.6 g/l, or a reimbursement for lipid-lowering drugs. Analyses were weighted and adjusted.

Results: LDLc was determined in 2.074 adults (44.8% of men). The mean LDLc was 1.30 g/l (95% CI [1.28–1.32]). One adult in five had LDLc > 1.6 g/l and 8% had a LDLc > 2 g/l. The prevalence of hypercholesterolemia LDLc was 27.0% (24.5–29.5%) and increased with age, reaching 48.4% in adults aged 65–74 years, and was higher in men (29.7%) than in women (24.5%). Between 2006 and 2015, mean LDLc and the proportion of adults with a LDLc > 1.6 g/l were stable (p = 0.5 and p = 0.09, respectively). We observed a 18% decrease in the prevalence of hypercholesterolemia LDLc (p < 0.001) and a 33% decrease in the proportion of adults having a reimbursement for lipid-lowering drugs (p < 0.0001).

Conclusions: Despite a significant decrease in the prevalence of hypercholesterolemia LDL observed during the past decade, it remains high in France. Our study suggested that this decrease could be linked to changes in the lipid-lowering drugs prescription. Further analyses are necessary to investigate this hypothesis.

THE 22-YEAR PROSPECTIVE QUEBEC (PROQ) STUDY ON WORK AND HEALTH CONDUCTED AMONG 9000 WHITE-COLLAR WORKERS

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Objective: Cardiovascular diseases (CVD) are the leading cause of mortality worldwide, and a counting for 17.7 million deaths per year. Mental health problems (MHP) are the first cause of disability worldwide. Their prevalence, long duration and high risk of recurrence place a considerable burden on health and social care systems and important productivity losses for employers. The PROspective Quebec (PROQ) Study on Work and Health is a prospective cohort initiated in 1991–93 to further extend our comprehension of the effect of work stressors on cardiovascular and mental health outcomes.

Design and method: At baseline (1991–1993), the study population involved 9,189 white-collar workers aged 18 to 65 years-old employed by 19 specific public organizations in Quebec City. At the first follow-up, 3 years later (1999–2001), 8,121 workers agreed to participate again corresponding to 89% of the initial sample. The 22-year follow-up (2015–18) is currently ongoing. This second follow-up includes measurements at later life of a large number of cardiovascular and mental health outcomes as well as their major risk factors, including blood pressure.

Results: Data collection procedures are a self-reported questionnaire, an interview, biological variables and medico-administrative databases extractions. This prospective cohort will fill important research gaps related to: 1) the pathways by which adverse psychosocial work stressors cumulated over the working life could lead to higher risk of cardiovascular diseases (CVD) and mental health problems (MHP) at older ages, 2) the effects of psychosocial work stressors on novel subclinical markers of disease risk (aortic stiffness, inflammatory markers, telomere length, cognitive function) and 3) the costs of CVD and mental health problems attributable to work stressors.

Conclusions: This cohort is one of the most rigorous and extensive occupational cohorts in the world. The results will contribute substantially to the primary prevention of CVD and MHP.

INCREASED ALL-CAUSE MORTALITY, TOTAL CARDIOVASCULAR DISEASE AND MORBIDITY IN HOSPITALIZED OCTOGENARIANS WITH ORTHOSTATIC HYPOTENSION

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Objective: Orthostatic hypotension is a common finding in elderly patients and is associated with significant morbidity and mortality. Most of the knowledge on orthostatic hypotension and cardiovascular endpoints and mortality comes from prospective cohort data and there are few clinical studies performed in octogenarians.

Design and method: From the year 2014 until May of the year 2017 a team composed of a physiotherapist and an occupational therapist supervised by a medical doctor visited newly hospitalized patients at Lund’s University Hospital. The team measured BMI, blood pressure, pulse, saturation and registered the patients’ age, sex, number and types of medications and symptoms for admittance. They were also able to register data from tests, the patients’ final diagnosis, the number of days in hospital, the number of medications at discharge, the number of re-hospitalizations and the number of deaths at follow-up after 6 months. Patients with complete blood pressure measurements both in the lying position and standing position were included in our study (n = 210). These patients were divided into two groups, the orthostatic hypotension group (n = 119) and the normotensive group (n = 91). Mean age was 83 years.

Results: During follow-up 14 of 91 patients died in the normotensive group compared to 32 of 119 in the orthostatic hypotension group (p = 0.05). At discharge 41 of 91 patient had been diagnosed with cardiovascular disease in the normotensive group compared to 70 of 119 patients in the orthostatic hypotension group (p < 0.05). The patients in the normotensive group stayed at the hospital for a mean of 8.38 days compared to the patients from the orthostatic hypotension group whom stayed for a mean of 9.86 days (p = 0.05).

Conclusions: This study has shown that there is increased cardiovascular disease, morbidity and mortality in elderly patients with orthostatic hypotension compared to patients without orthostatic hypotension in a hospital setting. The study results indicate the importance of taking orthostatic blood pressure tests in elderly patients.

ASSOCIATION BETWEEN SLEEP COMPLAINTS AND CAROTID ATHEROSCLEROTIC LESIONS

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Objective: Sleep deprivation is discussed as a cardiovascular risk factor, however, its association with cardiovascular mortality and morbidity is controversial. We assessed the relation between self-reported sleep complaints and carotid atherosclerotic lesions.

Design and method: In this analysis, we included 861 (320 males, 37.2%) out of 1600 participants of the St Petersburg population-based sample (within the ESSE-RF study) without previously known cardio/cerebrovascular events. Mean age: 44.9 ± 11.9 years old. Mean body mass index: 26.9 ± 5.3 kg/m². All participants underwent a structured interview regarding their lifestyle, complaints, medical history, and sleep complaints. In this analysis, we considered the following questions: “How often did you have difficulties in falling asleep for > 30 minutes after going to bed in the last month?”, “How often did you have difficulties in falling asleep after midnight awakening in the last month?”. The answers “> 1/week” were considered symptomatic. In addition, we measured office blood pressure (BP) and performed a standard duplex ultrasound protocol (My Sono U6, Samsung, Korea) to evaluate carotid intima-media thickness (IMT) (normal: < 0.9 mm, abnormal: 0.91–1.29 mm) and atherosclerotic plaques (local thickening > 1.3 mm). We applied parametric statistics (t-Student, chi-square tests), Spearman correlation analysis.

Results: In total, 362 subjects (42%) reported at least one sleep complaint. The atherosclerotic plaques were found in 15 subjects (1.7%). The plaques presence was associated with awakenings (chi-square 9.04, p = 0.005). Abnormal IMT was found in 83 subjects (9.6%). Subjects with sleep-related complaints showed higher IMT values (0.71 ± 0.18 vs. 0.67 ± 0.16 in insomniaics vs. non-insomniaics, p = 0.001). However, there was no association between the rates of sleep complaints and abnormal IMT (p = 0.24). Correlation analysis demonstrated a weak association between mean IMT and sleep complaints (r = 0.11, p = 0.001), which disappeared after adjustment for age and BP.

Conclusions: In a large epidemiology cohort, we demonstrated an association between sleep complaints and carotid atherosclerosis. However, their role seems to be minor compared to the traditional cardiovascular risk factors, although potential mechanisms and benefits of insomnia treatment deserve further investigation.
THE INFLUENCE OF ANNOYANCE DUE TO NOISE ON RENAL HEMODYNAMIC

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Objective: Epidemiological studies have found a link between noise exposure and increased incidence of arterial hypertension and cardiovascular disease. The kidney as long-term regulator of blood pressure might play a role in the underlying pathophysiological mechanism. The aim of this study is to investigate the influence of annoyance due to noise on renal hemodynamic in hypertensive and healthy subjects.

Design and method: We analysed the influence of annoyance due to noise on renal hemodynamic (measured using steady state input clearance with infusion of paraaminohippuric acid and inulin, respectively) in 79 healthy normotensive subjects (NT) and 34 drug-naïve subjects with hypertension stage 1 or 2 (HT). All subjects ranked subjective annoyance due to noise in everyday life on a 7 grade likert scale. The median of all rankings was used as cut off point to divide the group into annoyed and non-annoyed subjects.

Results: The prevalence of subjects with annoyance due to noise was higher in HT (25 out of 34 [73.5%]) compared to NT subjects (33 out of 79 [41.8%], p = 0.04). There was no difference in office blood pressure (124 ± 8.2/75 ± 7.8 vs 124 ± 7.4/73 ± 6.4 mmHg, p = 0.52/0.32) and heart rate (69 ± 1.4 vs 66 ± 9.0 bpm, p = 0.09) between annoyed and non-annoyed NT subjects. Annoyed NT subjects showed lower renal plasma flow (635 ± 95.7 vs 685 ± 116 ml/min, p = 0.04) compared to non-annoyed subjects. There was no difference in glomerular filtration rate (132 ± 12 vs 124 ± 7.4/73 ± 6.4 mmHg, p = 0.04) between annoyed and non-annoyed NT subjects. Annoyed NT subjects showed lower renal plasma flow (635 ± 95.7 vs 685 ± 116 ml/min, p = 0.04) compared to non-annoyed subjects. There was no difference in glomerular filtration rate between annoyed and non-annoyed NT subjects (133 ± 12 vs 124 ± 8.2/75 ± 7.8 bpm, p = 0.76) in annoyed and non-annoyed HT subjects. In HT subjects there was no difference in renal plasma flow (553 ± 102 vs 552 ± 106 ml/min, p = 0.99) and glomerular filtration rate (132 ± 12 vs 136 ± 14 ml/min, p = 0.52) between annoyed and non-annoyed subjects.

Conclusions: Annoyance due to noise in everyday life was found more frequently in HT compared to NT subjects and was associated with lower renal plasma flow in NT but not HT subjects. Our data suggest the hypothesis that annoyance due to noise triggers early renal changes in NT subjects potentially leading to hypertension.

FEASIBILITY OF ESTIMATING FIBROMUSCULAR DYSPLASIA PREVALENCE USING HEALTH ADMINISTRATIVE DATABASE: A NATIONWIDE STUDY

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Objective: Fibro-muscular dysplasia (FMD) is a non-atherosclerotic and non-inflammatory vascular disease, occurring mainly in women aged 30–50 years. Its prevalence is not well-known and possibly underestimated due to asymptomatic forms. Our aim was to determine whether the French national summary discharge database alone could be used to estimate the prevalence of FMD.

Design and method: Patients were selected by the first occurrence of the I773 code. This code was chosen after an exploratory analysis and advice from national hypertension specialists. In the French national summary discharge database system, all hospitalizations can be linked for a given patient. The zip code of residence was used for geographical analysis. We computed rates of prevalence by annual incident cases was observed between 2008 and 2016: 317 (11.3%), 342 (12.2%), 292 (10.4%), 309 (11.0%), 299 (10.7%), 319 (11.4%), 294 (10.5%), 279 (9.97%) and 347 (12.4%), respectively. The most common associated codes were I10 (hypertension, 49.0%), I15.0 (vascular/renal hypertension, 19.7%) and E780 (essential hypercholesterolemia, 11.9%). Among all French hospitals, the largest number of patients was identified in the Paris University Hospitals, especially ESH excellence centers (15.7%) and 8 additional University Hospitals belong to the ‘top 10’ recruiting centres. Using indirect standardization, we observed a geographical disparity with a low prevalence in the East/South-West part of France, which may indicate under-diagnosis of the disease and a very high unexplained prevalence in a single hospital.

Conclusions: Both the stable estimate of yearly incident cases and demographic characteristics of the population study are consistent with the literature. Nevertheless, the observed geographical disparity suggests a diagnostic bias. We conclude that the use of the French national summary discharge database alone cannot provide a reliable estimation of the FMD prevalence. Both harmonization of diagnosis procedures and hospitalization coding could help identifying FMD patients in addition to existent multicentric registries.

TRENDS IN THE USE OF CARDIOVASCULAR PREVENTION TREATMENTS IN FRANCE BETWEEN 2007 AND 2017 USING THE FRENCH LEAGUE AGAINST HYPERTENSION SURVEYS

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Objective: To observe the trends in the use of cardiovascular treatments for hypertension, dyslipidemia and diabetes resulting of consecutive French League against hypertension surveys.

Design and method: The FLAHS surveys are carried out by self-questionnaire sent by mail to individuals from the Kantar Health (representative panel of the population living in metropolitan France) sampling frame. Three surveys have been carried out in 2007, 2012 and 2017 in subjects aged 35 years and older. The questionnaire included questions related to treatment of hypertension, dyslipidemia and diabetes with medications. Number of participants in FLAHS 2007, 2012, and 2017 were 3229, 3462 and 4783 respectively.

Results: Results: In 2007, prevalence in subjects aged 35 years and older for treated hypertension was 32% [IC 95, 30–34], for treated dyslipidemia was 22% [IC 95, 19–25], for treated diabetes was 8% [IC 95, 5–11]. In 2012, prevalence were respectively: 30% [IC 95, 28–33], 22% [IC 95, 20–25], and 8% [IC 95, 5–11]. In 2017, prevalence were respectively: 28% [IC 95, 26–30], 17% [IC 95, 14–19], and 9% [IC 95, 6–11]. Calculated on the French national census in 2017, the number of subjects treated for hypertension and/or dyslipidemia and/or diabetes in 2007 was 13.6 millions [IC 95, 12.8–14.6]. Between 2007 and 2017, number of treated patients decreased from 8.3 to 6.4 millions for dyslipidemia and from 11.2 to 10.8 millions for hypertensives.

Conclusions: In France, the use of cardiovascular treatments for hypertension, dyslipidemia and diabetes has changed between 2007 and 2017. A decrease in the prevalence of treatments for hypertension and dyslipidemia is observed in the population of 35 years and older. Monitoring of cardiovascular morbidity and mortality indicators will make it possible to judge the consequences on the health of the population.

AN EDUCATIONAL THERAPEUTIC PROGRAM OF THE FRENCH NATIONAL HEALTH INSURANCE FUND (CNAM) FOR HYPERTENSIVE AND/OR DYSLIPIDEMIC FRENCH PATIENTS: FIRST RESULTS

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Objective: Aim: to improve the hypertensive and/or dyslipidemic French patients’ awareness in their health problems and to favor a healthier lifestyle, a better Blood Pressure (BP) and lipid control, and a better patient’s compliance.

Design and method: Methods: this educational program realized by the CNAM in association with the French Federation of Cardiology and the French National Committee Against Hypertension contains an educational assessment, four workshops: cardiovascular risk factors, physical activity and nutrition, stress and tobacco, treatment and home BP measurement, and an individual follow-up of 18 months.

Results: this program has been proposed to 2343 patients distributed in 16 centers, 844 (44 %) agreed to participate. Average age: 61 years, 52 % of women, 21 % workers, 65 % couple living, 60 % of the patients had one or two cardiovascular risk factors and 40 % both (hypertension and dyslipidemia).

The office BP control (<140/90 mm Hg) was 31 % for men and 42 % for women. The abdominal obesity (BMI > 30) occurred in 41 % for men and 26 % for women. LDL control (<1.3 g/l) under treatment was obtained in 52 % in men and 38 % in women. 12 % of the subjects are smokers, 30 % felt moderate stress. A good therapeutic observance assessed by a specific questionnaire was found in only 44 %.

Conclusions: Conclusion: BP and lipid controls are insufficient in this French cohort at the beginning of the program, associated with a poor observance. These results emphasize the need to provide more systematically a specific therapeutic education program to moderate risk patients (European score risk). An evaluation of the first 1000 patients will be made in 2018 to improve data collection and to perhaps allow an extension of this national program by CNAM.

FEATURES OF 24-HOUR BLOOD PRESSURE PROFILE, VASCULAR WALL STIFFNESS PARAMETERS AND MARKERS OF VASCULAR INFLAMMATORY REACTION IN POSTMENOPAUSAL FEMALE PATIENTS

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Objective: To study the relationship of 24-hour blood pressure profile, vascular wall stiffness parameters, sex hormone profile, parameters of lipid profile and vascular inflammatory markers in postmenopausal female patients with arterial hypertension (AH).

Design and method: 57 postmenopausal women (mean age 58.23 ± 6.45 years) with AH of moderate and high cardiovascular risk were included in the study. All patients underwent 24-hour blood pressure monitoring and sphygmography. Pulse wave velocity for elastic arteries on the right or the left (PWV-R/L), cardio-ankle vascular index (CAVI), ankle-brachial index (ABI); parameters of the lipid profile; inflammatory markers and sex hormone profile were measured.

Results: AH in postmenopausal female patients are associated with increase in blood pressure variability, increased pressure loading, disturbance of 24-hour blood pressure rhythm, great vessels rigidity (p < 0.05), low level of estrogen (p < 0.001) and increased level of total cholesterol, triglycerides, LDL-cholesterol, APO-B (p < 0.01), C-reactive protein, TNF-α, endothelin-1, IL-6 and uric acid (p < 0.05). The following positive correlations were found: between PWV-R and systolic blood pressure and diastolic blood pressure variability at night and systolic blood pressure variability in the daytime, IL-6 (p = 0.047), homocysteine (p = 0.015), APO-B (p = 0.048), age (p = 0.01); negative correlation with proges- terone. In addition, positive correlations were found between ABI-R and uric acid (p = 0.05), systolic blood pressure variability in the daytime (p = 0.02).

Conclusions: The parameters of 24-hour blood pressure profile are associated with target organ damage, in particular, with vascular wall stiffness, sex hormone profile and vascular inflammatory reaction in postmenopausal female patients, which can determine the course of hypertension and the development of cerebral and cardiovascular complications.

AUTONOMIC DYSREGULATION IN PRIMARY HYPERTENSION

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Objective: Introduction: Would cardiovascular autonomic reflexes help in understanding the diagnosis and the management of primary hypertension (PHT)? The purpose of this study was to evaluate the cardiovascular autonomic reflexes in patients with primary hypertension (PHT), including masked hypertension (MHT), hypertension with type 2 diabetes (DHT), orthostatic hypertension (OHT) and orthostatic hypotension (OHypoT).

Design and method: Patients and Methods. This prospective study included two groups: normotensive group, NT (N = 120) and primary hypertensive group, PHT (N = 120). The PHT group was divided in different subgroup: N1 = subgroup of MHT, N2 = subgroup of DHT, N3 = subgroup of OHT and N4 = subgroup of OHypoT. The PHT group as well as the subgroups were compared to NT group. The cardiovascular autonomic tests performed in these groups, included deep breathing (DB), hand-grip (HG), mental stress (MS) and orthostatic (Orth) tests. Statistical analysis was done using the Student’s t-test.

Results: Results. Cardiovascular autonomic reflexes responses were as follows: Compared to NT,

1. Central alpha adrenergic response to mental stress test was of 20.0 ± 9.8 % vs 15.2 ± 8.6% (p < 0.001) in PHT; 24.7 ± 7.2% vs 15.2 ± 4.5% (p < 0.001) in MHT; and 23.48 ± 9.82% vs 20.28 ± 9.60% (p = 0.243) in DHT.

2. Peripheral alpha adrenergic response to hand grip test of 16.7 ± 7.5% vs 13.3 ± 6.5% (p < 0.001) in PHT; 27.0 ± 5.4% vs 16.4 ± 4.5% (P < 0.001) in MHT; and 20.03 ± 8.05 vs 21.71 ± 11.23% (p = 0.588) in DHT.

3. Vagal response to deep breathing test was of 30.2 ± 8.1% vs 46.1 ± 2.1% (p < 0.001) in PHT; 30.5 ± 10.4% vs 32.7 ± 11.3% (p = 0.61) in MHT; and 23.09 ± 11.06% vs 34.15 ± 17.7% (p < 0.001) in DHT. Of interest orthostatic test showed that 70% of PHT had orthostatic hypertension and 15% orthostatic hypotension.

Conclusions: Conclusion. PHT, hypertensive with type 2 diabetes, MHT have a significantly higher sympathetic response when compared to controls and vagal response significantly lower. The latter is accentuated by the association of diabetes to hypertension. The results attest that cardiovascular autonomic reflexes study is of high interest in assessing PHT

AN EASY STRATEGY TO MANAGE NIGHT CRAMPS ASSOCIATED TO STATIN ASUMPTION: RESULTS FROM A REAL PRACTICE STUDY

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Objective: Night cramps associated to statin assumption are a relatively frequent adverse event, strongly disturbing and often cause of statin interruption. The aim of our study was to evaluate if the displace of statin assumption from evening (conventional one) to morning has been associated to change in night symptomatology.

Design and method: For the purpose of this study, we retrospectively evaluated 3200 ambulatory CRFs. Selection criteria were: patients claiming night cramps since the assumption of statins at evening, modification of the statin prescription (molecule or timing of administration), verification of the symptomatology at a next visit.

Results: In total we identified 129 patients claiming cramps from the statin assumption at evening. 64 of them also claimed cramps or myalgia during the day. 68 patients interrupted the treatment. We identified two main manoeuvres: egg: 62 patients were prescribed the same statin at the same dosage but displacing its assumption at morning (group A). 67 patients were prescribed a different statin (lower power or lower dosage) at evening (group B). The result was that in the group A 53 subjects declared the disappearance of the night cramps, while the remaining 9 ones just a reduction in frequency and intensity (all of these subjects were also claiming daily cramps and/or myalgia). No significant change in LDL-cholesterolemia control was observed. In group B, no significant change (same intensity and frequency) in the 50% of cases (24 of them interrupting again the treatment before the control visit). The ones experiencing a reduction of the
symptomatology however also experienced a small but significant increase in LDL-Cholesterol level.

Conclusions: In conclusion, shifting the statin assumption from evening to morning time improve symptomatology and persistence in therapy in patients with night cramps related to evening assumption of the statin, without a worsening of the LDL-cholesterol control.

PREVALENCE AND CONTROL OF HYPERTENSION WITH THE USE OF AMBULATORY BLOOD PRESSURE RECORDING IN HEMODIALYSIS PATIENTS

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Objective: To date, there is no commonly accepted definition for hypertension in patients with chronic kidney disease undergoing hemodialysis. A recent expert consensus suggests hypertension in dialysis to be defined based on ambulatory blood pressure monitoring (ABPM). The aim of this study is to evaluate the prevalence and control of hypertension using ABPM in a large hemodialysis population according to the latest definitions.

Design and method: A total of 160 hemodialysis patients underwent 48-hour ABPM, during a regular hemodialysis session and the subsequent interdialytic interval. Hypertension was defined as (i) pre-hemodialysis BP > 140/90 mmHg or use of antihypertensive agents (ii) ambulatory BP > 130/80 mmHg (over 44-hours or over the second 24-hour period) or use of antihypertensive agents. Phenotypes of hypertension control were defined as: 1) concordant control (pre-hemodialysis BP < 140/90 mmHg and ambulatory-BP < 130/80 mmHg), 2) concordant lack of control (pre-hemodialysis BP > 140/90 mmHg and ambulatory-BP > 130/80 mmHg), 3) “white coat” phenomenon (pre-hemodialysis BP > 140/90 mmHg and ambulatory-BP > 130/80 mmHg), and 4) masked hypertension (pre-hemodialysis BP < 140/90 mmHg and ambulatory-BP > 130/80 mmHg).

Results: Based on pre-hemodialysis BP levels, the prevalence of hypertension was 91.3%. Based on the ABPM covering the total 44-hour or the 2nd 24-hour interdialytic period, the prevalence was 88.8%. The proportion of hypertensive patients receiving treatment was 124 (84.9%). With the use of pre-hemodialysis BP and ABPM during 44-hours, 12 (10.1%) of hypertensive patients had concordant BP control, 87 (58.8%) of patients had lack of control, 29 (19.6%) had a white-coat phenomenon, and 17 (11.5) masked hypertension, respectively. In multivariate logistic regression analysis, only use of antihypertensive agents was independently associated with increased odds for lack of control (reverse causation).

Conclusions: Hypertension prevalence in hemodialysis patients is overwhelmingly high. The rates of control rates are different when calculated from office and ambulatory BP recordings. In the population studied, almost one out of three patients had white-coat or masked hypertension.

THE EFFECT OF GENDER ON RIGHT VENTRICULAR DEFORMATION IN UNTREATED HYPERTENSIVE PATIENTS

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Objective: The purpose of this investigation was to evaluate the effect of gender on right ventricular (RV) strain in hypertensive individuals.

Design and method: This cross-sectional investigation involved 178 untreated hypertensive subjects and 94 normotensive controls. All study participants underwent 24-hour ambulatory blood pressure monitoring and detailed echocardiographic assessment that included strain evaluation.

Results: The difference in 24-h blood pressure was not found between hypertensive men and women. RV wall thickness was higher among hypertensive participants, but there was no significant difference between hypertensive women and men (4.7 ± 0.5 vs. 4.9 ± 0.7 mm, p = 0.108). RV global longitudinal strain was significantly lower in hypertensive subjects comparing with controls (−22.8 ± 2.6 vs. −25.6 ± 3.4 %, p < 0.001). RV global longitudinal strain was significantly lower in hypertensive men than in hypertensive women (−21.4 ± 2.1 vs. −24.0 ± 3.1 %, p < 0.01). Layer-specific RV strain showed that endocardial and mid-myocardial longitudinal strains were significantly lower in hypertensive population. Additionally, RV endocardial longitudinal strain was significantly lower in hypertensive men than in hypertensive women (−23.2 ± 2.8 vs. −25.8 ± 3.4 %, p < 0.001). Female gender and arterial hypertension and their interaction were related with reduced RV global and endocardial longitudinal strain.

Conclusions: RV longitudinal strain and RV layer-specific endo- and mid-myocardial strains were significantly reduced in hypertensive patients. Female gender was associated with significantly higher risk of decreased RV longitudinal and endocardial strain.
POSTER SESSION

POSTERS’ SESSION PS02:
PHARMACOLOGICAL TREATMENT

ASSESSMENT OF SUITABLE ANTIHYPERTENSIVE THERAPIES: COMBINATION WITH HIGH DOSE AMLODIPINE/IRBESARTAN VS. TRIPLE COMBINATION WITH AMLODIPINE/IRBESARTAN/INDAPAMIDE (ASAHl AI STUDY)

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Objective: Angiotensin receptor blockers (ARBs) plus calcium channel blockers (CCBs) are a widely used combination therapy for hypertensive patients. This study aimed to determine which combination was better as the next step therapy: a combination with high dose CCBs or a triple combination with diuretics.

Design and method: We conducted a prospective, randomized, open-label trial. Hypertensive outpatients who did not achieve their target blood pressure (BP < 140/90 mmHg) with usual dosages of ARBs and amlopidine 5 mg were randomly assigned to switch treatment to losartan 100 mg/amlopidine 10 mg (group ARB+C; n = 30, aged 65 ± 14 years) or indapamide 1 mg in addition to ARBs+amlopidine 5 mg (group ARB+C+D; n = 29, aged 68 ± 9 years). The primary endpoint was any change in the systolic blood pressure (SBP) and diastolic blood pressure (DBP) after the 3-month treatment period, while secondary endpoints were any change in the BP after the 6-month treatment period and laboratory values. We also evaluated the blood pressure variability including the seasonal variation in both groups.

Results: At three months, the SBP/DBP significantly (p < 0.01) decreased from 150/80 ± 8/12 mmHg to 132/73 ± 13/11 mmHg in group ARB+C and 153/81 ± 11/14 mmHg to 129/74 ± 16/12 mmHg in group ARB+C+D. Similarly, at six months, the SBP/DBP significantly decreased to 132/74 ± 12/10 mmHg in the ARB+C group, and to 128/73 ± 12/11 mmHg in the ARB+C+D group. The serum potassium tended to decrease and uric acid to increase in the ARB+C+D group. When each treatment group was subdivided into four seasonal groups according to the season in which patients were assessed, there were no significant differences in the BP values between the four treatment groups. On the other hand, the visit-to-visit variability, evaluated by the SD or CV for the systolic BP, was higher in the ARB+C+D group than ARB+C group especially in the summer.

Conclusions: High dose CCBs combined with ARBs and a triple combination with diuretics combined with CCBs/ARBs produced a similar efficacy in reducing BP. However, the change in the laboratory data and blood pressure variability were advantageous in the ARB+C+D group. The results from the ASAHI AI trial will provide new evidence for selecting optimal combination therapies for uncontrolled hypertensive patients.

CARIOPROTECTIVE EFFECT OF THE RED PALM OIL SUPPLEMENTATION ON THE CARDIAC OXIDATIVE STRESS, NITRIC OXIDE SYNTHASE AND HEART FUNCTION IN THE RATS SUFFERING FROM HYPERTENSION

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Objective: We know from our previous study that myocardial protein connexin 43 (Cx43), responsible for intercellular communication, and protein kinase C epsilon which directly phosphorylates Cx43 on the serine 368, were significantly decreased in spontaneously hypertensive rats (SHR) what was also associated with increased incidence to malignant arrhythmias. Antioxidant rich red palm oil (RPO) significantly normalized all of these parameters. Therefore, we further aimed to investigate whether intake of RPO may affect endothelial dysfunction, antioxidant enzymes and heart function in SHR.

Design and method: In accordance with the rules issued by the State Veterinary Administration of the Slovak Republic and European Union Council Directive 86/609/EEC we used in our experiment 3-months-old, male SHR and normoten- sive Wistar-Kyoto control rats fed standard rat chow without or with RPO (0.2 ml/day/5 weeks). Left ventricular tissue was used to examine expression of anti-oxidant enzymes such as superoxide dismutases (SOD1, SOD2) and glutathione peroxidases (GPX) as well as activity of nitric oxide synthase (NOS). Functional parameters of the heart were measured during basal conditions and at the early-phase of post-ischemic reperfusion by Langendorff-perfused system.

Results: RPO supplementation significantly normalized higher blood pressure and total NOS activity as well as increased lowered expression of mitochondrial SOD2 in SHR hearts during basal condition. RPO intake resulted in the suppression of elevated heart rate, increase of reduced coronary flow and enhancement of systolic and diastolic heart function at the early-phase of post-ischemic reperfu- sion.

Conclusions: We can conclude that SHR benefit from RPO intake due to its ap- parent anti-arrhythmic effects byCx43 modulation, reduction of blood pressure, enhancement of oxidative stress and protection of heart function that was deterio- rated by post-ischemic reperfusion.

IMPACT OF CARDIOVASCULAR DRUG ON ALL-CAUSE MORTALITY IN SECONDARY PREVENTION. A POPULATION STUDY

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Objective: Drug treatment for secondary prevention of cardiovascular disease is an establish strategy recommended by guidelines. However, a wide gap exists between what the guidelines say and the real life in terms of number of drugs. The objective of the SATURNO study was to assess what is the impact on mortality of the gap in subjects after stroke or transitory ischemic attack (TIA), myocardial infarction (MI) or coronary revascularization (REV) based on Electronic Health Records (EHR).

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hypertension, in the cortex from AoCo-ischemic kidney Bax was increased, while 14-3-3e and PPARγ proteins were decreased. Treatment with RGZ, prevented PPARγ and 14-3-3e lower expression, however, it had no effect on Bax expression. With respect Bcl-2 expression was slightly increased in RGZ-treated group. These effects were not observed in medulla were proteins evaluated presented no differences in expres-

BISOPROLOL BETTER THAN ATENOLOL AS ADD ON THERAPY TO ACE INHIBITORS IN BLOOD PRESSURE CONTROL

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Objective: ACE-inhibitors (ACEi) are a first choice treatment in arterial hyper-
tension as reported in European and American guidelines. However, in order to reach the optimal target blood pressure (BP), frequently adding another drug is needed. The aim of this study is to evaluate whether the addition of a beta-blocker (BB) can lead BP to target and whether there is a difference between BBS

Design and method: We have recruited 2 groups of patients (pts) treated with ACEi who weren’t to BP target. First group (Group A), (50 pts 23 F; 27 M, age 62,6) has started treatment adding atenolol while second group (group B), (50 pts 21 F; 29 M, age 62,12) bisoprolol. Comorbidities (hypercholesterolemia, diabetes and use of tobacco) were similar in the 2 groups. The doses of BBs were deter-

Results: After 1 month 38 pts of the group A and 43 pts of the group B were to

BP at home (twice a day during a week) and 24 hours ambulatory monitoring (ABPM) was performed before and 1 month after the treatment.

Results: Of the group A, and 43 pts of the group B were to

BP target. Furthermore, the systolic BP in Group A decreased from 142,38 mm Hg to 131,17 mm Hg (-7,9%, p ns) and the diastolic BP from 89,44 mm Hg to 75,04 mm Hg (-16,05%). Pts didn’t experience any side effects.

Conclusions: Our study demonstrated that adding bisoprolol to a ACEi reduced BP in more pts compared to atenolol allowing to reach target.

PPAR GAMMA STIMULATION BY ROSIGLITAZONE DECREASES BLOOD PRESSURE AND RENAL APOPTOSIS IN A RAT HYPERTENSION MODEL SECONDARY TO AORTIC COARTICATION

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Objective: Rosiglitazone (RGZ), a peroxisome proliferator-activated receptor gamma (PPARγ) ligand, has been reported to function like an insulin sensitizer and exerts cardiovascular actions. The activation of PPARγ has been described to have antiapoptotic effects in renal ischemia-reperfusion models. We hypothesized that RGZ exerts a PPARγ-dependent regulation of blood pressure and decreases kidney apoptosis in an experimental model of hypertension.

Design and method: We performed the experiments in normotensive (sham) and aortic coarctation (AoCo)-induced hypertensive male Wistar rats. Both sham-

and AoCo rats were treated for 7 days with vehicle (V), RGZ (5 mg/kg/day) or RGZ plus BADGE (120 mg/kg/day). After treatment, we measured blood pressure and vascular reactivity on aortic rings as well as the expression and activity of renin-angiotensin system (RAS) components. To study the effect on renal apop-
tosis, we isolated the kidneys, separated both, cortex and medulla, and evaluated the expression of apoptotic (Bax) and anti-apoptotic proteins (14-3-3e, p-Akt and Bcl2) in both regions.

Results: RGZ in AoCo group decreased blood pressure values and improved vas-

cular response to Ach in a PPAR dependent manner. RGZ lowered serum AngII-but increased Ang-(1-7) levels. Also, RGZ decreased oxidative stress markers and improved antioxidant capacity. Regarding protein expression of ACE and AT1, it was lower in RGZ- than in vehicle-treated rats but the expression of ACE2, MAS, and AT2 receptors was increased. Regarding renal apoptosis, in the cortex from AoCo-ischemic kidney Bax was increased, while 14-3-3e and PPARγ proteins were decreased. Treatment with RGZ, prevented PPARγ and 14-3-3e lower expression, however, it had no effect on Bax expression. With respect Bcl-2 expression was slightly increased in RGZ-treated group. These effects were not observed in medulla were proteins evaluated presented no differences in expres-

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Conclusions: We conclude that RGZ lowers blood pressure values by reducing the expression of ACE, decreasing the levels of AngII, and increasing levels of Ang-(1-7) in a PPARγ-dependent manner. RGZ decreases apoptosis in renal cortex and medulla in hypertensive rats. The increase of PPARγ, Bcl-2 and 14-3-3e observed in renal cortex could contribute to this effect.

CONTRIBUTION OF ENVIRONMENTAL POLLUTANTS TO EPIGENETIC MODIFICATION IN RAT VASCULAR SMOOTH MUSCLE CELLS

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Objective: More than a quarter of human diseases have been linked to exposure to environmental pollutants. These pollutants can exacerbate disease conditions through labile epigenetic modifications and directly result in changes in gene transcription. The most commonly reported epigenetic changes are acetylation and methylation of histone lysine. Contribution of acrolen, an environmental pollut-

ant and a major component of cigarette smoke, to cardiovascular diseases and several biological disorders has been reported. We have previously reported toxicity of acrolen in rat’s vascular smooth muscle cells (VSMCs) and the effect of precursor of glutathione transerase, N-acetyl cysteine (NAC), in prevention of acrolen toxicity. In the present study, modification of histones and their effect on protein expression was further investigated in rat’s VSMCs in the present/absent of acrolen and NAC.

Design and method: Design and method: VSMCs were treated with 3 mg/ml of acrolen for 6 and 24 hours in the present/absent of 0.2 mM NAC. At the end of the treatment, MTS assay, ELISA, western blot analysis, immunofluorescence, and LC/MS/MS analysis was used to check cells viability, superoxide dismutase (SOD) activity/expression, reactive oxygen species (ROS) generation, expression and cellular localization of H3K9 tri-methylation and acetylation, and identification of proteins affected by these changes.

Results: Results: Acrolen treated VSMCs exhibited the highest toxicity after 6 hours. Acrolen increased generation of ROS, reduced SOD activity and expression. There was 52% induction of acetylation and 62% in tri-methylation. Addition of N-acetyl cysteine reduced ROS, induced SOD (45%), reduced H3K9 acetylation by 102% and tri-methylation by 120%. These changes were confirmed with immunofluorescence staining. LC/MS/MS analysis revealed in-
creased in actin protein and a significant decreased in annexin, heat shock cogn-
ate, and myosin 9 proteins.

Conclusions: Based on our data we are concluding that effect of acrolen on VSMCs is partially due to alterations of H3K9 methylation/acetylation, resulting in overexpression of actin and significant reduction of annexin, heat shock cognate, and myosin 9 proteins. Addition of 0.2 mM NAC resulted in prevention of toxicity by acrolen by reducing ROS, improving SOD and preventing changes in H3K9 acetylation and methylation.

EFFECTS OF GANAXOLONE ON BLOOD PRESSURE AND STRESS IN FEMALE BPH/2J GENETICALLY HYPERTENSIVE MICE

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Objective: Dysfunctional forebrain gamma-aminobutyric-acid type-A recep-
tors (GABAArS) have been suggested to contribute to neurogenic hypertension in Schlagcr BPH/2J mice. Ganaxolone is a synthetic-form of the progesterone metabtllite, allopregnanolone, an allostetic modulator of GABAARs that has re-
duced blood pressure (BP) in male BPH/2J mice. However, it is unknown whether ganaxolone is suitable to treat hypertension in females mice due to its related structure to progesterone.

Aim: To determine the cardiovascular effects of ganaxolone treatment in female BPH/2J mice.

Design and method: Female 12-13-week-old BPH/2J (n = 20) and normo-
tensive (BN3/1, n = 19) mice were implanted with a telemetry probe to record BP and heart rate. Cardiovascular responses to stress tests and pentolinium were measured before and after administering vehicle or ganaxolone (5 mg/kg/day via
subcutaneous minipumps) for two weeks. Vascular reactivity was measured using myography.

Results: Ganaxolone reduced BP of 9.9 mmHg (P < 0.001) in BPH/2J mice but there were no effects of vehicle or ganaxolone in BPN/3J mice. Depressor responses to pentolinium decreased by 32% (P = 0.02) and pressor responses during restraint (-40%; P < 0.001) and feeding (-40%; P < 0.04) were stresses were reduced in ganaxolone-treated BPH/2J mice compared with pre-treatment. Whilst there were no differences in 24-hour BP in BPN/3J mice, there was an increased pressor ganaxolone-treated BPH/2J mice compared with pre-treatment. Whilst there were no effects of vehicle or ganaxolone in BPN/3J mice. Depressor responses to pentolinium decreased by 32% (P = 0.02) and pressor responses during restraint (40%; P < 0.001) and feeding (40%; P < 0.04) stresses were reduced in ganaxolone-treated BPH/2J mice compared with pre-treatment. There were no differences in 24-hour BP in BPN/3J mice, there was an increased pressor ganaxolone-treated BPH/2J mice compared with pre-treatment. There were no effects of vehicle or ganaxolone in BPN/3J mice. Depressor responses to pentolinium decreased by 32% (P = 0.02) and pressor responses during restraint (40%; P < 0.001) and feeding (40%; P < 0.04) stresses were reduced in ganaxolone-treated BPH/2J mice compared with pre-treatment.

Conclusions: Ganaxolone is effective in reducing hypertension and the cardiovascular response to stress in female BPH/2J mice but also appears to impair endothelial function. Therefore, targeting GABAARs with ganaxolone presents a novel treatment for stress-related hypertension.

EVALUATION OF THE EFFECTS OF MONACOLIN K ON LIPID PROFILE AND ARTERIAL FUNCTION IN DYSLIPIDEMIC PATIENTS


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Objective: We investigated which choice will be more effective whether additional calcium channel blocker (CCB) or diuretic, even administration of routine dose CCB and angiotensin II receptor blocker (ARB) as a multi-center, prospective study.

Design and method: Hypertensives whose blood pressure (BP) couldn’t achieve target BP referred to guideline were recruited. These patients already took routine dose ARB and Amlodipine (AM) 5 mg were divided into two groups. The patients were changed from combination of routine dose ARB and AM 5 mg to combination of Irbesartan 100 mg and AM 5 mg and Indapamide were defined as Group-2. Selection of assign depended on decision of each attending physician. These patients were followed for 6 months to monitor office BP. Results: 85 Group-1 and 49 Group-2 patients were enrolled. After modification, systolic and diastolic BP decreased through 6 months in both groups (p < 0.001, respectively). In the same periods, depressor change of Group-1 SBP was greater compared with that of Group-2 in 1 and 6 month later (p < 0.05, p < 0.05, respectively). Although uric acid in Group-2 was increased in 3 month, this change disappeared in 6 month.

Conclusions: Although both choices demonstrated useful antihypertensive effect, loading AM to 10 mg might be respectable strategy for the uncontrolled hypertoners without serum uric acid increase.

EFFECT OF SUPPLEMENTATION OF FRUIT EXTRACT (CRANBERRY, BLUEBERRY AND POMEGRANATE) ON INSULIN RESISTANCE AND OXIDATIVE STRESS IN HYPERTENSIVE PATIENTS

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Objective: The purpose of this study was to determine if antioxidants (fruit extract) supplementation interfere with insulin resistance and oxidative stress in hypertensive patients.

Design and method: A clinical trial was conducted with 59 individuals, 30 hypertensive patients (group A) and 29 normotensive controls (group B). Study participants received placebo capsules for 4 weeks and then received the fruit extract capsules (blueberry, cranberry and pomegranate), one capsule each day for 4 weeks. Oxidative stress was evaluated by the catalase, TBARS, SOD, cardiolipin and FRAP methods. Anthropometric assessment (weight, height, and body mass index), systolic BP, diastolic BP, heart rate, and biochemistry were evaluated at baseline, after 4, and 8 weeks. The comparisons between groups were held with the GLM repeated measures.

Results: The mean age among hypertensive participants was 49.3 ± 9.3 years, of which 33 (55.9%) were female. BMI, blood pressure and heart rate did not differ between groups. HOMAAR decreased significantly in both groups. Oxidative stress analysis showed increased catalase in both groups and reduced TBARS, cardiolipin, and FRAP in the hypertensive group.

Table 1: Hemodynamic, anthropometric, and biochemistry data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Baseline</th>
<th>4 weeks</th>
<th>8 weeks</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28.6±3.9</td>
<td>28.7±4.1</td>
<td>28.6±4.1</td>
<td>0.452</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>141±22</td>
<td>143±28</td>
<td>137±27</td>
<td>0.113</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>83±13.9</td>
<td>83±17.9</td>
<td>78±15.3</td>
<td>0.137</td>
</tr>
<tr>
<td>HR (bpm)</td>
<td>63±10.2</td>
<td>56±9.7</td>
<td>51±7.9</td>
<td>0.081</td>
</tr>
<tr>
<td>HOMA (units)</td>
<td>3.6±2.9</td>
<td>3.6±2.9</td>
<td>1.3±1.4</td>
<td>0.001</td>
</tr>
<tr>
<td>Glucose (mmol/L)</td>
<td>107±44.2</td>
<td>103±33.1</td>
<td>106±35.1</td>
<td>0.060</td>
</tr>
<tr>
<td>Catalase (invertingprot)</td>
<td>1.06±0.3</td>
<td>1.10±0.2</td>
<td>1.07±0.1</td>
<td>0.108</td>
</tr>
<tr>
<td>TBARS (invertingprot)</td>
<td>0.05±0.7</td>
<td>0.05±0.3</td>
<td>0.05±0.1</td>
<td>0.002</td>
</tr>
<tr>
<td>SOD (invertingprot)</td>
<td>3.2±0.9</td>
<td>3.2±0.9</td>
<td>3.0±0.6</td>
<td>0.047</td>
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<tr>
<td>Cardiolipin (invertingprot)</td>
<td>2.4±0.9</td>
<td>1.9±0.7</td>
<td>1.8±0.4</td>
<td>0.014</td>
</tr>
<tr>
<td><strong>Group B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>27.9±3.8</td>
<td>28.0±3.8</td>
<td>27.6±3.7</td>
<td>0.045</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>121±15.6</td>
<td>122±13.4</td>
<td>120±13.1</td>
<td>0.557</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>74±9.6</td>
<td>74±9.6</td>
<td>71±8.7</td>
<td>0.134</td>
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<tr>
<td>HR (bpm)</td>
<td>64±11.2</td>
<td>66±12.0</td>
<td>67±10.7</td>
<td>0.179</td>
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<tr>
<td>HOMA (units)</td>
<td>2.6±1.2</td>
<td>2.5±0.7</td>
<td>1.6±0.7</td>
<td>0.009</td>
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<tr>
<td>Glucose (mmol/L)</td>
<td>90±7.9</td>
<td>91±8.7</td>
<td>90±7.3</td>
<td>0.848</td>
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<tr>
<td>Catalase (invertingprot)</td>
<td>1.5±1.1</td>
<td>1.9±1.5</td>
<td>1.89±1.3</td>
<td>0.003</td>
</tr>
<tr>
<td>TBARS (invertingprot)</td>
<td>0.07±0.4</td>
<td>0.05±0.3</td>
<td>0.05±0.1</td>
<td>0.037</td>
</tr>
<tr>
<td>SOD (invertingprot)</td>
<td>3.2±0.5</td>
<td>3.1±0.4</td>
<td>0.6±1.3</td>
<td>0.150</td>
</tr>
<tr>
<td>Cardiolipin (invertingprot)</td>
<td>1.8±0.2</td>
<td>1.8±0.2</td>
<td>2.1±0.6</td>
<td>0.618</td>
</tr>
<tr>
<td>FRAP (invertingprot)</td>
<td>1.16±0.5</td>
<td>1.40±0.5</td>
<td>1.36±0.4</td>
<td>0.213</td>
</tr>
</tbody>
</table>

Conclusions: The results of this study suggest that supplementation with fruit capsules rich in antioxidants for 4 weeks significantly reduces insulin resistance and improves oxidative stress in hypertensive patients.
SAFETY AND EFFICACY OF INDAPAMIDE SUSTAINED RELEASE/ AMLODIPINE FIXED-DOSE COMBINATION IN ESSENTIAL HYPERTENSION

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Objective: To assess safety and efficacy of indapamide/amlopidine in single-pill (Ind/Aml) versus free combination of indapamide + amlopidine (Ind+Aml).

Design and method: International, randomized, open-label, controlled, 12-week phase III trial. After a run-in period on their previous antihypertensive drug (if any), patients with mild to moderate systolic and diastolic or isolated systolic hypertension (SBP 140–180 mmHg and DBP < 110 mmHg) were randomized and received Ind/Aml 1.5/5 mg single-pill or free combination at the same dose, potentially up-titrated to 1.5/10 mg after 6 weeks.

Assessment criteria: Office systolic blood pressure (BP) in all patients, office diastolic BP in patients with systolic and diastolic hypertension, home BP monitoring (HBPM), control rate, safety.

Results: 154 patients (77 per group) with similar baseline BP (154/97 mmHg), mean age 58 years, mostly previously treated for hypertension (92%) were included. BP measurements in the 12-week placebo-controlled trial, the largest BP decrease (20-22 mm Hg in systolic and -15 mm Hg in diastolic) was obtained on the fixed-dose combination allowing BP control in most patients (69%). A large decrease was already observed after 6 weeks (-18-13 mmHg). The titration to Ind/Aml 1.5/10 mg, in patients not controlled at 6 weeks, allowed additional BP decrease (-11 mmHg in systolic and -6 mmHg in diastolic), while efficacy of the first dose was maintained in the patients already controlled at week 6 (51%). Similar results were observed in terms of BP decrease (-22/-12 mmHg) and control rate (64%) in the free combination group at 12 weeks. HBPM data corroborated these findings. Treatment was well tolerated regarding adverse events or laboratory testing. Peripheral edema and hypotension or orthostatic hypotension remained low, even with the highest dose. The safety profile was similar in the two treatment groups.

Conclusions: Indapamide/amlopidine in a single pill was as effective on BP reduction as the free combination in patients with uncontrolled hypertension, allowing a blood pressure control rate of 69% after 12 weeks. Up-titration to Ind/Aml 5/10 mg was associated with an incremental reduction of BP. The safety profile was good and similar in both groups.

CARDIAC MYOSIN-ISOFORM SHIFT IS ACCOMPANIED BY STABLE MUSCLE-SPECIFIC MICRORNAS IN MONOCROTALINE-INDUCED PULMONARY HYPERTENSION

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Objective: During cardiac hypertrophy, a shift in distribution of myosin heavy chains (MHC) isoforms occurs, namely MHC-b (coded by Myh7 gene) increases at the expense of MHC-a (coded by Myh6 gene). MicroRNAs are small, non-coding RNAs which are involved in gene expression regulation. Muscle-specific microRNAs in MCT+4W by 13%).

Results: MCT injection led to expected significant isolated right ventricular hypertrophy, decreased oxygen saturation and increased right ventricular pressure in MCT+4W group (P < 0.05). Nppb was significantly increased in RV in MCT+2W rats (by 154%) and in MCT+4W (by 312%) and, paradoxically, also in non-hypertrophied LV of MCT+4W (by 30%) when compared to age-matched controls (P < 0.05). Myh6 was significantly decreased in RV in MCT+4W (by 14%). Interestingly, we noted significant increase in Myh7 also in non-hypertrophied LV of MCT+2W (by 58%). These alterations were independent from microRNAs (miR-1, miR-133a, miR-208a and miR-499) expressions, which remained stable (the only exception was a moderate, but significant decrease in miR-133a in RV of MCT+4W by 13%).

Conclusions: MCT-induced pulmonary hypertension was accompanied by increased mRNA expression and myosin isoform shift, however change in muscle-specific microRNAs was observed. Our findings suggest a missing epigenetic regulation of particular MHC genes and hypertrophic remodelling by respective microRNAs in experimental pulmonary hypertension.

SMOOTHNESS INDEX OF CENTRAL BLOOD PRESSURE AND PARAMETERS FOR VASCULAR STIFFNESS AFTER 20 WEEK TREATMENT WITH LOSARTAN PLUS AMLODIPINE VS. THIAZIDE RANDOMIZED TRIAL

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Objective: With limitation of clinic and brachial BP, central BP and vascular parameters have been known to be better to probe efficacy of antihypertensive drug. Because vascular parameters are measured at resting state, role of ambulatory central BP and vascular parameters to explain the difference in clinical efficacy between renin angiotensin system inhibitor in combination with amlopidine versus hydrochlorothiazide was uncertain.

Design and method: As sub-study of multicenter randomized double blinded, losartan based therapy combined with amlopidine (LA) versus hydrochlorothiazide (LH), 143 patient (LH:73, LH:70) out of 220 patients with 80% or more valid readings in 24 hour ambulatory monitoring using Mobile-O-graph which provide ambulatory central BP and vascular stiffness data were analyzed. Smoothness index (SI) of SBP, central SBP (ACSBP), pulse pressure amplification(APPA), augmentation index(AAIX), and carotid femoral pulse wave velocity(AcPWV). APPA was calculated by the ratio of SBP to ACSPB.

Results: Age was 58.9 ± 12.3 years and female was 25.9%. Prevalence of drinking and current smoking were 51.5% and 21.7%, respectively. Diabetes mellitus was noted in 14.7%. Clinic BPs were 153.8 ± 10.2/92.4 ± 8.5 mmHg. Ambulatory 24 hour SBP and ACSPB were 136.5 ± 11.7 mmHg and 126.6 ± 11.0 mmHg. Changes in office BP was not different (LH: -15.2 ± 15.0/-7.8 ± 8.0 vs. LA: -14.9 ± 13.7/-9.2 ± 7.5 mmHg). Reductions of 24 hour SBP were greater in LA than LH (-10.3 ± 12.6 vs. -6.6 ± 10.2 mmHg, p = 0.0478). Only nocturnal ACSBP reduction was significant (LH:4.1 ± 12.2 vs. LA:9.4 ± 12.2, p = 0.01). And only nocturnal AcPWV reduction was significant (LH:0.09 ± 0.41 vs LA: 0.26 ± 0.44 m/sec, p = 0.023). Individual intra-SIs for SBP and ACSPB were higher in LA than LH(SBP: 0.57 ± 0.78 vs. 0.39 ± 0.57, p = 0.0196; ACSPB: 0.57 ± 0.74 vs. 0.40 ± 0.57, p = 0.022). Individual intra-SI for AcPWV were marginally significant (LH:0.31 ± 0.58 vs. LA:0.54 ± 0.77, p = 0.053). SIs for APPA and AAIX were not different. Individual intra-TP rates were higher in LH than LA group but the differences are not significant for both SBP[0.30(95%CI, -0.07-1.30] and ACSPB[0.24(95%CI, -0.51-3.80)].

Conclusions: LA combination seems to be superior to LH combination in reduction of ambulatory SBP. But for the reduction of ACSPB or AcPWV was significant only in nighttime. Difference in individual SI was significant both in SBP and ACSPB but not in AcPWV. Further larger sample size studies are need.
**Objective:** The increase of left ventricular mass index (LVMI), a marker of cardiac end-organ damage, is frequently found in hypertensive patients (HTs) and is associated with high risk of cardiovascular and cerebrovascular events. Therefore, LVMI reduction is an important treatment goal. Few specific studies on LVMI have been reported to date about the effects of tripled fixed-combination (TFC) of antihypertensive drugs.

**Design and method:** The data shown herein are a part of a clinical prospective, open-label study performed in 2016 (see reference below), involving 92 HTs with essential hypertension randomized to 4-month treatment with the TFC of perindopril + indapamide + amlopidine and a comparable sample of HTs taking a free triple combination therapy (FCT) with ACE-inhibitor + diuretic + calcium channel blocker. The study was aimed to clarify whether TFC treatment was as effective as FCT in reducing echocardiographic LVMI in a 14-month of follow-up. The changes of office systolic (SBP) and diastolic (DBP) blood pressure (BP) at the follow-up (FW) from baseline (BL) were calculated according this formula: ((BP_FW - BP_BL)/BP_BL) × 100. Analysis of variance for repeated measures was performed. Ref. Mazza A et al. Adv Ther 2017; 34:975–985.

**Results:** During the follow-up, BP lowering was comparable in the two groups, with a positive but non-significant trend for TFC (Figure 1). Compared to baseline, both treatments reduced LVMI, but the reduction was significantly greater with TFC that with FCT (Figure 2).

**Conclusions:** A TFC of antihypertensive drugs was found to be effective in improving LVMI and could be considered a new important tool in modulating the cardiovascular continuum from cardiac organ damage to events.

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**CONTRIBUTION FACTORS ON ACHIEVEMENT RATE OF TREATMENT GOALS OF BP AND LDL-C BY 3 MONTHS’ THERAPY OF ROVELITO (FIXED DOSE COMBINATION PILL OF IRBESARTAN AND ATORVASTATIN)**

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**Objective:** Coexistence of hypertension (HTN) and hypercholesterolemia is the major synergistic and modifiable risk factor for cardiovascular disease (CVD). A fixed-dose combination (FDC) of anti-HTN drug and stain may be valuable in terms of improving drug compliance especially for statin. Because renin angiotensin system activation and hypercholesterolemia are accompanied with obesity and angiotensin receptor blocker is more advantageous for Asians as it does not cause dry cough due to the angiotensin converting enzyme inhibitors, FDC of irbesartan and atorvastatin (Rovelito) may improve the treatment success rate.

**Design and method:** Patients with comorbid HTN and hypercholesterolemia were screened for this prospective, observational, descriptive, multi-center, phase IV study. Eligible patients were administered with Rovelito for 3 months. Dose adjustment was allowed per physician’s discretion. Primary purpose of this study was to evaluate the variables that affect treatment success rate for blood pressure (BP) and/or LDL-cholesterol (LDL-C). In addition, the compliance with the therapeutic lifestyle modification and the safety of the study drug were evaluated.

**Results:** Among the total of 2,801 patients enrolled in the study, 945 patients were analyzed for clinical efficacy. BP and LDL-C goals were achieved in 813 (86.03%) and 811 (85.82%), respectively. Higher baseline BP and body mass index (BMI) were the factors for poor treatment success rate of BP goal. Baseline LDL-C level, number of concurrent medications and drinking status were the factors for poor treatment success rate for LDL-C goal. Of the total of 945 study participants, 706 (74.71%) reached the both treatment goals BP and LDL-C, diabetics and higher baseline LDL-C levels and number of concurrent medications were the factors for poor treatment success rate for both BP and LDL-C. Adherence with Rovelito was 97.87 ± 6.06% and incidence of AEs was 4.15%.

**Conclusions:** FDC of irbesartan and atorvastatin (Rovelito) can be very helpful for managing patients with both HTN and hypercholesterolemia in Asian perspectives. Poor metabolic profile itself is as well the reason to choose Rovelito as the factor for poor treatment success rate. Therapeutic life style modification still should be underscored even with 75% treatment success rate for both conditions.

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**INFLUENCE OF ANTIHYPERTENSIVE TREATMENT ON MMP-9 LEVELS IN CONTROLLED HYPERTENSIVE INDIVIDUALS**

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**Objective:** Ambulatory blood pressure monitoring (ABPM), in addition to peripheral blood pressure (BP) measurements, provides data on central hemodynamics, such as pulse wave velocity (PWV), augmentation index (AI 75%) and central pressure, which are associated with arterial stiffness. The development of arterial stiffness is related to an extracellular matrix enzyme called metalloproteinase-9 (MMP-9). The aim of the current study is to evaluate the correlation between the variables obtained by ABPM and levels of MMP-9 at different BP levels.

**Design and method:** On-hundred and one individuals were enrolled: 21 normotensive (NT), 36 prehypertensive (PH), and 44 controlled hypertensive (CHT). Peripheral and central BP parameters were evaluated by ABPM using Mobil-O-Graph® 24-hour monitor and MMP-9 levels were determined in all participants. The levels of MMP-9 were assessed using the Human Matrix metalloproteinase-9 Quantikine ELISA kit (R & D Systems, Inc., Minneapolis, MN, USA) with a calculation of medians being presented as nanograms per milliliter (ng/mL). Subsequently, MMP-9 values were transformed into logarithms to reflect normal distribution for statistical analysis.

**Results:** Age of the participants ranged from 30–71 years. MMP-9 concentration was significantly higher in the PH (log 4.74 ± 0.5) compared to CHT group (log 4.41 ± 0.5; p = 0.02). Mean PWV was greater in CHT than PH (8.1 ± 1.2 m/s vs. 6.9 ± 1 m/s; p-value = 0.0003, respectively), but no differences were found in AI 75% between CHT and PH groups. On the other hand, PH individuals had higher mean PWV than NT individuals (8.1 ± 1.2 m/s vs. 6.9 ± 1 m/s; p-value = 0.0003, respectively). MMP-9 levels correlated with cardiac output and peripheral vascular resistance in the three periods evaluated by ABPM (24 h, wakefulness and sleep).

**Conclusions:** Prehypertensive individuals present greater arterial stiffness and MMP-9 levels than normotensive subjects, fact that demonstrate already structural alterations in this group. In its turn, higher levels of MMP-9 are observed in prehypertensive compared to controlled hypertensive subjects, suggesting that antihypertensive therapy may reduce MMP-9 plasma levels.

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**SELECTIVE DOWREGULATION OF STROMAL CELL DERIVED FACTOR-1 ALPHA IN THE RIGHT VENTRICLE PRECEDES THE DEVELOPMENT OF PULMONARY HYPERTENSION IN MONOCROTALINE-TREATED RATS**


**Objective:** Stromal cell derived factor-1 alpha (STF-1A) is chemotactic for stem cells, it inhibits cardiomyocyte apoptosis and promotes vascularization via CXCR4 receptor. STF-1A is inactive in dipeptidylpeptidase-4 (DPP-4). Albeit cardioactive, STF-1A was proposed to play a pathogenic role in hypoxic pulmonary hypertension (PH), antagonism of STF-1A in the monocrotaline PH model improved pulmonary remodeling, and increased STF-1A in human PAH was associated with an unfavourable outcome. However, the status and role of local STF-1A in right ventricular (RV) damage in PH is unknown.

**Design and method:** We treated male 12 weeks old Wistar rats with monocrotaline (60 mg/kg, s.c., MON) or vehicle (CON), (n = 7–10 per group at the end of experiment). The rats were sacrificed after 1, 2 or 4 weeks after monocrotaline or vehicle injection. Hemoglobin oxygen saturation, heart rate were measured using pulse oximetry in conscious rats, RV pressure was measured by right ventricular catheterisation under anesthesia. Gene expressions of STF-1 alpha (STF-1A), CXCR4 and DPP4 in left ventricle (LV) and RV samples from separate groups of rats sacrificed by CO2 were analyzed by qRT-PCR.

**Results:** Haemoglobin oxygen saturation decreased (−3.2%, P < 0.05) and breath rate increased (+40%, P < 0.05) after 4 weeks, heart rate was unaffected by MCT.
AGE-DEPENDENT HYPERTENSION AND VASCULAR REMODELING IN DAHL-S RATS ARE ASSOCIATED WITH ELEVATED LEVELS OF MARINOBUFAGENIN AND COGNITIVE DECLINE

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Objective: Age-associated hypertension and central arterial stiffening contribute to cognitive impairment. Increase in blood pressure (BP) and aortic remodeling occur in Dahl salt-sensitive rats (Dahl-S) with an advancing age even on a normal salt intake. Marinobufagenin (MBG), a novel pro-hypertensive factor, is implicated in Dahl-S hypertension. In Dahl-S, development of age-dependent cognitive impairment implicates in cognitive decline in Dahl-S and whether these changes are accompanied by an increase in pro-hypertensive and pro-fibrotic factor MBG.

Design and method: Male Sprague-Dawley rats (S-D) and Dahl-S were kept on a normal 0.5% NaCl intake (n = 8/14 per group) for the duration of the study. Systolic BP (SBP), pulse wave velocity (PWV), MBG, aortic collagen, and behavioral tests (open field test (OFT); novel object test; redundant place-cue version of the Morris water maze test (MWM); rotatedar test) were assessed in 3-mo and 12-mo animals.

Results: At 3-mo Dahl-S had higher SBP, PWV and aortic wall remodeling vs. 3-mo S-D. Between 3 and 12-mo both S-D and Dahl-S exhibited an increase in SBP, PWV, MBG and aortic wall collagen deposition. These parameters were significantly higher in 12-mo Dahl-S than in age-matched S-D (Table). MBG correlated with SBP in Dahl-S only (Pearson R = 0.52, p = 0.04), and with PWV in both S-D (Pearson R = 0.37, p = 0.01) and Dahl-S (Pearson R = 0.54, p = 0.04). Behaviorally, in an MWM, 12-mo DSS demonstrated impaired spatial hippocampal memory vs. 12-mo S-D. Compared to 3-mo, both 12-mo S-D and Dahl-S demonstrated an age-dependent decline in OFT activity, but 12-mo Dahl-S were more active in OFT, had more endurance during the rotatedar test indicating non-impaired motor coordination, and showed increased object exploration vs. age-matched S-D (Table). Performance in behavioral tests by 12-mo hypertensive Dahl-S may suggest the development of age-associated anxiety and change in emotional status, and a decline in their spatial hippocampal memory.

Conclusions: Cognitive deficit in aged hypertensive Dahl-S is limited to hippocampal-dependent spatial memory. In Dahl-S, development of age-dependent hypertension and aortic wall remodeling, occurred in context with an increase in MBG, may contribute to hippocampal spatial memory impairment, and suggested a possible implication of MBG in these declines.

QUERCETIN INCREASES NITRIC OXIDE-DEPENDENT DILATION IN RAT THORACIC AORTA

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Objective: Endothelial dysfunction plays an important role in development and progression of arterial hypertension. In recent years there was reported that polyphenolic compounds improve the function of endothelium, however, their molecular mechanisms on endothelial cells remain unclarified. Purpose of study was to determine whether polyphenols (quercetin, caffeic acid or resveratrol) are able to improve NO-dependent vasodilation in rat aortic rings.

Design and method: Male Wistar rats were anaesthetized by chloralhydrate over dose and decapitated. Descending thoracic aorta was carefully excised and cut into ring segments 3 mm in length and then transferred into organ baths containing Krebs solution bubbled with mixture of 95% O2 and 5% CO2. Rings were precoated with 0.3 uM Phenylephine and increasing concentrations of acetylcholine (Ach, 0.001 uM - 30 uM) were cumulatively added to organ bath. At the beginning of each experiment, all rings were pretreated with diclofenac for 30 minutes to prevent the generation of vasoactive prostanoid metabolites. Querce-

Results: Ach elicited a concentration-dependent relaxation of rat aortic rings. After exposure to quercetin the relaxant responses to all concentrations of Ach were markedly excised and cut into ring segments 3 mm in length and then transferred into organ baths containing Krebs solution bubbled with mixture of 95% O2 and 5% CO2. Rings were precoated with 0.3 uM Phenylephine and increasing concentrations of acetylcholine (Ach, 0.001 uM - 30 uM) were cumulatively added to organ bath. At the beginning of each experiment, all rings were pretreated with diclofenac for 30 minutes to prevent the generation of vasoactive prostanoid metabolites. Querce-

Conclusions: Our results demonstrate that quercetin improves endothelial dys-
function due to increased NO-dependent vasodilation. This mechanism could be associated with decrease in the ROS level and related decrease in inactivation of NO, or with activation of eNOS and related increase in NO synthesis in the endothelium.

Study was supported by grant from Russian Foundation for Basic Research 15-04-05-211

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**POSTER SESSION**

**POSTERS’ SESSION PS03: RESISTANT HYPERTENSION**

**PREVALENCE AND RISK FACTORS OF RESISTANT HYPERTENSION IN THE RENAL TRANSPLANT RECIPIENT**

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Objective: Arterial hypertension (HT) is common in renal transplant recipients (RTRs) and control of HT is not optimal in this high risk population. Previous study showed that metabolic syndrome is emerged as strong predictors of poor HT control. Also, persistent hyperparathyroidism is common in RTRs and elevated serum parathyroid (PTH) levels are related with an increased risk of diabetes, development. RTRs, regardless of achieved renal function, may experience resistant hypertension (RH). The aim of this a cross-sectional was to analyse the prevalence of RH and identified possible factors associated with resistant HT in RTRs.

**RESULTS:**

<table>
<thead>
<tr>
<th>Patients with arterial hypertension (n=198)</th>
<th>Patients with arterial hypertension (n=85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>25.72 ± 3.77</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>157.2 ± 18.71</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>102.2 ± 9.24</td>
</tr>
<tr>
<td>Creatinine (mmol/L)</td>
<td>1.07 ± 0.37</td>
</tr>
<tr>
<td>Glucose (mmol/L)</td>
<td>5.47 ± 0.43</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>4.12 ± 0.71</td>
</tr>
<tr>
<td>LDL cholesterol (mmol/L)</td>
<td>3.19 ± 0.92</td>
</tr>
<tr>
<td>Calcium (mmol/L)</td>
<td>2.43 ± 0.31</td>
</tr>
<tr>
<td>Phosphorus (mmol/L)</td>
<td>3.94 ± 0.23</td>
</tr>
<tr>
<td>Parathyroid hormone (pmol/L)</td>
<td>15.15 ± 7.65</td>
</tr>
<tr>
<td>Urea (mmol/L)</td>
<td>7.97 ± 3.32</td>
</tr>
</tbody>
</table>

**CONCLUSIONS:** A total of 48 patients were analysed with 27 patients suitable for long-term prediction. According to the protocol of the study, spironolactone was added at 12-month follow-up as a crossover and these patients were excluded from long-term analysis. Five of the 27 patients were identified as long-term responders with average 24 h blood pressure decline of 28.9 mmHg. Strongest predictors of BP decline were baseline 24 h systolic blood pressure (p = 0.01) and higher diameter of the left renal artery (p = 0.04).

**RESULTS:**

- Objective: Diverse of blood pressure response and great variability within studies emphasise the need to identify predictors of renal denervation efficacy. Previous studies identified various predictors within periods of 3–6 months.

- **Design and method:** The goal of the current study is to examine the possible predictors of sustained decline of blood pressure after renal denervation in a long-term period of 2 years.

- **Results:** A total of 189 RTRs were randomised in the original Prague-15 study or were pilot patients, meeting the same inclusion criteria of true-resistant hypertension. Patients were considered as responsive when the decline of 24 h systolic blood pressure > 10 mmHg was present 6, 12 and 24 months after the procedure. In addition, analysis for separate visits was performed. Denervation was performed using the Insignia Symplicity® Renal Denervation System. Extensive assessment of computed tomography angiography by numerous measurements including morphology of the renal arteries was performed.

- **Conclusion:** Only a minority of denervated patients exhibited sustained blood pressure decline. Higher baseline blood pressure and higher renal artery diameter were the strongest predictors. Our findings thus might theoretically support the actual hypothesis of the necessity to ablate the distal parts of the renal artery (these conditions might allow such ablation to be performed).

**EFFECTS OF TNF-ALPHA INHIBITION ON HEMODYNAMIC PARAMETERS AND BIOMARKERS IN RESISTANT HYPERTENSION**

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**Objective:** Currently it has been largely discussed the influence of inflammation in resistant hypertension (RH). The blood pressure (BP) variation promotes increased expression of pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α), interleukins -1 and -6. It was showed that treatment with TNF-α inhibitor improves BP and endothelial function, and reduces arterial stiffness in patients with rheumatoid arthritis. Recently, it was demonstrated that TNF-α levels are increased in RH subjects compared to normotensives. The purpose of this study was to assess whether the acute inhibition of TNF-α (using infliximab infusion) changes hemodynamic parameters, as well as biomarkers in RH.

**Design and method:** This crossover, double-blind study included 10 RH subjects – regularly followed at the Outpatient Resistant Hypertension Clinic (UNICAMP/Brazil) – which were randomized assigned to either (1) serum infusion followed by infliximab infusion (TNF-α inhibitor, 3 mg/kg) or (2) infusion of saline followed by serum infusion, for two hours and a washout period of 40 days between the infusions. Office, central and ambulatory BP levels, and biomarkers were determined before and after 7 days of infusions. Hemodynamic parameters (determined by Finometer device) was simultaneously assessed during infusions. The plasma concentrations of TNF-α, ILs-1, -6, -10, adiponectin, aldosterone, renin, cortisol were determined by ELISA.

**Results:** Treatment with infliximab increased the delta values of cortisol (3.45 vs. 2.44 µg.dL⁻¹; p = 0.01) and decreased delta renin levels (0.05 vs 0.25 ng.ml⁻¹; p = 0.03) compared with placebo. Also, TNF-α levels increased after 7 days of infliximab infusion (37.93 ± 38.49 to 110.18 ± 19.54 pg.ml⁻¹; p = 0.01), but did not change with placebo. Delta heart rate values increased after infliximab when
Results: The average level of office systolic BP(SBP) and diastolic BP(DBP) was158.1 ± 1.2 and 91.03 ± 0.9mmHg, respectively. After 3 months of treatment with 3-components FDC, according the results of office and ambulatory BP measurements,RAH was confirmed at 78pts and 102pts achieved the target blood pressure level(these pts were classified as pts with controlled arterial hypertension(CAH)). RAH pts were older than CAHpts:52.4 ± 1.2 vs.49.8 ± 1.6yas(p = 0.02). Both groups were dominate by men-60.5%among RAH pts and62.6% among CAH pts.But initial BP levels(of office and ambulatory)were higher in RAH group(tab.1).

In the CAH group the office SBP decreased by 21%,DBP-by19.5%,the average daytimeSBP and DBP by15.2% and14.4% respectively, the average nighttime SBP and DBP by16.7 and16.4% respectively. In the RAH group BP lowering was smaller:the office SBP decreased by13.2%,DBP - by9%,the average daytime SBP and DBP by10.3and8.7% respectively;the average nighttime SBP and DBP by11.1and10.2% respectively. All pointed changes of BP were significant(p < 0.001)(tab.1).

The results of the Morsky-Green tests show that treatment with FDC of anti-hypertensive drug led to improvement of the adherence to therapy. The initial Morsky-Green rate,which was assessed retrospectively, at RAH pts was1.3 ± 0.1(points and at CAH pts1.4 ± 0.1(p < 0.05),after 3-months of treatment with 3-components FDC it elevated to 2.5 ± 0.2 and2.6 ± 0.2 points, respectively, in both groups(p < 0.005).

Conclusions: Thus, administration of 3-components FDC(RAAS blocker/diuretic/calcium channel blocker) improves the adherence to treatment, which can probably ameliorate the efficacy of antihypertensive treatment. Perhaps, the use of 3-component FDC in patients with a diagnosis of RAH could help to achieve the effective BP control and reduce the necessity of adding the 4-th antihypertensive drug for achieving of goal BP.

EFFECTS OF RENAL DENERVATION ON BLOOD PRESSURE IN PATIENTS WITH END-STAGE RENAL DISEASE: A SINGLE CENTER EXPERIENCE

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1Department of Nephrology and Hypertension, Friedrich-Alexander University Erlangen-Nürnberg, Erlangen, GERMANY; 2Department of Radiology, Friedrich-Alexander University Erlangen-Nürnberg, Erlangen, GERMANY

Objective: Sympathetic nerve activity is a hallmark of hypertension in end-stage renal disease (ESRD). An initial proof-of-concept study implies that renal denervation (RDN) is feasible and safe in RDN, but overall data are limited.

Design and method: In this single-centre prospective pilot study 6 patients with ESRD and treatment resistant hypertension were consecutively included. Ambulatory blood pressure (ABP) was measured before and 6 months after RDN (Symplex FlexÔ, Medtronic Inc., Santa Rosa, CA). Moreover, hemodialytic parameters which may impact on BP-reduction were monitored closely.

Results: In all patients bilateral RDN was successful done, without documentation of peri- or postprocedural complications. There was a significant reduction in 24-h ABP by -20/17 ± 15/12 mmHg 6 months after RDN (systolic: 163 ± 16 vs. 143 ± 9 mmHg, p = 0.043; diastolic: 96 ± 9 vs. 81 ± 15 mmHg, p = 0.043), with similar results for day-, and nighttime values, respectively. Antihypertensive medication was kept stable as well as there was no change in hemodialysis parameters during follow-up. In addition, ultrafiltration/week (1.4 ± 1.4 versus 2.2 ± 1.4 l, p = 0.08) as well as hemocrit (measured at baseline and 6 months after RDN (33.7 ± 4.3 versus 33.1 ± 3.9, p = 0.715) revealed no change in volume status.

Conclusions: Our single-center pilot study support current data on renal safety of RDN even in small arteries of patients with ESRD, but also expand the knowledge towards an effective ABP-reduction.

A STANDARDIZED TRIPLE THERAPY COMBINED WITH ELECTRONIC MONITORING OF ADHERENCE NORMALIZES 24 H ABPM IN AT LEAST ONE THIRD OF PATIENTS WITH RESISTANT HYPERTENSION


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Objective: Poor adherence to drug therapy is one of the most common factor explaining a poor blood pressures (BP) control in patients with apparent resistant hypertension. Few studies have used a standardized treatment coupled to electronic adherence monitoring in patients with apparent resistant hypertension. The objective of this study was to determine the rate of BP control when prescribing a standardized triple therapy associated with electronic monitoring of drug intake for 3 months and assessing BP control using 24 h ambulatory BP monitoring (ABPM).

Because of the acute inhibition of TNF-α changes hormonal and inflammatory biomarkers although did not modify hemodynamic parameters in RH subjects.

CARDIOPROTECTIVE EFFICACY OF RENAL DENERVATION: INFLUENCE OF BLOOD PRESSURE VARIABILITY

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Objective: To study influence of BP variability on cardioprotective efficacy of renal denervation using cardiac contrast-enhanced magnetic resonance.

Design and method: 26 patients with resistant hypertension, giving informed consent, were enrolled in the study. RDN was done to all patients. All patients were divided into two groups, according to BP variability (systolic standard deviation SSD > 15 mm Hg): the 1st group – with normal 24-h BP variability (n = 10) and the 2nd - with high 24-h BP variability (n = 16). Initially, at 6 and 12 months after treatment, patients were measured 24-h ambulatory BP and cardiac contrast – enhanced magnetic resonance (MR). Left ventricular mass (LVM) and the volume of subendocardial damage, detected as summary volume of contrast uptake in myocardium on post-contrast MR study, were measured.

Results: All baseline parameters were similar in comparison groups: for ambulatory BP 151.9 ± 13.4/84.5 ± 9.7 and 157.0 ± 14.9/88.4 ± 14.3 mm Hg, p > 0.05) and 12 month (148.5 ± 13.4/84.5 ± 9.7 and 157.0 ± 14.9/88.9 ± 16.2 mm Hg, p = 0.03). LVM was significantly reduced at 6 month by 9.3% (231.8 ± 58.9 g, p = 0.003) and 12 month by 23.1% (216.7 ± 82.0 g, p = 0.003) in the 2nd group. The volume of subendocardial damage also was reduced in the 2nd group at 12 month by 23.1% (196.4 ± 41.6 g, p = 0.003) in the 2nd group.

Improving an efficiency of resistant hypertension treatment with fixed dose combination of 3-components antihypertensive medication

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Objective: Improving an efficiency of resistant hypertension treatment with fixed dose combination of 3-components antihypertensive medication

Table 1. The dynamics of blood pressure under 3-components FDC treatment

<table>
<thead>
<tr>
<th>BP, mmHg</th>
<th>CAH pts n = 102</th>
<th>RAH pts n = 78</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before treatment</td>
<td>After treatment</td>
<td>Before treatment</td>
</tr>
<tr>
<td>Office SBP</td>
<td>151.9 ± 13.4</td>
<td>148.5 ± 13.4</td>
</tr>
<tr>
<td>Office DBP</td>
<td>97.1 ± 12.1</td>
<td>97.1 ± 12.1</td>
</tr>
<tr>
<td>Average daytime SBP</td>
<td>154.1 ± 14.8</td>
<td>154.1 ± 14.8</td>
</tr>
<tr>
<td>Average daytime DBP</td>
<td>94.2 ± 10.1</td>
<td>94.2 ± 10.1</td>
</tr>
</tbody>
</table>

*p < 0.01 for the difference of the values between the groups and after treatment.*

Design and method: 180pts with the preliminary diagnosis of RAH, which was confirmed by 24-h ambulatory blood pressure monitoring(ABPM),were included in the study. All pts received an average of 0.4 ± 0.3 antihypertensive drugs, mainly in free combinations. After ABPM pts were started treatment with 3-component fixed dose combination (FDC) of antihypertensive drugs: the FDC of perindopril10 mg/indapamide2.5 mg/amlopidine10mg(108pts) or the FDC of valsartan120 mg/hydrochlorothiazide25 mg/amlopidine10mg(72pts). The adherence to the treatment was evaluated by the Morsky-Green test(MGT) at the initial examination and after 3 months of treatment with the FDC of antihypertensive drugs.
Design and method: Patients with 3 antihypertensive drugs and residual hypertension on 24 hr ABPM (excluding white coat hypertension) were recruited. A single pill combination of olmesartan 40 mg and amlodipine 10 mg was prescribed together with 25 mg chlorthalidone for 3 months. Medications were provided in 2 separated electronic pills boxes (MEMS®) recording the date and time of each opening. Patients were seen at 6 and 12 weeks. At 3 months, we analyzed MEMS® data and performed a second ABPM.

Results: 49 patients (36% women) were included: 36 had complete data sets. Mean age was 56.5 ± 11.9 y, BMI was 31.2 ± 5.1 kg/m². Overall, mean 24 hr systolic BP (SBP) decreased from 148 ± 19 mmHg to 129 ± 16 mmHg (p < 0.001) and diastolic BP (DBP) from 89.0 ± 16.1 mmHg to 77.5 ± 10.5 mmHg (p < 0.001). Overall 50% of patients normalized SBP and 36% normalized both SBP and DBP. Median taking adherence (%) was respectively 92.5% (interquartile range (IQR) 84.0–100) and 91.9% (IQR 83.0–100) for the fixed combination and chlorthalidone. When analyzed according to tertiles of adherence, decreases in SBP were respectively 27.7 ± 16.6 mmHg in tertile 1 (99–100%), 20.3 ± 31 mmHg in tertile 2 (89–98.9%) and 9.1 ± 15.4 mmHg in tertile 3 (0–88%) (p = 0.027 for trend).

Conclusions: A simplified standardized antihypertensive therapy together with an individualized strategy may prevent from expensive and unnecessary investigations.

REFRACTORY HYPERTENSION, ASSOCIATED AND TYPE 2 DIABETES MELLITUS: DIFFERENCE WITH RESISTANT HYPERTENSION

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Objective: Refractory hypertension (RH) is an extreme phenotype of antihypertensive treatment failure and a specific subgroup of resistant hypertension (RH). Type 2 diabetes mellitus (T2DM) is associated with both of RH and RH, but features of diabetic patients with RH have not been established. The purpose of this study was to determine the difference in clinical characteristics of diabetic patients with RH in comparison with those with RH.

Design and method: We examined 64 diabetic patients with RHT (mean age 59.0 ± 8.4 years; 24-hour BP (systolic/diastolic) 153.9 ± 17.0/81.4 ± 12.4 mmHg; 25 men (39%), eGFR 77.1 ± 21.9 mL/min/1.73m², duration of hypertension 22.4 ± 10.3 years, duration of DM 7.9 ± 5.2 years, body mass index (BMI) 34.5 ± 5.7 kg/m²), among them 15 patients (23.4%) met the criteria for RH. RH was defined as uncontrolled blood pressure (BP) (> 140/90 mm Hg), despite the use of > 3 antihypertensive drugs, or controlled requiring use of > 4 drugs. RH was defined as uncontrolled BP on ≥ 5 antihypertensive drug classes. All patients were undergone clinical examination, laboratory evaluation (basal and postprandial plasma glucose and insulin levels, microalbuminuria, homocysteine, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, high-sensitivity C-reactive protein (hsCRP). The night time BP dip was calculated as the difference between daytime mean pressure and night time mean pressure expressed as a percentage of the day value. Correlation analysis was conducted to assess the association between variables; independent t-tests were conducted to compare variables between those with hsCRP levels ≤ and > 3 mg/L, and between dippers and non-dippers.

Results: Diabetic patients with RH and RH did not differ in age, male sex, BP (according to office measurement and ABPM), BP dipping status, BMI, duration of hypertension and duration of DM, frequency of visceral obesity, type of hyperglycemic therapy. In addition, patients with RH and those with RH had the same levels of aldosterone and PRA, the average levels of eGFR, MA, HbA1C, glucose and insulin levels. At the same time, patients with RH compared with RH had a significantly higher value both of HOMA index (8.3 ± 3.1 vs. 4.6 ± 3.2; p < 0.02), and plasma resistin level (6.0 ± 1.1 vs. 4.5 ± 1.4 mg/L, p = 0.02).

Conclusions: Subjects with RH characterized by a higher level of HOMA index and plasma resistin level, despite the absence of differences in clinical phenotype with RH. Our results indicate important pathogenic role of the severity of insulin resistance and deregulation of adipokines in the development of refractory hypertension in patients with T2DM.

DOES HYPERURICEMIA INFLUENCE ON EFFICACY OF RADIOFREQUENCY SYMPATHETIC DENERVATION OF THE RENAL ARTERY?

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Objective: Hyperuricemia is a risk factor for chronic renal insufficiency and is frequently encountered in patients with arterial hypertension (AH). However the impact of hyperuricemia on efficacy of radiofrequency sympathetic denervation (RFD) of the renal artery in patients with resistant AH (RAH) has not been fully appreciated. The objective of the study was to assess the efficacy of RFD of the renal artery in patients with RAH and hyperuricemia one year after the procedure.

Design and method: 15 patients with RAH and hyperuricemia were examined while a comparison group consisted of 12 patients with RAH and without hyperuricemia. All patients received five antihypertensive drugs including diuretics. At baseline and one year after RFD of the renal artery the following parameters were assessed: 24-hour blood pressure monitoring, glomerular filtration rate (GFR) based on Modification of Diet in Renal Disease (MDRD) equation, 24-hour microalbuminuria and left-ventricular myocardial mass index (LVMMI).

Results: In one year after RFD of the renal artery the significant decrease in mean 24-hour systolic and diastolic BP was detected in both groups according to 24-hour blood pressure monitoring, GFR level significantly decreased in main group of patients. No changes in microalbuminuria were found. LVMMI did not reach significant differences in patients with RAH and hyperuricemia while significant decrease was observed in a comparison group.

Conclusions: In patients with RAH and hyperuricemia one year after RFD of the renal artery along with identical hypnotensive effect the significant reduction in GFR was observed. Moreover, no decrease in LVMMI was detected that might be caused by a latent kidney disease providing additional factors for maintenance of AH.
SHORT- AND LONG-TERM SAFETY AND EFFICACY OUTCOMES OF SPIRONOLACTONE IN RESISTANT HYPERTENSION

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Objective: We aimed to evaluate short- and long-term outcomes of spironolactone as add-on antihypertensive treatment for resistant hypertension (RH).

Design and method: We evaluated 202 patients with RH consecutively attended by hypertension specialists, who started spironolactone as additional antihypertensive treatment. Blood pressure and laboratory parameters (serum creatinine and SCrea, estimated glomerular filtration rate by CKD-EPI equation (eGFR) and serum potassium (Kp)) were analysed at 3, 6 and 12 months.

Results: The variation of SBP (mean and 95% CI) was -10.7 mmHg [-13.5 to -7.8] and -12.7 mmHg [-15.8 to -9.6] at 3 and 12 months, respectively. The variation of DBP was -4.0 mmHg [-5.6 to -2.3] and -5.4 mmHg [-7.2 to -3.6] at 3 and 12 months. P < 0.001 in all cases. These BP values were confirmed by 24-h ABPM at 12 months, the variation of SBP 24 h was -11.8 mmHg [-17.2 to -6.3] and the variation of DBP was -6.6 mmHg [-9.6 to -3.5] (P < 0.001). The variation of eGFR was -6.4 ml/min/1.73m² [-9.0 to -3.9] and -9.4 ml/min/1.73m² [-12.0 to -6.7] at 3 and 12 months, respectively (P < 0.001). The variation of Kp was 1.0 mmol/l [0.2 to 1.8] at 3 months (P = 0.02) and 0.4 mmol/l [-0.5 to 1.2] at 12 months (P = 0.4). The eGFR significantly decreased (p = 0.046) between 3 and 12 months. There were no statistically significant differences in BP, Kp and SCrea between 3 and 12 months. Seventy-seven patients out of the whole cohort were prospectively evaluated. Spironolactone was withdrawn in 7 patients (9.09%) due to adverse effects, including 1 due to excessive eGFR decrease and 1 due to hyperkalemia. The analysis of the remaining 70 patients parallels the results of the whole cohort.

Conclusions: 1) Spironolactone significantly decreased BP at 3 and 12 months. 2) Likewise, we observed a decrease in eGFR at 3 months and 12 months. 3) In 9% of RH patients, spironolactone was withdrawn due to adverse effects. Spironolactone seems a safe and effective add-on treatment for RH, although it requires a close monitoring of renal function.

PREVALENCE OF TARGET ORGAN DAMAGE IN PATIENTS WITH RESISTANT HYPERTENSION, ASSOCIATED WITH DIABETES MELLITUS TYPE 2

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Objective: To assess the frequency of target organ damage (TOD) in diabetic patients with resistant hypertension (RHT).

Design and method: 332 essential hypertensive patients were included in the study (47 patients with controlled hypertension (cHT) without diabetes mellitus (DM), 100 diabetic patients with cHT (cHT+DM), 120 RHT patients without DM (RHT) and 65 diabetic patients with RHT (RHT+DM). Patients were underwent ambulatory blood pressure monitoring, ultrasonography of heart and carotid arteries, laboratory tests (estimated glomerular filtration rate (eGFR)). All groups were comparable in male gender.

Results: Patients of RHT+DM group were older than patients of all other groups (57.9 ± 7.9 vs. 52.8 ± 8.9y.o. in RHT+DM vs. 51.2 ± 6.8y.o. in cHT+DM pts. and 50.8 ± 9.6y.o. in cHT pts., p < 0.05). Diabetic patient had higher frequency of LVH, carotid atherosclerosis (CA) and average value of 24h-pulse pressure (PP) than non-diabetic patients with the same blood pressure control (p < 0.05) (Fig.1). Diabetic patients with RHT had maximal frequency of LVH, CA and values of PP (p < 0.05). Values of eGFR were similar in RHT patients and were lower than in cHTN patients (p < 0.05) independently of presence of DM (p < 0.05).

Conclusions: DM contributes to more frequently TOD with maximal prevalence of those in diabetic patients with RHT, which can be the cause of a very high rate of cardiovascular complications. At the same time, decline the renal function is common feature in patients with RHT independently of DM.

NEED OF ANTIHYPERTENSIVE ADJUSTMENT TREATMENT THROUGHOUT THE ONCOLOGIC TREATMENT


Objective: Use of some antitumor drugs which are directed against vascular endothelial growth factor (VEGF) and tyrosine-kinase inhibitors has induced an immediate vital risk due to blood pressure sudden rising and a cause to limit both the dosage and the exposure to the chemotherapy.

Aims: To evaluate the implementation of a protocol for preferential derivation between the Oncology and Hypertension Units in order to decrease the incidence of severe hypertension and therefore to avoid oncoligic therapy interruption. We created a preferential derivation (less than 48 h) between both units for these clinical reasons: recent hypertension diagnosis or severe hypertension diagnosis not responding to conventional antihypertensive treatment.

Design and method: Data about patients gathering above mentioned criterias was evaluated. Collection of epidemiological, clinical variables, number of blood pressure-lowering drugs at initiation and final of oncoligic treatment and number of needed treatment modifications.

Results: 42 patients, aged 27–81 yo (24 women, 26 with background of hypertension, 13 dyslipidemia, 6 diabetics) were included. Regarding the type of cancer, all of them in stage IV: 19 digestive, 14 gynaecological, 3urological and 4 others.
VEGF inhibitors were used in 26 patients, tyrosine-kinase in 13 and both in the remaining 3. At the Hypertension Unit arrival, only 5 patients were free of antihypertensive drugs, 13 were under monotherapy, 12 bi-therapy, 3 with triple therapy and 3 with 4 or more drugs. This treatment was maintained in 2 patients while 35 of them needed with 3 or more antihypertensive drugs. Hypertension Unit follow-up lasted for 1–43 months (mean 12.5). It was not necessary oncologic treatment withdrawal in any patient. 12 died during this period.

Conclusions: Specific derivation protocol/circuit has improved the tolerability to anti-angiogenic drugs. The multi-disciplinary approach of oncologic patients allows treatment optimization. The possibility of antiangiogenic therapy adjustment (posology and dosage) across the anti-angiogenic treatment is associated with excellent results. Treated No patient needed definitive withdrawal of oncology treatment throughout our follow-up period.

THE IMPACT OF CHRONOTHERAPY OF FIXED-DOSE TRIPLE-COMBINATION ON BLOOD PRESSURE TARGETS IN RESISTANT AND CONTROLLED HYPERTENSION PATIENTS


Objective: to evaluate different effects on blood pressure (BP) control depending on the time of administration of antihypertensive treatment in resistant (rHTN) and controlled (HTN) hypertension patients.

Design and method: We studied 51 patients with true rHTN confirmed by the office and ambulatory BP monitoring (ABPM) despite the use of 3 antihypertensive medications (posology and dosage) across the anti-angiogenic treatment is associated with restoring the dipping BP profile in nondipping rHTN patients (80 % vs 14 %, P < 0.01) in bedtime treatment, but some non-dipper patients (75 %) had over-dipping pattern. In rHTN patients reduction in average 24-h BP was greater with night-time administration than morning (−23.8±16.7 mm Hg vs. −16.1±9.4 mm Hg, P < 0.05) both due lowering effect to daytime and nighttime BP. However, the decrease in office BP did not differ between the groups. Bedtime treatment was associated with restoring the dipping BP profile in nondipping HTN patients (80 % vs 33 % in patients on morning treatment, P < 0.01).

Conclusions: In rHTN patients ingestion of FDTC at bedtime compared with ingestion of medication upon awakening results in improved ambulatory BP control during day and night and restored normal dipper-type circadian BP rhythm. In HTN patients, bedtime dosing of FDTC demonstrated extreme dipping BP patterns even in patients with a blunted fall in night-time BP.

LONG ANTIHYPERTENSIVE EFFECT OF RENAL DENERVATION TO 3 YEARS OF FOLLOW-UP

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Objective: To determine the degree of reduction of arterial pressure and dynamics of the circadian profiles in patients with resistant arterial hypertension 3 years after renal denervation

Design and method: The study included 30 patients (average age 53.7 ± 9.6) with arterial hypertension resistant to drug therapy. All patients underwent office blood pressure measurement and ambulatory monitoring of blood pressure at baseline and after 1 and 3 years of renal denervation. The number of antihypertensive drugs throughout the study were not changed

Results: According to office measurements, baseline blood pressure made 168.4/95.0 mmHg with reduction on −27.0/−14.9 mmHg after 1 year and −27.5/−15.5 mmHg after 3 years of denervation (p < 0.05). The average level of blood pressure source made up 159.2/87.3 mmHg, with a decrease on −11.0/−7.3 mmHg after 1 year and on −17.3/−9.2 mmHg towards the end of the study (p < 0.05). Similar improvement is observed when comparing the average daily and average night of blood pressure and is −17.6/−9.4 mmHg and −16.4/−8.1 mmHg respectively (p < 0.05) by the end of the 3 years of observation. The decrease of the temporary load index pressure in the daytime and at night on −31%–17%, respectively (p < 0.05). No patient included in the study were not recorded unwanted side effects connected with carrying out renal denervation. Negative dynamics of the level of blood creatinine or signs of stenosis of the renal arteries after ablation have not been identified

Conclusions: Patients with resistant arterial hypertension conducting renal denervation contributes to a pronounced and persistent decrease in the level of office blood pressure levels and indicators of ambulatory monitoring. This effect persists for 3 years observation of patients and evidence the positive impact of renal denervation on the hypertension, reducing the burden on target organs due to long-term lowering blood pressure, reducing the risk of developing cardiovascular complications.

THE EFFICACY OF FIXED TRIPLE COMBINATION THERAPY IN ROUTINE CLINICAL PRACTICE

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Objective: Treatment of arterial hypertension reduces cardiovascular mortality and morbidity. Currently, the majority of patients during the treatment does not reach the target blood pressure (BP). One common cause of reaching the target pressure is poor adherence to treatment, which can improve the use of fixed combination therapy. The aim of our work is to analyze the effect on office blood pressure and influence of the number of antihypertensive medications deployment of fixed triple combination therapy (perindopril/indapamide/amlodipine).

Design and method: We enrolled 194 patients (122 men, average age 63.9 years). All patients underwent a clinical examination and office blood pressure measurements. It was subsequently modified antihypertensive therapy according to current guidelines ESH/ESC using a fixed combination of perindopril/indapamide/amlodipine. The effect of changes in therapy was evaluate the next clinical control, with an average interval of 15 weeks.

Results: Mean baseline office BP values were 168.9 ± 22.1/87.9 ± 12.6 mmHg. Patients received treatment prior to the change was averaged 3.9 ± 1.4 antihypertensive drugs, which represented 3.3 ± 2.0 daily tablet antihypertensive drugs. After adjusting treatment insignificantly increased the number of daily used anti-hypertensive agent by 0.2 ± 1.0 (p = 0.099) and significantly reduced the number of antihypertensive tablets per day 1.2 ± 1.4 (p < 0.001). Systolic blood pressure after changing average decreased by 23.6 ± 3.7 mmHg (p < 0.001) and diastolic pressure blood by 9.7 ± 2.3 mmHg (p < 0.001). The average office blood pressure achieved after treatment therapies were 132.7±8.30 mmHg.

Conclusions: The use of fixed triple combination therapy of arterial hypertension significantly reduced systolic and diastolic office blood pressure. At the same time there is a significant decrease in the number of antihypertensive tablets per day, which probably contributes to better adherence to treatment.

USE OF TRIPLE FIXED-DOSE ANTIHYPERTENSIVE DRUG COMBINATIONS IN RESISTANT HYPERTENSION – AMBULATORY BLOOD PRESSURE MONITORING RESULTS

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Objective: To check the efficacy of triple fixed-dose antihypertensive drug combination as continuation of separate drug regime during the follow-up at repeated ambulatory blood pressure monitoring (ABPM) in out-patient clinic.

Design and method: Triple fixed dose antihypertensive combination of perindopril, amlopidine and indapamide in four different dosage combinations is now available for 4 years. During years 2015 to 2017 we analysed 23 patients with resistant hypertension (16 men, ‘women’ who had repeated ABPM procedures with time gap from 3 to 24 months, replacing separate drugs.

Results: Patients’ age was 60 ± 11 years (37–79 years). During 1st ABPM average antihypertensive drug use was 3.3 ± 1.4 drugs (1–7 drug groups) with 61% of patients already taking the 3 studied drug groups separately (ACE inhibitor, diuretic and calcium channel blocker), or in double fixed combinations. 26% of patients were taking additional antihypertensive drug groups (e.g. beta blockers, alpha blockers, centrally acting drugs, spironolactone). During 2nd ABPM triple fixed-dose perindopril/indapamide/amlodipine was prescribed (10/2.5/10 mg in 78%, 10/2.5/5 mg in a single patient – 4% and 5/1.25/5 mg in 18% of patients). Drug usage was intensified to 4.2 ± 1.3 antihypertensive drugs (1–9 drugs) and after 3 months of treatment the end of the study (p < 0.05). Additional drug groups were prescribed in 22% of patients (beta blockers in 2, alpha blocker in 3 patients) and in 2 patients drug regimen could be simplified with discontinued drug groups (beta blocker and alpha blocker).
THE ROLE OF HIGH DIETARY SALT INTAKE IN DEVELOPMENT OF RESISTANT HYPERTENSION

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Objective: Aim of the study: evaluate salt-taste sensitivity and daily salt intake in patients with resistant arterial hypertension (RAH) during antihypertensive treatment (AHT).

Design and method: The study included 137 patients with high risk arterial hypertension in average age 56.6 ± 9.8 years. All patients took triple combination AHT with diuretic, RAAS-blocker and calcium antagonists during 3 months. After 3 months therapy 83.2% patients were achieved goal BP, 16.8% of them were resistant to triple combination AHT. Thus, patients divided into 2 groups: RAH (n = 23) and non-RAH (n = 114) and continued AHT with recommendation to reduce dietary salt intake to 5–6 g/24 h. Salt-taste sensitivity (STS) evaluation, implemented R.Henkin method with using sodium chloride in different concentration: from 0.01% to 1.28%. The patients divided to 3 STS thresholds: low (0.01%–0.08% NaCl), medium (0.16% NaCl), and high thresholds (>0.32% NaCl). Daily salt intake was calculated by urinary sodium excretion level multiply 2.55, before and after treatment.

Results: Patients with RAH characterized with significantly high systolic and diastolic BP (SBP/DBP): 178.1 ± 15.4/103.3 ± 10.1 mmHg vs. 158.9 ± 13.3/90.7 ± 7.25 mmHg in non-RAH group (p = 0.0001). STS test was shown prevalence high threshold of STS in RAH patients (high/medium 90.5%/9.5% c² = 46.7, p = 0.0001) in comparison with non-RAH group (high/medium/low 74%/12%/14% c² = 130.4, p = 0.0001) with significant difference in sodium chloride concentration: 0.41 ± 0.17% vs. 0.3 ± 0.18%, p = 0.01, for RAH and non-RAH groups respectively. Before AHT daily urinary sodium excretion rate was high in RAH patients (5.66 ± 2.49 g/24 h vs. 4.5 ± 2.54 g/24 h, p = 0.056), that corresponded to 14.4 g and 11.47 g daily salt intake in RAH and non-RAH respectively. During 6 months therapy BP significantly decreased in both groups, but in non-RAH group BP reducing was better with statistical difference: 128.3 ± 11.46/80.8 ± 7.9 mmHg vs. 122.4 ± 6.0/76.36 ± 8.5 mmHg, p = 0.0001 and p = 0.022 for SBP and DBP respectively. Daily urinary sodium excretion rate was significantly decreased only in non-RAH patients in comparison with RAH patients with statistical difference: 3.8 ± 2.92 g/24 h vs. 5.46 ± 2.7 g/24 h (p = 0.006).

Conclusions: Patients with RAH characterized with high STS threshold and dietary salt intake. During six monthly optimal AHT, BP significantly reducing in both groups, but in non-RAH patients BP and daily urinary sodium excretion was statistically lower.

COMPARATIVE EVALUATION OF RESISTANT AND REFRACTORY HYPERTENSION: CLINICAL AND ABPM DATA

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Objective: Background: Resistant hypertension (RHT) is defined as failure in control of hypertension despite of using tree antihypertensive agents in maximal dose including a diuretic. Refractory hypertension (RFHT) is defined variably as either failure to control BP after 8 weeks or failure to control blood pressure with use of over 5 different classes of antihypertensive agents. RHT is multifactorial in cause: excess fluid retention, older age, obesity, chronic kidney disease, diabetes are well-recognized causes. The underlying mechanisms of RHT are not clearly established, but some data suggest a possible role of increased sympathetic tone. The aim of this work was to evaluate the real prevalence of RHT and RFHT using arterial blood pressure monitoring (ABPM) in patients with clinical suspicion of RHT and a comparative evaluation of clinical and ABPM derived parameters including blood pressure variability (BPV) in this two special group of hypertensives.

Design and method: Material and methods: Approximately 600 hypertensive patients were evaluated. Clinical blood pressure, age, sex, BMI, smoking status, associated diabetes and target organ damage were evaluated. ABPM monitoring on patients with clinical suspicion of RHT and a repeated second ABPM on patients with suspicion of RFHT (after 3 month of treatment optimization) were performed.

Results: RFHT has apparently high prevalence among hypertensive patients with RHT, but after treatment optimization the real prevalence is around 2–3%. RHT is more often in males, older and with higher BMI. RFHT patients are younger, with-out differences between sexes and with higher prevalence of comorbidities (renal, cardiovascular) Additional ABPM indices as high pulse pressure and pressure load, non-dipping or rising pattern, morning surge are present in RHT and RFHT patients with unfavorable prognostic significance and predictors of high cardiovascular risk.

Conclusions: The high systolic blood pressure, higher heart rate values and the low variability present in RFHT patients suggests an increased sympathetic activity in these patient. This could be a new therapeutic on this special group of hypertensive pathology.

SEVERE HYPERTENSION IN A YOUNG BOY WITH PARAGANGLIOMA OF THE ORGAN OF ZUCKERKANDL TREATED WITH THERMOABLATION

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Objective: Paragangliomas are tumors of the paranganglia, chromaffin tissue complexes of the neuroendocrine system distributed along the paravertebral and para-aortic axes. A small number of these tumors arise from the organ of Zuckerkandl that is the smallest endocrine gland, composed by paranganglia. These organs are accessory tissues of the autonomic nervous system that undergo involution during childhood. By adulthood distinct microscopic groups of extra-adrenal chromaffin cells endure and have the potential to develop into tumors that are rare cases of secondary hypertension.

Design and method: A 19-year-old professional footballer, since two years, developed severe symptomatic hypertension forcing him to stop all activities. During each episode he reported headache, sweating, tachycardia, blurred vision and paradoxical hypotension. No drugs were effective to lower blood pressure. Laboratory hormonal assessment were discordant, with high daily urinary catecholamines but daily adrenaline, noradrenaline and dopamine in range. We performed a CT scan and a MRI of the abdomen that showed a nodular lesion of 7 mm near the left crus of diaphragm, where the left superior mesenteric artery originates (Figure 1). An iodine-123-meta-iodobenzylguanidine scan revealed an abnormal radiotracer uptake in the region of the mass identified by CT.
Conclusions: This is absolutely the first case in literature, since exist only few cases of robot-assisted laparoscopic excision, laparoscopic resection or laparotomy. The patient recovered well from the operation and was eventually discharged in a stable state. He’s no longer suffering from hypertension and he started playing football again. 24-hour ambulatory blood pressure monitoring, after 15 days from discharge, shows satisfying blood pressure values (Figure 3).

RESISTANT HYPERTENSION IN ELDERLY: A CLINICAL MANIFESTATION OF HFP EF? RETROGRADE SINGLE CENTER ANALYSIS

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Objective: Resistant hypertension is defined as high blood pressure despite treatment with at least 3 different classes of antihypertensive drugs at best tolerated doses. Resistant hypertension is a common clinical problem and has not been studied widely. The present study has investigated the diagnostic differences and relationship between resistant hypertension and the N-terminal pro-brain natriuretic peptide (NT-proBNP) level, which is a marker of heart failure among the resistant hypertensive patients according to age retrospectively.

Design and method: The outpatient data of 957 patients, who applied to the hypertension specialty clinic of Izmir Kemalpasa State hospital between 1st of January and 30th of June 2015, has been reviewed retrospectively. The patients with pseudo-resistant hypertension and secondary hypertension are excluded. All the resistant hypertensive patients have had an echocardiogram, renal Doppler ultrasonogram, NT-proBNP and thyroid function tests in addition to the electrocardiogram (ECC), routine biochemistry and urine exam, which have been performed for every resistant hypertensive patient according to the clinic’s algorithm, 68 patients have been identified as true resistant hypertensive with an ejection fraction (EF) < 50, no moderate to severe valvular disease and serum creatinin level < 1.5. The present study has investigated the relationship between resistant hypertension and the NT-proBNP level, which is a marker of heart failure.

Results: The mean age was 58.94 ± 11.81 years. Among 68 patients, 49 were female and 19 were male. Only 9 patients had atrial fibrillation and 59 were on sinus rhythm. Instead of a common cut-off level for NT-proBNP age (decades) and gender related cut-off levels have been used for each patient. NT-proBNP levels were disproportionally high in elderly patients (<0.001) and high NT-proBNP levels in resistant hypertensive patients were related to a larger left atrial diameter (<0.001).

Conclusions: Resistant hypertension could be the clinical manifestation of various diseases with different etiology. Resistant hypertension in older patients can be a clinical presentation of heart failure with preserved ejection fraction (HFrEF). Elderly patients with resistant hypertension should be investigated for HFrEF and treated accordingly. Because of one-center results and limited number of patients, further studies are needed.

CORRELATION RELATIONSHIPS AGES, OFFICE BLOOD PRESSURE, EGFR, RENIN, ALDOSTERONE, METANEPHRYS LEVELS IN PATIENTS WITH RESISTANT HYPERTENSION

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Objective: The purpose of this analysis was to determine factors that contribute to poor blood pressure lowering in patients with resistant hypertension.

Design and method: We examined and treated 1146 patients with AH and take 3 or more antihypertensive drugs (62.7% - women, 37.3% - men). Mean age was 57.9 ± 8.4 years, weight 87.7 ± 0.6 kg/m2. At baseline mean office blood pressure (BP) was 174.6/100.5 ± 6.0/4.4 mmHg.

Results: Mean office BP after treatment was 131.3/80.1 ± 4.0/6.3 mmHg. Patients had dyslipidemia - 65%, type 2 diabetes - 16.6%, cerebrovascular disease - 15.8% (ischemic stroke - 12.8%), thyroid disease - in 10.4%, including hypothyroidism - 2.8%, chronic pyelonephritis - 16.3%, obstructive sleep apnea - 3.3%, chronic kidney disease - 3.3%. Ages was correlation with weight (r = 0.255, p < 0.01), triiodothyronine (r = 0.40, p < 0.01), thyroid-stimulating hormone (r = 0.169, p < 0.01), eGFR (r = 0.551, p < 0.01), SBP after treatment (r = 0.081, p < 0.012), DBP after treatment (r = -0.230, p < 0.01), urine metanephys (r = -0.243, p = 0.03), office DBP after treatment (r = -0.230, p = 0.04). SBP after treatment was correlated with men (r = 0.135, p = 0.001), eGFR (r = -0.132, p < 0.01), high density lipoproteins (r = -0.170, p = 0.007), DBP after treatment was correlated with potassium (r = -0.066, p = 0.041).

Conclusions: Patients whose taken 3 or more antihypertensive drugs drugs less decreased BP was associated with male sex, less of renin level, less eGFR, bigger body mass index, was younger, less level of high density lipoproteins, less of potassium level, higher left ventricular myocardial mass index.

ENDOVASCULAR RENAL DENERVATION EFFICACY AND FEASIBILITY IN END-STAGE KIDNEY DISEASE WITH RESISTANT HYPERTENSION

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Objective: Sympathetic neural activation is markedly increased in end-stage kidney disease or in dialysis treatment, making hypertension difficult to control. Neprhexotomy should be considered to remove the reflex pressor effects of the afferent fibers originating in renal parenchyma, but - due to the high risk of morbidity and mortality associated with the surgical procedure - endovascular renal denervation (RDN) may be an alternative therapeutic strategy to improve blood pressure levels.

Design and method: A 47-year-old male, with a long history of hypertension complicated by renal amyloidosis diagnosed in 2009, was admitted to our emergency department 3 times in the last 2 months for hypertensive crises with initial
signs of encephalopathy. He followed a dialysis program 3 times a week. At the last admission, his blood pressure was in average 256/142 mmHg under up to 10 antihypertensives medications (nifedipine 120 mg/day, ramipril 20 mg/day, furosemide 500 mg/day, doxazosine 12 mg/day, valsartan 320 mg/day, and hydrochlorothiazide 25 mg/day). Resistant hypertension was confirmed by the 24-h ambulatory blood pressure measurement (Figure 1). Patient underwent bilateral RDN using a 3rd-generation Spyral™ catheter, a device with multi-electrode configuration that is associated with a reduced procedural time, contrast use and radiation exposure.

**Results:** The procedure was completed without complications. After 48 hours office systolic blood pressure was 40 mmHg lower, and controlled with 4 antihypertensive drugs 1 month later (Figure 2) through the 24-h ambulatory blood pressure measurement.

**Conclusions:** Bilateral RDN procedure in dialyzed patients with resistant hypertension was feasible without complications and produced an acute and long-term significant decrease in blood pressure. End-stage kidney disease might be the source of a persistently elevated activity of afferent signals to sympathetic nervous system, and the interruption of this loop may favour blood pressure reduction. This may be obtained by RDN with no need of surgical kidney removal.
POSTER SESSION

POSTERS’ SESSION P504: HEART

THE PATHOGENESIS OF HYPERTENSIVE HEART IN EXTREME NORTH CONDITIONS

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Objective: To study the relationship between the autonomic nervous system dysfunction (ANSD) with circadian BP disorders and structural changes of the heart in patients with AH in Far North conditions.

Design and method: 373 patients engaged in monthly round-trip sojourns to the Arctic with arterial hypertension (AH) of 1–2 stages (Gr.1) and 144 inhabitants of moderate climate zone with AH of 1–2 stages (Gr.2) were examined. The groups were matched for age (p = 0.4450), AH experience (p = 0.7333), office SBP (p = 0.3222), and race (p = 0.0640).

All patients underwent ABPM, echocardiography, 24-hour heart rate variability and vegetative status using the questionnaire offered by A.M. Vayne.

Results: ANSD was detected significantly more often in Gr.1 compared to Gr.2 due to the survey (p = 0.0279) and according to the physical examination (p = 0.0001). Heart rate (HR) variability (SDNN and SDNN5 indices) in Gr.1 was significantly lower than in the Gr.2 (p = 0.0266) with significantly low circadian index (CI). Higher 24-hour DBP was detected in Gr.1 due to high night-time DBP and day/night BP variability (p = 0.00001). 24 h HR, daytime HR and night-time HR in Gr.1 were significantly higher than in Gr.2. In Gr.1 compared to Gr.2 diurnal SBP and DBP were significantly lower as well as CI (p = 0.0001). With equal office BP values in both groups, LVM and LVMi were higher in Gr.1 as compared with Gr.2 (LVM: 281.5 ± 90.4 g., LVMi 130.3 ± 26.2 g. vs 247.5 ± 76.6, p = 0.0002 and 128.3 ± 36.4, p = 0.0024). The most prevalent type of LV structural changes in Gr.1 was concentric LV hypertrophy (p = 0.0014). Higher LVM and LVMi values were due to thicker interventricular septum (p < 0.0001) and LV posterior wall (p = 0.0001) as well as large left atrium (p = 0.0088).

Conclusions: Thus, in Arctic monthly round-trip sojourns conditions the influence of exogenous factors can cause in autonomic and neurohumoral BP regulation mechanisms the circadian-dependent changes that modulate the circadian rhythm of BP and structural changes in the heart. As a result, metabolic disorders and hemodynamic alterations towards increasing BP with severe LV hypertrophy occur.

LABORATORY PREDICTORS OF THE RISK OF RECURRENT CARDIOVASCULAR EVENTS IN PATIENTS WITH UNSTABLE ANGINA AND ARTERIAL HYPERTENSION AND STENTING OF THE CORONARY ARTERIES

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Objective: To determine independent laboratory predictors of the risk of developing cardiovascular events in patients with unstable angina (UA) and arterial hypertension (AH) and stenting of the coronary arteries for 1 year of follow-up.

Design and method: 143 patients with UA who underwent stenting of the coronary arteries by 3.6 ± 1.2 days after admission. 1 Group 63 (44%) patients mean age 61.2 ± 6.5 years without AH, 2 group 80 (56%) patients mean age 63.5 ± 4.5 years with AH. All patients initially, at discharge, at 6 and 12 months of follow-up was performed aggregation, coagulation tests, levels of troponin I, C-reactive protein, myeloperoxidase, BNP.

Results: Over the 1 year of follow-up, repeated cardiovascular complications developed in 10 patients G1 (15.9%) and 21 G2 (26.3%) (p = 0.048). After 12 months a large-heart attack of myocardial infarction developed in 1 patient (1.6%) from G1 and in 3 patients from G2 (3.7%), in 27 cases recurrent angina developed (9 persons G1 (14.3%) and 18 G2 (22.5%). There were no death.

Independent laboratory predictors of the risk of recurrence of cardiovascular events (MI, recurrent angina pectoris) after UA with AH are: baseline von Willebrand factor > 149% (sensitivity - 73.6%, specificity 84.6%), myeloperoxidase level > 348 nmol/L (sensitivity - 80.3%, specificity 81%), platelet volume-MPV > 9.8fl (sensitivity - 86.0%, specificity - 90%) AUC value of the ADR test > 60U.

Conclusions: The independent predictors of adverse outcomes in patients with UA and AH after stenting of the coronary arteries are the baseline levels of PV1 149%, myeloperoxidase > 348 nmol/L, platelet count of MPV > 9.8fl, ADR test value > 60U, and for patients with UA and without AH: baseline levels of CRP > 6.8 g/l (sensitivity 84.4%, specificity 78.5%), BNP > 129 pg/ml (sensitivity - 80.0%, specificity - 91%) and AUC value of ADR test > 60U.

CARDIOTOXICITY IN PATIENTS WITH TRIPLE NEGATIVE BREAST CANCER UNDERGOING ANTHRACYCLINE CHEMOTHERAPY DEPENDING ON BLOOD PRESSURE LEVEL

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Objective: to study the risk of cardiotoxicity in patients with triple negative breast cancer with arterial hypertension (AH) during anthracycline chemotherapy.

Design and method: 70 women [48.6 ± 13.3 yrs] with breast cancer were enrolled. In all patients office blood pressure (BP) was thrice measured. Echocardiography, including 2D STE, was performed before and after 8 courses of anthracycin therapy. Left ventricular ejection fraction (LVEF) measured with the biplane Simpson’s method and global longitudinal strain (GLS) [normal GLS – 22.1 ± 3.8% for women] were analyzed.

Patients depending on blood pressure level were divided into 2 groups: group 1 - with AH (n = 18) and group 2 - without AH (n = 52).

Results: The average level of office BP in group 1 was 130.8 ± 2.3 / 79.5 ± 2.7 mm Hg. After chemotherapy target BP level was maintained in 10 patients. There was a significant LVEF reduction after chemotherapy (from 68.9 ± 5.8% to 63.7 ± 6.7%, p < 0.05). Initially in group 1 GLS was lower than normal range (19.1 ± 2.8%, p < 0.05), after chemotherapy further GLS decrease was recorded (from 19.1 ± 2.8% to 16.4 ± 3.8% [p < 0.05]).

There was a further progression of AH (mean systolic BP (sBP) 162.2 ± 11.2 mmHg, mean diastolic BP (DBP) – 98.3 ± 4.9 mmHg) in 8 patients (44.4%) in spite of antihypertensive therapy during chemotherapy. After chemotherapy reduction in LVEF was observed (from 65.9 ± 3.4% to 62.0 ± 2.0% (n.s.)). GLS before chemotherapy was below the normal values (18.0 ± 1.5%), after chemotherapy GLS values were 15.6 ± 1.3% (n.s.).

Also there was an increase in BP in 7 patients (13.4%) without initial AH during chemotherapy (mean sBP -148.3 ± 5.8 mmHg, mean DBP - 94.1 ± 3.7 mmHg). Before and after chemotherapy the LVEF was 68.9 ± 1.7% and 67.9 ± 1.5%, consequently. There were practically no changes in initially normal GLS before (21.8 ± 0.4%) and after chemotherapy GLS (21.4 ± 0.5%, n.s.).

Conclusions: Patients with AH already have a subclinical impairment in cardiac function, which makes them more vulnerable to cardiotoxic effects of chemotherapy.

HEMODYNAMIC MODULATORS (VOLEMIA, INOTROPY, CHRONOTROPY AND VASOCATIVITY) AND HEMODYNAMIC STATUS IN TREATMENT-NAIVE, DEBUTTING HYPERTENSIVE PATIENTS

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Objective: No single antihypertensive class has been shown to be superior to the rest of drugs, especially in treating debut hypertension (HTN). Nevertheless, hemodynamic factors involved in HTN may vary significantly. Aim of this study is to describe the hemodynamic components of debutting HTN according to thoracic bioimpedance analysis (impedance cardiography).

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Design and method: Cross-sectional, observational study in 64 consecutive, treatment-naive hypertensive patients referred to a Hypertension Unit for study. Standard clinical and laboratory examinations were performed, including ABPM and echocardiography. Impedance cardiography by the HOTMAN® System was used for noninvasive assessment of hemodynamic modulators and evaluation of the hemodynamic status of the patients.

Results: Mean age was 50.0 years in 39 (60.9%) men and 25 (39.1%) women. Office systolic and diastolic BP averaged 144/86 mmHg, 24-h ABPM was 137/90 mmHg. 41 patients (64.1%) were diagnosed as normodynamic, 14 (21.9%) as hyperdynamic and 9 (14.1%) as hypodynamic. 13 patients (20.3%) were strictly normal, while up to 5 different hemodynamic states were found in the rest. Intravascular hypertrophy was present in 59 patients (92.2%), in 21 patients (32.2%) as the only abnormality, followed by 22 (34.4%) with vasoconstriction, 20 (31.3%) with hyperinotropy and 18 (28.1%) with hypotropotropy. Eleven combinations of hemodynamic modulators were found, being the most common hypervolemia either combined with hyperchronotropy in 13 patients (20.3%), or with vasoconstriction or with hypochronotropy and hypotropotropy each in 6 patients (9.4%).

Conclusions: Our data suggest that abnormal hemodynamic modulators play an important role in incident hypertension. We found a strong association between intravascular hypertrophy and elevated blood pressure in debuting hypertensives, while abnormalities in peripheral vascular tone if any, played only a secondary role and always in combination with hypertrophy. Future longitudinal outcome studies are required to test the potential clinical benefits of guiding pharmacological treatment by measurement of hemodynamic modulators.

EARLY MARKERS OF CARDIOTOXICITY IN PATIENTS WITH BREAST CANCER WITH OR WITHOUT ARTERIAL HYPERTENSION


Objective: to evaluate the development of cardiotoxicity in patients with triple negative breast cancer with or without arterial hypertension (AH) during anthra- cycline chemotherapy

Design & method: 70 women [mean age 48.6 ± 13.3yr] with triple negative breast cancer were enrolled. Echocardiography, including 2D Speckle Tracking Imaging, was performed before and after 8 weeks of chemotherapy with doxorubicin, cisplatin, paclitaxel. Left ventricular ejection fraction (LVEF) (the biplane Simpson’s method) and global longitudinal strain (GLS) [mean normal GLS of -22.1 ± 1.8] were analyzed. Patients were divided into 2 gr: gr. 1 - with AH (n = 18) and gr. 2 - without AH (n = 52)

Results: Before chemotherapy in gr. 1 LVEF was lower than the normal value (~19.1 ± 2.8% vs. -22.1 ± 1.8% (p < 0.05)) and lower than in the gr. 2 [19 ± 2.8% vs. 20.0 ± 2.8% (n.s.)]. After chemotherapy in all patients decrease of GLS was observed (from ~20.0 ± 2.8% to ~18.5 ± 2.9% (p < 0.05) and in both grs: in gr. 1 from ~19.1 ± 2.8% to ~16.4 ± 3.8% (p < 0.05), gr.2 from ~20.0 ± 2.8% to ~19.2 ± 2.4% (p < 0.05), however LVEF decreased, but remained within normal values.

Conclusions: Initially GLS was lower than the normal value in patients with AH and breast cancer. Patients with AH and breast cancer, receiving anthracycline chemotherapy constitute the risk group of cardiotoxicity. Thus, patients with AH and breast cancer must be observed by a cardiologist and an oncologist.

PROGNOSTIC VALUE OF OFFICE BLOOD PRESSURE MEASUREMENT AND HYPERTENSION DIAGNOSIS IN ATRIAL FIBRILLATION: SYSTEMATIC REVIEW AND META-ANALYSIS

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Objective: To determine the prevalence of hypertension in patients suffering from atrial fibrillation (AF), to assess echocardiographic parameters in patients with AF with or without hypertension, and to assess the current status of the use of anticoagulation for the treatment of AF.

Design and method: The study included 167 patients with AF: 116 men (69.46%) and 51 women (30.54%) who were hospitalized at our University Hospital between 2014. and 2016 year. Out of 167 patients with AF, 133 (79.6%) had hypertension (group AHF), while 34 (20.4%) did not (group AF). In all pts echocardiography study was performed and size of left atrium (LA), ejection fraction (LVEF) and systolic pulmonary artery pressure (sPAP) were determined.

Results: The most common type of atrial fibrillation AFHT group was paroxysmal (37.5%), while, in the AF group was permanent (40.2%). Size of LA was higher in AFHT group than in AF group (48.3 ± 6.84 vs 47.4 ± 10.82 mm, ns), as well as LVEF 49.5% vs 48.8% (ns). Patients with new diagnosed AF and hypertension had statistically higher values of LVEF than patients with first diagnosed AF without hypertension (53.0 ± 14.6 vs 39.2 ± 10.5; P < 0.042). Value of sPAP was higher (ns) in the subgroup of pts with first diagnosed and pts with persistent AF in AFHT than in AF group. At the admission, only 98 (58.7%) pts had oral anticoagulant therapy, while 127 (76.1%) pts was on OAT at discharge.

Conclusions: Our study showed high prevalence of arterial hypertension in patients with atrial fibrillation. In pts with AF, size of LA, LVEF and sPAP are higher in pts with than without hypertension. In spite of high prevalence of AF, use of OAT is still low.

CORRELATION BETWEEN GRADE OF HYPERTENSION AND EXTENSION OF CORONARY ARTERY DISEASE IN HYPERTENSIVE PATIENTS – CROSS-SECTIONAL STUDY FROM CENTRAL ROMANIA

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Objective: The prevalence of coronary artery disease (CAD) is more susceptible to develop in hypertensive patients with multiple associated cardiovascular risk (c-v) factors. We hypothesized that the number and severity of coronary lesions is directly related to hypertension grade and concomitant presence of different c-v risk factors.

Design and method: Between September 2015 to February 2016, 283 hypertensive patients (mean age 63.1±9.039 y.o.) performed invasive evaluation of coronary arterial tree. Clinical indications were: ischemic heart disease, cardiomyopathies, valvular heart disease and rhythm and conduction disturbances. An observational, cross-sectional study was conducted; clinical and imaging results were computed. Hypertensive patients were stratified to 3 grades according to 2013 ESH/ESC guidelines for the management of arterial hypertension (HT). Patients were divided according to the number of coronary arteries involved: single, double, triple vessel CAD.
Results: With regard to hypertension grades correlated with CAD, in our study 3.1% (9) pts were included in grade 1 HT, 53.0% (150) grade 2 HT and 19.0% (54) patients were diagnosed with HT grade 3. No significant CAD was described in 70 pts (24.73%) presenting grades 1, and 3 HT.

Of 190 male and 93 female hypertensive patients, 61.13% (173 pts) had significant CAD (>50% reference vessel diameter reduction). Single vessel disease was present in 88.8% of grade 1 hypertensive patients, and triple vessel disease was identified in 29.3% of patients presenting hypertension grade 2 compared to 24.0% in grade 3 hypertensive patients.

Correlation between grade of HT and severity of CAD (number of affected vessels) was studied using chi-square test, demonstrating a very strong statistically correlation (p < 0.0001).

Conclusions: Not optimally treated high grades of hypertension will increase the number of patients requiring different procedures of myocardial revascularization. Extended research on risk factors predisposing to coronary artery disease and their synergism, among them high blood pressure, is necessary in order to reduce the global burden of cardiovascular disease.

EVALUATION OF PLATELET-PLASMA HAEMOSTASIS IN PATIENTS WITH UNSTABLE ANGINA AND STENTING OF THE CORONARY ARTERIES IN THE PRESENCE OF HYPERTENSION

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Objective: To evaluate the activity of platelet and plasma hemostasis in 143 patients (pts) with unstable angina (UA) and stenting of the coronary arteries against the background of arterial hypertension (AH).

Design and method: 143 pts were examined, coronary artery stenting was performed on 3.6 ± 1.2 days after admission. 1 Group 63 (44%) pts without AH, in the 2nd Group 80 (56%) pts with AH initially, at admission, at 6 and 12 months of observation was performed coagulation, aggregation tests; levels of troponin I, C-reactive protein, myeloperoxidase. Pharmacogenetic testing was carried out by real-time polymerase chain reaction with the BioRad CFX96TM Real-Time PCR Detection Systems.

Results: Pts in both Groups were characterized by activation of platelet-plasma haemostasis upon admission, however, in pts with UA with AH (G2) the values were significantly higher: platelet volume (MPV) (9.88 ± 9.11, p < 0.003), FVR (158% vs. 130%, p < 0.041), MPO (348 pmol/L vs. 296 pmol/L, p < 0.001), platelet aggregation level with an AUC (122-U) test against the 106U (TRAP test) vs. 102-U (p < 0.02) and the AUC of the ADR test (68 U versus 52U, p < 0.02). By the 6th and 12th months of monitoring, significant differences were recorded only between pts G1 and G2, who did not achieve stable target BP values. It should be noted that the pts of both Groups are comparable in polymorphism of the CY - T1-y8, 12.7% pts, in G2 - in 11.3% of the pts). During the year of follow-up, repeated cardiovascular complications developed in 31 pts (21.7%), 10 (15.9%) G1, and 21 (26.3%) in G2 (p = 0.048)

Conclusions: The presence of AH in pts with UA aggravates platelet hyperactivity and activates plasma and platelet hemostasis, increase in the number of pts with reduced sensitivity to clopidogrel and an increase cardiovascular events.

RELATIVELY IMPAIRED CORTISOL SUPPRESSION BY DEXAMETHASONE IS ASSOCIATED WITH LEFT VENTRICULAR MASS AND GEOMETRIC CHANGES IN PATIENTS WITH ESSENTIAL HYPERTENSION

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Objective: Both subclinical hypercortisolism and overt Cushing syndrome are associated with cardiovascular events and changes in left ventricular (LV) geometry. However, few data are available on the relationship between cortisol production and LV mass and geometry in essential hypertensive (EH) patients.

Design and method: In 103 EH subjects (age 50 ± 14 y, 58 males, 33 never treated with antihypertensive drugs), we evaluated clinical characteristics, renal function, plasma levels of glucose, insulin, and lipids, the circadian levels of plasma cortisol (8 AM, 8PM, and 11 PM) with the area under the curve (C-AUC), 24-hour urinary cortisol excretion, and the response of plasma cortisol to an overnight suppression test with 1 mg of dexamethasone (DMT). Echocardiography was performed in all patients with a standard technique.

Results: LV hypertrophy (LHV) according to current criteria was detected in 34 of 103 EH patients. Patients with LHV were significantly older, had longer duration of hypertension, and greater BMI, systolic blood pressure, plasma triglycerides, and post-DMT plasma cortisol level (P = 0.004) than patients without LHV. No differences were detected in circadian plasma cortisol profile nor urinary cortisol excretion between with and without LHV. Eccentric LHV was present in 13 EH patients who showed greater post-DMT plasma cortisol levels than patients with other types of LV geometry. In a logistic regression model, LV mass was associated independently with BMI (OR 1.20, P = 0.022) and post-DMT plasma cortisol (OR = 1.06, P = 0.045). LV mass (LVMi) was significantly and directly related to age (r = 0.329, P = 0.001), duration of hypertension (r = 0.243, P = 0.015), BMI (r = 0.317, P = 0.001), systolic blood pressure (r = 0.397, P < 0.001), plasma glucose (r = 0.215, P = 0.031) and triglycerides (r = 0.323, P = 0.001), HOMA-index (r = 0.226, P = 0.029), and post-DST plasma cortisol (r = 0.349, P = 0.002), whereas a borderline significant relationship was found with C-AUC (r = 0.201, P = 0.053). In multivariate regression models, LVMi was independently associated post-DMT cortisol (B = 0.245, P = 0.026) and C-AUC (B = 0.233, P = 0.018).

Conclusions: Subtle changes in the regulation of plasma cortisol secretion contribute to cardiac hypertrophy and LV geometric changes in patients with EH.

CORRELATION OF ARTERIAL STIFFNESS AND 25(OH) VITAMIN D LEVEL IN POSTMENOPAUSAL WOMEN WITH CONTROLLED UNCOMPPLICATED HYPERTENSION

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Objective: was to assess the association between carotid – femoral pulse wave velocity (PWV) and serum 25(OH) vitamin D level in postmenopausal women with controlled uncomplicated hypertension (UH).
MYOCARDIAL STIFFNESS AND LEFT VENTRICULAR HYPERTROPHY IN THE MIDDLE-AGED HYPERTENSIVE PATIENTS

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Objective: to investigate left ventricular (LV) and left atrial (LA) stiffness parameters in middle-aged patients with grade 1–2 essential arterial hypertension (EAH) without concomitant cardiovascular diseases according to the presence of LV hypertrophy (LVH).

Design and method: Case-control study. We examined 127 naive patients with uncomplicated grade 1–2 EAH and divided them into two groups according to the LV mass index (LVI). The first one is included 96 hypertensive patients (HP) with LVH (mean LVI 25.8 ± 2.1 g/m², mean age 52.6 ± 0.7 years; mean office blood pressure (BP) 151.9 ± 1.5, 93.1 ± 1.1 mm Hg). The second group consisted of 31 patients without LVH (mean LVI 89.7 ± 2.1 g/m², mean age 51.3 ± 1.0 years; mean office BP 138.7 ± 2.1, 83.5 ± 1.9 mm Hg). 44 healthy individuals (mean age 51.5 ± 1.0 years; mean office BP 120.1 ± 2.0, 80.5 ± 1.0 mm Hg) represented the control group. All the patients underwent 24-hours ambulatory BP monitoring. Comprehensive transthoracic echocardiography using Vivid 7 Dimension system (GE) was also performed. LV end-diastolic stiffness, LV end-systolic elastance, LV diastolic elastance, LA stiffness index, LA expansion index and tissue Doppler-derived (TDD) LA strain were calculated. 2-D speckle tracking echocardiography data were acquired for determination of LV myocardial global longitudinal peak strain (LV GLPS).

Results: TDD LA strain was significantly higher in HP without LVH (60.0 ± 4.7%) compared to HP with LVH (49.77 ± 1.49%); p < 0.05. LV GLPS was significantly lower in absolute value in HP with LVH (16.9 ± 0.3%) and HP without LVH (-17.6 ± 0.6%) compared to controls (-19.9 ± 0.4%; p < 0.001 and p < 0.01, respectively). No significant differences between studied groups were obtained in other myocardial stiffness parameters. LV GLPS showed a weak but significant associations with office diastolic BP (r = 0.354; p < 0.01), 24 h systolic BP (r = 0.291; p < 0.05), 24 h pulse pressure (r = 0.296; p < 0.05), and average night-time systolic and diastolic BP (r = 0.343; p < 0.01 and r = 0.262; p < 0.05, respectively).

Conclusions: The present study reveals that disturbances in myocardial stiffness parameters occur early, before the development of echocardiographic signs of LVH. They are earlier markers of target organ damage even in middle-aged untreated patients with grade 1-2 uncomplicated EAH.

ATRIAL FIBRILLATION AND ARTERIAL HYPERTENSION. VARIANCE OF SERUM URIC ACID LEVELS IN BOTH DISEASES


Objective: Atrial fibrillation and arterial hypertension share common risk factors such as obesity, diabetes mellitus, alcohol consumption etc. There is evidence however that the aforementioned risk factors are associated with serum uric acid (SUA) levels. We sought to assess the relation of SUA levels with arterial blood pressure (BP) levels and the incidence of atrial fibrillation

Design and method: We prospectively enrolled 568 hypertensive patients (mean age 63 ± 10 years) for assessment of the Hypertension clinic. All patients underwent 24-hour holter monitoring for the detection of atrial fibrillation (AF). Patients with documented AF in 24-hour recordings or patients with a history of AF were defined as AF patients. In all subjects routine blood chemistry, including SUA determination, echocardiographic examination, office and 24 h ambulatory blood pressure (BP) monitoring were obtained. In all patients data regarding lifestyle (smoking, alcohol consumption and exercise) were recorded.

Results: From 568 hypertensive patients, 77 patients (13%) had atrial fibrillation. Mean average 24 hour systolic blood pressure (SBP) was 132 ± 15 mmHg, mean 24 hours average diastolic blood pressure (DBP) was 77 ± 10 mmHg. Spearman analysis showed that SUA levels were significantly and positively associated with the average 24 hours systolic blood pressure levels (rs = 0.092, p < 0.05 for SBP) but not with diastolic BP levels (rs = 0.06, p > 0.05). Serum uric acid levels in patients with atrial fibrillation were statistically significantly higher than those without (Z = 5.3, p < 0.001). In addition, SUA levels were highly correlated with all the major risk factors predisposing for the development of arterial hypertension or AF. Specifically SUA levels were significantly higher in males (Mann-Whitney U = 25158.500, p < 0.01), in elderly patients (rs = 0.117, p < 0.01), in patients with increased body mass index (rs = 0.337, p < 0.01), with diabetes (Mann-Whitney U = 25445.500, p < 0.05).

Conclusions: Increased SUA levels were significantly associated with the incidence of atrial fibrillation and systolic BP levels as well as with the majority of the risk factors predisposing for the development of both diseases.

DETERMINANTS AND PROGNOSTIC VALUE OF UNASSSESSABLE LEFT VENTRICULAR MASS INDEX IN HYPERTENSIVE PATIENTS

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Objective: Left ventricular hypertrophy (LVH) assessed by transthoracic echocardiography, a subclinical target organ damages, detect a subgroup of high-risk patients. However echocardiography presents several limits, among which results unavailability in more than 10% of hypertensive subjects for technical reasons. The aim of the present study was to determine variables that can explain unassessable left ventricular mass index (LVMi) and to explore the prognostic value of this subgroup of patients.

Design and method: 1104 hypertensive patients having an echocardiography were included. LVMi was calculated with the formula of Devereux and further indexation was performed to heighten to the allometric power of 2.7 with the following LVH criterion: TTE LVMi2.7 > 51 g/m2.7 in both sexes. LVH was defined as unassessable LVMi. After a median follow-up of 8.5 [5.4–13.3] years, 110 deaths occurred, 62 of which were from cardiovascular cause.

Results: LVMi was unassessable in 183 patients and assessable in 921 patients included 468 patients with LVH. Independent determinant of unassessable LVMi was age, gender and BMI. After a median follow-up of 8.5 [5.4–13.3] years, 110 deaths occurred, 62 of which were from cardiovascular cause.

Conclusions: The present study reveals that disturbances in myocardial stiffness parameters occur early, before the development of echocardiographic signs of LVH. They are earlier markers of target organ damage even in middle-aged untreated patients with grade 1-2 uncomplicated EAH.
Atrial Fibrillation Detection during Automated Blood Pressure Measurement: A Systematic Review and Meta-Analysis

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Objective: In 2013 the UK National Institute for Health and Care Excellence (NICE) recommended opportunistic atrial fibrillation (AF) screening during routine office blood pressure (BP) measurement using the oscillometric Microlife Afi b BP monitor with specific AF detection algorithm in primary care in the elderly. This study evaluated the current evidence on the diagnostic accuracy of this technology in detecting AF during automated BP measurement.

Design and method: A systematic PubMed search was conducted using the keywords "atrial fibrillation", "blood pressure", "detection", "screening". Articles evaluated the diagnostic accuracy of BP monitors during office measurements, and 2 during home BP measurements. Electrocardiography was used as reference method in all studies. A meta-analysis of 11 studies with adequate data (n = 10,972; AF prevalence 17 ± 12%; 4 studies required at least 2 of 3 AF positive readings for AF diagnosis) showed pooled sensitivity, specificity and accuracy as follows: 95% (95% C.I. 92–98%), 94% (92–96) and 94% (93–96), respectively. With increasing AF prevalence across studies, meta-regression analysis showed a trend towards higher sensitivity and lower specificity.

Conclusions: The available evidence suggests that AF detection during automated BP measurement using the Microlife Afi b device has high diagnostic accuracy, which is influenced by the AF prevalence. These data support the 2013 UK NICE recommendation for AF screening using automated BP measurement with specific AF detecting algorithm in the elderly.

Clinical Determinants of Angiotensin Converting Enzyme Inhibitors/Angiotensin Receptor Blockers Use in an Early Phase after Acute Heart Failure Hospitalization

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Objective: To investigate which clinical determinants predict the use of angiotensin converting enzyme inhibitor (ACEi) or angiotensin receptor blocker (ARB) in an early phase after acute heart failure (AHF) hospitalization.

Results: Of 697 study patients with adjudicated diagnosis of acute heart failure (AHF) were included in the analysis. Blood biomarkers tested at admission included: cardiac and kidney markers, electrolytes, and glucose. Analysis of variance (ANOVA) was used to interpret the differences among group means. For variables that were marginally skewed, a nonparametric Kruskal-Wallis test was performed. Data were analysed using SPSS v23 statistical package.

Results: 405 (58.1%) patients were male and 292 (41.9%) female. Systolic and diastolic blood pressure, mean arterial pressure, and pulse pressure were divided into quartiles for analysis (Table 1). Kruskal-Wallis test demonstrated that the distribution of blood concentration of BNP, hs-Troponine I, urea, sodium, creatinine, and glucose differed significantly among 1st and 2nd, 1st and 3rd, and 1st and 4th percentile groups of systolic BP, diastolic BP, MAP, and PP (Table 1). Patients with the lowest BP had distinctively elevated congestion, myocardial and kidney injury markers.

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Objective: We aimed to investigate whether blood biomarker profile varies in patients with different baseline blood pressure at admission for acute heart failure.

Design and method: A prospective, multi-centre, observational cohort study enrolled consecutive patients with acute dyspnea from March, 2015 till December, 2017. The exclusion criterion was a suspected acute coronary syndrome. Data of 697 study patients with adjudicated diagnosis of acute heart failure (AHF) were included in the analysis. Blood biomarkers tested at admission included: cardiac and kidney markers, electrolytes, and glucose. Analysis of variance (ANOVA) was used to interpret the differences among group means. For variables that were marginally skewed, a nonparametric Kruskal-Wallis test was performed. Data were analysed using SPSS v23 statistical package.

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INTERRELATIONSHIP BETWEEN CHANGES OF E/E’ AT REST AND AFTER EXERCISE AND NT-PRO-BNP IN MILD HYPERTENSION PATIENTS WITH STRUCTURAL CHANGES AND DYSPNEOA

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1. Bogomolets National University, Kiev, UKRAINE, 2. Oleksander Clinical Hospital, Kiev, UKRAINE

Objective: The aim was to compare the frequency of NT-pro-BNP elevation in phenotypes of mild arterial hypertension (AH) pts with left heart structural changes and heart failure (HF) symptoms based on E/E’ > at rest, E/E’ > 13 only after exercise and E/E’ < 13 both at rest and exercise.

Results: Patients Group A included patient with average E/e’ > 13 at rest. Group B with E/e’ < 13 at rest < 13 and Group C patients with E/e’ < 13 both at rest and after exercise. In all pts NT-pro-BNP levels (ELISA) were obtained.

PARAMETERS OF ELASTIC PROPERTIES, ECHOCARDIOGRAPHIC RANGES, INFLAMMATION AND LEVEL OF URIC ACID IN PATIENTS WITH CORONARY HEART DISEASE COMBINED WITH LIVER PATHOLOGY

M. Grechanyk1, D. Chvora2, L. Trunova2, I. Bohovina3, A. Kuryata1. 1. PATHOLOGY

Objective: To compare the relationship parameters of elastic properties, echocardiographic ranges, inflammation and level of uric acid in patients with coronary heart disease (CHD) combined with liver pathology.

Results: E/E’ was 13 only at exercise E/E’ both at rest and exercise phenotypes as regards of NT-pro-BNP elevation (in 68.2% and 35.7%) demonstrates the need of heart failure with preserved ejection fraction (HFpEF) criteria specification.

Conclusions: In mild hypertension pts with left heart structural changes and HF symptoms only E/E’ elevation at rest phenotype was associated with NT-pro-BNP elevation in 100% of cases. Heterogeneity of E/E’ > 13 only at exercise E/E’ both at rest and exercise phenotypes as regards of NT-pro-BNP elevation (in 68.2% and 35.7%) demonstrates the need of heart failure with preserved ejection fraction (HFpEF) criteria specification.

PARAMETERS OF ELASTIC PROPERTIES, ECHOCARDIOGRAPHIC RANGES, INFLAMMATION AND LEVEL OF URIC ACID IN PATIENTS WITH CORONARY HEART DISEASE COMBINED WITH LIVER PATHOLOGY

M. Grechanyk1, D. Chvora2, L. Trunova2, I. Bohovina3, A. Kuryata1. 1. Pathology

Objective: To compare the relationship parameters of elastic properties, echocardiographic ranges, inflammation and level of uric acid in patients with coronary heart disease (CHD) combined with liver pathology.

Design and method: Studied 59 men (group A) with CHD combined with hepatic steatosis, the group B- 17 patients with CHD without hepatic steatosis. The study group was divided into 3 subgroups according to BMI (subgroup 1 - patients who are overweight, 2- obesity 1 degree, 3- obesity grade 2. Evaluated Peterson’s elastic modulus (Ep), Young’s elastic modulus (Es), echocardiographic ranges, C-reactive protein (CRP), and level of uric acid.

Results: E and Es in a group A (412.3 ± 142 kPa, 990.6 ± 227 kPa) was lower than in a group B (574.5 ± 158 kPa, 1358 ± 243 kPa p < 0.001). Ep and Es were lower in the subgroup 1< 570.8 ± 158 kPa, 846 ± 160 kPa and in subgroup 2 (375 ± 175 kPa, 1041 ± 301 kPa) than in subgroup 3 (522 ± 125 kPa, 1106 ± 281 kPa) (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 (5.26 ± 0.37 mm and 4.8 ± 0.1 mm; p = 0.02; 3.47 ± 0.3 mm and 3.08 ± 0.3 mm, p = 0.01; 135.23 ± 23.5 mL and 110.1 ± 6.24 mL, p = 0.03; 50.47 ± 10.85 mL and 38.2 ± 9.2 mL, p = 0.03; 295.1 ± 73.57 g and 184.3 ± 31.6 g, p = 0.02). In group A there was an increase in the level of NT-pro-BNP (4.8 ± 1.4 mg/l) than in the group B (4.2 ± 1.3 mg/l; p < 0.03). The level of CRP was higher in group A (72.9 ± 31.8 vs 58.6 ± 28.4 ms; p = 0.005) compared to those without arterial hypertension.

Conclusions: Our findings demonstrates that low arterial elasticity is really involved in LV diastolic dysfunction formation. Moreover, CRP was the only parameter significantly associated with VAC. That is why VAC may not only diagnose arterial stiffening but also may demonstrate how it increases LV load.

THE IMPACT OF HYPERTENSION ON QT DISPERSION AND ECHOCARDIOGRAPHIC PARAMETERS IN PATIENTS AFTER MYOCARDIAL INFARCTION

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Objective: The aim of this study was to investigate the effect of hypertension on QT dispersion and echocardiographic parameters in patients after myocardial infarction.

Design and method: The study included 133 patients after myocardial infarction (average age 58.8 years), of which 87 were with hypertension, and 46 were without arterial hypertension. There were no significant differences in age and gender between the two groups of patients. In all subjects exercise stress test on a treadmill according to the Bruce protocol and echocardiographic examination were performed and from standard ECG corrected QT dispersion (QTe) and QTd was calculated.

Results: Patients after myocardial infarction with hypertension had significantly higher values of QTe (65.2 ± 26.4 vs 52.7 ± 25.2 ms; p < 0.01) and QTd (72.9 ± 31.8 vs 58.6 ± 28.4 ms; p < 0.005) compared to those without arterial hypertension. Also, patients after myocardial infarction with hypertension...
had significantly higher values of the thickness of the interventricular septum (13.4 ± 1.8 vs 10.1 ± 1.0 mm; p < 0.001), left ventricle posterior wall thickness (10.9 ± 1.8 vs 9.8 ± 0.7 mm; p < 0.001) and left atrium diameter (40.9 ± 6.6 vs 38.5 ± 5.8 mm; p < 0.02) compared to those without hypertension. Patients after myocardial infarction with arterial hypertension have lower values of the left ventricular end-diastolic diameter (54.1 ± 6.3 vs 55.8 ± 5.4 mm; p-NS), and left ventricular end-systolic diameter (36.8 ± 7.1 vs 38.8 ± 6.5 mm; p-NS) and higher values of left ventricular ejection fraction (52.6 ± 13.5 vs 50.8 ± 12.5 %; p-NS), compared to those without hypertension, but the differences were not statistically significant.

Conclusions: The study demonstrated that patients after myocardial infarction with hypertension have significantly higher values of QT dispersion parameters, thickness of the left ventricle walls and left atrium diameter in comparison to those without hypertension.
POSTER SESSION

POSTERS’ SESSION PS05:
LIFESTYLE, HYPERTENSION MANAGEMENT

IMPROVING THERAPEUTIC COMPLIANCE OF DABIGATRAN IN PREVENTING STROKE IN PATIENTS WITH NON-VALVULAR ATRIAL FIBRILLATION: DRUG INTAKE REMINDER STRATEGY

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Objective: To assess the efficacy of a mixed intervention, educational and reminder calendar of the intake, as a strategy to improve therapeutic compliance with dabigatran in patients with non-valvular atrial fibrillation (NVAF).

Design and method: Prospective, longitudinal, multicenter study, carried out in 110 specialized healthcare centers in Spain. 726 patients treated with dabigatran prescribed for stroke prevention were included.

A cluster randomization was performed based on two groups: 1) Control Group (CG) as usual clinical practice and Intervention Group (IG) with a mixed strategy: a) Healthcare education and b) Use of a reminder calendar for taking the anticoagulant medication. These visits took place at baseline and follow up at 6 and 12 months. Compliance was measured using electronic monitors (Medication Event Monitoring System - MEMS). Average compliance percentage (%; Average CP) and daily compliance (%; Daily CP) was calculated. A patient was considered complier when CP was 80–100%.

Results: Six hundred twenty-five patients ended the study. There were 315 evaluable subjects in the IG and 310 in the CG, with a mean age of 73.52 ± 8.3 years and 73.32 ± 8.56 respectively. Daily CP was 91.97 % at 6 months and 91.05 % after 12 months in the IG and 82.26 % and 82.63 % in the CG. Average compliance was 90.79 % and 89.20 % in the IG and 64.51 % and 63.22 % in the CG at 6 and 12 months respectively. Significant differences were observed in the Daily CP and Average CP with higher percentages in IG. In the non-compliers group, the number of concomitant drugs, baseline and 6 months SBP values, 6 and 12 months DBP values, baseline, 6 and 12 month weight, and total cholesterol and LDL cholesterol at baseline, 6 and 12 months were significantly higher.

The number needed to treat (NNT) at the end of the intervention was 3.84 patients to prevent 1 non-compliance.

Conclusions: A mixed intervention with educational and reminder calendar of drug intake, has been proven to be effective as a strategy to improve therapeutic compliance with dabigatran in patients with NVAF. The percentage of compliance with dabigatran was high.

LINKS BETWEEN BLOOD PRESSURE AND LIFE-STYLE FACTORS REPORTED VIA A MOBILE PHONE-BASED SELF-MANAGEMENT SUPPORT SYSTEM

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Objective: To explore relationships between patients’ self-monitoring of blood pressure and their concurrent self-reports of medication intake, wellbeing stress, physical activity and symptoms.

Design and method: This was a prospective study exploring the eight-week effectiveness of a mobile phone based self-management system support for patients with hypertension. 50 patients undergoing treatment for hypertension, from four primary health care centers situated in urban and suburban communities in Sweden, self-reported through the system once daily during eight weeks.

Scientific data: Associations between systolic and diastolic blood pressure and 10 self-report lifestyle-related variables.

Results: The single strongest association was found between medication intake and systolic blood pressure, where failure to take medications was associated with an estimated 7.44 mmHg higher systolic blood pressure. To a lesser degree, medication intake was also associated with diastolic blood pressure. Wellbeing and stress were consistently associated with systolic blood pressure and diastolic blood pressure, whereas physical activity was associated with only systolic blood pressure. None of the symptoms dizziness, headache, restless, fatigue or palpitations were significantly associated with blood pressure.

Conclusions: Blood pressure was associated with patients’ blood pressure management behaviors, eg drug intake and experiences of wellbeing and stress. No association was found between blood pressure and side effects. Enabling persons with hypertension to monitor and track their BP in relation to medication intake, symptoms and life-style variables may be a fruitful way to help them gain first-hand understanding of the importance of adherence and persistence to treatment recommendations.

A COMPARATIVE STUDY BETWEEN EUROPEAN GUIDELINES AND AMERICAN GUIDELINES USING FUZZY SYSTEMS FOR THE CLASSIFICATION OF BLOOD PRESSURE

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Objective: The main objective is using fuzzy classifiers to provide accuracy in the handling of information, which will help to be more accurate when classifying the blood pressure level of a patient. Classifiers are based on the parameters provided by the guidelines, and make the comparison given by the European and the American guide and observe the behavior that each of them can take at the time of making a diagnosis.

Design and method: Based on this study we want to identify the way in which a patient is diagnosed using two different guidelines of blood pressure levels, the first is the European guidelines and the second it is the American guides, the latter mentioned was recently updated and it is important to see the impact that each of them can have on society. Currently there is a database with 200 patients, each patient has an average 45 measurements, these 24-hour screenings have been obtained in collaboration with a cardiologist, and this information is then processed.
with neural networks to obtain the tendency, which enters in fuzzy classifier, which gives us the blood pressure level depending on the base guideline.

Results: The following result was obtained based on the parameters and levels given by each of the guidelines and using fuzzy classifiers respectively for each, which have a correct classification accuracy rate of 100% for the 30 patients processed and classified. For the European guidelines the classification of patients with hypertension is 43.3% with a standard deviation of 2.71 and using the new American guidelines is 56.6% with a standard deviation of 2.71 using the same patients.

Conclusions: The performed study reports a higher rate of hypertensive people, which based on European guidelines are within normal to high normal ranges, but based on the new American guidelines it was observed that some patients directly enter the stage 1 or stage 2 hypertensive classes, which generates an impact on their daily life, in which they need to change their lifestyle to avoid a cardiovascular event.

ASSOCIATION OF DIETARY SODIUM INTAKE AND 24H URINE SODIUM EXCRETION WITH ENDOTHELIAL DYSFUNCTION AND URINARY ALBUMIN EXCRETION IN EARLY-STAGE HYPERTENSIVE INDIVIDUALS

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Objective: Monitoring of dietary sodium intake is essential in hypertension and efforts have been made to find the least troublesome method to accurately estimate sodium consumption. Asymmetric dimethylarginine (ADMA) is an endogenous inhibitor of nitric oxide, which is implicated in abnormal pressure-natriuresis. Increased urinary albumin excretion (UAE) has been associated with sodium intake, possibly through alteration of intrarenal hemodynamics. We investigated which method of measuring sodium intake, including dietary and urinary assessment, correlates better with endothelial dysfunction and UAE and may be a better indicator of vascular damage in newly-diagnosed, never-treated hypertensive patients.

Design and method: Untreated individuals free from cardiovascular comorbidities were eligible to participate, whose 24h systolic/diastolic blood pressure exceeded 130 and/or 80 mmHg based on their ambulatory blood pressure recording (MobilOGraph). Asymmetric dimethylarginine (ADMA) was measured in serum samples using commercially available competitive enzyme-linked immunosorbent assay (ELISA) kit. UAE was measured in 24 h urine samples. Dietary sodium intake was estimated with a 24-hour diet recall that corresponded to the same day as the 24-hour urine collection, b) a salt score questionnaire based on a 0–10 scale, with higher values indicating higher salt intake, and c) urinary sodium excretion in 24-hour urine sample.

Results: A total of 50 hypertensive patients, 28 males and 22 females, with a mean age of 47.0 ± 10.9 years and mean 24-hour ambulatory systolic/diastolic blood pressure 135.2 ± 10.0/88.5 ± 9.1 mmHg, were included. Urinary albumin excretion was 6.1 (4.3–10.5) mg/24 h and ADMA levels were 0.99 ± 0.42 mmol/l. Urinary sodium excretion was 83.3 (48.4–146.5) mmol/24 h, estimated dietary sodium intake was 79.2 (36.7–130.4) mmol/24 h, and salt score was scaled at 4.9 ± 1.5. Urinary sodium excretion was the only sodium indicator that positively and strongly correlated with both urinary albumin excretion (r = 0.347, p = 0.043) and ADMA levels (r = 0.389, p = 0.025).

Conclusions: In a population of untreated, relatively young, early-stage hypertensive individuals, urinary sodium excretion, yet not other dietary measures of sodium, may reflect microvascular damage. These results support the widely perceived premise that 24-hour urine collection is more accurate, although more cumbersome to perform, than other dietary sodium assessments, in terms of pathophysiology and clinical significance.

ASSESSMENT OF ADHERENCE TO ANTIHYPERTENSIVE DRUGS IN PATIENTS WITH RESISTANT HYPERTENSION RECEIVING OPTIMAL TREATMENT


Objective: Estimate the proportion of nonadherence to antihypertensive drugs in patients with resistant hypertension despite a maximal treatment

Design and method: The study was prospective and observational. We screened all consecutive patients managed in our tertiary center for resistant hypertension between January 2014 and September 2017. Were included only those who already done an ambulatory blood pressure measure to eliminate a white coat effect and an exhaustive etiological work up to exclude a secondary cause. Hypertension was considered resistant if the ambulatory measure was over or equal to 135/85 mmHg during the awakening period or to 130/80 mmHg during the 24 hours, despite 4 antihypertensive medications combining a renin-angiotensin system inhibitor, amlopidine, a thiazide (or indapamide) and spironolactone, at optimal doses. Treatment compliance was assessed by the eight-item Morisky Medication Adherence Scale (MMAS-8).

Results: 386 patients were enrolled, with a mean age of 57.4 ± 11.3 years, and 48.3% of men. The mean office blood pressure was 178 ± 20.4 / 101 ± 15.5 mmHg and the 24 hours ambulatory blood pressure was 164 ± 17.6 / 97 ± 15.2 mmHg. The proportions of fully adherence, partially nonadherence and completely nonadherence were 27.9%, 47.6% and 24.5% respectively. Fully adherent, partially nonadherent and completely nonadherent patients differed significantly in terms of proportions of women (25%, 48% and 72%), number of daily drugs, reflecting comorbidities (5.9; 6.1 and 9.8 respectively) and education level (the proportions of patients who do not achieve a secondary school were 10.1%, 28.3% and 53.2% respectively).

Conclusions: More than two out of three patients with resistant hypertension optimally treated and without white coat effect were partially or completely nonadherent to treatment in our study. Assessment of the adherence to antihypertensive treatment in these high cardiovascular risk patients should be systematic and possibly by more objective methods.

EFFECT OF RENAL DERENATION ON CARDIAC FUNCTION AND APOPTOSIS-RELATED GENES’ EXPRESSION IN HEART FAILURE DOGS

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Objective: To observe the effects of RDN on cardiac function and apoptosis-related genes’ expression in MI-HF dogs.

Design and method: Eighteen healthy mongrel dogs were randomly divided into normal group (n = 6), model group (n = 6) and treatment group (n = 6). MI-HF was established in model group and treatment group by anhydrous alcohol embolization. After heart failure mode was established, dogs in the treatment group and model group proceeded bilateral renal artery ablation and bilateral renal arteriography, respectively. The cardiac function parameters were measured; the serum NT-ProBNP level was detected by ELISA; the degree of myocardial fibrosis was observed through masson staining; TUNEL method was used to observe cardiomyocyte apoptosis and calculate the apoptosis index (AI). Relative expression of Bcl-2,Bax, Caspase-3 and GRP78 were detected using RT-PCR and WB. Renal artery HE staining and serum creatinine were conducted to access the the efficacy and safety of RDN.
Results: No statistical differences between the baseline weight, HR, LVEDD, LVESD, LVEFD, LVESP and LVESP in all dogs. Before ablation, NT-ProBNP level increased in HF dogs (treatment group and model group) compared with normal dogs, while no difference between treatment group and model group. 4 weeks after ablation, compared with model group the NT-ProBNP values reduced in treatment group. NT-ProBNP level were higher in HF dogs. 4 weeks after ablation, compared with normal group the Bax, Caspase-3, GRP78 mRNA and protein level in myocardial tissue have increased, Bcl-2 mRNA and protein expression decreased and cardiomyocyte apoptosis index increased in heart failure HF dogs (model group and treatment group) with statistical significance. Compared with model group, the level of Bax, Caspase-3, GRP78 decreased, Bcl-2 mRNA and protein expression increased, myocardial apoptosis index decreased in RDN treatment dogs with statistical significance. 4 weeks after ablation, HF staining showed that the sympathetic nerve distribution decreased significantly after RDN operation.

Conclusions: RDN could improve cardiac function in MI-HF dogs, and we speculate that its mechanism may be related to the raise of Bcl-2 gene expression and lower of Bax, Caspase-3, GRP78 expression level by RDN.

IMPORTANCE OF THE DIRECTLY OBSERVED TREATMENT INTAKE ON THE APPROACH OF PATIENTS WITH RESISTANT HYPERTENSION

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Objective: The diagnosis of resistant hypertension (HRes) and the efficacy of renal denervation ensure proper compliance with the therapy. We intend to assess the usefulness of directly observed treatment intake (OTI) in the control of adherence to antihypertensive medication in patients with HTAres.

Design and method: We studied 46 patients with Hres (BP > /or 150/90 mm Hg under with at least 3 different classes of drugs in optimal doses) in outpatient hypertension clinic. Four were previously submitted to renal denervation. 24-h ambulatory BP (ABP) was evaluated before the procedure. In OTI patients took all medications in the morning for 5 days under the supervision of a technician and performing on the fifth day a second ABP.

Results: Out of the 46 patients 76% were female, ageing 63 ± 11 years and BMI 30 ± 5 Kg/m2. The average of antihypertensive agents was 4.5 ± 1.2 (day. After OTI casual, daytime and nighttime BP decreased significantly (Table). After OTI, 16 patients (34.8%) reported adverse drug reactions not reported before, and 4 patients who persisted to the control group patients required at least 1 remote consultation (from 1 to 8, mean n = 4) for different reasons which in 36 cases (33%) lead to change in antihypertensive therapy. At 3-month visit TMDC group demonstrated reduction in anxiety and depression according to HADS compared to baseline data (-1.2 and -1.8 score, respectively, p < 0.05) and improvement in physical life quality (+ 9 ± 3,3 points SF-36, p = 0.04). In control group patient-reported outcomes remained unchanged.

Conclusions: Results demonstrated that 3-month telemonitoring program in patients with uncontrolled HTN provides additional antihypertensive effect and improving of patient-reported outcomes. These results can be explained by better patients-doctor interaction and improvement of patient compliance.

ASSOCIATION BETWEEN SALT INTAKE AND URIC ACID, AND ITS INTERACTION ON THE INCIDENCE OF PREHYPERTENSION AMONG CHINESE YOUNG ADULTS

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Objective: High uric acid (UA) level and high salt intake are reportedly associated with cardiovascular disease. This study investigated the association between UA and daily salt intake, as well as its interaction on the risk of prehypertension.

Design and method: A total of 1869 participants without hypertension were recruited from a previously established cohort in Shaanxi Province, China. The participants were classified as normotensive or prehypertensive on the basis of their blood pressure. Salt intake was estimated from early-morning urine specimens using an equation validated for this study population.

Results: Increasing quartiles of salt intake were associated with high urinary UA/creatinine levels in prehypertensive participants (from quartile 1 to quartile 4: 0.12, 0.17, 0.24, and 0.33, P for trend < 0.001). Estimated salt intake positively correlated with urinary UA/creatinine excretions in the prehypertensive group (r = 0.496, P < 0.001). In addition, the prehypertensive group had higher levels of salt intake and serum UA than the normotensive group [salt intake: 13.22 ± 3.52 vs. 12.35 ± 3.42 g/day, P < 0.001; serum UA: 290.0 (233.6–340.6) vs. 255.6 (211.6–305.0) mmol/L, P < 0.001]. The multivariate-adjusted odds ratios (95% confidence interval) for prehypertension compared with normotension were 1.68 (1.27–2.22) for salt intake and 1.71 (1.21–2.42) for serum UA. Increasing salt intake and serum UA were associated with higher risk of prehypertension. Compared technical instructions on BP self-monitoring and trained for the use of website and mobile application. Remote consultations were allowed at any time by demand during a 3-month program, the frequency and reasons were also registered.

Results: After the 3-month period the decrease in office systolic (SBP) and diastolic (DBP) BP levels was significantly higher in TMDC group compared to the controls: –22 ± 12.4 versus –8.6 ± 22.4 mmHg for SBP (p = 0.005) and –13.6 ± 10.8 versus –7 ± 11.3 mmHg for DBP (p = 0.02). Target office BP level (< 140/90 mmHg) was achieved in 82 patients (75%) and 16 patients (20%), respectively (c² = 20.8; p < 0.01). During 3-month program every patient in TMDC group required at least 1 remote consultation (from 1 to 8, mean n = 4) for different reasons which in 36 cases (33%) lead to change in antihypertensive therapy. At 3-month visit TMDC group demonstrated reduction in anxiety and depression according to HADS compared to baseline data (–1.2 and –1.8 score, respectively, p < 0.05) and improvement in physical life quality (+ 9 ± 3,3 points SF-36, p = 0.04). In control group patient-reported outcomes remained unchanged.

Conclusions: Results demonstrated that 3-month telemonitoring program in patients with uncontrolled HTN provides additional antihypertensive effect and improving of patient-reported outcomes. These results can be explained by better patients-doctor interaction and improvement of patient compliance.
Conclusions: Salt intake is associated with urinary UA excretion in prehypertensive participants. High levels of salt intake and serum UA simultaneously are associated with a higher risk of prehypertension.

VENTRICAL ARRHYTHMIAS IN YOUNG ATHLETES: ARE THERE ANY POSSIBLE PREDICTORS?

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Objective: Long-term outcomes of frequent and/or complex ventricular arrhythmias in apparently healthy athletes are still controversial. Ventricular ectopy in young athletes often originates from the right ventricle. Arrhythmias can be a clinical expression of an initial cardiovascular disease that may not be easily detected in the growing age.

Design and method: The present study was designed to investigate the right ventricle morphology and function trough echocardiography in young athletes with ventricular arrhythmias originating from right ventricle. 265 young athletes were recruited, aged 9 to 18 years, 158 male and 107 females. 97 of them presented frequent and/or complex ventricular arrhythmias at baseline EKG which did not disappear nor decrease during exercise test (group A) while 168 of them had no arrhythmias (group B). All athletes underwent echocardiography focused on right ventricle, according to the American Society of Echocardiography’s guidelines. A multivariate logistic regression analysis was performed to identify possible adjusted predictors of arrhythmias. The coefficients obtained were used to develop a scoring system to calculate the risk of arrhythmia.

Results: No sex differences were found. All echocardiographic parameters were between the normal range though the athletes with arrhythmias were older, heavier and taller. Group A presented different right ventricle systolic function indexes, namely a lower TAPSE, a higher MPI index and more positive values of strain; moreover, they had lower right ventricle longitudinal dimensions and higher end diastolic area (both absolute and indexed for subject’s height). The likelihood of arrhythmia increased with age, with the decrease in systolic function parameters and with a glossier aspect of right ventricle. This score seems reliable in predicting the development of frequent and complex extrasystolia in young athletes (65% specificity, 86% sensitivity)

Conclusions: Athletes with a score value of 250 or more, should be more closely followed with EKG Holter and accurate echocardiographic study of right ventricle to detect early signs of cardiac disease.

MRI BASED DETECTION OF RENAL ARTERY ABNORMALITIES RELATED TO RENAL DENERVATION BY CATHERER BASED RADIO-FREQUENCY ABLATION IN DRUG RESISTANT HYPERTENSIVE PATIENTS

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Objective: Endovascular renal denervation (RDN) using catheter-based radiofrequency (RF) ablation has emerged as a potential treatment option for drug resistant hypertension. Its efficacy is currently under debate. We aimed to evaluate the capability of contrast enhanced MRI to assess the effects of RDN on the renal arterial wall in patients presenting with drug resistant hypertension.

Design and method: Patients were included prospectively following IRB approval and written informed consent. Renal arteries were imaged using a 2D T1-w TSE sequence pre- and post-administration of a Gadolinium based contrast agent, before (D0), 2days (D2) and 6 months (M6) after RDN. Mean enhancement of the wall (mENH) and mean wall thickness (mWT) were compared across time using an ANOVA with repeated measures and post-hoc paired t-test.

Results: Follow-up was completed for 23 patients (median age, 57 years; 16 men); mENH at D2 (96.3 ± 36.0 %) was significantly higher than at D0 (61.1 ± 26.3%, p < 0.001) and M6 (66.1 ± 22.7%, p < 0.001). Similarly, mWT was significantly higher at D2 (3.1 ± 0.4mm) than at D0 (2.7 ± 0.4 mm, p < 0.001) and M6 (2.9 ± 0.5 mm, p = 0.002).

Conclusions: MRI demonstrated abnormalities of the arterial wall two days after RDN that had resolved at 6 months.

THE LONG-TERM EFFECTIVENESS OF A SMARTPHONE APPLICATION TO REDUCE SEDENTARY TIME IN PRIMARY CARE. EVIDENT STUDY II


Objective: The objective of this study is to evaluate the long-term effectiveness of adding an app to standardized counselling in order to reduce sedentary time

Design and method: Multicenter clinical trial with 12 month-follow up, including 833, recruited by random sampling in six primary care centers (415vs418). Interventions: Counseling on healthy and active lifestyle was given to both groups by a nurse. The intervention group (IG) received additional training in the use of an app that was designed to promote active lifestyle and healthy nutrition over a 3-month period. Measurements: Sedentary time by Marshall sitting questionnaire and Physical Activity by 7-day Physical Activity Recall (PAR) questionnaire.

Results: Mean age was 51y. (SD12) in the IG and 52.3(SD12.0) in the group of only counseling (CG); women predominated in both groups (60.0% and 64.1%).

In the baseline assessment, 114(27.5%) were active in IG and 118(28.2%) in the group of only counseling. CG (p = 0.807). The total sedentary hours per week (h/week) were 42.2 ± 17.8 in IG 41.4 ± 17.9 in CG (p = 0.506). There were also no differences in the hours of transport, work or watching television.

At 3 months there was a decrease in the sedentary time in both groups, IG: -0.02(h/week) (95%CI: -0.37 to 0.05) and in CG: 0.07 (95%CI: 0.77 to 0.51), without intragroup or intergroup difference. Only a significant decrease of time was observed in watching television in IG: -1.18 (95%CI: -2.21 to 0.14); p = 0.026, but not in CG: -0.36 (95%CI: -1.35 to 0.62); p = 0.466. Difference was not reached when comparing the changes between both groups (p = 0.613).

At 12 months, there was a small increase in sedentary lifestyles in IG:1.03(95%CI: 0.52 to 1.58); p = 0.191 and in CG:1.85(95%CI: 0.40 to 3.30); p = 0.012, although it only reached statistical significance in the second, but not when comparing both groups (p = 0.445). There was also an increase in time watching TV in the CG:1.84(h/week) (95%CI: 0.66 to 3.02) p = 0.002, but not in IG. The comparison of the change between both groups did not reach statistical significance (p = 0.061).

Conclusions: The intervention based on applications for Smartphone to promote healthy and active lifestyle decreased sedentary time, especially in leisure time in IG and increased in the control group with respect to the baseline, but without reaching the significance when comparing the changes between both groups.

DIFFERENCES OF EATING HABITS CAUSING HIGH SALT INTAKE OBSERVED IN SHIMANE COHRE STUDY

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Objective: To prevent hypertension, it is important to promote the reduction of salt intake, however, its practice is not easy. One of the reasons for the difficulty is that it will be ineffective unless differences in dietary habits in each region are considered. We conducted estimation of salt intake and eating habits for 2 consecutive years.

Design and method: We conducted the survey in 2 areas, one in the middle mountainous area (Town A) and another in isolated island area (Town B) at Shimane prefecture in Japan. We collected spot urine and acquired clinical data such
as blood pressure at the annual medical examination. The amount of daily salt intake was estimated from spot urine using Tanaka’s method. In addition, dietary habits were surveyed.

Results: At Town A, there was no statistical difference in the average daily salt intake in 2014 and 2015, those were 9.67 g and 9.70 g, respectively. Likewise, the average of salt intake of both years showed no difference at Town B. Analysis of relationship between eating habits and salt intake showed that causative eating habits for high salt intake were different between at Town A and B. At town A, the number of times of eating pickles showed high correlation with the amount of salt intake. However, at Town B, there was no correlation between those. Instead, the number of times of eating pickles per day does not differ between Town A and B. It is suggested that the amount of eaten pickles or salt content may differ. Our study suggested that even in the same regional area, the difference in eating habits should be considered.

Impact of Socioeconomic Factors on Daily Urinary Sodium and Potassium Excretion in Chinese First Generation Migrants in Italy

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Objectives: Evidence are indicating that opportunities for appropriate treatment of risk factors are unequal at population level and ethnic minorities tend to have a higher rate of cardiovascular diseases. Our work aimed to underline possible differences in eating habits between at Town A and B. At town A, the number of times of eating pickles for high salt intake. However, the number of times of eating pickles per day does not differ between Town A and B. It is suggested that the amount of eaten pickles or salt content may differ. Our study suggested that even in the same local area, the difference in eating habits should be considered.

Usefulness of Two-Dimensional Echo Strain in Evaluation of Cardiac Function in Elite Athletes

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Objective: Cardiovascular adaptation to sport training is influenced by many factors, including the intensity and the kind of sport practiced. The “Morganroth hypothesis” asserted that a static exercise characterized by a pressure load and dynamic (isotonic) exercise which involves a volume load to the heart lead to different myocardial adaptation patterns. More recent studies revisited this hypothesis, showing that left ventricular (LV) remodeling observed in both resistance and endurance trained athletes, presented similar aspects. Although morphological modifications secondary to exercise have been largely studied, less is known on myocardial systolic function in LV remodeling patterns in different elite athletes. Two-dimensional strain analysis allows a complete study of the contractile function in different myocardial regions of interest in both ventricles. In this study we aim to underlie possible differences in contractile myocardial function with strain analysis in two groups of elite athletes, trained with different loads and playing different sports (football and cycling).

Design and method: We enrolled 47 male athletes: 23 football players and 24 cyclists, belonging to same football or cycling team (mean age in both groups 18 ± 3 years old). The athletes were evaluated with echocardiography at the beginning of the sports season. We assessed LV contractile function using speckle-tracking echocardiographic global longitudinal strain (GLS) and global circumferential strain (GCS). We also analysed right ventricular function by strain echocardiography.

Results: Cyclists showed a significantly augmented indexed LV mass and TAPSE. No significant differences were found in GLS data between the two groups (-23.4 ± 0.02 in football players and -24.1 ± 0.02 in cyclists), whereas a significantly higher GCS was found in cyclists compared to football players (-31.2 ± 0.04 and -27.2 ± 0.05 respectively, p < 0.005). The cyclist group showed a significantly augmented indexed LV mass and TAPSE. No significant differences were found in GLS data between the two groups (-23.4 ± 0.02 in football players and -24.1 ± 0.02 in cyclists), whereas a significantly higher GCS was found in cyclists compared to football players (-31.2 ± 0.04 and -27.2 ± 0.05 respectively, p < 0.005).

Conclusions: Our preliminary data suggest that a dynamic exercise, which involves a volume load, like cyclism, leads to a sensible increase in systolic function in elite athletes especially in right ventricle contractility.
BLOOD PRESSURE MEASUREMENT AND VARIABILITY

INFLUENCE OF HYPERURICEMIA ON ELASTIC PROPERTIES OF ARTERIES IN PATIENTS WITH ARTERIAL HYPERTENSION

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Objective: Increased level of uric acid (UA) is not well studied.

Design and method: 110 patients were examined, including 68 individuals with AH and 42 — with normal level of BP. The following studies were performed: measurements of height and weight, body mass index, office systolic (SBP) and diastolic blood pressure (DBP), heart rate, ambulatory blood pressure monitoring, non-invasive determination of central SBP and pulse wave velocity in the arteries of elastic and muscular types (PWV(e) and PWV(m)), biochemical blood test with definition of UA level.

Results: Patients with AH and controls were similar in age. UA level was increased in 55% of patients with hypertension. 17% of persons with normal blood pressure had elevated UA levels. Individuals with hypertension were divided into 2 subgroups — with elevated levels of UA, the second one — with its normal level. In both subgroups, patients were of the same age and, predominantly, with excess body weight or obesity, there were more men in both subgroups. Patients did not differ significantly. In the subgroup of individuals with hypertension and hyperuricemia, PWV(e) was significantly higher — by 1.6 m/s (p = 0.044) than in the subgroup of patients with hypertension and normouricemia. But the value of PWV(m) was equal in both subgroups. There was a significant correlation between UA level and a history of transient ischemic attack or stroke, retinopathy, arrhythmia, as well as with the 24-h SBP and DBP. Also, we found reliable correlations with central arterial pressure (R = 0.293; P = 0.007), ejection duration (R = 0.49; P < 0.001), subendocardial viability ratio (R = 0.47; P < 0.001), augmentation pressure (R = 0.53; P < 0.001) and standardized augmentation index (R = 0.24; P = 0.016), as well as with PWV(e) (R = 0.47; P < 0.001). Reliable correlation with the level of UA was observed also for a number of echocardiographic and biochemical parameters.

Conclusions: There was an association of UA concentration with rigidity of arteries and central blood pressure and with augmentation index and may be an additional risk factor.

INTER-ARM BLOOD PRESSURE DIFFERENCE: THE PREVALENCE AND CHARACTERISTICS IN KOREAN GENERAL POPULATION

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Objective: An increased inter-arm systolic blood pressure difference (IBPD) is an easily determined physical examination finding and a significant IBPD has recently been associated with worse cardiovascular outcome. But the prevalence of IBPD in Asian population is unknown and the relationship between IBPD and blood pressure (BP) variability is not yet determined. This study was performed to describe the prevalence and clinical characteristics of the patients with increased IBPD and to examine the association between IBPD and BP variability.

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 ambulatory blood pressure monitoring (ABPM) was performed 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: Five hundreds of subjects were included in this study, and 13 subjects were excluded because of inadequate ABPM measurements. Mean age was 46.9 ± 9.4 years and 309 participants were female (63.4%). Overall systolic BP and diastolic BP were 118.5 ± 13.4 mmHg and 75.1 ± 10.3 mmHg and mean systolic IBPD was 5.7 ± 4.0 mmHg. Of 487 subjects, 66 subjects (13.6%) had an increased systolic IBPD. Compared with those with normal IBPD, subjects with increased systolic IBPD showed higher clinic BP (127.2 ± 13.7 vs. 117.2 ± 12.8 mmHg in systolic BP; p < 0.001; 78.7 ± 11.2 vs. 74.6 ± 10.1 mmHg in diastolic BP; P = 0.002), higher 24-hour systolic BP (118.5 ± 12.0 vs. 115.6 ± 10.8 mmHg, P = 0.045) and higher 24-hour pulse pressure (42.4 ± 7.4 vs. 40.2 ± 6.5 mmHg, P = 0.012). The subjects with increased systolic IBPD showed higher 24-hour BP variability; increased standard deviation of daytime BPs, increased weighted standard deviation of BPs, increased coefficient of variation of daytime BPs and increased average real variability of both 24-hour BPs and daytime BPs (Table). There was no significant difference in nighttime dipping pattern of increased IBPD subjects.

Conclusions: In this community-based cohort, an increased IBPD is common and associated with an increased short-term BP variability. Bilateral BP measurements should be emphasized in routine clinical practice.

CORRELATION OF SERUM NGAL LEVELS, HYPERTENSION AND DIASTOLIC FUNCTION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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Objective: The aim of this study was to evaluate correlation of serum level of NGAL to severity of hypertension and diastolic dysfunction in patients with ST-segment elevation myocardial infarction treated with fibrinolytic therapy.

Design and method: We included 54 consecutive ST-segment elevation myocardial infarction patients treated with fibrinolytic therapy (alteplase). The median follow-up time was 6 days (interquartile range, 5 to 7 days). Blood samples were drawn immediately after admission prior to fibrinolytic administration. The end-points were mean systolic and diastolic pressure (continuously monitored) and mean E/A ratio as a measure of diastolic function.

Results: Patients with high NGAL (above 134.05 mg/l; 75th percentile) had significantly higher mean systolic and mean diastolic blood pressure compared to patients with low NGAL (under 134.05 mg/l; 75th percentile), p = 0.001 and p = 0.003, respectively. Patients with high NGAL (above 134.05 mg/l; 75th percentile) had significantly lower E/A ratio compared to patients with low NGAL (under 134.05 mg/l; 75th percentile), p = 0.004.

Conclusions: High NGAL significantly correlates with severity of hypertension and diastolic dysfunction in patients with acute STEMI.

HOW TO IMPROVE THE CALCULATION OF MEAN ARTERIAL PRESSURE AT THE BRACHIAL ARTERY LEVEL

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Objective: Mean arterial pressure (MAP) is the time-averaged pressure through the cardiac cycle and may be calculated from brachial pressure values. Previous studies proposed thumb-rules, as adding 40% of pulse pressure to diastolic BP to calculate MAP, but this approach is not unanimously accepted. We aimed to find the best way of calculating MAP by analyzing the brachial pressure wave.

Design and method: We examined the pressure waveform obtained with brachial arterial tonometry (PulsePen, DiaTecne) in 1526 subjects from 3 cohorts (age 64.4 ± 18.2 years, 44.1% males), one from general population (n = 490, age 49.6 ± 12.7 years, 39.4% males), one of elderly patients (n = 284, age 87.6 ± 4.7 years, 25.4% males) and one of hypertensive patients (n = 752, age 59.2 ± 14.4 years, 54.3% males). Brachial pressure wave was calibrated with oscilometric systolic and diastolic brachial blood pressure measurement. The “real” MAP and the percentage of pulse pressure that needs to be added to diastolic blood pressure (PP%) to obtain the MAP were calculated from the time-averaged brachial pressure waveform.

Results: The mean PP% in the pooled population was 42.2 ± 5.5% and was lower in the elderly cohort (40.8 ± 5.4%, p < 0.0001) than in the general population cohort (42.8 ± 6.0%) and in the hypertensives (42.2 ± 5.0%), PP% was higher in women (42.9 ± 5.6%) than in men (41.2 ± 5.1%, p < 0.0001), and was significantly correlated in multiple regression analysis with diastolic pressure (b = 0.337, p < 0.0001), heart rate (b = 0.091, p < 0.0001), while it was weakly related with age (b = 0.053, p = 0.05) and not related to systolic pressure. An equation to obtain an improved calculation of MAP in a single subject was derived from our data: MAP = 25.361 + 0.0474 × heart rate + 0.1634 × diastolic pressure (+2.137 if female).

Conclusions: Our data provide an estimate of the PP% required to be added to diastolic pressure to obtain the “real” MAP, which is 42.2% (with and SD of ± 5.5%). PP% presents a marked inter-individual variability, which discourages the use of a unique PP% for everyone. Our results offer the possibility to improve the calculation of MAP in the single subject by applying a formula derived from the analysis of the brachial waveforms in a large population.

**EFFECT OF DIFFERENT BLOOD PRESSURE TARGETS AND MEASUREMENT METHODS ON PREVALENCE OF CONTROLLED HYPERTENSION: THE IMPACT OF THE 2017 ACC/AHA BLOOD PRESSURE GUIDELINES**

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Objective: Objective. The new 2017 ACC/AHA Blood Pressure Guidelines changed the definition of hypertension and its treatment targets, reducing blood pressure (BP) thresholds from 140 and/or 90 mmHg to 130 and/or 80 mmHg. The aim of the study was to compare the percentage of hypertensives to target following the new threshold and the previous ones, by using OBP and AOBP measurements.

Design and method: 118 treated non-diabetic hypertensive adults afferent to our Hypertension Unit were included in the study. All underwent an AOBP measurement with Omron HEM-907XL following the SPRINT and Myers unattended methodology, followed by a traditional OBP measurement, obtained as the mean of three readings, with a Microlife BP A150 AFIB (Microlife, Swiss) with an appropriate cuff. All patients signed an informed consent and the study was approved by local ethical committee (CEI 652). Patients were classified according to BP measurement method and different guidelines (ESH/ESC 2013/AHA 2014 or AHA 2017). Pearson’s correlation coefficient was used to evaluate agreement between AOBP and OBP measurement.

Results: Mean AOBP values were significantly lower than the “traditional” ones. A mean SBP and DBP difference respectively of 12.1 ± 15.9 mmHg and 3.6 ± 9.4 mmHg was found at Bland Altman analysis. Pearson’s correlation coefficients were 0.65 for SBP and 0.67 for DBP. Receiver operating characteristic (ROC) curves and the area under curve (AUC) used for evaluating the diagnostic accuracy of the thresholds identified 130/79 mmHg as the best AOBP threshold in our population compared to OBP. 60% of patients were not to target with the ESH/ESC 2013/AHA 2014 vs 86% with AHA2017 by using OBP, while only 25% and 44% remained uncontrolled respectively with ESH/ESC 2013/AHA2014 and AHA2017 by using AOBP.

Conclusions: Our data confirm that the new BP thresholds will dramatically increase the number of hypertensives not to target, but only when the “traditional” OBP measurement is used. In conclusion, these new guidelines will lead to important modifications in hypertension management, starting from BP measurement, even if a general adoption of AOBP may raise practical and economical concerns.

**MASS SCREENING FOR HYPERTENSION IS FEASIBLE IN RURAL INDIA**

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Objective: To evaluate if it is a feasible to screen for hypertension, and to estimate the prevalence of hypertension in rural India. To evaluate economical feasibility of mass screening for hypertension.

Design and method: An active door to door and opportunistic screening of adults for hypertension was done in villages in rural India. Blood pressure (BP) was measured two to three times in sitting position using a calibrated digital apparatus. Height, weight and heart rate were recorded as well. A short questionnaire including history of prior hypertension, diabetes, cardiovascular diseases and importantly any prior BP measurement was completed. The screening was performed by accredited Social Health Activists (ASHA), social health leaders, doctors and paramedics after a short training in measuring BP. All the expenses for the screening were calculated.
15% got their BP checked for the first time in their life. Among the 124 individuals older than 90 years, 101 individuals had never got their BP checked before although 39% had hypertension (≥ 140/90 mmHg). Overall the prevalence of hypertension was 29.3%. Hypertension was known in 4.4% of the individuals. In a random subgroup of 4613 individuals, 6% had diabetes which was known by half of the individuals. The expenses for this screening was only 0.07 USD per individual screening.

**Conclusions:** In rural India, the prevalence of hypertension is high, but often unrecognized and untreated because of lack of screening although only very few individuals refusing screening. It is also economically feasible and possible to mass screen people for hypertension.

**UNATTENDED VS ATTENDED BP MEASUREMENT: MEAN VALUES AND DETERMINANTS OF THE DIFFERENCE**

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**Objective:** The results of the SPRINT study have called attention on the possible differences between blood pressure (BP) values obtained by health-care professionals in the office, during the visit (“attended BP”) as compared to those obtained in the office leaving the patient alone (“automated office BP” or “unattended BP”). Only few studies have compared the two techniques and none of them implemented the approach for unattended BP measurement used in SPRINT by the use of completely automated device for both attended and unattended BP and by the measurement of 3 values after 5 minutes of rest.

**Design and method:** In 261 consecutive outpatients attending the outpatient clinic at an ESH Excellence Centre, BP values were measured by the physician with an automated oscillometric device (Omron HEM 9000Ai, mean of 3 measurements), after 5 minutes of rest. After the measurement of BP by the physician, the patient was left alone in the room, and the device was programmed to automatically perform 3 BP measurements after 5 minutes.

**Results:** Mean age was 61 ± 16 yrs, 60% F, BMI 26.1 ± 4.2, 88% with a previous diagnosis of hypertension (64% treated). Unattended systolic BP (SBP) and diastolic BP (DBP) were both lower as compared to attended SBP (130.1 ± 15.7 vs 137.2 ± 7.2 mmHg) and DBP (77.1 ± 11.7 vs 78.9 ± 12.2 mmHg). The differences (Δ) between the values obtained using the two techniques were 8.5 ± 7.9 mmHg for SBP and 1.8 ± 5.6 mmHg for DBP. ΔSBP was directly correlated with age (r = 0.235 p < 0.001) and with attended BP values (r = 0.407 p < 0.0001); ΔDBP was significantly lower in males than in females. At multivariate analysis ΔSBP remained independently correlated with age and attended SBP. ΔDBP was directly correlated with attended DBP (r = 0.322 p < 0.001) and was lower in males.

**Conclusions:** Our findings indicate that “unattended BP” measurement provides values significantly lower as compared to measurements obtained in the presence of the physician. Interestingly, the difference between the values obtained by the two approaches is not constant for all patients, being significantly affected by age, gender, and BP values.

**MUSCULAR ARTERIAL TONE IS A DETERMINANT OF PERIPHERAL MUSCULAR ARTERY STIFFNESS**

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**Objective:** Due the practical weaknesses of cuff based methods for arterial blood pressure (BP) measurement, efforts are made to establish non-invasive and continuous BP measurement by using alternative methods. One of them is based on the determination of the pulse transit time and pulse wave velocity (PWV), respectively. Arterial BP and PWV correlate, which opens the possibility of the determination of arterial BP by measuring the pulse transit time (PTT). Recent validation studies revealed usefulness of this method in clinical practice. The accuracy of this method depends on the transfer function (model) between arterial BP and PWV. Since PWV is mainly determined by the arterial elasticity (stiffness), knowledge about the contribution of different components and to the arterial stiffness as well as their modulation is important. We hypothesize that the vascular smooth muscle (VSM) tone significantly determines arterial stiffness in muscular arteries and thus may contribute to the PWV-BP relation.

**Design and method:** We used the pressurized artery method and investigated the influence of inherent and pharmacologically modified VSM tone on measurements of arterial stiffness. We first characterized passive and active components of arterial stiffness by calculating pressure-diameter-relation, stress-strain-relation, and the stiffness parameter beta in vessels with spontaneous tone and in vessel after calcium depletion. Further, the effect of norepinephrine in different concentrations on the measures of stiffness was investigated.

**Results:** Vessels with spontaneous myogenic tone showed left shifted pressure-diameter- and stress-strain-relations compared to passive vessels, expressing an increased vascular stiffness. Norepinephrine in higher concentration further shifted these curves to the left and consequently increased vessel stiffness. The stiffness parameter beta was also increased.

**Conclusions:** The data suggest that the myogenic tone and the action of norepinephrine increases arterial stiffness in muscular arteries of rats. This effect may contribute the PWV in muscular arteries and thus influences to the PWV-BP relation.

**ASSOCIATION OF SHORT-TERM VARIABILITY INDICES WITH COMMON CAROTID ARTERY INTIMA-MEDIA THICKNESS IN CHRONIC KIDNEY DISEASE PATIENTS**

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**Objective:** Several studies have demonstrated that increased blood pressure (BP) variability is associated with target-organ damage development in hypertensive patients. However, the impact of short-term BP variability indices on target-organ damage in chronic kidney disease patients (CKD) is unclear. Aim of the study was to evaluate the association between ambulatory BP variability indices and common carotid artery intima-media thickness (CCA-IMT) in chronic kidney disease patients.

**Design and method:** A total of 83 CKD patients, referred for evaluation at the Hypertension Unit of our department, underwent 24-h ambulatory blood pressure (BP) monitoring and CCA-IMT ultrasonographic measurements. 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 bivariate correlations, simple and multiple linear regression analysis.

**Results:** The study population consisted of 65 men (78%) and 18 women (22%). All diastolic BP variability indices did not correlated significantly with CCA-IMT. In contrast, 24-h systolic SD (r = 0.429, p < 0.001), TR (r = 0.576, p < 0.001), ARV (r = 0.537, p < 0.001) and CV (r = 0.309, p = 0.004) significantly correlated with CCA-IMT. The multivariate analysis revealed (ARV was excluded due to collinearity reasons) that 24-h systolic TR of BP variation was the only variable that was significantly and independently associated with CCA-IMT (β = 0.702, 95%CI 0.377–1.027, p < 0.001). The association remained significant after adjustment for baseline characteristics and risk factors.

**Conclusions:** Systolic ambulatory BP variability indices such as SD, TR, ARV and CV are associated with CCA-IMT in CKD patients. The systolic TR of BP variation is better associated with CCA-IMT than the other indices in CKD patients.

**PULSE PRESSURE AMPLIFICATION DIPPING PATTERN DURING SLEEP TIME: THE SAFAR STUDY**

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**Objective:** The difference in pulse pressure (PP) between peripheral arteries and the aorta, called pulse pressure amplification (PPamp), is a well-described physiological phenomenon which is independently associated with cardiovascular events. Recent studies suggest that it exhibits circadian variability. Our aim was to evaluate the 24 hour profile of peripheral and central hemodynamics and detect the factors associated with the circadian variability of PPamp.

**Design and method:** In 497 consecutive subjects (aged 54 years, 56.7% male, 79.7% hypertensives) we assessed the circadian pattern of peripheral and central arterial pressures. We first characterized passive and active components of arterial stiffness by calculating pressure-diameter-relation, stress-strain-relation, and
**Results:** All parameters exhibited a circadian variation. Sleep dipping (decrease) pattern was observed for Ppamp (Figure 1), brachial and aortic systolic BP, mean BP (Figure 2) and PWV (Figure 3), whereas a rising pattern (higher sleep than wake values) was observed for brachial PP, aortic PP (Figure 4) and AI (Figure 5). The factors independently associated with the less sleep-dipping in Ppamp were: older age, lower height, the use of antihypertensive medication, sleep decrease in heart rate and mean BP were associated with a greater sleep-dipping in Ppamp (Table 1).

**Conclusions:** These data provide further pathophysiological understanding of the mechanisms leading to Ppamp dipping. Several implications regarding the clinical use of the aortic and brachial BP, especially during sleep time, are raised that should be addressed in future research.

**FACTORS ASSOCIATED WITH AN INCREASED SYSTOLIC BLOOD PRESSURE VISIT-TO-VISIT VARIABILITY IN A TERTIARY HEALTH CARE CENTER**


**Objective:** Identify factors associated with an increased systolic blood pressure visit to visit variability in a “real-life” setting.

**Design and method:** The study was observational, and retrospective. We included 2436 hypertensive outpatients, followed at our tertiary health care center, who had at least 8 visits with blood pressure readings. Epidemiological, clinical and therapeutic data were extracted and analyzed. Systolic blood pressure visit to visit variability was defined as the standard deviation around the mean systolic blood pressure of the 8 recordings.

**Results:** The mean age of the population was 63.7 ± 10.9 years, and 55.7% of the patients were men. The proportions of diabetes, smoking, dyslipidemia and history of major cardiovascular events were 32.4%, 28.6%, 39.9% and 22.6% respectively. The mean blood pressure was 157.2 ± 11.7 / 90.8 ± 8.3 mmHg. The proportions of patients receiving one, two, three or more antihypertensive drugs at time of inclusion were 19.6%, 59.4% and 21% respectively. We found that, age, systolic blood pressure, left ventricular hypertrophy, low eGFR, use of diuretics and use of beta-blockers were significantly associated with an increased systolic blood pressure variability. In a multiple regression analysis, the remaining independent factors were: age (p = 0.001), low eGFR (p = 0.003), use of diuretics (p = 0.0001) and treatment with beta-blockers (p = 0.0001).

**Conclusions:** Among factors affecting blood pressure visit to visit variability in our hypertension unit, the most deleterious are related to the type of drug prescribed, suggesting that limiting the use of these medications, at least in the first step, could result in a risk reduction of cardiovascular events linked to blood pressure visit to visit variability.

**IS 30 MINUTES INTERVAL ENOUGH FOR ANALYZING AMBULATORY BLOOD PRESSURE MONITORING?**

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**Objective:** The National Institute for Health and Clinical Excellence (NICE) undertook detailed analysis for ambulatory blood pressure monitoring (ABPM) and showed that the use of ABPM is the most cost-effective method of confirming a diagnosis of hypertension. ABPM device should be set to record with the measurement frequency set at 15–30 minute intervals. In some papers the frequency was recommended at 10–15 minute intervals. The aim of this study is to see if there is a significant difference if the measurement frequency set at 15 or 30 minute intervals.

**Design And Method:** Our clinic took part in the International Ambulatory Blood Pressure Registry: Telemonitoring of Hypertension and Cardiovascular Risk Project (ARTEMIS). We have analysed 425 subjects from the ARTEMIS study. Validated Meditech ABPM50 devices were used to record for a duration of 24 hours with the measurement frequency set at 15 minute intervals. Analyses were performed by using Levene Test of Homogeneity of Variances as a part of Analysis of Variance in order to see if there is a significant difference between the measurement frequency set at 15 or 30 minutes intervals.

**Scientific data:** The resulting p-value of Levene’s test in 92% subjects was higher than 0.05. The obtained differences in sample variances are not significant.

**Results and conclusions:** We didn’t find a significant difference between 15 and 30 minute interval analyses of ABPM. In 34 subject we missed information regarding blood pressure and pulse during some events. Dipper status findings were different in 25 subjects. In most subjects the measurement frequency of ABPM device set at 30 minute intervals provides proper analysis of blood pressure and pulse during 24 hours.

**UNOBSERVED OFFICE BLOOD PRESSURE MEASUREMENTS ARE NOT PROBABLY NECESSARY IN ALL PATIENTS VISITING AN OUTPATIENT CARDIOLOGY CLINIC**

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**Objective:** The incidence of white coat hypertension is approximately 15–20%. Unobserved automatic office blood pressure measurement (AOBP), i.e. SPRINT trial-like BP measurement, has given new evidence regarding treatment goals in the recent American arterial hypertension guidelines. However, this kind of BP measurement is time-consuming while it needs extra available space in medical office which makes it difficult to implement in clinical practice. We aimed to study any differences regarding BP parameters between baseline semi-AOBP and subsequent conventional BP measurements in patients visiting a medical office.

**Design and method:** We performed semi-AOBP (Microlife, Watch BP) followed by conventional BP measurements in 114 patients (mean age 63±15 years, 46 males, 47% hypertensives) visiting an outpatient cardiology clinic for follow-up appointments. Briefly, patients were advised to take two unobserved semi-automated BP measurements (preBP), at 5’ after rest and at 3’ after the first measurement and then they changed office and examined by the physician. Conventional BP was measured using a mercury sphygmomanometer at least after 5’ of patient’s rest (office BP). BP was characterized as normal or controlled if SBP < 140 mmHg and DBP < 90 mmHg.

**Results:** We found that office BP compared with preBP measurements were increased in: a. the whole population [SBP (p = 0.001) and DBP (p = 0.02)], b. the women [SBP (p < 0.001) and DBP (p = 0.01)] c. both the hypertensives [SBP (p = 0.004) and DBP (p < 0.001)] and non-hypertensives [SBP (p = 0.04)], d. patients with SBP > 140 mmHg and DBP > 90 mmHg [SBP and DBP (p = 0.001)], e. in diabetic patients there was a trend towards higher office SBP (p = 0.07). No differences were found in men as well as in those patients with normal (n = 36) or controlled BP (n = 18). In the whole population, we took in consideration regarding blood pressure treatment plans the preBP measurements only in 77 (68%) patients (mostly hypertensives) in whom the latter were normal or controlled while office BP was uncontrolled.

**Conclusions:** Unobserved BP measurements might be useful for decision making in clinical practice in hypertensive patients with apparently uncontrolled office BP and especially women. Those results probably narrow the need for SPRINT trial-like measurements and raise doubts regarding new BP treatment goals.

**RECTANGULAR CUFFS OVERESTIMATE BLOOD PRESSURE IN OBESE PEOPLE WITH VERY LARGE ARMS**

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**Objective:** Rectangular cuffs and bladders are currently used for blood pressure (BP) measurement at the upper arm. However, large arms always have a troncoconical shape. Aim of this study was to ascertain whether rectangular and troncoconical cuffs provide different readings in obese subjects with very large arms.

**Design and method:** In 33 subjects with morbid obesity (BMI 45 ± 5.0 Kg/m2, 16 men) aged 51 ± 12 years, with arm mid-circumference ranging from 42 to 55 cm, and 33 subjects of control with standard arm circumference (range, 22–31 cm) the upper-arm frustum slant angle was measured. Two different rectangular and two different tronco-conical bladders of appropriate size and shape were constructed, on the basis of previous anthropometric measures obtained in our laboratory. In each subject, BP was measured in triplicate by two observers using the two cuffs in a random order. In addition, in the obese participants, the pres-
sure under the two cuffs was measured at five pressure levels (60, 90, 120, 150 and 180 mmHg) using a paper-thin pressure sensor attached to the central point of the cuffs.

**Results:** In all obese participants the upper arm shape was tronco-conical with slant angles ranging from 80.4 to 87.6° (mean 84.1 ± 1.4°). Systolic BP (SBP) and diastolic BP (DBP) differences between the troncoconical and the rectangular cuff were −4.8 ± 4.0 and −3.0 ± 4.3 mmHg, respectively, whereas they were negligible in the controls (SBP, p < 0.001 and DBP, p = 0.01). In the subjects of the top SBP quintile (SBP > 150 mmHg), the between-cuff SBP difference was −9.1 ± 5.1 mmHg. Arm slant angle was an independent predictor of the between-cuff SBP discrepancy (p = 0.003). Measurement with the pressure sensor showed a higher pressure under the rectangular compared to the conical cuff at any pressure level. The mean difference was −10.2 ± 5.2 mmHg and the difference progressively increased with increasing level of pressure applied to the cuffs.

**Conclusions:** In obese people, the upper arm has a pronounced tronco-conical shape and rectangular cuffs may overestimate BP. Tronco-conical cuffs should be used for BP measurement in subjects with very large arms.

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**DIURNAL RHYTHM OF CENTRAL HEMODYNAMICS DURING TWENTY-FOUR-HOUR AMBULATORY MONITORING**

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**Objective:** 24-hour ABPM is a better method for diagnosing hypertension and predicting BP-related complications than office-based measurements. In addition increasing amount of evidences supports that central (aortic) BP is stronger predictor of cardiovascular risk than the conventional brachial BP. Dipping status of subjects can be easily assessed according to night-to-day brachial BP ratio provided by ABPM. However there is no data in the literature whether the diurnal rhythm of central aortic systolic blood pressure (CASP) follows the same pattern as the brachial one (BrSP). The aim of our study was to compare the 24-hour pattern of peripheral and central blood pressure in the same individuals.

**Design and method:** 24-hour monitoring of aortic and brachial blood pressure was performed with Arteriograph24, a newly developed upper-arm cuff oscillometric noninvasive method in children.

**Results:** The nocturnal fall of CSP was significantly lower than the peripheral pressure fall in 47 subjects of 55. 24-hour systolic pressure amplification was significantly lower during the night than during the day. In contrast to the nighttime decrease of central-to-peripheral systolic pressure Augmentation index was increased during the night.

**Conclusions:** Central hemodynamic parameters (AIx, cSBP) also have diurnal rhythm but in contrast to peripheral BP the circadian variation of central BP is not necessarily parallel with the corresponding peripheral values. Theoretically elevated peripheral vascular resistance (which is represented by the augmentation index) during nighttime helps to maintain the appropriate central systolic pressure which is mandatory for the perfusion of the brain, heart and kidneys.

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**ASSESSMENT OF SUBCLINICAL TARGET ORGAN DAMAGE BY COMPONENTS OF BLOOD PRESSURE: COMPARISON OF CENTRAL AND PERIPHERAL ARTERIAL PRESSURE**

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**Objective:** Central aortic pressure (cAP) has stronger association with markers of vascular function and compared to peripheral arterial pressure (pAP), particularly in groups with elevated cardiovascular risk. However, the potential clinical use of blood pressure (BP) components of cAP and pAP as markers of target organ damage (TOD) has not been well established. The Aim of this study was to assess the association of pulsatile components of cAP + pAP as markers of TOD and to seek any differences related to age.

**Design and method:** From invasive waveform recordings, indices of cAP and pAP (pulse pressure [pAP; pPP augmentation index. AIx]) were assessed in relation with TOD in 770 hospital inpatients (age 60 ± 10.0 years, 473 males) with primary hypertension (brachial BP > 140/90 mmHg). TOD was quantified by arterial stiffness (carotid-femoral pulse wave velocity [cPWV]), carotid intima-media thickness (IMT), urine albumin-to-creatinine ratio (ACR). Subclinical TOD was defined as carotid IMT > 0.9 mm, urine ACR > 3.5 mg/mmol (females) and >2.5 mg/mmol (males) and/or cPWV > 12 m/s.

**Results:** Females showed greater cPP (mmHg) (50 ± 13) compared to males (40 ± 13) (p < 0.01) for similar pPP (mmHg) (62 ± 15, 60 ± 16 respectively). For the whole cohort, cPP and pPP were correlated with cPWV (r = 0.41 vs. r = 0.40; p < 0.01), ACR (r = 0.24 vs. r = 0.27; p < 0.01) and carotid IMT (r = 0.14 vs. r = 0.15; p < 0.01). Each SD increase in pPP and cPP was associated with respective Odds Ratios (of 2.7, 2.9 [cPWV], 1.2, 1.4 [ACR], 1.46, 1.53 [IMT]). For males > 60 years, each SD increase in AIx corrected for heart rate was associated with 1.5 times increase in risk of cPWV > 12 m/s. When corrected for confounding variables, cPP had higher predictive power for TOD for age > 60 years compared to pPP.

**Conclusions:** Both pPP and cPP were associated with TOD in a hypertensive population. However, compared to pPP, cPP provides independent and additional information associated with TOD elderly hypertensive subjects (> 60 years). Additional hemodynamic indices of cAP as potential biomarkers of subclinical TOD require validation by further prospective studies.

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**STRATEGY OF DISTANCE ACTIVE CONTROL IS ASSOCIATED WITH MORE PRONOUNCED ACHIEVEMENT OF TARGET BLOOD PRESSURE AND REDUCED EMERGENCY CALLS**

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**Objective:** The aim of the study was to evaluate the influence of the distance control of blood pressure on the efficacy of treatment, frequency of emergency calls in patients with arterial hypertension (AH) in Voronezh out-patient clinic.

**Design and method:** 249 patients with AH (31% men, age 59 ± 6.1 years, AH duration 12 ± 4.2 years, smokers 7%, obesity 31%) were openly randomized in 2 groups. In the intervention group patients (n = 127) were under active distance physicians’ control and in the control group patients (n = 122) received routine standard care. Patients in the intervention group reported the physician the results of home blood pressure monitoring (HBPM) by phone or e-mail daily (weekly in patients with target BP) and antihypertensive therapy was changed accordingly. Achievement of target BP level and number of emergency calls were assessed in 12 months.

**Results:** In the intervention group BP decreased from 158.2 ± 15.4 to 142.1 ± 13.7 mmHg, proportion of patients with target BP increased from 32 to 82% (p < 0.001). In the control group BP decreased from 157.9 ± 16.1 to 154.8 ± 12.7 mmHg, proportion of patients with target BP increased from 33 to 50%p (p < 0.01). The number of emergency ambulance calls with hypertensive crises was significantly less in the intervention group (108 vs 186, p < 0.01).

**Conclusions:** The active distance control with modification of antihypertensive therapy based on HBPM compared with routine practice significantly increased the proportion of patients with target BP and decreased the amount of the emergency ambulance calls.

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**THE ACCURACY OF CENTRAL BLOOD PRESSURE OBTAINED BY OSCILLOMETRIC NONINVASIVE METHOD IN CHILDREN**

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**Objective:** Analyzing central (aortic) blood pressure waveform obtained by an invasive method is the gold standard for the pulse wave analysis. In adult, central systolic blood pressure (cSBP) is thought to relate more closely to target organ damage than peripheral systolic blood pressure, and cSBP can now be reliably assessed non-invasively with a number of devices. However, noninvasive measurement of central blood pressure have not been validated in children. The purpose of this study is to clarify the reliability of a central blood pressure obtained by oscillometric noninvasive method in children.

**Design and method:** This study enrolled 10 patients (1 men and 9 women) who underwent a cardiac catheterization. The mean age was 9.9 ± 5.8 years (range 3 to 18 years). For each individual, we compared estimates of cSBP obtained from oscillometric noninvasive method (Mobil-O-Graph) with that measured directly by a catheter in the aortic root.

**Results:** Comparison of the cSBP values measured by the two methods showed a linear correlation (r = 0.72). The mean cSBP obtained from invasive method (catheter) was 92.5 ± 7.8 mmHg, and mean cSBP obtained from noninvasive method (Mobil-O-Graph) was 88.5 ± 11.2 mmHg. Bland-Altman analyses showed that the mean differences (95% confidence interval) between two measurements was 2.1 ± 0.75 (1.35–2.85) mmHg.
Conclusions: Oscillometric noninvasive estimation of cSBP with the Mobil-O-Graph is as effective as using the catheter. Because of the small sample size, result need to be interpreted with caution and further investigation is required.

The diagnostic threshold of 2017 ACC/AHA hypertension guidelines increases white-coat hypertension

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Objective: We compared the diagnostic office blood pressure (OBP) threshold of 2017 American College of Cardiology and the American Heart Association hypertension (ACCA/ AHA) guidelines (≥ 130/80 mmHg) to that of European Society of Hypertension (ESH) guidelines (≥ 140/90 mmHg) using ABP based diagnosis of each guidelines as a reference.

Design and method: Among individuals (n = 319) who had high blood pressure (BP; ≥ 140/90 mmHg) measured by physicians at the outpatient clinic and did not take antihypertensive drugs, 263 patients (mean age, 51.6 ± 9.6 years; 125 men) with valid 24-hour ABP measurements were analyzed. Research grade OBPM was measured three times for each occasion during three-days visit with attendance of study nurses using a validated oscillometric device (WatchBP Home, Microlife, Taiwan) after 5 minutes of seated rest and at 1-minute intervals.

Results: The prevalence of hypertension by OBP was increased to 93.9 % (n = 247) based on 130/80 mmHg from 65.4 % (n = 172) based on 140/90 mmHg. The mean difference of systolic and diastolic BP between OBP and daytime ABP were 3.9 ± 11.0 mmHg and -0.4 ± 8.6 mmHg respectively. When diagnosis of hypertension was based on daytime ABP diagnostic threshold of each guidelines, the sensitivity, specificity, positive and negative predictive value of ESH guidelines were 78.4%, 71.0%, 88.4% and 53.8% respectively. Those of ACC/AHA guidelines were 98.2%, 28.6%, 87.8%, and 75.0%. The diagnostic agreement (kappa) of ESH and ACC/AHA guidelines between OBP and daytime ABP were 0.448 and 0.357 respectively. The prevalence of white-coat hypertension based on daytime ABP in normotensive individuals was 29.0% (20/69) by ESH guidelines and 71.4% (30/42) by AHA guidelines (p = 0.001). Among 86 individuals with systolic OBP 130 – 139 mmHg, 37 (43.0%) had white-coat hypertension. Among 86 individuals with diastolic OBP 80 – 89 mmHg, 18 (20.9%) had white-coat hypertension.

Conclusions: The diagnostic threshold of ABP and OBP by new ACC/AHA guidelines shows poor diagnostic agreement and increases the frequency of white-coat hypertension, which may lead to overtreatment of hypertension.

CUFF-LESS BLOOD PRESSURE MEASUREMENT USING THE PULSE TRANSIT TIME - A COMPARISON TO CUFF-BASED OSCILLOMETRIC 24 HOUR BLOOD PRESSURE MEASUREMENT IN CHILDREN

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Objective: Ambulatory blood pressure monitoring (ABPM) is recommended as mandatory for diagnosis of hypertension in children and adolescents. However, utility of cuff-based ABPM in children has several important limitations, e.g. fail recordings due to high motoric activity or arousal reactions followed by blood pressure (BP) fluctuations during sleep. SOMNOtouch® NIBP (SOMNOmedics GmbH) is an ESH validated cuff-less BP monitor, based on pulse transit time (PTT) measurement. It provides a beat-to-beat, non-invasive and non-reactive measurement of BP determined by the time interval between R- peak of the ECG and peripheral recorded pulse wave and a one-point calibration with a cuff device. Previous studies in adults showed a good agreement of both methods. The aim of this study was to compare the reliability of the PTT method versus conventional ABPM in children over 24 hours.

Design and method: Systolic (SBP) and diastolic (DBP) blood pressure were measured in 27 children (6 females, mean age 10.7 ± 2.6 years; 152.7 ± 15.6 cm, 48.7 ± 17.4 kg) using an oscillometric ABPM (Mobil-O-Graph PWA, L.M.E.M.). Measurement intervals were 30 min during daytime (6–22 h) and 60 min during night-time (22–6 h). Simultaneously, BP was recorded based on PTT (SOMNOtouch® NIBP) on the contralateral arm. In addition, a 3-channel ECG, motoric activity, body position, finger plethysmography, oxygen saturation and cuff pressure curve were recorded. All fail recordings of cuff measurements influenced by arrhythmia, activity, arousals during sleep and artefacts in cuff in deflation were excluded from analysis (approximately 25%).

Results: Preliminary results (228 BP values) revealed a linear correlation of SBP and DBP (r = 0.8 for SBP; r = 0.7 for DBP). Limits of agreement in Bland-Altman plot were +22 and -17 mmHg, with a mean difference of 2.2 mmHg, for SBP resp. +22 and -12 mmHg, with a mean difference 4.9 mmHg, for DBP.

Conclusions: Our preliminary results imply that PTT and ABPM-based BP values are closely correlated in children during a 24-hour measurement in case invalid recordings were excluded. Despite high activity of children, the PTT method provides considerably more BP values than the cuff-based method.

HEALTH PROFESSIONALS AND BLOOD PRESSURE MEASUREMENT: SCOPING REVIEW AND PROTOCOL FOR KNOWLEDGE, PERCEPTION AND PRACTICE

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Objective: Blood pressure measurement (BPM) is a fundamental aspect of hypertension management. Guidelines regarding BPM methods namely home (HBPM), ambulatory (ABPM), office (OBPM) and automated (AOBP) are strongly recommended and supported by Hypertension Canada guidelines. Since health professionals (HP) play an important role in BPM and hypertension management a clearer picture of the knowledge, perception and practices of HP is needed. A scoping review was conducted to identify all studies assessing knowledge, perception and practices of HP with regard to all BPM methods.

Design and method: Keywords were identified and extraction was completed using the CINAHL and MEDLINE databases. A total of 74 potentially relevant studies were identified for scoping review.

Results: Of the 74 studies identified, 16 studies focused on HBPM, 3 studies focused on ABPM, 3 studies focused on AOBP, 46 studies focused on OBPM. Majority of studies enrolled physicians, whereas few studies enrolled nurses. The results presented focused on knowledge, perception and practices. As for knowledge, studies on HBPM (5), AOBP (1) OBPM (17) demonstrated lack of agreement among HP with regard to BPM techniques. No Canadian study assessed the knowledge of HP with regard to BPM techniques. As for perception, majority of studies on HBPM (7), ABPM (3), AOBP (1), OBPM (3) showed positive perceptions towards the usefulness of BPM methods in clinical practice. As for practice, the majority of studies on ABPM (4), AOBP (4), OBPM (21) showed unsatisfactory practices among HP with regard to BPM techniques. Lack of knowledge, less positive perceptions and unsatisfactory practices were observed in studies performed in USA, Canada, UK, Europe, and Asia.

Conclusions: Knowledge, perception and good practices are essential components of accurate BPM. The present scoping review therefore suggests the need to identify the gap between recommended guidelines and actual knowledge, perception and practices in primary care. A proposed protocol will include descriptive survey with an online questionnaire. Items in the questionnaire will distinctly focus on knowledge, perception and practices of HP with regard to BPM methods. This questionnaire will be developed in accordance with the guidelines.

NURSE-OBP: A NURSING STANDARDISED METHOD FOR MEASURING BLOOD PRESSURE

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Objective: The role of the nurse in both diagnostic and therapeutic management of hypertensive patient is becoming more and more important; nevertheless until now there is not a nursing standardised method of blood pressure (BP) measurement. The aim of this study was to standardise a nursing method for measuring blood pressure (Nurse-OBP) and to compare it with the Ambulatory Office Blood Pressure.

Design and method: Design and Method. 118 treated non-diabetic hypertensive adults afferent to our Hypertension Unit were included in the study. All underwent an AOBP measurement with Omron HEM-907XL and the Nurse-OBP measurement, designed to be methodologically identical to the classical AOBP proposed by Meyers and colleagues but which takes place with the nurse staying in the same patient’s room during the BP measurement. All subjects were randomized into two groups, different according to the order in which the two method of measurement were performed to avoid eventual reduction of white coat effect mostly deriving from changes in patient behaviour, and finally, during the medical examination all underwent a traditional OBP measurement. All patients signed an informed consent and the study was approved by local ethical committee (CEI 652).

Pearson’s correlation coefficient was used to evaluate agreement between AOBP and Nurse-OBP measurements.
Results: Results. Mean Nurse-OBP values (132 ± 19.4/73.3 ± 12.9) were significantly lower than OBP ones (141.3 ± 38.8/84.7 ± 10.7). When AOBP and Nurse-OBP were compared, no statistically significant differences between the two methods were found. The Bland-Altman analysis showed how the presence of the nurse could cause a minimum rise of BP values, (mean SBP and DBP difference respectively of 3.57 ± 12.23 mmHg and 2.25 ± 7.26 mmHg), but clinically non-significant; therefore the two modalities, AOBP and Nurse-OBP, can be considered as comparable. Furthermore no differences in terms of Nurse-OBP values were found when the two groups were compared.

Conclusions: Conclusions. Our study proposes a standardised nursing method for measuring BP absolutely comparable to AOBP technique, that could have practical implications mostly when it is not possible to have a dedicated room where performing AOBP.

AN ABNORMAL BETWEEN-ARM BLOOD PRESSURE DIFFERENCE IS ASSOCIATED WITH CARDIOVASCULAR RISK FACTORS AND DISEASE: A COMMUNITY STUDY

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Objective: Hypertension guidelines recommend to measure blood pressure (BP) at both arms, at least in one occasion, since an abnormal between-arm BP difference is associated with an increased risk of vascular abnormalities and of cardiovascular (CV) disease. In the present community study we tested whether an automatic oscillometric BP monitor allowing simultaneous both arm BP measurement might be effective for screening of subjects with potential vascular disease.

Design and method: 220 consecutive subjects from an unsellected sample of individuals of a small Italian community were screened using an automatic electronic BP monitor (Microlife WatchBP Office). Seated BP was measured in triplicate at 1 min interval, using cuffs of the appropriate size for the subject’s upper arm. Demographic and clinical data were collected prior to any BP measurement. An abnormal between-arm BP difference was defined as systolic (S) BP was > 20 mmHg and/or diastolic (D) BP > 10 mmHg.

Results: In 9 of 220 subjects (4.1%) an abnormal between-arm BP difference was found, with lower BPs measured in the non-dominant arm (147 ± 28/78 ± 9 vs. 154 ± 15/92 ± 11 mmHg dominant, p < 0.01). In an univariate analysis, subjects with a significant between-arm BP difference were significantly older (71 ± 8 vs. 67 ± 15 years, p < 0.01), had a greater body mass index or BMI (32 ± 7 vs. 25 ± 4 kg/m², p = 0.001), higher BP levels (154 ± 15 / 92 ± 11 vs. 134 ± 18 / 80 ± 10 mmHg, p < 0.01) and were more likely to report obesity (56 vs. 13%, p < 0.01), a history of hypertension (67 vs. 35%, p < 0.05) or of cardiovascular disease (33 vs. 10%, p < 0.05) than subjects with non-significant difference. In a multivariate analysis, a higher BMI and SBP were significantly associated with a larger risk of a between-arm difference [odds ratio (95% confidence interval) for BMI: 1.29 (1.11, 1.51), p = 0.001; for SBP: 1.06 (1.01, 1.10), p = 0.012].

Conclusions: A significant between-arm BP difference is associated with a larger prevalence of CV risk factors (in particular obesity and hypertension), and CV disease. Thus, our study confirms that simultaneous both arm BP measurement must always be accomplished in all subjects at risk for CV disease.

EFFECTS OF 5-STEP COST-EFFECTIVE TREATMENT ALGORITHM ON AWARENESS, TREATMENT AND CONTROL OF HYPERTENSION IN RESOURCE-CONSTRICTED NORTHWEST CHINA OVER THE PAST 17 YEARS

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Objective: Prevalence of hypertension in Xinjiang, Northwest China is approximately 30–54.6% in population aged 30 years and older, and ranks at the national forefront due to its geographical remoteness, unhealthy eating habits, and physical inactivity, whereas treatment and control rates are too low for several reasons, which encompass a relatively backward economy (GDP ranking 25th among 31 provinces in China by 2014), extremely premature medical conditions (), lower educational level (illiteracy rate: about 19%, far higher than 4% of national level in 2004) and the existence of multi-ethnic background and thus communication barrier, which make it difficult to implement campaigns against hypertension. Therefore, our center has focused on training and education of local medical staff and population and has generalized easy-to-comprehend 5-step evidence-based cost-effective ant-hypertensive treatment algorithm in three counties (Hefeng, FuHai and Fukang) of Xinjiang since 1998 after completing a baseline survey.

Design and method: Between 1998 and 2015, training and educational programs in four language were conducted to local medical staff and population. Meanwhile, seven independent population-based cross-sectional surveys were performed in these three counties to assess the changes in awareness, treatment and control of hypertension.

Results: 6144 (n = 1551 in 1998–2000, n = 2331 in 2007–2008 and n = 2262 in 2015) adults aged 30 years or older were enrolled for the survey. Awareness, treatment and control rates of hypertension were 34.8%, 11.1% and 0.2% in 1998–2000, 52.3%, 24.7% and 2.9% in 2007–2008 and 52.8%, 30.9% and 10.1% in 2015. Mean SBP was 144.4mmHg in 1998–2000 and 127.7mmHg in 2015 and mean DBP was 89.6mmHg in 1998–2000 and 76.4mmHg in 2015.

Conclusions: Over the past 17 years, awareness, treatment and control of hypertension showed substantial improvements. Particularly control rate increased 50%, although still lower than the most parts of the world and China (13–15%). We consider generalization of easy-to-comprehend 5-step evidence-based cost-effective ant-hypertensive treatment algorithm has been effective in population-based management of hypertension in resource-constricted area, whereas secular trends must also be kept in mind.

BLOOD PRESSURE AND HEMODYNAMIC PARAMETERS AFTER ACUTE AEROBIC, RESISTANCE AND COMBINED EXERCISES IN RESISTANT HYPERTENSIVE SUBJECTS


Objective: Evaluate the acute effects of aerobic, resistance and combined exercise on blood pressure (BP) and hemodynamic parameters in resistant (RH) and non-resistant (non-RH) hypertensive subjects.

Design and method: This intervention, randomized, single-blind, crossover study was conducted with 20 patients (RH = 10, non-RH = 10) from the Resistant Hypertension Clinic at UNICAMP- Brazil. All subjects were submitted to a previous adaptation of physical activity to determine the load to be implemented in resistant exercise session. Subjects were randomized to perform 45 minutes of: a) Aerobic exercise (AE): activity on a treadmill (70% of maximum heart rate obtained from ergometric test); b) resistance exercise (RE): 4 series of 12 repetitions of each exercises at moderate intensity (Borg scale); and c) combined exercise (CE): AE (25 minutes) + RE (20 minutes). Clinical and hemodynamic parameters were assessed before and after each exercise session.

Results: We found no difference between RH and non-RH subjects after each exercise, except for a reduction in aortic pulse pressure (41 ± 13 vs. 37 ± 9 mmHg, p = 0.04) after CE in non-RH subjects and Augmentation Index after AE (31 ± 11 vs. 22 ± 9 %, p = 0.02) in RHTN patients. Daytime 24 hour ambulatory diastolic
Conclusions: The hemodynamic parameters after one session of AE, RE and CE were similar between RH and non-RH subjects. However, when compared the different types of exercises, we observed that EC was more effective in reducing blood pressure in RH patients.

RELATIONSHIP BETWEEN BLOOD PRESSURE VARIABILITY IN WORKPLACE AND PSYCHOLOGICAL STATE IN HYPERTENSIVE PATIENTS

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Objective: The aim of our study was to determine relationship between blood pressure variability (BPV) in workplace (BPVw), daytime (BPVd), nighttime (BPVn) periods and psychological state in hypertensive patients without serious concomitant diseases.

Design and method: We analyzed ambulatory blood pressure monitoring (ABPM) data recorded from 189 hypertensive patients without serious concomitant diseases. The washout period was 1 week. The monitor (SpaceLab 90207) was applied between 10.00 - 10.30 A.M. We defined daytime period as 8–22, nighttime period as 0–6, workplace period as 11–19 hours. After ABPM session each patient completed the psychological questionnaire “Minnesota Multiphase Personality Inventory” (MMPI). We analyzed the following scale scores: L – lie scale, F – aggression scale, K – correction scale, Hs(1) – hypochondria, D(2) – depression, Hy(3) – hysteria, Pd(4) – psychopathy, Pa(6) – rigidity of affect, Pt(7) – psychasthenia, Sc(8) – schizothemia, Ma(9) – hypomania. Spearman Partial Correlation Coefficient was used for correlation analysis. The analysis model was adjusted for age, sex and duration of hypertension.

Results: The initial daytime period systolic BP was 142±3±11.3, diastolic BP - 91±4±7.1 mm Hg. We found correlations (p < .05) between: 1) Pa(6) scale score and BPVd, BPVw; 2) L scale scores and BPVd, BPVw. Thus, increase of L, Pa(6) scale score (psychological immaturity, aggressiveness, leadership traits e. t. c.) was associated with BPV increase. We revealed inverse correlations (p < .05) between: 1) Ma(9) scale score and BPVd, BPVw; 2) Hs(1) scale scores and BPVd; 3) Pt(7) scale scores and BPVw. Thus, increase of Hs(1), Pt(7) scale scores (asthenia behavioral type, otherwise, social conform, compassion, leadership traits absence e. t. c.) and Ma(9) scale scores (cheerfulness level) was associated with BPVd and BPVw decrease.

Conclusions: Social disadaptation (aggression, leadership traits, psychological immaturity e. t. c.) was related with higher BPV. High social conform, compassion (asthenia behavioral type) and cheerfulness is associated with decreased possibility of conflict situations and lower BPVd and BPVw.

WAVE REFLECTION IS INVERSELY ASSOCIATED WITH THE DEVELOPMENT OF MYOCARDIAL HYPERTROPHY AMONG HYPERTENSION SUBJECTS

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Objective: Wave reflection forms the basis of arterial input impedance and they offer valuable information on arterial stiffness. Thus, it has emerged as a strong, important marker of premature cardiovascular disease.

Objective: To evaluate the association between wave reflection coefficient and the myocardial hypertrophy among hypertensive subjects.

Design and method: Subjects with office blood pressure (BP) > 140/90 mmHg, without treatment attending our Hypertension Center participated in the study. Exclusion criteria were renal dysfunction, heart failure, severe arrhythmia including atrial fibrillation and evidence of secondary hypertension. A complete medical history was obtained from all participants. Office BP was measured in 3 consecutive visits (Microlife WatchBPN, Microlife, Widnau, Switzerland). Consequently, all participants underwent 24 h ambulatory blood pressure monitoring (24h-ABPM), using the Mobil-O-Graph monitor (IEM, Stolberg, Germany). Mobil-O-Graph records oscillometric brachial BP, and calculates pulse wave velocity (P WV), aortic BP, augmentation index (Aix) and wave reflection as measure of arterial stiffness. BP measurements were performed at 20-min intervals for 24 hours. Daytime and nighttime periods were defined according to the patients’ diaries (awake and asleep periods). Transthoracic echocardiogram for the assessment of myocardial hypertrophy was performed in all subjects. Results are expressed as frequencies and percentages for qualitative variables and as mean values with SD for quantitative variables. Statistical analysis was performed using the Student’s t-test for independent samples. A p-value of 0.05 was considered statistically significant.

Results: A total of 72 individuals, mean age 52.15 ± 11.97 years, 31 women were included in the analysis. A strong inverse association between wave reflection coefficient and myocardial hypertrophy was observed, with p values < 0.002. Similar association were found for 24-hour, awake and asleep BP (p = 0.002, p = 0.018 and p = 0.002, respectively).

Conclusions: Wave reflections markedly affect the central pressure profile, further contributing to increased cardiovascular risk. Future studies should assess the role of genetic versus geographic and other environmental influences in wave reflection coefficient as an index of vascular remodeling and especially aortic stiffness.

COMPARISON OF AUTOMATED BLOOD PRESSURE MEASUREMENTS WITH CONVENTIONAL READINGS IN A MUNICIPAL OUTPATIENT CLINIC

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Objective: Conventional office blood pressure (COBP) readings are compromised by artificial increases in in blood pressure (BP). Automated office blood pressure (AOBP) technique eliminates the white-coat response and sequel improves the validity of office readings. The clinical interpretation of BP readings taken in real life outside hospital clinics is not clear.

Objective: To compare community AOBP with COBP readings in a public outpatient clinic.

Design and method: Blood pressure (BP) was measured twice in the clinic with a validated oscillometric device, after a 5-min rest period in a sitting position (Microlife WatchBP Office, Microlife AG, Widnau, Switzerland). Consequently, all participants were measured with an Omron 907 XL to obtain AOBP readings. The patient was left alone to rest for 5 min after which the device was set to record BP at 1 min intervals. All three readings were used to determine the mean AOBP.

Results: A total of 81 individuals, mean age 63.14 ± 12.32 years, 45 women were included in the analysis. The mean systolic AOBP-COBP difference was 12.79 ± 12.11 mmHg (95% confidence interval 10.11 to 15.47, p < 0.001). The mean systolic AOBP-COBP difference was 12.79 ± 12.11 mmHg and the mean diastolic COBP was 84.99 ± 12.40 mmHg, p < 0.001 and the mean diastolic AOBP-COBP difference was 8.06 ± 7.55 mmHg (95% confidence interval 6.39 to 9.73).

Conclusions: AOBP readings appear to yield lower BP values compared to COBP and could be recognized as a valuable tool for hypertension diagnosis in public clinics.
POSTER SESSION

POSTERS' SESSION PS07: KIDNEY AND RAAS, ENDOCRINE HYPERTENSION

EFFECTS OF EMPAGLIFLOZIN ON SALT-SENSITIVE HYPERTENSION AND RENAL INFLAMMATION IN RAT

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Objective: Renal inflammation may have a role in salt-sensitive hypertension. Although sodium-glucose cotransporter-2 (SGLT2) inhibitors were reported to exert blood pressure lowering in type 2 diabetes mellitus, whether they have a role in non-diabetic kidney diseases is not clear. This study was undertaken to investigate whether salt-sensitive hypertension and its accompanying renal inflammation are ameliorated by SGLT2 inhibition.

Design and method: The animal model of salt-sensitive hypertension was established by salt loading in uninephrectomized rats. Male Sprague-Dawley rats were randomly divided into 3 groups: sham controls (SC, n = 4), uninephrectomized controls (UC, n = 4), and empagliflozin-treated rats (ET, n = 5). All rats were fed a rodent diet with 8% NaCl throughout the study period. Empagliflozin (20 mg/kg/d) was orally administered for 3 weeks after uninephrectomized rats were stabilized over 2 weeks. Systolic blood pressures (SBPs) were weekly measured, and kidneys were harvested for qPCR at the end of animal experiment.

Results: At baseline, SBPs were 122 ± 4, 127 ± 1, and 125 ± 3 mmHg in SC, UC, and ET, respectively. At the end of animal experiment, SBP in UC was higher than that in SC (167 ± 4 vs. 137 ± 6 mmHg, P < 0.01). However, ET had a lower SBP (146 ± 3 mmHg) compared with UC (P < 0.05). As expected, urinary glucose excretion was remarkable in ET (2.61 ± 0.59 mmol/d/100 g BW versus controls). Whereas natriuresis was not different between groups, urinary excretion of osmolites in ET (29.8 ± 3.6 mmol/d/100 g BW, P < 0.01) was higher than that in SC (20.6 ± 2.3 mmol/d/100 g BW) or UC (19.3 ± 1.4 mmol/d/100 g BW). Compared with SC, the mRNA expression level of IL-1β (206 ± 91%, P < 0.005), RANTES (167 ± 20%, P < 0.005), and gp91phox (300 ± 36%, P < 0.005) were increased in UC but ameliorated in ET (IL-1β/H9252, 159 ± 29%; RANTES, 87 ± 34%; gp91phox, 142 ± 74%, all P < 0.005).

Conclusions: Empagliflozin was effective in controlling salt-sensitive hypertension induced by renal mass reduction, via glycosuria-driven osmotic diuresis rather than natriuresis. The upregulation of renal inflammation in salt-sensitive hypertension may be relieved by empagliflozin treatment.

KLOTHO SUPPLEMENTATION ATTENUATES BLOOD PRESSURE AND CYST GROWTH IN MOUSE POLYCYSTIC KIDNEY DISEASE

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Objective: Klotho interacts with various membrane proteins such as receptors for transforming growth factor (TGF)-beta and insulin-like growth factor (IGF) to alter their function. Renal expression of klotho is diminished in chronic kidney disease. In the present study, the effects of klotho supplementation on polycystic kidney disease (PKD) model were assessed.

Design and method: Recombinant human klotho protein (10 mg/kg/day) or vehicle was administered daily by subcutaneous injection to 6 week-old PKD (DBA/2-pcy) mice. Blood pressure was measured by tail-cuff method. After 2 months, mice were killed by over-dose of anesthesia and the kidneys were harvested for the analysis.

Results: Exogenous klotho protein supplementation reduced right (1.24 ± 0.10 vs. 0.84 ± 0.09 g, p < 0.01) and left kidney weight (1.19 ± 0.10 vs. 0.88 ± 0.06 g, p < 0.01), cystic area (5 ± 3 vs. 34 ± 4 %, p < 0.05), systolic blood pressure (110 ± 3 vs. 101 ± 2 mmHg, p < 0.05) and 8-epi-prostaglandin F2alpha excretion (354 ± 86 vs. 100 ± 35 ng/day, p < 0.01) without changes in body weight. Creatinine clearance in klotho-treated PKD mice was higher than the untreated (1.01 ± 0.08 vs. 0.51 ± 0.04 ml/min/g.kidney.wt, p < 0.01). Klotho supplementation reduced plasma angiotensin II levels (459 ± 76 vs 217 ± 31 fmol/ml, p < 0.05) without significant changes in renal angiotensin II concentrations. Exogenous klotho protein supplementation improved renal expression of superoxide dismutase (SOD), as well as renal klotho expression itself (p < 0.01 for each). Klotho supplementation reduced renal expressions of fibronectin and collagen I (p < 0.05 for each), and diminished renal abundance of phosphorylated Akt and mTOR (p < 0.05 for each). Pathological examination revealed that klotho reduced fibrosis index and nuclear staining of Smad3 in PKD kidneys.

Conclusions: The present data indicate that klotho supplementation reduces blood pressure in association with ameliorating renin-angiotensin system in PKD mice. Furthermore, our results are consistent with the notion that klotho inhibits its IGF signaling, inducing SOD to reduce oxidative stress and suppressing Akt-mTOR signaling to decrease abnormal cystic growth in PKD mice. Finally, the present findings suggest that klotho inhibits TGF-beta signaling through Smad to attenuate fibrosis. The present data provide translational evidence to examine whether klotho supplementation is the treatment of choice for PKD patients resistant to AVP antagonist.

ASSOCIATION STUDY OF URIC ACID TRANSPORTER GLUT9 GENOTYPE WITH THE RENIN-ANGIOTENSIN SYSTEM


Objective: Uric acid is thought to be one of risk factors for atherosclerotic disorders. The mechanisms have been thought to include endothelial dysfunction, inflammation, oxidative stress and the renin angiotensin system (RAS) activation. It is known that the RAS plays a pivotal role in the atherosclerotic disorders. However, the evidence that uric acid is involved in the activation is not sufficient. We therefore tested the hypothesis that a genetic variant of a uric acid transporter, glucose transporter 9 (GLUT9) could show significant association with prevalence of hyper-reninemic state.

Design and method: We enrolled consecutive 804 subjects who had consulted our hospitals for life style related diseases (statistic power 80%, significance level 0.05). We defined the subjects with plasma renin activity (PRA) equal with or more than 0.70 mg/ml/h as hyper-reninemic group as cases of the study and the subjects with PRA less than 0.70 mg/ml/h as normo-reninemic group as controls. Genomic DNA was isolated from human leukocytes. Genotypes were assayed with genomic DNA for a C/T variant of GLUT9 (rs1014290) using real-time PCR method by TaqMan method. Association between the genetic variant and the prevalence of hyper-reninemic state was tested.

Results: They consisted of cases (51.0%) and controls (49.0%). The serum uric acid (mg/dl) with each genotype of GLUT9 were as follows: CC (127 cases) 5.04 ± 1.45, CT (392 cases) 5.08 ± 1.49, TT (286 cases) 5.44 ± 1.45 (CC vs CT, p = 0.77; CC vs TT, p = 0.011; CT vs TT, p = 0.002). The numbers of individuals with each genotype were as follows (CC, CT and TT): 52, 204 and 132 for controls. Accordingly, the risk for hyper-reninemic state was 1.24 (95% confidence interval: 1.02–1.52), p = 0.033 for allelic comparison and also p = 0.032 for Armitage’s trend test, the T allele being the risk allele.

Conclusions: The uric acid concentration is associated with a genetic variant of transporter GLUT9 and the subjects with genetic variant of high uric acid have hyper-reninemic constitution. Thus, from a view point of Mendelian randomization theory, it is found that high uric acid state may have a significant impact on the RAS activation.

ANGIOTENSIN II TRIGGERS PODOCYTE APOPTOSIS THROUGH THE MODULATION OF CD2AP AND AMPK

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Objective: Angiotensin II (Ang II) promotes the pathogenesis and progression of renal diseases and also plays an direct role in the pathogenesis of proteinuria. CD2-associated protein (CD2AP) in podocytes serves as an adaptor protein binding to nephrin and podocin, anchoring these slit diaphragm proteins to actin fila-
ments of podocyte cytoskeleton, and sending signals inward or outward. In addition, CD2AP can facilitate the nephrin-induced PI3-K/AKT signaling, which protects podocytes from apoptosis. AMP-activated protein kinase (AMPK), as a sensor of cellular energy status, has been known to play an important role in the pathophysiology of metabolic diseases, including diabetes, and its renal complications. We investigated the role of AMPK on the changes of CD2AP and podocyte apoptosis by angiotensin II (Ang II), a major vascular injury inducer.

**DESIGN AND METHOD:** Mouse podocytes were incubated in media containing various concentrations of Ang II and AMPK-related agents. The changes of CD2AP and podocyte apoptosis were observed by confocal imaging, western blotting, and FRET assay according to the presence of Ang II.

**RESULTS:** CD2AP and AMPKα2 were located diffusely but predominantly in perinuclear cytoplasm and localized with nephrin. Ang II reduced AMPKα2 in time- and dose-sensitive manners and also decreased CD2AP stainings diffusely and induced spatial separation from concentrated nephrin, similar to those of compound C-treated condition. AICAR and metformin, AMPK activators, ameliorated the abnormal distributional changes of AMPKα2 and CD2AP. In western blot analysis, Ang II also reduced (Thr172) phosphorylation of AMPKα2 and CD2AP in time- and concentration-dependent manners, which were significantly recovered by metformin and AICAR. Ang II type 1 receptor antagonist, losartan also recovered CD2AP suppressed by Ang II. LY294002, a PI3-K inhibitor, reduced CD2AP suppressed by Ang II. Ang II increased apoptosis in time- and concentration-dependent manners, which were ameliorated by AMPK activators and siCD2AP.

**CONCLUSIONS:** Our findings suggest that Ang II induces the relocation and suppression of podocyte CD2AP and AMPKα2 via Ang II type 1 receptor and through the inhibition of PI3-K signaling, which trigger podocyte apoptosis induced by Ang II.

**LOSARTAN NORMALIZES BLOOD PRESSURE AND PREVENTS RENAL DAMAGE AND INFLAMMATION INDUCED BY FRUCTOSE OVERLOAD. L-DOPA/DOPAMINE INDEX AS A NEW POTENTIAL BIOMARKER OF RENAL DAMAGE**

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**OBJECTIVE:** The renin angiotensin system (RAS) and the renal dopaminergic system (RDS) act as autocrine and paracrine systems to regulate renal sodium management and inflammation, and their alterations have been associated to hypertension and renal damage. Nearly 30–50% of hypertensive patients have insufficiency of the renin-angiotensin system (RAS), which has a strong correlation to microalbuminuria. The aim of this study was to evaluate the effects of RAS blockade with losartan on blood pressure and renal damage in a model of IR produced by fructose overload (FO), and its association to changes in the RDS. Finally, we studied the urinary L-dopa/dopamine index as a potential biomarker of renal dysfunction.

**DESIGN AND METHOD:** Male Sprague Dawley rats were divided into: Control (C, tap water), FO (10% w/v of fructose solution), Losartan (L, 30 mg/kg/day in tap water), FO+L (30 mg/kg/day in fructose solution) groups for 4, 8 and 12 weeks.

**RESULTS:** CD2AP and AMPKα2 were located diffusely but predominantly in perinuclear cytoplasm and localized with nephrin. Ang II reduced AMPKα2 in time- and dose-sensitive manners and also decreased CD2AP stainings diffusely and induced spatial separation from concentrated nephrin, similar to those of compound C-treated condition. AICAR and metformin, AMPK activators, ameliorated the abnormal distributional changes of AMPKα2 and CD2AP. In western blot analysis, Ang II also reduced (Thr172) phosphorylation of AMPKα2 and CD2AP in time- and concentration-dependent manners, which were significantly recovered by metformin and AICAR. Ang II type 1 receptor antagonist, losartan also recovered CD2AP suppressed by Ang II. LY294002, a PI3-K inhibitor, reduced CD2AP suppressed by Ang II. Ang II increased apoptosis in time- and concentration-dependent manners, which were ameliorated by AMPK activators and siCD2AP.

**CONCLUSIONS:** Our findings suggest that Ang II induces the relocation and suppression of podocyte CD2AP and AMPKα2 via Ang II type 1 receptor and through the inhibition of PI3-K signaling, which trigger podocyte apoptosis induced by Ang II.

**HYPERBARIC OXYGEN PRECONDITIONING IMPROVES RENAL HAEMODYNAMIC AND KIDNEY FUNCTION IN SPONTANEOUSLY HYPERTENSIVE RATS WITH ISCHEMIC ACUTE KIDNEY INJURY**

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**OBJECTIVE:** Acute kidney injury associated with other risk factors, such as hypertension, causes high mortality rate. Hyperbaric oxygen preconditioning has been shown to prevent ischemia reperfusion injury in different tissues. The aim of our study was to determine the effect of hyperbaric oxygen preconditioning on renal haemodynamic and kidney function in spontaneously hypertensive rats suffered kidney ischemia–reperfusion injury.

**DESIGN AND METHOD:** An experiment was performed in anesthetized, adult six-month-old male spontaneously hypertensive rats (SHR). SHR were randomly selected in three experimental groups: sham operated (SHAM; n = 7); AKI control group (AKI, n = 9); and AKI group with hyperbaric oxygen preconditioning (AKI+HBO; n = 9). The right kidney was removed and the renal ischemia was performed by clamping the left renal artery for 45 minutes. Treated rats were placed into experimental HBO chambers and exposed to pure oxygen, twice a day (in a 12 hour interval, 8AM and 8 PM) for two consecutive days in the following manner: 10 minutes slow compression, 2.026 bar of oxygen for 60 minutes, 10 minutes slow decompression. AKI was performed on the next morning. Mean arterial pressure (MAP) and renal blood flow (RBF) were measured and renal vascular resistance (RVR) was calculated 24 h after reperfusion. Plasma creatinine (Pcr) was measured on Cobas integra 400 plus.

**RESULTS:**

**EXERCISE HEART RATE DURING TREADMILL TEST IS RELATED TO RENAL FUNCTIONAL RESERVE IN ESSENTIAL HYPERTENSIVE PATIENTS: A NOVEL LINK BETWEEN THE HEART AND THE KIDNEYS**


**OBJECTIVE:** Renal functional reserve (RFR) refers to the capacity of the kidney to augment its level of function under the influence of certain stimuli and it constitutes a valuable diagnostic tool for recognizing high risk patients for acute kidney injury and chronic kidney disease. The aim of our study was to assess the relation of RFR with diverse clinical parameters in patients with essential hypertension and glomerular filtration rate (GFR) > 60 ml/min/1.73m2.

**DESIGN AND METHOD:** 15 hypertensive subjects [mean age = 57 years, body mass index = 28.5 kg/m2, office systolic/diastolic blood pressure (BP) = 148/90 mmHg] were included and underwent exercise treadmill stress test, 24-hour ambulatory BP and echocardiographic examination. All subjects were fasted for 8 hours and then baseline hydration status was recorded using bioimpedance analysis. Basal GFR **p < 0.01; *** p < 0.001 vs. SHAM; # p < 0.05; ## p < 0.01; ### p < 0.001 vs. AKI**

**CONCLUSIONS:** Our results suggest that HBO treatment improves renal haemodynamic and kidney function of SHR with AKI episode. This implies that preconditioning with hyperbaric oxygen may attenuate consequences of AKI development in hypertensive subjects exposed to risky surgical procedures.
Since a functional crosstalk between GPCRs has been reported, we investigated if 17β-estradiol or aldosterone. The receptor-1 (GPER-1), which trigger aldosterone production by binding Ang II and giotensin (Ang) II type 1 receptor (AT1R) and G protein-coupled estrogen receptor, and/or the selective GPER-1 antagonist G36. The experimental end-point was 12 hours, and/or after pre-treatment with the selective AT1R antagonist irbesartan or G36. Similarly, in HAC15 cells aldosterone potentiated the effect of Ang II (+800% vs Ang II alone; +1300% vs aldosterone alone), and pre-treatment with irbesartan and/or G36 blunted the synergistic effect of aldosterone plus Ang II. After immunoprecipitation for AT1R, GPER-1 protein expression was detected by immunoblot

Conclusions: Aldosterone and Ang II can increase the expression of CYP11B2 through a crosstalk between GPER-1 and AT1R receptors. In HAC15 cells AT1R and GPER-1 form heterodimers which interact to induce an autonomous aldosterone production in APAs.

CIRCADIAN HAEMODYNAMIC CHARACTERISTICS IN PATIENTS WITH PRIMARY ALDOSTERONISM

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Objective: The circadian variability of central blood pressure (BP), arterial stiffness indices, and haemodynamic parameters in primary aldosteronism (PA) patients remains to be elucidated. The present study aimed to compare circadian haemodynamic characteristics in hypertensive patients with and without PA.

Results: Office systolic BP, PWV, AIx@75, and BP variability indices were similar between groups, but central BP, systolic BP variability indices, central pulse wave velocity (PWV), augmentation index (AIx@75), cardiac index, and total vascular resistance (TVR) were evaluated using an oscillometric device, Mobil-O-Graph NG device (IEM, St. Eaddin, Germany), in 60 patients with PA (63.4 ± 13.3 years, 47% female) and 120 age- and sex-matched patients with essential hypertension. The device monitored the above parameters every 30 minutes during the daytime (6 AM to 9 PM) as well as at nighttime (9 PM to 6 AM) for 24 hours until the next day.

Results: Office systolic BP was lower in PA patients than in controls (124 ± 14 vs 130 ± 11 mmHg, p < 0.05). Circadian haemodynamics, including 24-hour brachial and central BP variability indices, central pulse wave velocity (PWV), augmentation index (AIx@75), cardiac index, and total vascular resistance (TVR) were evaluated using an oscillometric device, Mobil-O-Graph NG device (IEM, St. Eaddin, Germany), in 60 patients with PA (63.4 ± 13.3 years, 47% female) and 120 age- and sex-matched patients with essential hypertension. The device monitored the above parameters every 30 minutes during the daytime (6 AM to 9 PM) as well as at nighttime (9 PM to 6 AM) for 24 hours until the next day.

Results: Results: Captopril lowered PTH in PA (from 36.9 ± 16.0 to 31.2 ± 13.2 ng/L, p = 0.0005) but not in PH (from 31.4 ± 9.0 ng/L to 28.7 ± 10.9 ng/L, p = 0.1024). Proportion of tissues expressing both AT1R and 11-beta hydroxy steroid dehydrogenase type 2 (11HSDB2) were quantified in parathyroid tissues. Cultures of parathyroid primary cells characterized in terms of specific markers (Calcium Sensing Receptor, Chromogranin A and Glial cell missing-2 homolog) were developed and PTH production in response to angiotensin II (100 nM) and aldosterone (10–3 M) was measured by ELISA kit.

Results: Captopril lowered PTH in PA (from 36.9 ± 16.0 to 31.2 ± 13.2 ng/L, p = 0.0005) but not in PH (from 31.4 ± 9.0 ng/L to 28.7 ± 10.9 ng/L, p = 0.1024). Proportion of tissues expressing both AT1R and 11-beta hydroxy steroid dehydrogenase type 2 proteins. Parathyroid primary cells cultured up to 7 days lost their capability to produce PTH. Secretion of PTH was increased after stimulation with aldosterone (10–3 M) (% secretion of PTH vs control: 240 ± 52, p < 0.01) and Angiotensin II (% secretion of PTH vs control: 168 ± 15, p < 0.01); this effect was abolished by ciprofloxacin (% secretion of PTH vs control: 135 ± 55) and irbesartan (% secretion of PTH vs control: 102 ± 15).

Conclusions: These results show that acute lowering of Ang II formation lowers PTH secretion in vivo. The finding that parathyroid glands express AT1R and 11HSDB2, alongside that of the MR, and the response to Ang II and aldosterone stimulation of primary parathyroid cells, provide further support for an involvement of the renin-angiotensin-aldosterone system in the regulation of parathyroid function.

CYP11B2 gene expression change. HAC15 proteins were immunoprecipitated with an antibody for AT1R, and GPER-1 expression was revealed by immunoblot in immunoprecipitated proteins.

Results: In APA strips both aldosterone and Ang II increased CYP11B2 gene expression (+220% and +190%, respectively, p < 0.01 vs untreated); aldosterone on top of Ang II potentiated the secretagogue effect of Ang II (+400%, p < 0.001 vs untreated). The synergistic effect of aldosterone and Ang II was inhibited by either irbesartan or G36. Similarly, in HAC15 cells aldosterone potentiated the effect of Ang II (+800% vs Ang II alone; +1300% vs aldosterone alone), and pre-treatment with irbesartan and/or G36 blunted the synergistic effect of aldosterone plus Ang II. After immunoprecipitation for AT1R, GPER-1 protein expression was detected by immunoblot

Conclusions: Aldosterone and Ang II can increase the expression of CYP11B2 through a crosstalk between GPER-1 and AT1R receptors. In HAC15 cells AT1R and GPER-1 form heterodimers which interact to induce an autonomous aldosterone production in APAs.
tracking evaluation, and to ambulatory blood pressure monitoring (ABPM). Sig-ificant determinants of cardiac remodelling were explored with regression analy-sis adjusted for several clinical confounders.

Results: 86% of the study participants were hypertensives, 45% diabetics, 68% had lipid abnormalities and 47% high serum uric acid levels. Among hypertensive patients the majority (51%) were taken three pills and the most frequent treatment prescribed were B-blockers (79%). At echocardiographic evaluation 64% of the patients presented concentric hypertrophy, 27% concentric remodelling, 9% a normal morphology, none had eccentric hypertrophy. Mean longitudinal strain was -21.4 ± 20% and 20% of the study participants had an impaired longitudinal function. With regard to diastolic function, 27% had a normal function, 66% a diastolic dysfunction, 5% had a pseudo-normal pattern. According to ABPM data 27.3% had diurnal hypertension and 90.9% had nocturnal hypertension; the majority of the patients were risers (53%) or non-dippers (30%), only 17% had a normal dip-ping pattern. In multivariate regression analysis, adjusted for several clinical and biochemical analysis, none of the ABPM parameters was a significant determinant of left ventricular mass, diastolic function or global longitudinal strain, while the main determinant was gender (p = 0.018 for left ventricle mass, p = 0.033 for GCS, p = 0.007 for diastolic function). Only serum calcium level presented a significant difference according to gender and was higher in females compared to males.

Conclusions: Renal transplanted patients presented an unfavourable cardiac remodelling and nocturnal hypertension, however none of ABPM indexes sig-nificantly correlated with cardiac organ damage. Gender and in particular male gender, is a significant determinant of cardiac remodelling, indicating that prob-ably these patients should be treated more intensive.

A MASS IMAGING TECHNIQUE REVEALED A RENO-PROTECTIVE EFFECT OF THE XANTHINE OXIDASE INHIBITOR FEBUXOSTAT IN THE ISCHEMIC KIDNEY BY PROMOTING ATP RECOVERY IN THE CORTEX


Objective: The kidney has different energy metabolism depending on the region. However, the distribution of phosphorylated adenosine (ATP, ADP and AMP) and their alteration after transient ischemia have not been known due to the technical difficulties.

Design and method: Imaging mass spectrometry (IMS) with metabolome analysis is a novel technique to quantify the small metabolites in the tissues. We performed the IMS analysis in the ischemic kidney after transient ischemia by renal artery clipping.

Results: In the normal kidney, ATP was significantly rich in both the cortex and outer medulla. After transient ischemia, ATP in the cortex degraded and the energy charge value decreased within a minute. ATP in the inner medulla did not decrease within a minute and needed 10 minutes to start decreasing. After the 10 minutes of ischemia, total adenylates deceased in the cortex, although the decrease in energy charge value was homogeneous in the kidney. During the 24 hours reperfusion after 10 minutes ischemia, restoration of total adenylates in the cortex was not sufficient. Febuxostat is a xanthine oxidase inhibitor which might promote renee of hypoxan-thine as a progenitor of adenylates and therefore might improve the restoration of total adenylates and ATP after transient ischemia. The administration of febuxostat in accordance with the reperfusion period supported the restoration of ATP level in the cortex and improved renal function which was impaired by transient ischemia.

Conclusions: In these IMS, we revealed the region-specific alteration of phos-phorylated adenosine in the ischemic kidney and the novel effect of febuxostat on the restoration of total adenylates and ATP in the cortex after transient ischemia.

JUXTAGLOMERULAR CELL TUMORS: A CASE SERIES

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Objective: Juxtaglomerular cell tumors (JCTs) are a rare but potentially curable cause of hypertension. Their diagnosis is challenging because these tumors may not be detected or mistaken for a cyst on CT-scan.

Design and method: Between 1986 and 2017, 10 patients with JCTs were retro-spectively identified in our Hypertension Unit. Clinical, biological and radiologi-cal features were extracted from our clinical data warehouse.

Results: Among the 10 patients with JCT, 7 were women, 3 were men. Median age was 24.5 [15–49] years, 8 of 10 patients had grade III hypertension. Severe hyperkalemia related to a marked secondary hyperaldosteronism was a constant feature. Medians of plasma renin and aldosterone concentrations were 392 [70.5–4800] mUI/L and 1490 [671–2492] pmol/L, respectively. Median plasma pro-renin concentra-tion was 835.5 [133–6546] mUI/L. Median tumor size was 17.5 [8–33] mm. On CT-scan, JCTs were spontaneously isodense with little enhancement after con-trast medium injection. On MRT, JCTs were iso (7/10) or hypointense (3/10) on T1-weighted images (WI). On T2-WI, JCTs were hypointense (2/10), isointense (4/10), with 3/4 heterogeneous) or heterogeneously hyperintense (4/10). Six of 10 JCTs had a thin peripheral “pseudo-capsule’’ (hypointense on T2-WI). Contrast enhancement was low, slightly heterogeneous and delayed. On diffusion-WI, tumors were hyper-intense with a restricted apparent diffusion coefficient. Surgical resection allowed hormonal recovery in all cases and hypertension cure in all but one patient because of the involvement of renal infarcted area. After 43 [0–228] months follow-up, one patient had a recurrence of hypertension 4 years after surgery.

Conclusions: This is the largest study describing clinical, biological and radio-logical characteristics of JCTs, including detailed description of MRI features. In hypertensive patients with secondary hyperaldosteronism, imaging (CT or ultra-sound) should be performed to analyze renal arteries and renal cortex. In case of unexplained secondary hyperaldosteronism, renal MRI should be performed if a renal lesion without cystic specific characteristics is detected. MRI should also be considered in patients with usual hypertension and signs of secondary hyperal-dosteronism and normal CT-scan, particularly in women. Non-invasive imaging techniques, especially renal MRI, may improve diagnosis of JCTs.

PARATHYROID HORMONE, BUT NOT 25-HYDROXY VITAMIN D, SERUM LEVELS ASSOCIATE WITH ALDOSTERONE-TO-RENIN RATIO AND NOCTURNAL MEAN BLOOD PRESSURE VARIABILITY

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Objective: To assess the association between serum parathyroid hormone (PTH) or vitamin D serum levels with blood pressure, aldosterone-to-renin ratio, and target organ damage in a series of hypertensive patients.

Design and method: Observational cross-sectional study of hypertensive pa-tients who underwent 24-hour ambulatory blood pressure monitoring (24-h ABPM), in whom plasma aldosterone, plasma aldosterone-to-renin ratio, PTH and 25-OH D serum levels were available. Blood pressure (BP) was measured by 24-hour ABPM. BP was assessed as average real variability. Renin-angiotensin-aldosterone system status was assessed through plasma aldosterone levels and aldos-terone-to-renin ratio. Electrocardiography, echocardiography and urine albumin-to-creatinine ratio were used to evaluate left ventricular hypertrophy and renal damage, respectively. Patients with primary hyperparathyroidism were excluded.

Results: We enrolled 170 consecutive patients (median age [IQR] year), 52 [42–64]; 48.2%, female). In comparison with patients with normal PTH serum levels (<88 pg/ml), those with high PTH serum levels (>88 pg/ml) showed a sig-nificantly increase in plasma aldosterone-to-renin ratio [mean ± SD] (37.8 ± 46.6 vs. 20.7 ± 27.0, p = 0.032), and nocturnal pulse pressure (56.3 ± 17.9 vs. 50.6 ± 13.1 mm Hg; p = 0.029). Furthermore, when compared with patients in the PTH 1st quartile, those in the 4th PTH quartile showed significantly higher nocturnal systolic BP (129.5 ± 25.6 vs. 119.9 ± 14.4 mm Hg; p = 0.038), plasma al-dosterone (204.9 ± 128.4 vs. 153.8 ± 87.8 pg/ml; p = 0.037), plasma aldosterone-to-renin ratio (36.4 ± 45.8 vs. 18.9 ± 24.5; p = 0.033), and nocturnal mean BP variability (8.9 ± 4.4 vs. 7.1 ± 1.7 mm Hg; p = 0.016). Differences in aldosterone-to-renin ratio and nocturnal mean BP variability remained significant after adjust-ing by age, gender, renal function and ACE/ARB therapy in multivariate analysis. No such differences were observed in patients with vitamin D deficiency (25-OH D < 20 ng/ml), when compared with patients with normal vitamin D serum levels.

Conclusions: High PTH, but not low 25-OH D serum levels associate with in-creased aldosterone-to renin ratio and elevated nocturnal mean blood pressure variability. Our results might explain, in part, the lack of consistent clinical benefit of vitamin D supplementation on high blood pressure and cardiovascular risk. We suggest that serum PTH status should be considered in trials searching for cardiovascular benefits from vitamin D supplementation in patients with hypo-vitaminosis D.
EFFECTS OF A NOVEL INTERACTING MOLECULE WITH AT1 RECEPTOR, ATRAP, ON ANG II-INDUCED PROLIFERATIVE ACTIVITY AND OXIDATIVE STRESS IN VASCULAR SMOOTH MUSCLE CELLS

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Objectives: Superoxide anions are recognized as mediators of intracellular signaling cascades and are known to participate in cardiovascular diseases such as arteriosclerosis and hypertension. 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. We previousy 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.

PRIMARY ALDOSTERONISM AND PREGNANCY

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Objective: Primary aldosteronism (PA) may present in younger age and it may so complicate pregnancy if not diagnosed early. Our aim was to identify female patients in whom PA was diagnosed after pregnancy and to seek for possible complications during pregnancy.

Design and method: Retrospective analysis of female patients with PA diagnosed and treated at our Department in the period from 2000 to 2017.

Results: We found 12 patients with PA (age at diagnosis 32.4 ± 4.6 years, hypertension duration 5.4 ± 3.1 years) suffering from hypertension 2.4 ± 1.7 years before pregnancy (5 patients had hypertension diagnosed during pregnancy). Three subjects were pregnant twice before the final diagnosis of PA was made. In 8 cases, pregnancy was terminated with caesarean section (3 times due to preterm preeclampsia and twice due to significantly increased blood pressure) and in 7 cases by spontaneous delivery (twice due to term preeclampsia). Preterm delivery occurred in 5 cases – the earliest one in the sixth month of gestation (4 times due to blood pressure related complications). Subsequent diagnosis of PA (sometimes with a long delay [12 years]) was made on the basis of significantly low potassium values (2.6 ± 0.4 mmol/l; 2 subjects suffered even from hypokalaemic paralysis) and hypertension (mostly moderate), elevated plasma/serum aldosterone (57.4 ± 19.4 ng/dl) and suppressed plasma renin activity (0.33 ± 0.1 ng/ml/h) or plasma renin 3.25 ± 1 ng/l. Eleven subjects underwent laparoscopic adrenalecstasy [in all cases, diagnosis of a larger cortical adenoma (16.5 ± 5.7 mm) was made] and one subject was classified with bilateral hyperplasia according adrenal venous sampling. Operation has normalized blood pressure in 8 subjects and has improved significantly blood pressure control in remaining 3 subjects. One patient became pregnant after adrenalecstasy and her pregnancy went uneventful.

Conclusions: Primary aldosteronism is associated with high rate of pregnancy-related complications. The most frequent one is preeclampsia, in some cases leading to preterm delivery. The best prevention of these complications is the early diagnosis of PA, in these particular hypertensive cases the awareness of hypokalaemia.

THE LOCATION SPECTRUM OF THE ORIFICE OF RIGHT ADRENAL VEIN IN PATIENTS WITH PRIMARY ALDOSTERONISM: THE EXPERIENCE BASED ON 575 CASES OF ADRENAL VENOUS BLOOD SAMPLING


Objective: To determine the distribution characteristics of the right adrenal vein orifices to improve the success rate of right adrenal vein catheterization in adrenal vein sampling (AVS).

Design and method: 575 patients with confirmed diagnosis of primary aldosteronism and undertook successful AVS in the Hypertension Center of People’s Hospital of Xinjiang, China between January 2006 and October 2013 were consecutively enrolled. A SIM-ADS V4.2 medical imaging workstation was used to determine the location of the right adrenal vein orifices. The distribution characteristics of the right adrenal vein orifices were analyzed according to the markers in the spine.

Results: 1) the orifice of the right adrenal vein was located ranging from the middle edge of Th10 to the middle edge of Th12 in 457 patients (79.5%). Only 3.5% orifices were found between the upper edge of L1 to the middle edge of L1. 2) Distributions of the right adrenal vein orifices were significantly different based on gender, height, weight, BMI, and abdominal circumference, while the age did not show significantly different in groups.

Conclusions: The middle edge of Th10 to the middle edge of Th12 should be main target area for successful right adrenal vein catheterization when performing AVS.

A COMPARISON STUDY BETWEEN MOBIL-O-GRAPH AND SPHYGMOCOR DEVICES IN ASSESSING AORTIC SYSTOLIC PRESSURE AND PULSE WAVE VELOCITY IN PERITONEAL DIALYSIS PATIENTS

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Objective: The newly-introduced Mobil-O-Graph monitor has been validated against invasive and non-invasive measurements of aortic systolic pressure (sSBP) and pulse wave velocity (PWV) in the general hypertensive population. However, the validity of Mobil-O-Graph-derived measurements among patients on peritoneal dialysis (PD) remains unclear. The aim of this study is to compare oscillometric measurements of sSBP, heart-rate adjusted augmentation index (AIx75) and PWV obtained with the Sphygmocor device (ArtCor, Australia) in patients receiving long-term PD.

Design and method: A comparison study of 27 consecutive PD patients using the Sphygmocor-derived sSBP, AIx75 and PWV as reference standard. After a 10-min rest in the supine position, we applied the Mobil-O-Graph and Sphygmocor devices in a randomized order. Brachial BP recordings taken with a conventional sphygmomanometer were used to calibrate the Sphygmocor device.

Results: Measurements of sSBP, AIx75 and PWV obtained with the Mobil-O-Graph device did not differ from relevant measurements taken with Sphygmocor (120.5 ± 18.2 vs 124.4 ± 19.0 mmHg, P = 0.438 for sSBP; 27.0 ± 12.4 vs 24.5 ± 10.6%, P = 0.428 for AIx75 and 9.5 ± 2.1 vs 10.1 ± 3.1 m/sec, P = 0.397 for PWV). The slight difference in estimation of sSBP is possibly explained by the numerically higher brachial SBP values used for the calibration of Sphygmocor (131.0 ± 20.6 vs 134.5 ± 19.7 mmHg, P = 0.525). Mobil-O-Graph-derived parameters were strongly and significantly correlated with paired measurements taken with Sphygmocor (r = 0.889, P < 0.001 for sSBP, r = 0.816, P < 0.001 for AIx75 and r = 0.794, P < 0.001 for PWV). Bland-Altman plots showed no evidence of asymmetry and wide range of agreement between the two devices.

Conclusions: This study suggests that oscillometric measurements of sSBP, AIx75 and PWV taken under static conditions with the Mobil-O-Graph monitor are closely related to tonometric measurements taken with the widely applied Sphygmocor device among patients on PD. The use of the Mobil-O-Graph monitor may facilitate the accurate determination of arterial stiffness indexes under ambulatory conditions in this population.
THE IMPACT OF OSTEOCALCIN, OSTEOPROTEGERIN AND OSTEOPONTIN ON ARTERIAL STIFFNESS IN CHRONIC RENAL FAILURE PATIENTS ON HEMODIALYSIS

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Objective: Background/Aims: This cross-sectional study was designed to assess the relationship between vascular stiffness (VS) and bone-related proteins involved in the development of arteriosclerosis in patients on regular hemodialysis (HD).

Design and method: Methods: 68 consecutive patients in stable clinical condition who received regular HD in the FMC Dialysis Center, Pécs were included. VS parameters (carotid-femoral pulse wave velocity – PWV, aortic augmentation index – AIX) were determined by applanation tonometry (SphygmoCor, AtCor Medical, Sidney) and the routine laboratory test were completed with measurements of osteocalcin (OC), osteopontin (OP) and osteoprotegerin (OPG) by using commercially available ELISA kits. 35 healthcare workers served as controls.

Results: Results: In patients on regular HD PWV markedly increased and there was several-fold elevation in the interrelated bone-specific proteins (OC, OP, OPG). PWV was found to be independently associated only with OC (beta: -0.25, p < 0.029) and age (r = 0.411, p < 0.000), but risk factors for arterial calcification had significant impact on OC (systolic blood pressure, hsCRP, BMI), OPG (age, BMI) and OP (LDL-cholesterol).

Conclusions: Conclusion: Except for OC, our results failed to document direct association of vascular lesion with OP and OPG, therefore their high circulating levels may be an epiphenomenon or they may have counter-regulatory role to attenuate the uremic calcification process.
POSTER SESSION

POSTERS’ SESSION PS08:
METABOLIC DISORDERS AND SLEEP APNOEA

EFFECT OF BETA BLOCKERS ON NOCTURNAL ARRHYTHMIAS AND HEART RATE VARIABILITY IN OBSTRUCTIVE SLEEP APNOEA PATIENTS

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Objective: To explore the effects of BB on nocturnal peri-apnoeic heart rate variability (HRV) and on arrhythmias in OSA patients.

Design and method: Arrhythmias and increased cardiovascular V are highly prevalent in patients with obstructive sleep apneas (OSA), possibly resulting in fatal events, as shown by the significant increase of sudden cardiac death and arrhythmias during sleep in OSA patients. Data concerning drug effects on this phenomenon are scarce and the use of beta blockers (BB) has been limited by concern that they might lead to bradyarrhythmias. However, recent evidence suggests that BB mostly reduce rhythm accelerations with trivial influence on decelerations.

We analysed 166 OSA patients (78 BB-treated and 88 BB-naive), who performed cardiorespiratory polysomnography (PSG) between 2013 and 2015. Patients on antiarrhythmic therapy were excluded. We analysed PSG-derived ECG traces for the assessment of arrhythmias. More- over, through an ad hoc developed software, we performed a specific analysis of HRV associated with apneic events. We considered HR decelerations occurring during the apnoeic phase and accelerations during the post-apnoeic phase (the first five seconds after the resumption of breathing). Statistical analysis was performed with Mann-Whitney U test.

Results: We did not find any difference between BB-treated and BB-naive groups concerning prevalence of nocturnal arrhythmias. HRV analysis showed a reduction of HR accelerations, expressed as RR length, during post-apnoeic phase in BB group (940.7 ± 121.4 msec BB-treated vs 897.8 ± 122.5 msec BB-naive; P = 0.040). Moreover, BB-treated patients showed a smaller delta between HR decelerations/accelerations and mean HR during apnoeic phase (58.5 ± 28.5 vs 74.6 ± 40.2 msec; P = 0.010 and 75.0 ± 42.4 vs 96.7 ± 55.5 msec; P = 0.018, respectively). Finally, the delta between HR accelerations and decelerations was smaller in BB-treated group (133.5 ± 63.8 vs 171.3 ± 87.7 msec; P = 0.010).

Conclusions: BB therapy does not worsen apnoea-induced HR decelerations nor increase the risk of bradyarrhythmias, while reducing the frequency and magnitude of apnoea-induced HR acceleration.

Therefore, our study suggests that BB are safe and possibly advantageous in OSA patients, although further studies are needed to establish if in the long term they may have a role in reducing fatal events.

ASSOCIATION OF MEASURES OF SHORT- AND LONG-TERM GLYCAEMIC VARIABILITY AND GLYCAEMIC CONTROL WITH AMBULATORY BLOOD PRESSURE PATTERN IN TYPE 1 DIABETES MELLITUS

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Objective: Long-term glycaemic variability (GV) is associated with microvascular complications in patients with type 1 diabetes mellitus (T1DM). The exact mechanism underlying this association are unclear, but might be related to effects of GV on patients’ blood pressure pattern.

This study was conducted to establish whether there is a relationship between glycaemic variability, glycaemic control and blood pressure pattern in patients with T1DM.

Design and method: Using 24 h ambulatory blood pressure monitoring (ABPM) (Spacelabs Healthcare Company Headquarters, Issaquah, WA), blood pressure patterns were assessed in 68 patients with T1DM for longer than 10 years who were free from known cardiovascular disease. Continuous glucose monitoring (CGM) (DexCom G4 Platinum (San Diego, CA) Continuous Glucose Monitoring (CGM)) for 7 days was used to estimate short-term GV (mean glucose CGM and standard deviation CGM). Long-term glycaemic control and GV were computed as mean and SD of HbA1c measurements over the last 5 and 10 years, respectively.

Results: Current HbA1c and HbA1c averaged over 5 and 10 years were positively correlated with systolic and diastolic blood pressure, and were higher in hypertensive patients.

SD of HbA1c over 5 years was negatively correlated with both systolic and diastolic nocturnal dipping. Mean glucose CGM correlated positively with nocturnal diastolic blood pressure.

Conclusions: In T1DM, both poorer short- and long-term glycaemic control are associated with higher diastolic and systolic blood pressure and a higher prevalence of hypertension. Long-, but not short-term GV is associated with lack of nocturnal dipping. Minimizing glycaemic fluctuations might therefore be important in preventing complications in patients with T1DM.

CENTRAL SLEEP APNEAS AND BLOOD PRESSURE DURING ACUTE EXPOSURE TO MODERATE ALTITUDE

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Objective: The association between obstructive sleep apnea (OSA) and both acute and chronic blood pressure (BP) increase is well established but it is not clear whether similar relationship exists for central sleep apneas (CSA). CSA are common in advanced heart failure but in these patients BP is usually low due to the effects of the disease and drugs used. Exposure to elevated altitudes may induce both CSA and BP increase. Aim of this study was to investigate the relationship between the presence of CSA and BP changes in healthy subjects acutely exposed to moderate altitude (MA).

Design and method: 44 healthy volunteers (mean age 41 ± 12y, 16 males) residing at low altitude were transported to the altitude of 2035 m asl (Sestriere, Italy). During the first and second 24-hours of exposure they underwent in a random order 24-hour ambulatory BP monitoring (AND TM-2430) and cardiorespiratory sleep study (Emblerta). The investigations were performed also at sea level (SL). Analyses involved pairwise comparisons of BP and cardiorespiratory variables between SL and MA as well as unadjusted and adjusted correlations between changes in these variables.

Results: Significant increases occurred at MA in 24-hour, daytime and night-time systolic/diastolic BP (difference vs. SL 5.36 ± 8.4/3.55 ± 4.6, 4.98 ± 11.0/2.98 ± 6.7, 4.97 ± 10.8/3.75 ± 7.0 mmHg), respectively. No changes in the size of nocturnal BP fall were observed. In parallel, the rate of CSA increased (total Apnoea Hypopnea Index: 1.55 vs 4.90, p < 0.001; central apnea index: 0.75 vs 1.30, p = 0.0004; Oxygen Desaturation Index 1.50 vs 7.85, p < 0.001 for SL vs MA, respectively), while mean nocturnal oxyhemoglobin saturation decreased (95.7 ± 1.5% vs. 91.6 ± 1.5%, p < 0.001). No correlations between BP changes and indices characterizing breathing during sleep were observed either in univariate analysis (all correlation coefficients < 0.2) or after considering possible confounders (age, sex, BMI).

Conclusions: At variance with what observed with OSA, presence and severity of CSA induced in healthy lowlanders by MA exposure seems unrelated to BP increase occurring in this condition, either during day or during night-time. This may depend either on pathophysiological differences between OSA and CSA or on inadequacies of indices characterizing breathing pattern during sleep.

MITOCHONDRIAL DYSFUNCTION IN MACROPHAGES LEADS TO SYSTEMIC INSULIN RESISTANCE, WHICH CAN BE IMPROVED BY GROWTH DIFFERENTIATION FACTOR 15

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Abstracts
Conclusions: Although epidemiological studies have linked adipose inflammation with obesity, the underlying mechanisms are incomplete. It is widely accepted that the interaction between insulin target cells and pro-inflammatory cytokines from accumulated macrophages is a cause of insulin resistance. Reduced mitochondrial capacity has been confirmed in patients with type 2 diabetes, and generally disposes macrophages toward a pro-inflammatory phenotype. However, little is known about decreased mitochondrial function and its effects on secreted macrophage factors which regulate macrophage polarization.

Design and method: To find out the soluble factors of macrophages in adipose inflammation, we have sought six transcription factors from control macrophages and macrophages that were treated with rosiglitazone. We identified a secretory factor, GDF15, which is required for increased oxidative metabolism in M2-like macrophages stimulated with IL-4 and the PPARγ agonist, rosiglitazone.

Results: Administration of GDF15 increased the oxidative function of macrophages, leading to their polarization into an M2-like phenotype, and reversed insulin resistance in ob/ob mice and in HFD-fed mice harboring myelooid-specific deletion of Crif1. Reintroduction of GDF15-null macrophages into HFD-fed mice in which macrophages were depleted with clodronate treatment rendered them glucose intolerant. Moreover, GDF15 deficiency prevented improvement of insulin sensitivity in mice treated with the Th2 cytokine IL-4.

Conclusions: Thus, GDF15 is an important microenvironmental factor regulating phenotypic polarization of macrophages linked to improvement of systemic insulin resistance.

Reducing Cardiovascular Risk in Patients with Morbid Obesity After Bariatric Surgery

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Objective: The rate of obesity is rising logarithmically, especially morbid obesity (BMI > 40 kg/m²). Obesity is commonly associated with multiple conditions imparting adverse cardiovascular risk including, hypertension, dyslipidemia and diabetes. Severe obesity is generally refractory to lifestyle modification, including diet, exercise and pharmacological treatment. The main objective of the study is to confirm the use of bariatric surgery as a means to reduce cardiovascular risk in severely obese patients.

Design and method: We examined 164 patients with morbid obesity (BMI > 40 kg/m²), they formed two groups. The first group included 81 patients who treated with diet, physical activity and drugs. The second group included 83 patients who using bariatric surgery (gastric bypass). Patients were examined before and after 6 months of treatment. All patients underwent clinical examination, determination of anthropometric parameters, measurement office SBP and DBP, daily monitoring of blood pressure, echocardiography, exploration indicators carbohydrate and lipid metabolism, definition cardiovascular risk with using scales SCORE, PROCAM, DRS, FRAMINGHAM.

Results: It was found that after 6 months of treatment weight loss was observed in both groups. A more significant decrease in body weight was observed in patients after surgical treatment (in first group by 4.6%, in the second group by 22.8%). Weight loss in patients after surgical treatment was associated with a greater decrease in blood pressure, improvement in the daily BP profile, changes in the structural and functional characteristics of the myocardium, decrease in the number of patients with LV hypertrophy, decrease LDL cholesterol, TG, glucose level, which was accompanied by a decrease in the number of patients with glucose intolerance (by 41.2%) and with diabetes (by 75%). Weight loss was associated with reducing the number of patients at very high risk on a scale SCORE by 78%, on a scale PROCAM by 100%, on a scale FRAMINGHAM by 95.6% and on a scale DRS by 13% in patients after surgical treatment.

Conclusions: Weight loss with the use of bariatric surgery contributes to the normalization of BP, reduces LV hypertrophy, has a positive effect on the lipid, carbohydrates profile and reduces cardiovascular risk.

Risk of Developing Type 2 Diabetes According to Blood Pressure Levels and Presence or Absence of Hypertensive Treatment: The SAKU Study

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Objective: To investigate the risk of developing type 2 diabetes according to blood pressure (BP) levels and presence or absence of hypertensive treatment.

Design and method: Methods: This 5-year cohort study comprised 3,508 Japanese adults aged 30–74 years without diabetes who had undergone a medical checkup including a 75-g oral glucose tolerance test between April 2008 and March 2009 at Saku Central Hospital. Participants receiving antihypertensive treatment were categorized into controlled hypertension (<140/90 mmHg) or uncontrolled hypertension (≥140/90 mmHg or higher). Participants not receiving antihypertensive treatment were categorized according to the definition of the Japan Society of Hypertension: optimal BP (<120/80 mmHg), normal BP (120–129/80–84 mmHg), high-normal BP (130–139/85–89 mmHg), grade 1 hypertension (140–159/90–99 mmHg) and grade II/III hypertension (≥160/100 mmHg or higher). Hazard ratios (HRs) and 95% confidence intervals (CIs) for the incidence of type 2 diabetes as defined by the 75-g oral glucose tolerance test were estimated using multivariable-adjusted Cox proportional hazard models in reference to optimal BP.

Results: During the follow-up, 295 participants developed type 2 diabetes. Those with high-normal BP grade I hypertension, grade II/III hypertension and uncontrolled hypertension were at significantly higher risk for developing type 2 diabetes, with HRs (95% CIs) of 1.53 (1.03–2.29), 1.53 (1.02–2.32), 2.19 (1.01–4.77) and 1.81 (1.10–2.99), respectively.

Conclusions: Conclusion: Compared with those with optimal BP, individuals with BP 130/85 mmHg or higher not receiving antihypertensive treatment and uncontrolled hypertensives with BP 140/90 mmHg or higher receiving antihypertensive treatment were at a significantly higher risk for developing type 2 diabetes.

The Influence of Prehypertension, Hypertension and HbA1c on the Development of Type 2 Diabetes Mellitus in Prediabetes: The Korean Genome and Epidemiology Study (KOGES)

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Objective: It has been reported that elevated blood pressure (BP) was significantly associated with the increased risk for type 2 diabetes mellitus (T2DM). However, there is still limited information about the influence of BP on the risk for T2DM across the level of glycated hemoglobin (HbA1c).

Design and method: In a cohort of the Korean Genome and Epidemiology Study (KOGES), 2,830 non-diabetic Korean adults with prediabetes defined by HbA1c level of 5.7 - 6.4% were followed-up for 10 years. Multivariate cox proportional hazards assumption was used to assess the risk for T2DM according to the baseline BP categories (normal, prehypertension and hypertension) and HbA1c level (low: 5.7 - 5.9% and high: 6.0 - 6.4%).

Results: The risk for T2DM significantly increased proportionally to BP categories (adjusted Hazard Ratio (HR); reference in normal BP, 1.32 [1.10 – 1.59] in prehypertension and 1.61 [1.35 – 1.92] in hypertension). Subgroup analysis indicated that individuals with high HbA1c had the higher risk for T2DM than individuals with low HbA1c regardless of BP. Additionally, combined presence of hypertension and high HbA1c had the highest risk for T2DM (adjusted HR: 3.82 [3.00 - 4.87]). In each systolic and diastolic BP level, the risk for T2DM significantly increased from systolic BP > 130 mmHg (adjusted HRs: 1.39 [1.15 – 1.71]) and diastolic BP > 80 mmHg (adjusted HRs: 1.30 [1.07 – 1.55]).

Conclusions: BP and HbA1c may be useful tools in identifying individuals with prediabetes more potentially predisposed to T2DM. Prospective studies should be considered to examine whether controlling BP actually lowers the risk for T2DM.

Association of Vitamin D with the Components of the Metabolic Syndrome in General Population without Cardiovascular Diseases. EVA Study

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Objective: To examine whether controlling BP actually lowers the risk for T2DM across the level of glycated hemoglobin (HbA1c).
Influence of metabolic syndrome on renal function in patients with hypertension

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Objective: Metabolic syndrome (MetS) is a condition linking insulin resistance, dyslipidemia, hyperglycemia, and hypertension that increases the risk of developing diabetes, cardiovascular disease, and subsequent cardiovascular morbidity and mortality. Hypertension is the key component of the metabolic syndrome. Aim of this study to estimate the impact of MetS on renal function in patients with hypertension.

Design and method: 312 hypertensive patients without history of chronic kidney disease (CKD) or cardiovascular disease at baseline were analyzed. Participants were categorized into two groups based on the presence of MetS at baseline. Group-1, 218 patients with MetS and Group-2, 94 hypertensives without MetS. Mean age of the patients was 52.4 ± 12.4 years, male:female. Incident CKD was defined as eGFR < 90 ml/min per 1.73 m^2 over 3 years. Metabolic syndrome was diagnosed according to the “Harmonized definition of the MetS”.

Results: During the 3-year follow-up period, CKD developed in 27 subjects (12.5%) in the Group-1 and in 7 subjects (7.5%) in the Group-2. Compared to subjects without MetS, the odds ratio (OR; 95% confidence interval, CI) of incident CKD in those with MetS was 1.29 (1.09–1.52) after controlling for confounding factors. The risk of decline of eGFR was also higher in hypertensive patients with MetS than those without MetS (OR: 1.14, 95% CI: 1.02–1.27).

Conclusions: Metabolic syndrome is the risk factor for the development of CKD and patients with MetS should be treated more aggressively with renoprotective drugs.

Empagliflozin may attenuate adipose tissue inflammation and arterial stiffness in normotensive type 2 diabetics

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Objective: Adipose tissue inflammation impairs arterial compliance at early stages of type 2 diabetes mellitus (T2DM). We aimed to assess the impact of empagliflozin, as compared to sitagliptin, on arterial stiffness and serum adiponectin (ADPN), an adipocytokine with insulin-sensitizing, anti-inflammatory and anti-atherogenic properties, in normotensive patients with T2DM.

Design and method: In this 24-week, randomized, open, parallel-group, controlled trial, 106 Caucasian normotensive T2DM subjects, inadequately controlled on metformin monotherapy (at least 1700 mg daily), were randomly assigned to receive 25 mg empagliflozin (n = 54) or 100 mg sitagliptin (n = 52) orally once daily. Arterial stiffness was assessed by carotid-femoral pulse wave velocity (PWV) measured via Complior (Artech Medical), whereas a sandwich enzyme-linked immunosorbent assay was employed for ADPN measurement. Office blood pressure (BP) was measured using a validated automated sphygmomanometer (Omron 705IT). Three measurements were taken at a 1-minute interval and were averaged for a single systolic/diastolic BP value.

Results: In the entire study population, mean age was 50.4 years, diabetes duration 6.1 years, baseline HbA1C 7.7%, fasting plasma glucose [FPG] 159 mg/dl, body mass index 30.2 ± 4.1 kg/m², systolic/diastolic BP 132/82 mmHg, glomerular filtration rate 89.9 ml/min/1.73m², PWV 13.0 ± 2.1 m/s and ADPN 6.0 ± 1.8 mg/ml at baseline. After 24 weeks significant changes were observed in HbA1c and FPG with both empagliflozin (~0.72% and ~25.3 mg/dl, respectively) and sitagliptin (~0.70% and ~23.2 mg/dl, respectively; p < 0.001 for all comparisons, between-group differences being non-significant), whereas hypo-glycemia rates were comparable (2.1% with empagliflozin and 1.9% with sitagliptin; p = 0.494). BP values decreased with empagliflozin (~4.9 ± 0.9 mmHg [p = 0.05] systolic /–2.4 ± 0.4 mmHg [p = 0.05] diastolic), but not with sitagliptin (~1.3 ± 1.0 mmHg [p = 0.672] systolic /–0.1 ± 0.5 mmHg [p = 0.848] diastolic). Body weight declined by 3.8 kg (p < 0.001) with empagliflozin and 0.5 kg (p = 0.082) with sitagliptin (p < 0.001 for between-group difference). PWV decreased (~3.1 ± 0.3 mmHg [p < 0.001] with empagliflozin and ~1.6 ± 0.4 mmHg [p < 0.05] with sitagliptin) and ADPN increased (~3.3 ± 0.9 [p < 0.001] with empagliflozin and 1.3 ± 0.3 mg/ml [p < 0.01] with sitagliptin), the differences being greater with empagliflozin (p < 0.01 for both comparisons).

Conclusions: Addition of empagliflozin to metformin may attenuate adipose tissue inflammation and arterial stiffness to a greater extent than sitagliptin in normotensive patients with T2DM.

Estradiol and leptin overexpression have independent modes of action on decreased food intake and body weight in males rats

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Objective: We recently reported that male compared with female rats are less responsive to long-term central leptin overexpression, as assessed by decreased food intake and delta body weight. Moreover, males were more susceptible to development of leptin resistance than females suggesting that either male hormones mitigate or female hormones exacerbate leptin responses or both. To address the potential role of estradiol, we examined the treatment of leptin with or without estradiol on body weight parameters in male rats.

Design and method: To this end, we centrally delivered a viral vector to overexpress either leptin or green fluorescence protein (GFP) into male rats that were simultaneously treated with either estradiol (25 mg/kg, S.C., daily) or vehicle in a two x two design. We examined chronic changes in food intake (FI), BW, and body composition over 26 days.

Results: BWs in both Leptin-vehicle and GFP-Estradiol were reduced compared with GFP-vehicle but more sustained in Leptin-Estradiol reminiscent of the pattern in females. Changes in FI were unique to each treatment, with a rapid decrease in Leptin-vehicle followed by gradual renormalization typical of the pattern in females. Changes in BW were unique to each treatment, with a decrease in FI & BW, with the pattern of Leptin-Estradiol reminiscent of that observed in females. Furthermore, the estradiol-induced decrease in FI & BW does not involve P-STAT3. These data suggest that estradiol may be one factor in the increased leptin response and the mitigated leptin resistance observed in female rats.

Estradiol and leptin overexpression have independent modes of action on decreased food intake and body weight in males rats

ESTRADIOL AND LEPTIN OVEREXPRESSION HAVE INDEPENDENT MODES OF ACTION ON DECREASED FOOD INTAKE AND BODY WEIGHT IN MALES RATS

P. Scarpice, I. Côté, S. Green, D. Morgan, C. Carter, N. Tümer. University of Florida, Gainesville, FL, USA

Objective: We recently reported that male compared with female rats are less responsive to long-term central leptin overexpression, as assessed by decreased food intake and delta body weight. Moreover, males were more susceptible to development of leptin resistance than females suggesting that either male hormones mitigate or female hormones exacerbate leptin responses or both. To address the potential role of estradiol, we examined the treatment of leptin with or without estradiol on body weight parameters in male rats.

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Results: BWs in both Leptin-vehicle and GFP-Estradiol were reduced compared with GFP-vehicle but more sustained in Leptin-Estradiol reminiscent of the pattern in females. Changes in FI were unique to each treatment, with a rapid decrease in Leptin-vehicle followed by gradual renormalization typical of leptin-induced leptin resistance. In contrast, the GFP-Estradiol decrease in FI was of lower amplitude (P = 0.001) but sustained over the 26 days (P = 0.003). The Leptin-Estradiol group was mostly additive but with a delay in leptin resistance typical of the pattern observed in female rats. Decreased body fat by TD-NMR was unique to each treatment paralleling FI. Phosphorylation of STAT3 (P-STAT3) was examined at death. No exogenous leptin was administered, thus detected P-STAT3 was due to central overexpressed leptin. P-STAT3 was greater in both leptin groups compared with GFP, but there was no difference between Leptin-vehicle and Leptin-Estradiol.

Conclusions: In conclusion, these data suggest that leptin and estradiol both decreased FI and BW, with the pattern of Leptin-Estradiol reminiscent of that observed in females. Furthermore, the estradiol-induced decrease in FI & BW does not involve P-STAT3. These data suggest that estradiol may be one factor in the increased leptin response and the mitigated leptin resistance observed in female rats.
Effects of Losartan and Metformin on Vascular Prostanoids Release in Rats in a High-Fat Diet

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Objective: High-fat diet in rats is an experimental model that resembles human metabolic syndrome (MS). This multifactorial alteration is related to hypertension. Metformin (Mf, antidiabetic drug used in type 2 diabetes and MS treatment); and losartan (L, an angiotensin 1 receptor antagonist) play an important role in the regulation of vascular tone. Prostanoids (PR) are endogenous substances derived from arachidonic acid via cyclooxygenases with vasoactive effects. The aim of this study was to analyze the effects of Mf and L on prostanoids (PR) release by the mesenteric vascular bed (MVB).

Design and method: Six groups (n = 6) of male Sprague-Dawley rats were studied during 8 weeks: Control (C), standard diet (SD) and tap water (W) to drink; HF diet (HF), 50% (w/w) bovine fat added to SD and W; C + Mf (CMI), SD + 500 mg/Kg/day Mf in W; C + L (CL), SD + 30 mg/Kg/day L in W; HF + Mf (HFMf) 500 mg/Kg/day Mf in W; HF + L (HFL) 30 mg/Kg/day L in W. MVBs were removed and incubated and the released PR measured by HPLC. Adiposity index is calculated by: body weight/MVB weight x 100.

Results: HF diet increased systolic BP (SBP, mmHg): HF: 145 ± 5 vs. C: 118 ± 2, p < 0.01); MVB adiposity index (%): HF: 1.7 ± 0.1 vs. C: 0.9 ± 0.04, p < 0.01); and the release of vasoconstrictor PR thromboxane (TX) B2, stable metabolite of TXA2, (ng PR/mg of tissue, HF: 117 ± 6 vs. C: 66 ± 2, p < 0.001); and prostaglandin (PG) E2 PGE2 (ng/mg: HF: 153 ± 9 vs C: 88 ± 3, p < 0.001). In HFM and HFL groups, M and L treatment prevented the increased SBP of HF diet (HF: 127 ± 2, HFL: 111 ± 3 vs. HF, p < 0.001 and p < 0.01), TXB2 release (ng PR/mg of tissue, HF: 65 ± 12, HFL: 66 ± 7 vs. HF, p < 0.05 and p < 0.01); and PGE2 PGE2 (ng PR/mg of tissue, HF: 99 ± 13, HFL: 90 ± 7 vs. HF, p < 0.01 and p < 0.05). Meanwhile Mf also prevented the increase of MVB adiposity index (%: HFM: 1.3 ± 0.2 vs. HF, p < 0.05).

Conclusions: Treatments with Mf and L could exert beneficial effects on the vascular system improving endothelial dysfunction by preventing the increase of vasoconstrictor PR in MVB. In addition, Mf prevents adiposity increase.

Utility of Waist-to-Height Ratio as an Indicator of Cardiac-Metabolic Risk Compared with Routinely Used Adiposity Indices

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Objective: The tools used to identify obesity, a common risk factor for hypertension and other cardiac-metabolic abnormalities, are not always optimal in all populations; therefore, the utility of other instruments are constantly being assessed. This study aims to compare the utility of waist-to-height ratio (WHtR) with commonly used adiposity indices of body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR) with many cardio-metabolic components, particularly in men, and the stronger association of raised WHtR with hypertension, hypercholesterolaemia and raised LDL-C supports the utility of WHtR in routine assessments of adiposity in this population, which may improve the identification of cardiac-metabolic risk in black South Africans.

Combined Therapy with Telmisartan and Amldipine on Blood Pressure, Echocardiographic Parameters and Microalbuminuria in Patients with Metabolic Syndrome

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Objective: Patients with hypertension (H) with metabolic syndrome (MS) have a high risk of cardiovascular events. The aim of the study was to assess the effects of combination therapy with Telmisartan (L) and Amlodipine (A) on BP, left ventricular (LV) hypertrophy, LV diastolic function, and microalbuminuria in patients with hypertension and MS.

Design and method: Sixty four patients with moderate to severe hypertension and metabolic syndrome were provided to T (80 mg) + A (5 mg) in combination once a day (31 males and 33 females). The presence of metabolic syndrome was diagnosed by “Harmonized” Metabolic Syndrome definition. Anthropometric, laboratory and instrumental measurements was performed at baseline and after 12 weeks of therapy. Statistical comparisons were performed by 2 tailed Student’s t test for quantitative parameters.

Results: All patients completed the study without showing intolerance or side effects to the drugs. At the end of the study therapy normalized BP (from 178.26 ± 9.1/109.3 ± 7.2 mmHg to 127.6 ± 6.2/90.2 ± 4.8 mmHg, p < 0.01) in 95.3 % of patients. LV mass index reduced from 162.0 ± 9.4 to 137.8 ± 5.0 g/m2, (p < 0.01) in 79.7 % of patients. At the end of the study E/A ratio increased from 0.87 ± 0.04 to 1.42 ± 0.05 (p < 0.01) in 82.8 % of patients. IVRT has been decreased from 108.4 ± 8.5 to 77.3 ± 5.2 msec (p < 0.01) in 81.2% of patients. Deceleration time passed from 170.6 ± 7.2 to 134.1 ± 6.0 msec (p < 0.05) in 78.1% of patients. Microalbuminuria decreased from 56.6 ± 12.5 to 35.4 ± 10.6 mg/l (P < 0.05) in 84.3 % of patients.

Conclusions: These data suggest significant antihypertensive and nephroprotective efficacy of the combination of T 80 mg + A 5 mg. Combination therapy with T + A has been demonstrated positive effect on the echocardiographic indexes of the heart by reducing LV hypertrophy and improving LV diastolic function, and renal function by reducing albuminuria in patients with moderate to severe hypertension and metabolic syndrome.

Chemerin in Extremely Obese Hypertensive and Non-Hypertensive Patients after Bariatric Surgery

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Objective: Extreme obesity is associated with subclinical inflammation, which is important for development of several obesity-associated complications. Increased level of chemerin protein in obesity may influence on inflammatory cascades. The objective of the study was to assess changes of chemerin levels after bariatric surgery among hypertensive and normotensive subjects.

Design and method: Study population consisted of patients with severe obesity who met the eligibility criteria and underwent bariatric surgery (sleeve gastrectomy and Roux-en-Y gastric bypass). Body mass index (BMI), ambulatory blood pressure (SpaceLab 90207), and laboratory investigations (glucose, cholesterol, leptin, adiponectin, insulin, chemerin, hsCRP) were measured before and six months after bariatric surgery. Data were analyzed in two groups: I—patients with diagnosis of hypertension and II—normotensive subjects.

Results: Data from 49 patients (mean age 41.0 ± 12.0 years, 40% men) were analyzed. Hypertensives (n = 30) were older (44.4 ± 11.4 vs 36.8 ± 11.8 years, p = 0.02), presented higher values of systolic blood pressure (SBP, 124.8 ± 12.2 vs 118.0 ± 8.7 mmHg, p = 0.02) and insulin levels (40.7 ± 15.0 vs 31.2 ± 13.9 mIU/ ml, p = 0.01), but lower levels of adiponectin (3461 ± 1728 vs 4605 ± 2328ng/ ml, p = 0.04) than normotensives. However, initial values of BMI, diastolic BP and other laboratory parameters were similar in both groups. BMI diminished similarly in both groups after surgery. SBP decreased in both groups but remained low high-density lipoprotein cholesterol (OR 2.84, 95%CI: 1.90–4.26) and hyperglycemiaemia (OR 3.60, 95%CI: 2.03–6.40).

Conclusions: Compared with other adiposity indices, the better correlation of WHtR with many cardiac-metabolic components, particularly in men, and the stronger association of raised WHtR with hypertension, hypercholesterolaemia and raised LDL-C supports the utility of WHtR in routine assessments of adiposity in this population, which may improve the identification of cardiac-metabolic risk in black South Africans.
significantly higher in hypertensives. Chemerin levels decreased significantly in both groups, but hsCRP diminished only in the normotensive group. Adiponectin and insulin levels were similar in both groups after surgery.

Conclusions: Modulation of immunity after bariatric surgery changes in different ways in hypertensive and non-hypertensive obese patients.

RELATIONSHIP BETWEEN OBSTRUCTIVE SLEEP APNEA AND ERECTILE DYSFUNCTION IN PATIENTS WITH ARTERIAL HYPERTENSION

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Objective: The aim of our study was to determine the impact of obstructive sleep apnea (OSA) on erectile dysfunction (ED) in patients with arterial hypertension (AH). Currently, ED is evaluated as a predictor of cardiovascular diseases.

Results: Statistical analysis showed no correlation between the severity of ED according to IIEF-5 and IPD (r = .42, p = .07), as well as no correlation has been shown between the severity of OSA and ED by IIEF-5 (r = .20, p = .10). Patients who underwent IPD had mean AH 25.6 ± 18.1; mean ODI 21.6 ± 20.8; mean SBP was 146.4 ± 12.1 mm Hg and mean DBP 8.6 ± 8.7 mm Hg. We found statistically significant correlation between parameters of OSA and severity of ED, such as apnea/hypopnea index (AHI) and Er 0–5, PSV and RI (r = −.50, p = .02; r = −.52, p = .02; r = −.67, p = .0009 respectively); oxygen desaturation index (ODI) with PSV and RI (r = −.61, p = .003; r = −.60, p = .003 respectively). A statistically significant correlation between the quality of penile blood flow and the systolic blood pressure (SBP) was revealed too (r = .49, p = .02; r = −.52, p = .02; r = −.67, p = .0009 respectively); oxygen desaturation index (ODI) with PSV and RI (r = −.61, p = .003; r = −.60, p = .003 respectively). Adiponectin and insulin levels were similar in both groups, but hsCRP diminished only in the normotensive group. Adiponectin and insulin levels were similar in both groups after surgery.

Conclusions: There is a significant correlation between the level of SBP, the severity of OSA and ED according to objective method of its evaluation.

PREVALENCE OF ABDOMINAL OBESITY IN RUSSIAN FEDERATION AND ITS RELATIONSHIP WITH ARTERIAL HYPERTENSION AND OTHERS COMORBIDITIES. BY THE DATA OF EPIDEMIOLOGICAL STUDY ESSE-RF

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Objective: Data from cross-sectional epidemiological study ESSE-RF (Epidemiology of Cardiovascular Diseases and their Risk Factors in Regions of Russian Federation) of 21817 adults 25–64 y.o. stratified by age and sex from 12 regions RF (females - 13483, males - 8334). Final analysis included 20817 (average age 49 ± 11.62, females – 64.77%, males – 35.23%).

Design and methods: We used the systematic stratified multistage random sampling creating by the territorial principle of method by Kesh. Abdominal obesity (AO) was defined by cut-off of > 80 cm in women and > 94 cm in men. General obesity criterion was taken like BMI > 30.0 kg/m2. Data related to regions, co-morbidity, socio-economic status, general health assessment, stress influence, education, pernicious habits, physical activity. Calculation was done with software STATISTICA 10.0, SPSS 14.0

Results: AO prevalence in RF was 55.02% (women – 61.83%; men – 44.0 %). The proportion BMI obesity was significantly lower in all regions (Tab.1). The number of people with AO increased with age, both among men and women (p = 0.0001). There were a significant relationship of AO with following diseases (p < 0.0001 for all): arterial hypertension–64.4%, angiina pectoris–15.18%, myocardial infarction–2.94%, stroke–2.97%, osteochondrosis–23.43%, pathology of the gastrointestinal tract–42.1%, ulcer of stomach and/or duodenal–13.63%, chronic bronchitis–18.54%, bronchial asthma–3.92%, rheumatoid arthritis–8.74%, cardiac rhythm disturbances–24.22%, kidney diseases–22.88%, thyroid diseases–15.91%, oncological diseases–4.22%, diabetes–7.43% (types 1 & 2). The number with AO were greater in poor/very poor families and in groups individuals with secondary special education and below (p = 0.0001 for all). Persons with AO were more likely to notice the influence of obesity, low physical activity, nutrition, stress on their health (p = 0.0001 for all). People without obesity smoked more often (p < 0.0001). We didn’t find close relationship between obesity and alcohol consumption.

Conclusions: Study results showed high prevalence of women abdominal obesity in all regions of RF. In most cases, their socioeconomic status was worse, they had comorbidities more often than people without of obesity. The prevalence of abdominal obesity was rather higher than obesity by BMI and people with abdominal obesity need more attention.

IMPAKT OF OBESITY ON THE EFFECTIVENESS OF TREATMENT WITH A SINGLE-PILLS COMBINATION OF PERINDOPRIL ARGININE/INDAPAMIDE. DATA ANALYSIS OF THE RUSSIAN PROGRAM, FORSAGE

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Objective: Efficacy of a single-pill combination of perindopril arginine/indapamide (Per/Ind) at full dose (10 mg/2.5 mg) in patients with arterial hypertension, depending on the initial body mass index (BMI).

Design and methods: 1963 treated, uncontrolled hypertensive patients from the FORSAGE study (29 cities of the Russian Federation). These patients were divided into three groups according to their baseline BMI: 1) Normal BMI < 25 kg/m2 (16.6% of patients), 2) Overweight with 25 < BMI < 30 kg/m2 (48.7%) and 3) Obese with BMI > 30 kg/m2 (34.7%); they were switched from a previously ineffective combined bi-therapy to Per/Ind single-pill combination at full dose (10 mg/2.5 mg). The use of beta-blockers in case of concomitant CAD was authorized. Patient evaluation was performed at 2 weeks, 1 month, and 3 months.

Results: Patients (mean age 59–60 y) were mainly women (64%). Most of them had a history of heart failure (75%) and 26% had angina pectoris. Patients who were overweight (59% women) or obese (72% women) presented with higher baseline values of total cholesterol and creatinine and had a decreased glomerular filtration rate, especially in the group with BMI > 30 kg/m2. Left ventricular hypertrophy (85%), diabetes mellitus (22%), stress angina (31%), heart failure **hypertension**
Conclusions: Switching from a previously ineffective anti-hypertensive therapy to a single-pill combination of perindopril arginine/indapamide at full doses significantly decreased BP and resulted in high rates of target BP achievement in all BMI groups, including in more than 70% of obese patients, usually the most difficult to control with more co-morbidities and risk factors.

POTENTIAL RELATION BETWEEN SERUM LIPOPOLYSACCHARIDE BINDING PROTEIN LEVELS AND NOCTURNAL BLOOD PRESSURE VARIABILITY IN MIDDLE AGED HYPERTENSIVE MALES

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Objective: Stability of the nocturnal arterial pressure is markedly affected by normal sleep with differential autonomic regulation during the different sleep stages. Nevertheless, the mechanism behind the association of sleep disruption and nocturnal blood pressure variability is still unknown in hypertensive population. Lipopolysaccharide binding protein (LBP) has been applied as a surrogate biomarker for gut-intestinal permeability in clinical, and may disrupt sleep architecture and balance of parasympathetic and sympathetic activity in human. A significant correlation was observed between 1) serum LBP levels and nocturnal systolic and diastolic BPV and nocturnal mean arterial pressure CV; 2) serum LBP levels and nocturnal systolic and diastolic BPV and mean arterial pressure CV and remained significant even after adjusting for age, BMI, AH, and mean BP.

Results: Hypertensive males with higher serum LBP showed significantly higher inflammatory status as assessed by IL-1β, and significantly prolonged sleep stage 1 than did those with lower LBP. Hypertensive males with higher circulating LBP levels showed significantly higher 24-h mean arterial pressure CV, and nocturnal SBP/SD, DBP/SD, mean arterial pressure SD, SBP/VC, DBP/VC and nocturnal mean arterial pressure CV compared with those with lower circulating LBP levels. Subjects with prolonged N1% also showed similar results while compared to their counterparts. A significant correlation was observed between 1) serum LBP levels and nocturnal systolic and diastolic BPV and nocturnal mean arterial pressure SD; 2) serum LBP levels and nocturnal systolic and diastolic BPV and mean arterial pressure CV, and remained significant even after adjusting for age, AH, BMI and mean BP.

Conclusions: Increased serum LBP, prolonging N1%, might aggravate nocturnal BPV. Elevation in serum LBP might a potential predictor for nocturnal BPV in this middle-aged hypertensive males.

Table 1: Blood pressure changes in patients treated with a single-pill combination of perindopril (20 mg) plus indapamide (2.5 mg) by body mass index.

<table>
<thead>
<tr>
<th>Patient groups</th>
<th>-25 kg/m²</th>
<th>25-30 kg/m²</th>
<th>P1</th>
<th>≥30 kg/m²</th>
<th>P2</th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP ± SD at baseline (mmHg)</td>
<td>118.1±0.1</td>
<td>149.0±0.3</td>
<td>0.0009</td>
<td>171.2±4.3</td>
<td>0.0009</td>
<td>0.0001</td>
</tr>
<tr>
<td>DBP ± SD at baseline (mmHg)</td>
<td>75.3±0.3</td>
<td>96.3±0.2</td>
<td>0.0256</td>
<td>98.6±0.2</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>SBP ± SD at 3 months (mmHg)</td>
<td>128.0±0.3</td>
<td>130.0±0.3</td>
<td>0.0233</td>
<td>131.0±0.3</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>DBP ± SD at 3 months (mmHg)</td>
<td>75.6±0.3</td>
<td>76.6±0.3</td>
<td>0.0257</td>
<td>80.6±0.3</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>SBP/DBP decrease in 3 months (%)</td>
<td>39.7±18.8</td>
<td>39.8±18.8</td>
<td>0.8359</td>
<td>39.4±18.7</td>
<td>0.8301</td>
<td>0.8301</td>
</tr>
</tbody>
</table>

Due to analyzer differences, significant differences were found in the number of patients with N1% for the groups with BMI ≤ 25 (n = 35) and BMI ≥ 25 (n = 40). A significant correlation was observed between 1) serum LBP levels and nocturnal systolic and diastolic BPV and nocturnal mean arterial pressure SD; 2) serum LBP levels and nocturnal systolic and diastolic BPV and mean arterial pressure CV and remained significant even after adjusting for age, AH, BMI and mean BP.

Conclusions: Increased serum LBP, prolonging N1%, might aggravate nocturnal BPV. Elevation in serum LBP might a potential predictor for nocturnal BPV in this middle-aged hypertensive males.

INCREASED EPICARDIAL ADIPOSE TISSUE AND ARTERIAL STIFFNESS, USING CARDIO-ANKLE VASCULAR INDEX IN SLEEP APNOEA

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Objective: OBJECTIVES: To clarify the relationships between severity of obstructive sleep apnea (OSA) and epicardial adipose tissue (EAT), in addition to discusses for arterial stiffness shown by cardio-ankle vascular index (CAVI).

Design and method: Consecutive 110 Japanese patients with obstructive sleep apnea who had CAVI test and computed tomography (CT) were included in this study. EAT, visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) were measured and assessed for severity of OSA.

Results: Neither the body mass index nor SAT showed any co-relation with severity of OSA. But there were significant positive co-relation between severity of OSA and VAT or EAT (r = 0.17 p < 0.05, r = 0.18 p < 0.05 respectively). In addition, severity of OSA and EAT were selected as contributing factor for CAVI.

Conclusions: These data suggested that OSA could be induced by visceral obesity. OSA could be invasive factor for arterial stiffness. EAT may have increased through visceral obesity, intermitted hypoxia and reoxygenation and increasing afterload such as arterial stiffness shown by CAVI. Suitable diet and sleep apnea treatment could be effective to reduce cardiac pericardial fat.
POSTER SESSION

POSTERS' SESSION P809:

CEREBROVASCULAR DISEASE

COGNITIVE DYSFUNCTION IN UNTREATED MIDDLE-AGED PATIENTS WITH UNCOMPROMICATED GRADE 1-2 ESSENTIAL ARTERIAL HYPERTENSION

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Objective: Hypertension is a risk factor for mild cognitive deterioration and vascular dementia. In recent years, neuropsychology has recognized the impact of vascular pathology on cognitive function, as well as the importance of early detection and prevention. The purpose of the present study was to identify the effect of vascular pathology—and more specifically, hypertension—on cognition in untreated middle-aged patients with uncomplicated grade 1–2 essential arterial hypertension compared to normotensive controls.

Design and method: 50 healthy volunteers (17 men, mean age 47.3 ± 5.5 years) and 103 hypertensive patients (46 men, mean age 51.2 ± 5.2 years) were recruited. All subjects underwent 24-hours blood pressure monitoring. Neuropsychological assessment included Montreal Cognitive Assessment (MoCA), Trail Making test (part A and part B), Stroop Color and Word Test, verbal fluency test, 10-item word list learning task.

Results: Hypertensive patients had lower mean MoCA score (28.4 ± 1.4 points vs 28.9 ± 1.3 points, p = 0.02), worse performance in TMT B (119.4 ± 42.5 vs 105.5 ± 31.4, p = 0.03) and higher TMT difference score (80.7 ± 42.5 vs 62.9 ± 27.9; p = 0.002), compared to controls. Significant correlations were found between mean nighttime pulse pressure and TMT B – TMT A score (r = 0.261; p < 0.01).

Conclusions: Untreated middle-aged patients with uncomplicated grade 1-2 essential arterial hypertension have worse task switching, compared to normotensive controls.

REDUCED WHITE MATTER INTEGRITY AND CEREBRAL BLOOD PERFUSION AS POSSIBLE NEW EARLY MARKERS OF BRAIN DAMAGE IN PATIENTS WITH ESSENTIAL ARTERIAL HYPERTENSION

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Objective: New markers of brain damage (apart from white matter hyperintensities (WMH)) must be found to optimize the patient management. Arterial spin labeling (ASL), a noninvasive perfusion sequence, allows to detect changes in cerebral blood flow (CBF) in the early stages of the disease. Diffusion tensor imaging (DTI) has been proposed as a marker of cerebral small vessel disease. The aim of this study was to examine whether the fractional anisotropy (FA) and CBF values changed in untreated middle-aged patients with uncomplicated grade 1–2 essential arterial hypertension compared to controls.

Design and method: 41 healthy volunteers (15 men, mean age 46.2 ± 4.6 years) and 41 untreated hypertensive patients (18 men, mean age 50.3 ± 6.7 years) were recruited. All subjects underwent brain MRI (MAGNETOM Skyra 3.0T, Siemens AG, Germany). Fazekas scale was used to quantify the amount of WMH. ASL CBF maps were used to calculate the perfusion defects. FA was used as a DTI index. Regions of interest included splenium and genu of corpus callosum, inferior frontal gyrus, cingulum, insula, corona radiata, optic radiation.

Results: WMH were found in 4 healthy controls (9.7%, Fazekas 1) and in 22 hypertensive patients (53.7%, Fazekas 1 in 20 patients (48.8%) and Fazekas 2 in 2 patients (4.9%), p = 0.0005). Hypertensive patients had lower CBF in the cortical plate of both frontal lobes of the brain (37.3 ± 6.7 vs 45.3 ± 3.5 ml/100 g/min; 38.0 ± 6.2 vs 45.8 ± 3.2 ml/100 g/min, p < 0.0001). Hypertensive patients with and without WMH had lower CBF compared to controls (p < 0.0001). Hypertensive patients had lower FA in splenium of corpus callosum (p = 0.003) and left inferior frontal gyrus (p = 0.003). Hypertensive patients with WMH had lower FA in left inferior frontal gyrus (p = 0.01), genu of corpus callosum (p = 0.04), left lentiform nucleus (p = 0.02). Hypertensive patients without WMH had lower FA in left inferior frontal gyrus (p = 0.001) and splenium of corpus callosum (p = 0.04).

Conclusions: FA and CBF can be used as early markers of brain damage in patients with essential arterial hypertension.

STROKE RECURRENCE AND COMPLIANCE TO ANTIHYPERTENSIVE TREATMENT

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Objective: To evaluate whether hypertension awareness and compliance to antihypertensive treatment is associated with less recurrent stroke among stroke patients from an emergency hospital.

Design and method: 595 adult subjects (age range 28–104 years) admitted to the neurology department of an emergency hospital in 2016 with stroke were included. We tested whether hypertension and lack of hypertension awareness were associated with recurrence of stroke, and whether compliance to antihypertensive treatment was less frequent in recurrent stroke patients.

Results: Among those at first stroke (78.82%) 74.84% were hypertensives, with 93.44% awareness rate, but with 85.06% of cases compliant to treatment. Hypertension correlated with stroke recurrence (chi2 = 4.002, RR 1.510 CI95% 0.99–2.299, p = 0.045). Both compliance to antihypertensive treatment and hypertension awareness were more frequent among those with recurrent stroke (Mann Whitney p = 0.001, respectively, p = 0.03). On logistic regression, hypertension was the only predictor of recurrent stroke. For results see table.

<table>
<thead>
<tr>
<th>Variables</th>
<th>P value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial hypertension</td>
<td>0.046</td>
<td>1.692</td>
<td>1.010</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>0.968</td>
<td>0.990</td>
<td>0.616</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>0.528</td>
<td>0.793</td>
<td>0.387</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>0.878</td>
<td>0.967</td>
<td>0.629</td>
</tr>
<tr>
<td>Carotid plaque</td>
<td>0.798</td>
<td>1.057</td>
<td>0.690</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>0.578</td>
<td>0.890</td>
<td>0.591</td>
</tr>
</tbody>
</table>

Conclusions: Stroke, as the most frequent neurologic complication of hypertension, is often followed by recurrence. Our results underline that even awareness and compliance to antihypertensive treatment cannot fully protect from such major events, pointing at the high residual risk patients often carry despite adequate therapy. Often the first to occur in the cardiovascular continuum of disease, hypertension may manifest its effects years before other pathologies ensue, and this may explain its larger influence on cardiovascular events.

HYPERTENSION AND AGEING LEAD TO IMPAIRMENT OF MYOCARDIC VASOMOTOR MECHANISM, HIPPOCAMPAL EXPRESSION OF GENES INVOLVED IN BETA-AMYLOID GENERATION AND COGNITIVE DYSFUNCTION

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Abstracts  e89

cine, University of Oklahoma Health Sc., Oklahoma, USA, 5Reynolds Oklahoma Center on Aging, Donald W Reynolds Department of Geriatric Medicine, University of Oklahoma Health Sc., Oklahoma, USA

Objective: Hypertension in the elderly can lead to dysfunctional autoregulation of cerebral blood flow (CBF), leading to increased risk of stroke and the development of Alzheimer’s disease (AD), but the underlying mechanisms are still unknown. We hypothesized that hypertension and aging synergistically impair the myogenic constractor response of cerebral arteries (CA), known to be involved in the autoregulation of CBF and as a consequence, an altered gene expression in the hippocampus will be observable.

Design and method: Hypertension was induced in young (3 mo) and aged (24 mo) C57BL/6 mice with chronic (4 wk) infusion of angiotensin II and changes in myogenic response and hippocampal mRNA expression of genes involved in amyloid precursor protein (APP)-dependent signaling, APP cleavage, A-beta processing and A-beta-degradation, synaptic function were assessed.

Results: In MCAs from young hypertensive mice, pressure-induced increases in SMC Ca-signal and myogenic tone were increased compared to young and aged controls. Aged hypertensive mice exhibited spatial memory impairments in the Y-maze and impaired performance in the novel object recognition assay. Hypertension in aged mice was associated with changes in hippocampal expression of APP-binding proteins, e.g., [Mint3/amyloid beta A4 precursor protein-binding family A member 3 (APBA3)], Fe65/amyloid beta A4 precursor protein-binding family B member 1 (APBB1)]. amyloid beta (A4) precursor-like protein 1 (APLP1), muscarinic M1 receptor, and serum amyloid P component, all of which may have a role in the pathogenesis of late-onset AD.

Conclusions: Thus functional maladaptation of aged cerebral arteries to hypertension is due to the dysregulation of pressure-induced 20-HETE and TRP channel-mediated SMC calcium signaling, whereas the hippocampal gene expression signature observed in aged hypertensive mice provides important clues for future studies to elucidate the mechanisms by which hypertension may contribute to the pathogenesis of Alzheimer’s disease.

BLOOD PRESSURE REDUCTION AND OUTCOME IN PATIENTS WITH HYPERTENSIVE CRISIS AND ACUTE ISCHEMIC STROKE

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Objective: Antihypertensive treatment and blood pressure (BP) reduction in the acute phase of stroke is controversial. The aim of the study was to analyze the BP dynamics and outcome in treated with antihypertensive medication patients with hypertensive crisis (HC) and acute stroke ischemic (IS)

Design and method: The study included 70 randomly selected in-hospital patients with acute ischemic stroke accompanied by HC at admission (systolic blood pressure /SBP/ > 180 mm Hg and /or diastolic blood pressure /DBP/ > 120 mm Hg). BP values were recorded at admission, 12th hour, third day, and during the acute phase of stroke. Determination of proBNP , urinary albumin excretion, and NT-proBNP were included. Subjects with Rankin  >  2 and patients with history of previous heart failure were excluded. Blood pressure (BP) was measured at admission and during the acute phase of stroke. Determination of proBNP, urinary albumin excretion (UA/E) and echocardiographic study were performed in all subjects. The aortic pulse wave velocity (aPWV) and 24 h brachial and central BP (24h-BP) were measured.

Results: We found MoCA < 26 in 252 patients; mean score: 22.42 ± 4.72, MoCA < 24 in 19.6% (70 patients, mean score: 26.05 ± 3.14). Age negatively correlated with MoCA scores. The cognitive domains impaired by ageing were attention, visuospatial/executive, abstraction, delayed recall and language domains, while orientation and naming remained unaffected in most cases. Patients with former stroke (13.4%) had significantly lower scores in visuospatial/executive, attention, language and orientation domains, while those with atrial fibrillation (22.7%) in language and abstraction (p < 0.05). No significant difference was found in cognitive domains among patients affected or not by peripheral artery disease (11.2%), coronary heart disease (35.3%) and type 2 diabetes (38.7%). Depression was detected in 51.7% (mean BDI-13: 8.01, ± 6.04 points), depressive patients had lower performance compared to nondepressives, especially in visuospatial/executive, attention, language, abstraction and delayed recall domains. A gender related significant difference in the distribution of visuospatial/executive, naming and attention domains was present (p < 0.05). Women had globally lower scores. Obese patients (47.89%) had significantly higher MOCA scores than non-obese patients, presenting better performance in visuospatial/executive and delayed recall domains.

Conclusions: Mild cognitive impairment is common among hypertensive patients. Aging and depression has negative impact on cognitive performances. Women may have greater risk for cognitive decline. Cardio- cerebrovascular diseases may influence different domains of cognitive functions.

DIFFERENCES IN BIOMARKERS LEVELS AND BRACHIAL AND CENTRAL BLOOD PRESSURE DURING THE ACUTE PHASE OF STROKE BETWEEN LACUNAR AND OTHER ISCHEMIC STROKES SUBTYPES


Objective: We aimed to evaluate the differences in biomarker levels and brachial and central blood pressure estimates during the acute and subacute phase of stroke, between lacunar infarcts and other ischemic stroke subtypes.

Design and method: Patients > 18 years old, with a first episode of ischemic stroke, admitted to our institution between July 2015 and July 2017 were consecutively included. Subjects with Rankin > 2 and patients with history of previous heart failure were excluded. Blood pressure (BP) was measured at admission and during the acute phase of stroke. Determination of proBNP, urinary albumin excretion (UAE) and an echocardiographic study were performed in all subjects. The aortic pulse wave velocity (aPWV) and 24 h brachial and central BP (24h-ABPM) were measured by means of Mobil-O-Graph device during the subacute phase of stroke.

Results: 71 subjects with a first episode of ischemic stroke were included, mean age: 64.7± 13.9 years, 62% men: 22 lacunar stroke (31%), and 49 cases (69%) with non lacunar ischemic stroke. The levels of proBNP were significantly lower in patients with lacunar stroke as compared as atherothrombotic and cardioembolic stroke (medians: 36, 277 and 274 pg/mL, respectively, p = 0.009). After adjusting for age, patients with lacunar stroke had significantly higher levels of BP in the emergency department: systolic BP 173 ± 37 vs 153 ± 28 mm Hg respectively; p = 0.006, diastolic BP: 97 ± 21 vs 86 ± 16 mm Hg; p = 0.035, and during
the acute phase of stroke - systolic BP: 142 ± 19 vs 128 ± 16 mm Hg; \( p = 0.002 \); diastolic BP: 79 ± 12 and 73 ± 12 mm Hg respectively; \( p = 0.025 \).

Regarding 24-h ABPM, patients with lacunar stroke showed higher values of day-time pulse pressure, day-time brachial systolic BP, day-time brachial diastolic BP and central BP estimates, after adjusting for age. No significant differences were observed in target organ damage between the different ischemic stroke subtypes.

**Conclusions:** Patients with a first episode of lacunar stroke had lower levels of proBNP and higher BP levels during acute and subacute phase of stroke, suggesting a closer relationship with hypertension.

**EFFECT OF VERAPAMIL SUSTAINED RELEASE ON CEREBROVASCULAR REACTIVITY IN HYPERTENSIVE PATIENTS WITH RHEUMATOID ARTHRITIS**

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**Objective:** To investigate the effect of verapamil sustained release (SR) on cerebrovascular reactivity (CVR) in patients with hypertension (HT) and rheumatoid arthritis (RA).

**Design and method:** The study comprised 30 patients with HT of grade 1–2 and RA, aged 59.7 ± 9.1 years. All patients were treated with 120 mg or 240 mg verapamil SR for 24 weeks. Ambulatory 24-hour blood pressure (BP) monitoring and evaluation of CVR were performed twice: initially and at the end of the study. CVR was evaluated using transcranial Doppler ultrasound of the middle cerebral arteries (MCA) in the hyperoxia and hypercapnia tests. We measured MCA time average maximal blood flow velocity (TAMX), peak systolic velocity (Vps) at baseline, during 2 min inhalation of oxygen (O2) and during 3 min recovery phase. The hypercapnia test was carried out according to the same protocol with inhalation of the 4% mixture of carbonic gas with air (CO2). We used three parameters for CVR evaluation: index changes of flow velocity mean (IFVm), speed modification of velocity (SMFVm) and index of recovery for velocity (IR-Vmrec). IFVm = (Vps2–Vps0)/Vps0*100%. SMFVm = (Vps2–Vps0)/120. IR-Vmrec = Vps0/Vps4. Vps0 is starting parameter. Vps2 is the parameter during the 2 minute of inhalation. 120 is time of inhalation in seconds. Vps4 is the parameter during 4 minutes of test. The differences in BP values and parameters for CVR evaluation were tested with Student’s t-test for paired samples.

**Results:** Verapamil SR treatment reduced both systolic/diastolic office and 24-h BP by 14.1/8.2 mmHg for office BP and 13.5/9.9 mmHg for 24-h BP, all \( p < 0.0000 \). After Verapamil SR treatment, the parameters of MCA blood flow and CVR did not change either in the hyperoxia or in the hypercapnia tests compared with those before treatment.

**Conclusions:** Treatment with verapamil SR did not improve the parameters of CVR in hypertensive patients with RA.

**PREDICTORS OF STROKE RECURRENT IN HYPERTENSIVES IN AN EMERGENCY HOSPITAL**

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**Objective:** To evaluate cardiovascular (CV) risk factors and therapeutic management as predictors of recurrent stroke among hypertensives from an emergency hospital.

**Design and method:** The study comprised 30 patients with HT of grade 1–2 and age 70Y, with hypertension and 44 healthy volunteers (HV) without stroke. Secondarily, we selected hypertensives (n = 456). They were divided in two subgroups depending on history of previous stroke and propensity matched to control for age and sex. Logistic regression was used to evaluate CV risk factors and treatment strategy as predictors of recurrent stroke.

**Results:** The prevalence of hypertension among stroke patients was 76.63%. Propensity matching resulted in 208 hypertensives, which may suggest either the lack of intensive risk control, or an important residual risk despite therapy in those who already suffered stroke. Recurrence of stroke is more likely to lead to higher in-hospital mortality.

**THE ASSOCIATION BETWEEN CAROTID FLOW AND COGNITIVE FUNCTION IN THE COMMUNITY ELDERLY POPULATION**

S. Y. Chuang1, H. M. Cheng2, B. S. Yip3, C. H. Chen4, W. H. Pan5. 1 Institute of Population Health Sciences, National Health Research Institutes, Miaoli, TAIWAN; 2 Department of Medicine, Taipei Veterans General Hospital, Taipei, TAIWAN; 3 Department of Neurology, National Taiwan University Hospital, Hsin-Chu Branch, Hsin-Chu city, TAIWAN; 4 Department of Medicine, Taipei Veterans General Hospital, Taipei, TAIWAN; 5 Institute of BioMedical Science, Academia Sinica, Taipei, TAIWAN.

**Objective:** Carotid hemodynamics, such as intima-media thickness and carotid flow velocity, are associated with cognitive function impairment. Lower carotid flow may involve the pathogen of cognitive function impairment in the general elderly population.

**Design and method:** A total of 744 elderly (more than 60 years) subjects completed the baseline and followed ultrasound examinations and those were evaluated for cognitive function. Cognitive function was evaluated by MMSE and cognitive function impairment was defined by the MMSE less than 26. The peak-systolic velocity, end-diastolic velocity were measured in the common carotid arteries. Logistic regression was used to evaluate the association between carotid flow velocities, carotid diameters and cognitive function.

**Results:** A total of 744 elderly subjects completed all examinations during the follow period. The prevalence Cognitive function impairment (MMSE less than 26) was 13.3% (n = 99). The peak systolic velocity (PSV) and diastolic end-velocity (EDV) were lower in those with cognitive function impairment (60.5 ± 65.6 cis/sec, p-value < 0.001 for PSV and 19.7 vs. 22.1 cm/sec, p-value < 0.001 for EDV), and only peak-systolic velocity remains significant in the multivariable models. Moreover, those with lower carotid flow velocities (the lowest 10th of peak systolic velocity) had 9.69 fold risk (95% confidence intervals: 2.75–34.21) of cognitive function impairment, compared to those with the highest 10th of peak systolic velocity. The significant association remains in the multivariable model by adjusting for age, gender, education, brachial systolic BP, fasting glucose, and low density lipoprotein cholesterol.

**Conclusions:** Lower carotid flow velocity, especially peak-systolic velocity was associated with cognitive function impairment. Lower carotid flow may involve the pathogen of cognitive function impairment in the general elderly population.

**CEREBROVASCULAR RESERVE TEST IN HEALTHY VOLUNTEERS AND HYPERTENSIVE PATIENTS WITH DIFFERENT DURATION OF HYPERTENSION AND WITH APNOEA**

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**Objective:** We compared different types of the cerebrovascular reserve (CVR) in healthy volunteers, patients with different duration of hypertension, and with sleep apnea.

**Design and method:** All participants of research have given the informed agreement. We used ultrasonography of transcranial Doppler’s method in the middle cerebral arteries (MCA) from temporal window. We studied the changes of flow velocity mean (FVm) starting, during hyperoxia (inhalation 2 min 100% oxygen) and FmIV in period of recovery (rec) (air-inhalation 3 min) in 228 patients (36–70Y) with hypertension and 44 healthy volunteers (HV) without stroke. Secondary hypertension were excluded by clinical and biochemical tests. At the time of vascular evaluation, none of the patients had a history or clinical evidence of diabetes, peripheral vascular disease, coagulopathy, or any disease predisposing them to vasculitis. HP were divided into 3 groups: hypertension duration (HD) < 5

<table>
<thead>
<tr>
<th>Variables</th>
<th>P value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslipidemia</td>
<td>0.965</td>
<td>1.016</td>
<td>0.515–2.066</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>0.844</td>
<td>0.958</td>
<td>0.494–1.781</td>
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<td>Atrial fibrillation</td>
<td>0.675</td>
<td>1.159</td>
<td>0.581–2.314</td>
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<tr>
<td>Carotid plaque</td>
<td>0.181</td>
<td>1.530</td>
<td>0.820–2.855</td>
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<td>Chronic kidney disease</td>
<td>0.433</td>
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<td>0.706–2.251</td>
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<td>0.251</td>
<td>0.048–1.303</td>
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<td>Betablocker</td>
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<td>1.345</td>
<td>0.713–2.538</td>
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<td>0.455–2.452</td>
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<td>0.619</td>
<td>0.254–1.504</td>
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<td>1.006</td>
<td>0.527–1.920</td>
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<td>ACEI/Sartan</td>
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<td>0.610</td>
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<tr>
<td>Antiplatlet</td>
<td>0.552</td>
<td>1.278</td>
<td>0.569–2.870</td>
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</tbody>
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years, HD ≥ 5 years and apnea. We used Indexes of FVm; IFVm = (Vm0−Vm)/
Vm0×100. Vm0, BP0 are starting parameters and Vm, BP are the parameters at
period of inhalation.

Results: HV had the normal distribution of Index of FVm 95%CI [-23,1; -19,8].
The index of FVm differed significantly in HV compared to HV: -21.42 ± 1.27 and
-11.32 ± 2.30% p < 0.01. Distribution of the index parameters showed the pres-
ence of three types of reactions arteries response to hyperoxic test: normal 95%CI
[-27,1; -19,9], reduced 95%CI [-4,9; -16,6], and opposite reaction 95%CI [2,3; 5,6] e¢
- during hyperoxia. The frequency of occurrence of normal; reduced; opposite
reactions were in the groups HD < SY 43,1; 55,2; 2,4% e¢ = 17,53, HD ≥ SY 16,2; 64,1; 20,1% e¢ = 72,3, and sleep apnea 10,2; 23,4; 67,4% e¢ = 6,44
p = 0,00; p = 0,00; p = 0,01.

Conclusions: HP had different types of the CVR, it was normal, reduced, and
opposite directions of the reactions during hyperoxia test. Patients had significant-
ly less often normal reaction and significantly more often had opposite reaction,
which had more than 5 years of hypertension, and with sleep apnea. The study
needs further observations.

A FAST AND SIMPLE NEW QUESTIONNAIRE TO HIGHLIGHT THE
COGNITIVE IMPAIRMENT IN HYPERTENSIVES: THE ASSOCIATION
WITH ARTERIAL STIFFNESS

P. Nazzaro, M.F. De Caro, A. Nardecchia, F. Caradonna Moscatelli, M. Contini,
G. Schrosi, L. De Benedittis, G. Accoto, A.M. Papagni, I. Vitali, G. Laselva. Uni-
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Bari, ITALY

Objective: The critical incidence of cognitive impairment in hypertensives leads
into the need to adopt tools easy to use and able to precociously discern the neu-
ropsychological deficit. Aim of the study was to verify, in relatively well-treated
hypertensive patients, the discriminative ability of a brief questionnaire to discern
the quality and the grade of a mild cognitive impairment and their association with
the preclinical vascular damage.

Design and method: Following a pilot study performed in healthy and hyper-
tensive subjects, an 18-item (NPI) questionnaire, with a good internal coherency
(alpha:0.87) and graded answers (never-very often: 1–4), exploring diverse neuro-
psychological abilities ascribable to different cerebral cortical areas, was adminis-
tered to 375 grade1–2 hypertensives treated with ACEi or ARBs as monotherapy.
In the patients, subdivided in tertiles, in order of the total score for cognitive im-
pairment (CIStot), 196 with lower (LCIS), 120 with intermediate (ICIS) and 59
with higher (HCIS), but with similar education, metabolic assessment, history and
hypertensive state (BPIS), it were normal, reduced, and
preclinical vascular damage, structural as carotid intima-media thickness (IMT) and functional, as carotid-femoral pulse wave velocity (PWVcf), was determined.

Results: The analysis showed significant characteristics. (m ± s.d.; *:p < .05,
**:p < .01, ***:p < .001 vs LCIS; **:p < .05, ***:p < .01, ****:p < .001 vs ICIS)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>LCIS</th>
<th>ICIS</th>
<th>HCIS</th>
<th>p-value</th>
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<tbody>
<tr>
<td>CIStot</td>
<td>95</td>
<td>90</td>
<td>100</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>IMT</td>
<td>0.75</td>
<td>0.80</td>
<td>0.85</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>PWVcf</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

In particular, psychophysical attitude (NPI1), brief-term memory (NPI3, NPI7)
and graded answers (never-very often: 1–4), exploring diverse neuro-
psychological abilities ascribable to different cerebral cortical areas, was adminis-
tered to 375 grade1–2 hypertensives treated with ACEi or ARBs as monotherapy.
In the patients, subdivided in tertiles, in order of the total score for cognitive im-
pairment (CIStot), 196 with lower (LCIS), 120 with intermediate (ICIS) and 59
with higher (HCIS), but with similar education, metabolic assessment, history and
hypertensive state (BPIS), it were normal, reduced, and
preclinical vascular damage, structural as carotid intima-media thickness (IMT) and functional, as carotid-femoral pulse wave velocity (PWVcf), was determined.

Conclusions: The findings show that between relatively well-treated hyperten-
sives, the mild impairment of attentive-executive capabilities are associate with
the arterial stiffness, before the onset of a preclinical structural vascular damage,
as IMT, and are detectable by a new rapid and easy-to-use screening tool.

GEOGRAPHIC VARIABILITY IN THE DECLINE OF FATAL AND NON-FATAL STROKE

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Medical School, New Brunswick, USA, 2Rutgers University, Piscataway, NJ, USA

Objective: To examine whether the decline in incidence of fatal and non-fatal
stroke is affected by characteristics of the population in different geographic areas.

Design and method: County specific data from the 21 counties in the state of
New Jersey were obtained from the Robert Wood Johnson Foundation

County Health Rankings. The percentage of the population in each county with
the following medical and socioeconomic risk factors was used in the analysis:
persons under the age of 18, persons 65 years or older, female, smokers, physically inactive, obese, with diabetes, diabetic monitoring among
obstetrics, excessive drinking, college education, median household income,
unemployed, uninsured, single parent household, areas with violent crime. The
counties were lumped into 4 categories based on similarities of the above char-
acteristics. The incidence in fatal and non-fatal stroke was compared among
the 4 county clusters.

Results: Overall, the incidence of fatal and non-fatal stroke declined throughout
the state. The incidence was significantly lower (p < 0.05) in cluster 1. There was
no difference in the decline among the other 3 clusters (Figure). Compared to
clusters 2, 3 and 4 in the aggregate, persons included in cluster 1 had higher house-
hold income, were more likely to have college education, and were less likely to
be unemployed, to live in single parent households, to have diabetes, to be obese,
to smoke, or to be physically inactive.

Conclusions: The incidence of fatal and non-fatal stroke was more pronounced
among persons who had better risk factor profile and higher socioeconomic status.
There were no significant effects of demographics (e.g. age, gender).

AN EXAGGERATED BLOOD PRESSURE RESPONSE TO EXERCISE IS COMMON IN THE SUBACUTE PHASE AFTER STROKE, BUT IS NOT AFFECTED BY RANDOMIZATION TO 12 WEEKS OF INTENSIVE AEROBIC EXERCISE

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cal and Health Sciences, Linkopings Universitet, Norrkoping, Sweden, Norrköping, SWEDEN, 4Department of Dermatology and Venerology, Linkopings Universitet, Linköping, Sweden, Norrkoping, SWEDEN, 5Department of Rehabilitation and De-
partment of Medical and Health Sciences, Linkopings Universitet, Norrkoping, Sweden, Norrköping/Linköping

Objective: The primary aim of this study was to explore peak systolic blood pres-
sure levels attained during an ergometer exercise test in patients in the subacute
phase after stroke. The secondary aim was to evaluate the impact of twelve weeks
of twice-weekly intensive aerobic exercise on the systolic blood pressure response
to exercise in these patients.

Design and method: We analyzed data from a clinical trial, in which 56 patients
with a recent stroke were randomized to either participation in a twice-weekly
intensive aerobic exercise program for twelve weeks (intervention group, n = 29),
or usual care (non-intervention group, n = 27). All patients performed a symp-
tom-limited ergometer exercise test twice; prior to randomization (baseline, at a
median of 22 days following the acute stroke) and after twelve weeks. Complete
ergometer blood pressure data were obtained for 53 participants both at baseline
and after twelve weeks.

Results: At baseline 66% of the patients exhibited an exaggerated exercise blood
pressure response (peak systolic blood pressure greater than over equal to 210
mmHg in men or greater than over equal to 190 mmHg in women). An exagger-
ated blood pressure response occurred more frequently in patients with resting
systolic blood pressure greater than over equal to 140 mmHg (24/31 or 77.4% vs. 11/22
or 50.0%, P = 0.038). At follow-up patients who had been randomized to the ex-
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**THE NEED OF BETTER ARTERIAL HYPERTENSION AND ATRIAL FIBRILLATION MANAGEMENT IN REDUCING STROKE INCIDENCE**

L. Gaspar1, A. Komornikova1, M. Bendzalá2, D. Celovska1, V. Vestenicka1, 1Comenius University and University Hospital, 1st Department of Internal Medicine, Bratislava, SLOVAK REPUBLIC, 2Comenius University and University Hospital, Department of Infectology and Geographical Medicine, Bratislava, SLOVAK REPUBLIC, 3Comenius University and University Hospital, 1st Department of Neurology, Bratislava, SLOVAK REPUBLIC

**Objective:** Strokes are among the most common causes of morbidity and mortality, and in individuals who suffered stroke, subsequent long-term neurological deficit in a larger or smaller range is also an important factor. Arterial hypertension and atrial fibrillation are the most common influencing factors of strokes. Numerous clinical and epidemiological studies have confirmed that elevated systemic blood pressure values are among the major risk factors for both ischemic and hemorrhagic stroke, and the effect of arterial hypertension is complex. Aim of the study was to point out the need to improve the early identification, elimination and treatment of risk factors for stroke, according to the valid recommendations of the European Society of Hypertension and European Society of Cardiology.

**Design and method:** Retrospectively, we analyzed a cohort of patients hospitalized for stroke during a three month period (July - September 2016) at the 1st Department of Neurology in Bratislava. The group consisted of 104 patients, from which ischemic stroke was diagnosed in 88 subjects (84.6 %) and hemorrhagic stroke in 16 subjects (15.4 %). The average age was 70.7 years. A history of previous stroke was in 18 (17.3 %) patients.

**Results:** Among the most important risk factors in addition to age, we found that arterial hypertension as the most common risk factor occurred in 96 subjects (92.3 %). Atrial fibrillation occurred in 34 patients (32.7 %), but only 14 patients (41.2 %) were treated with anticoagulant therapy before hospitalization. Hemorrhagic stroke during anticoagulant therapy was only in 1 patient, but ischemic stroke in 13 patients. In this group of patients with anticoagulant therapy who have evolved ischemic stroke in spite of this treatment, we found that in 7 patients (53.8 %) the treatment was underdosaged and therefore ineffective.

**Conclusions:** Our results from real clinical practice points to the need to improve the effective management of arterial hypertension and atrial fibrillation, the most common influencing factors of stroke. It is necessary to improve the inadequate indication of anticoagulant treatment with consideration of the stroke risk calculation for atrial fibrillation (CHA2DS2-VASc Score) and bleeding risk calculator (HAS-BLED).

**THE PREVALENCE OF MASKED HYPERTENSION AMONG OLDER PATIENTS WITH COGNITIVE COMPLAINTS**

R. De Heus, E. Peters, J. Claassen. Radboud University Medical Center. Department of Geriatrics, Radboud Alzheimer Centre, Nijmegen, THE NETHERLANDS

**Objective:** Although the clinical relevance of masked hypertension (MHT) defined as normal office BP, but elevated BP at home is still debated, it has been associated with sustained hypertension and higher cardiovascular morbidity, both established risk factors for cognitive decline. Data about MHT in elderly with cognitive problems is scarce. Therefore, the aim of this study was to estimate the prevalence of MHT in older patients visiting a memory clinic and to examine the association between MHT and cognitive function.

**Design and method:** We studied 249 patients who attended our memory clinic. They were subjected to 7-day home BP measurements (Microlife WatchBP Home), twice in the morning and evening. Patients were included if they had at least 8 measurements left, after discarding measurements of day 1, and if office BP (single, supine) was available. The following definitions were applied: MHT: office BP < 140/90 mmHg; home BP > = 135/85 mmHg, normotension (office BP < 140/90 mmHg; home BP < 135/85 mmHg), hypertension (office BP > = 140/90 mmHg; home BP > = 135/85 mmHg), white-coat hypertension (office BP > = 140/90 mmHg; home BP < 135/85 mmHg). Characteristics of the group with MHT were compared to those with normotension. Statistical analyses were performed using independent samples t-test, Mann-Whitney U-test and chi-square test, using P = 0.05.

**Results:** From 202 patients (73.3 ± 9.3 years, 52% male) office and home BP was available. Office BP and home BP significantly differed (157±9 ± 23/10 mmHg and 139/79 ± 16/9 mmHg, respectively, P = 0.0001). The prevalence (with 95% CI) of MHT was 6.9% (3.4–10.4), corresponding to 14 patients. Normotension was observed in 12.4% (n = 25), hypertension in 55.0% (n = 111) and white-coat hypertension in 25.7% (n = 52). Characteristics of patients with MHT and normotension are shown in Table 1. We observed a trend (P = 0.08) for a lower cognitive score on the CAMCOG test battery in MHT compared to normotension.

**Conclusions:** Our findings show a lower prevalence of MHT compared to earlier studies performed in older people. Based on results from this relatively small group, patients with MHT may show decreased cognitive function compared to patients with normotension. However, further studies with larger numbers are needed to confirm this.

**HYPERTENSIVE STATUS AND CARDIOVASCULAR RISK FACTORS IN STROKE PATIENTS**

E. Weiss1, V. Mihalces2, A. Balahura1, D. Bartos1, C. Predescu1, E. Badila1, 1Emergency Clinical Hospital Bucharest, Bucharest, ROMANIA, 2Carol Davila University of Medicine and Pharmacy, Bucharest, ROMANIA

**Objective:** To evaluate cardiovascular (CV) risk factors in hypertensive versus normotensive stroke patients admitted to an emergency hospital.

**Design and method:** In 595 adult subjects (age range 28-104 years) admitted to the neurology department of an emergency hospital in 2016 with stroke, we evaluated prevalence of cardiovascular risk factors and differences in them between hypertensives versus normotensives.

**Results:** Hypertension was the most prevalent cardiovascular risk factor among stroke patients at 76.63% of cases. Diabetes mellitus was more frequently associated with hypertensive status, while carotid plaque was seen more in normotensives. Dyslipidemia, atrial fibrillation and chronic kidney disease were not significantly different among the subgroups. See table.

**CONCLUSIONS:** Stroke patients have a very high cardiovascular burden, with hypertension, the first in the cardiovascular continuum, having probably accelerated effects on total risk by other factors, which were here insignificantly different between hypertensives and normotensives.

**MORTALITY IN PATIENTS WITH STROKE AND BLOOD HYPERTENSION**

J. Osuna Sanchez, J. Ampuero Ampuero. Hospital comarcal de Melilla, Melilla, SPAIN

**Objective:** To carry out a retrospective descriptive study of hypertensive patients with cerebrovascular disease in a regional hospital.

**Design and method:** Tranversal descriptive analysis of patients with arterial hypertension who suffered cerebrovascular disease admitted to our service from January to December 2015. A detailed study of all the risk factors suffered by patients was carried out. The population was divided into two groups according to the type of pathology, Ischemic vs Hemorrhagic and a descriptive study of the characteristics of each of the groups was carried out by means of their frequencies.
Results: There were a total of 106 patients, with an age of 71.08 ± 13.53 years, of which 52.8% were women. Of the total population, 83 patients (79%) comprised the group of ischemic stroke and 22 patients (21%) belonged to the group of hemorrhagic stroke. The mean stay of the patients was 9.99 ± 10.53. Only 71.7% of patients had social security and 40.6% were Bere Ber race. Mortality was 16% (17 patients). 68.9% of the patients were HBP, 37.7% had DM and 22.6% DLP as outstanding comorbidities. Patients were divided between hypertensive and non-hypertensive patients, analyzing mortality in both groups without statistically significant differences being observed (17.80% vs 12.12%, p < 0.333). The patients were then divided between ischemic ICTUS and hemorrhagic stroke, analyzing the mortality dependent on hypertension in each of the groups. Within the ischemic ICTUS, no statistically significant differences were observed (12% vs 15.51%, p < 0.482). In the hemorrhagic ICTUS group, no statistically significant differences were found either (12.5% vs 28.75%, p < 0.380).

Conclusions: In our study, we observed how patients with arterial hypertension who suffer a cerebrovascular accident have higher comorbidity and tend to have a more torpid clinical course with higher mortality. In all the series we observed a trend (more marked in the hemorrhagic stroke) to the mortality in patients with arterial hypertension without it becoming statistically significant, this is probably due to the small sample size, we are currently collecting data to see the results in a more truthful way.

Objective: To carry out a retrospective descriptive study of patients aged 90 years or older admitted to the Internal Medicine service with arterial hypertension.

Design and method: This is a cross-sectional descriptive analysis of patients older than 90 years admitted to internal medicine for any pathology from January to December 2016 with arterial hypertension. A detailed study was carried out to analyze all the risk factors presented by the patients, the associated comorbidities, as well as personal history.

Results: There were a total of 109 admitted patients older than 90 years. Of which 67.9% were women. The mean age was 92.78 years (90–103). 18.3% of the patients were institutionalized, 57.8% were dependent for all the basic activities of daily life (ABVD) and 27.5% were partially dependent for all ABVD. 67.8% were ethnic Caucasians, 30.6% Berber and 1.6% were Jews. With respect to personal background, 36.7% IRC; 40.4% ICC; 36.7% previous ischemic heart disease; 30.3% DM; 41.3% FA; 14.8% COPD; 30.3% dyslipidemia; 14.7% neoplasia (active or not); and an 18.3% history of stroke. As an important finding, 33.9% of patients presented cognitive impairment to some degree. 78.9% of the patients had presented at least one admission in the previous 12 months, and 27.9% 2 or more previous admissions. Up to 90.7% of patients had 2 or more pathologies at the time of admission. The mean hospital stay was 12.43 ± 9.52 days, 46.8% of the patients died.

Conclusions: As we advance in the findings in medicine, the patients in our services are older and have greater comorbidity. Within these comorbidities, arterial hypertension is one of the main ones.
POSTER SESSION

POSTERS’ SESSION PS10:
ATHEROSCLEROSIS AND MOLECULAR FOUNDAMENTS

GENOME WIDE ASSOCIATION STUDY META-ANALYSIS OF HOMOARGININE USING THE HRC REFERENCE PANEL

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Objective: Data from the LUDwigshafen Risk and Cardiovascular Health (LURIC) study and the 4D Study have shown that low homoarginine (HARG) is a significant risk factor for all-cause and cardiovascular mortality. In 2013, we performed a first genome-wide association study (GWAS) meta-analysis on the genetic determinants of homoarginine concentration based on data from LURIC and the Young Finns study (YFS) and discovered three loci with genome-wide significance. In the meantime, new expanded and more accurate imputation reference panels have been released.

Therefore, our aim was to perform a meta-analysis of GWAS using the haplotype reference consortium (HRC) imputation reference panel to identify further genes which are involved in the regulation of HARG serum levels. Furthermore, we increased the sample size from ca. 5k to 6k.

Design and method: HARG was measured in serum stored at -80°C by a reversed phase high-performance liquid chromatography. Genotyping was done in LURIC and 4D by using the Affymetrix 6.0 array and a custom-built Illumina Human 670k BeadChip in YFS. Imputation to the HRC reference panel was performed using Minimac with HARG for association with HARG using linear regression analyses using the software PLINK2 with adjustment for age, sex and principle components. Meta-analysis was done using a fixed-effects, effective sample-weighted Z-score meta-analysis method, as implemented in the software METAL.

Results: In the meta-analysis, 391 SNPs were genome-wide significantly associated with HARG. These SNPs are located on chromosome 2 (CP51), on chromosome 5 (AQX2), on chromosome 6 (ARG1) and on chromosome 15 (GATM) (Fig. 1). This adds one significant locus to the previous meta-analysis. Another six loci showed suggestive association with P-values < 10^-6.

Gene set enrichment and tissue enrichment analyses using DEPICT did not result in any significant hits after FDR correction. Highest-ranking gene sets with p-values of 10^-6 were gene sets involved in dystonia, cellular hormone response, insulin resistance, carbohydrate and lipid metabolism. Highest-ranking tissues with nominally significant p-values were atrial appendage and heart atria.

Conclusions: In the meta-analysis four genomic loci reached genome-wide significance and a further six loci showed suggestive association.

SUBCLINICAL TARGET ORGAN DAMAGE IN HYPERTENSIVE SUBJECTS INCLUDED IN THE IBERICAN STUDY


Objective: The general aim of IBERICAN study is to know the prevalence and incidence of cardiovascular risk factors and cardiovascular and renal disease in Spain. The aim of this abstract is to know the prevalence of subclinical target organ damage (TOD) in hypertensive patients respect non hypertensive patients in the population of the IBERICAN Study

Design and method: The IBERICAN Study is a longitudinal, observational, and multicentric study with subjects between 18 to 85 years of age, recruited in Primary Care (PC) and who will be follow up at least 5 years. The final sample size is estimated at 7,000 patients. We show the baseline characteristics of the patients in the first visit (n = 5,944). To define the TOD, we consider the ESH 2103 Guide criteria: pressure pulse in aged > 60 mmHg, ankle/brachial index < 0.9, microalbuminuria: albumin/creatinine ratio (between 30 - 299 mg/g), glomerular filtration (CDK-EPI < 60 ml/min), left ventricular hypertrophy (electrocardiogram or ECHO).

Results: 2.873 hypertensive patients (prevalence: 48.3%), the mean age in the sample was 64.7 ± 12 years, 49.7% women, antiquity of hypertension 9.7 ± 6 years, BMI 31.1 ± 8.9 kg/m2. Prevalence of TOD in hypertensive vs no hypertensive patients was 39.8% vs 13.3%, p < 0.001. With respect to the type of TOD: pressure pulse in aged > 60 mmHg: 27.5% vs 7%, p < 0.001; ankle/brachial index < 0.9: 2.7% vs 1.3% p = 0.196, NS; microalbuminuria: 11.7% vs 4.9%, p < 0.001; glomerular filtration (CDK-EPI < 60 ml/min), left ventricular hypertrophy (electrocardiogram or ECHO).

Conclusions: Patients with hypertension in Primary Care have higher prevalence of subclinical target organ damage respect no hypertensive patients and for each of the types of the subclinical target organ damage according to the ESH 2103 Guide criteria. Is important the diagnosis of TOD, because they are high-risk cardio-vascular patients.

IMPACT OF OBSTRICTIVE SLEEP APNOEA AND TREATMENT RESPONSE ON IMMUNODENSIBILITY PARAMETERS IN HYPERTENSION

C. Park, Y. Kim, E. Park, J. Na, C. Choi, J. Kim, E. Kim, S. Rha, H. Seo. Korea University Guro Hospital, Seoul, SOUTH KOREA

Objective: Inflammation and immunosenescence (IS) have been considered to be associated with hypertension. (HTN) Obstructive sleep apnea (OSA) was also associated with chronic inflammation by repetitive oxidative stress. However, the relationship between immunosenescence parameters and treatment of HTN with or without OSA is unclear. We evaluate to demonstrate the association of chronic inflammation and IS parameters with OSA in hypertensive patients and the changes according to BP treatment.

Design and method: Multicenter longitudinal observational study from April 2013 to October 2015. A total of 131 Hypertensive patients (SBP > 140 mm Hg
or DBP > 90 mm Hg) were devided into OSA low risk and OSA high risk according to Berlin sleep apnea questionnaire. CD28 null and CD28+ fraction of CD8 T-cells were sampled at baseline in both groups. 87 patients among them were analyzed for baseline and 6 months follow-up immunosenescence parameters with treatment of HTN.

Results: Among 131 subjects, 88 patients (67.2%) were OSA high risk, and 43 patients (32.8%) were OSA low risk. CD28 null fraction of CD8 T cells in OSA high risk group was 35.1 ± 18.3% vs 43.9 ± 19.9% in low risk group with a p-value 0.014. CD8+ fraction of CD8+ T-cells in OSA high risk group was 37.0 ± 16.9% vs 44.7 ± 20.0% in OSA low risk group with a p-value 0.023. HTN was controlled in 56 patients (64.4%). CD28nullCD8+ T cell was significantly decreased from 41.1 ± 17.9% to 37.5 ± 18.8% (p-value = 0.01) but CD57+CD8+ T cell was not correlated with HTN treatment. (42.2 ± 17.5% vs 42.7 ± 18.4%, p-value = 0.596). In multivariate analysis, only age was associated with change in CD28nullCD8+ T cell with greater reduction in CD28nullCD8+ T cell. (beta: 0.373, t = 2.412, p-value = 0.019).

Conclusions: CD28 null and CD28+ fraction of CD8 T-cell in hypertensive patients with OSA were paradoxically higher in patients without OSA. IS parameter, CD28nullCD8+ T cell was significantly decreased with HTN treatment, especially in younger patients.

LONG NON CODING RNAs IN PERIPHERAL BLOOD MONONUCLEAR CELLS IN HYPERTENSIVES WITH HEART FAILURE WITH PRESERVED EJECTION FRACTION AND THEIR RELATION TO THEIR FUNCTIONAL CAPACITY

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Objective: Long non coding RNAs (IncRNAs) are emerging as important components of regulatory networks underlying cardiovascular development and pathophysiology. They exhibit distinctive roles in modulating tissue-specific epigenomic states that are critical for the transcriptional and epigenetic reprogramming that underpins heart failure (HF) pathogenesis. Our aim was to assess gene expression levels of the IncRNAs CARMEN and FENDRR in peripheral blood mononuclear cells (PBMCs) in hypertensive patients with heart failure with preserved ejection fraction (HFpEF) and to evaluate their association with their exercise capacity.

Design and method: We included 45 patients with essential hypertension and HFpEF (mean age 67 ± 8 years). Twenty one hypertensive patients without HFpEF (mean age 65 ± 12 years) were also included as controls. All patients underwent a cardiopulmonary exercise test (CPX). PBMCs were isolated and IncRNAs’ expression levels were determined by quantitative real-time reverse transcription polymerase chain reaction.

Results: Results: Patients with HFpEF showed significantly higher CARMEN (27.93 ± 5.68 versus 11.6 ± 4.8, p = 0.02) and FENDRR (45.72 ± 8.88 versus 16.01 ± 4.04, p = 0.01) expression levels compared with the control group. For hypertensive patients with HFpEF, strong positive correlations were observed between CARMEN expression levels in PBMCs and peakVO2 and (r = 0.46, p = 0.001), VE/VCO2 (r = 0.45, p = 0.002) as well as exercise duration (r = 0.427, p = 0.001), VE/VCO2 (r = 0.45, p = 0.002) as well as exercise duration (r = 0.427, p = 0.001), VE/VCO2 (r = 0.45, p = 0.002) as well as exercise duration (r = 0.427, p = 0.001), VE/VCO2 (r = 0.45, p = 0.002) as well as exercise duration (r = 0.427, p = 0.001). However, a negative association of uromodulin with systolic BP (NS) and diastolic BP (r = 0.45, p = 0.009) was observed in the entire group. No association between uromodulin and eGFR was noted. Uromodulin was found to be lower in women than men. The frequency of A and G alleles was 83.2% and 16.8%, respectively. No difference in the frequency of G allele was found among the BP categories. A trend of higher uromodulin was observed in homozogous for the G allele. No significant trend was observed between uromodulin and eGFR in the entire group.

Conclusions: There is trend of negative association of uromodulin with BP in middle-aged untreated subjects with normal kidney function. We did not find an association of uromodulin with eGFR. A trend of a higher uromodulin urine concentration was observed in subjects with the G allele of UMOD rs13333226.

ASSOCIATION OF SERUM URIC ACID LEVELS WITH ARTERIAL STIFFNESS AND ENDOTHELIAL DYSFUNCTION IN A POPULATION OF NORMOTENSIVE TO EARLY-STAGE HYPERTENSIVE INDIVIDUALS

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Objective: Hyperuricemia appears to be associated with increased cardiovascular risk. Both accelerated vascular stiffness and endothelial injury caused by
increased oxidative stress have been postulated as contributing potential mechanisms. We investigated whether serum uric acid levels correlate with robust markers of arterial stiffness and endothelial dysfunction in a population of untreated individuals free from cardiovascular diseases, whose blood pressure ranged from normal to early-stage essential hypertension.

**Design and method:** Individuals free from cardiovascular comorbidities, who received no medication for any reason, were eligible to participate. Arterial stiffness was estimated by the carotid-femoral pulse wave velocity (PWV) measurement with applanation tonometry using the Sphygmocor device. Serum samples were drawn for the measurement of uric acid levels and other biochemical parameters. Asymmetric dimethylarginine (ADMA), an endogenous inhibitor of nitric oxide synthase, was measured in serum samples using commercially available competitive enzyme-linked immunosorbent assay (ELISA) kit.

**Results:** A total of 241 individuals, 144 males and 97 females, with a mean age of 45.0 ± 11.2 years and mean systolic/diastolic blood pressure 138.8 ± 18.4/88.7 ± 12.0 mmHg, participated in the study. Mean PWV was 7.9 ± 1.8 m/s, while serum uric acid and ADMA levels were 5.1 ± 1.4 mg/dl and 1.00 ± 0.39 mmol/l, respectively. Uric acid positively correlated with both PWV (r = 0.152, p = 0.025) and ADMA levels (r = 0.141, p = 0.029). After adjustment for other variables (age, gender, body mass index, HDL cholesterol, triglycerides, glomerular filtration rate) in the multivariate analysis for uric acid, an independent association between ADMA levels was observed (beta = 0.200, p < 0.001), whereas the association between uric acid and PWV was no longer significant.

**Conclusions:** In a population of untreated normotensive to early-stage hypertensive individuals, increased levels of uric acid are independently associated with endothelial dysfunction. On the other hand, the observed association between uric acid and arterial stiffness appears to be mediated by traditional cardiovascular risk factors. Uric acid might be implicated in the pathogenesis of cardiovascular diseases through endothelium-dependent mechanisms.
SUBSTANTIAL VARIABILITY ACROSS INDIVIDUALS IN THE VASCULAR RESPONSE AND NUTRIGENOMIC RESPONSE TO AN ACUTE INTAKE OF CURCUMIN: A RANDOMISED CONTROLLED TRIAL

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Objective: Curcumin exerts biological activities of interest in cardiovascular prevention. However, its vascular protective effect is still investigat ed in humans. The present study aims to assess vascular effects of an acute intake of curcumin and its nutrigenomic impact in circulating immune cells.

Design and method: In a randomised, double-blind, crossover design, eighteen healthy smokers consumed a placebo or a 5-g gram of curcumin. Before and two hours after the intake, vascular function measurements were performed by using flow-mediated dilation (FMD). In addition, endothelial function in the microcirculation and blood pressure were evaluated. Plasma curcumin concentrations and changes in gene expression in peripheral blood mononuclear cells (PBMC) were analysed.

Results: No significant effect of curcumin on FMD was observed when considering the entire study population (p = 0.08), mainly due to a high inter-individual variability. Interactions were found for gender and risk score, but not for plasma curcumin concentration, to explain this variability. A subgroup analysis according to the gender or the cardiovascular-risk score revealed a significant effect of curcumin on FMD in women (β = 2.07 ± 2.59%, p < 0.001) and in subjects presenting lower cardiovascular risk (β = 1.45 ± 0.97%; p < 0.001). Pulse pressure decreased significantly in men (β = −5.06 ± 7.21 mmHg, p = 0.009) and in subjects presenting higher cardiovascular risk (β = −4.81 ± 4.54 mmHg, p = 0.04). No change in gene expression was observed when data were analysed for all volunteers but changes in expression were observed when analyzed according to gender.

Conclusions: This clinical trial highlights that a substantial variability in efficacy of curcumin exists across individuals, with potential positive effects on endothelial function and pulse pressure.

THE EFFECT OF STATIN THERAPY ON MONOCYTE SUBPOPULATIONS IN PATIENTS WITH ARTERIAL HYPERTENSION AND OBESITY

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Objective: Association of arterial hypertension with obesity is an acknowledged risk factor of the development of coronary artery disease (CAD). Statins represent golden standard of management dyslipidemia in these patients. One of the mechanisms linking arterial hypertension, obesity and atherosclerosis is a low-grade inflammation. Recently it had been shown that minor subpopulations of monocytes with phenotype CD14loCD16+ and CD14+CD16+ are highly proatherogenic. The objective of the study was to evaluate influence of statins on composition of monocyte population in obese patients with arterial hypertension.

Design and method: A total number of 16 patients (7 men, 9 women; age 58.5 (54.8; 62.5) years; body mass index 30.9 (29.1; 32.8)) were recruited in the study. Among them 9 patients received statin therapy (atorvastatin in 7 patients (mean dose 18.6 mg); rosuvastatin in 2 patients (mean dose 10 mg)); 7 patients did not take statins. Lipid profile was determined by standard method, including measurement of total cholesterol, triglycerides, low density lipoproteins cholesterol (LDL-C) concentrations, and calculation of high density lipoproteins cholesterol (HDL-C) concentration and LDL/HDL ratio. Numbers of classical CD14hiCD16lo, non-classical CD14loCD16+ and intermediate CD14+CD16+ monocytes were determined by flow cytometry.

Results: Statin therapy allowed to obtain target values of LDL-C in the majority of patients in the study (2.9 (2.5; 3.4) mmol vs. 3.6 (3.1; 4.3) mmol in patients who did not take statins). Patients receiving statin therapy were characterized by lower numbers of CD14loCD16+ monocytes (5.4 (3.6; 8.1)% vs. 10.9 (8.5; 18.3)%; p = 0.016) and higher frequency of CD14hiCD16lo monocytes compared to patients without statins in the course of medication (89.4 (82.9; 92.3)% vs. 79.3 (73.8; 84.4)%; p = 0.023). No differences were revealed in numbers of CD14+CD16+ monocytes. In total group of patients we revealed negative association between numbers of CD14loCD16+ monocytes and LDL-C concentrations in women, but not in men (r = 0.857; p = 0.014).

Conclusions: Statin therapy in patients with arterial hypertension and obesity is associated with low numbers of proatherogenic CD14loCD16+ monocytes and higher frequency of classical CD14hiCD16lo monocytes, which may be related to lipid-lowering effects of statins.

COMPARATIVE PROTEOMIC ANALYSIS IN MICRODISSECTED RENAL VESSELS OF HYPERTENSIVE AND NORMOTENSIVE RATS

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Objective: Systemic hypertension has a profound impact on the renal vascular physiology and functionality. Our goal was to identify the biological pathways and macromolecules of the renal arteriolar wall, which are involved with the development of hypertension.

Design and method: Tissue derived exclusively from renal vessels of 4 Spontaneously Hypertensive Rat (SHR) and 4 normotensive controls (Wistar Kyoto,WKY) at 20 weeks using Laser Capture Microdissection on 14 micrometer cryosections was used. High sensitivity proteomic analysis was performed in the microdissected homogenized material in order to detect early molecular alterations associated with hypertension of the renal vessels before the onset of vascular damage.

Results: Proteomic analysis revealed 688 proteins; 550 proteins were found in both groups, of which 58 proteins were differentially expressed (15 proteins were up-regulated and 43 proteins were down-regulated in SHR). 71 proteins were found exclusively in control WKY rats and 67 exclusively in SHR rats. Pathway enrichment analysis revealed 114 and 111 pathways in WKY and SHR, respectively and 106 common pathways in both groups. Many of the interesting differentially expressed proteins identified in our study are relevant to vascular tone regulation. Thus proteins involved with NO and vasodilation and affecting eNOS include Xaa-Pro aminopeptidase 1 (XPP1), N(G)(G)-dimethylarginine dimethylaminohydrolase 1 (DDAH1), Dihydropyrimidine reductase (DHPR), whereas proteins involved with blood pressure regulation by the renin-angiotensin system include Glutamin/aminopeptidase/Aminopeptidase A (AMP) and Aminopeptidase N (AMPN). Moreover, pathway enrichment analysis revealed that the eNOS activation pathway is disregulated only in the hypertensive SHR animals.

Conclusions: Our study demonstrates that hypertension causes early proteomic changes in the renal vessels of SHR compared to WKY. These changes are relevant to vascular tone regulation and consequently may be involved in the development of vascular damage and hypertensive nephrosclerosis. Further studies are required to explore whether these pathways and molecules are involved with hypertensive nephrosclerosis and to identify components that could be considered new therapeutic targets.

RELATIONSHIP BETWEEN LYMPHANGIOGENESIS, TISSUE MACROPHAGES EXPRESSION AND SUBCUTANEOUS SODIUM CONCENTRATION: EFFECTS OF HYPERSONDIC AND HYPOSODIC DIET IN A NORMOTENSIVE RAT

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Objective: Salt retention is a condition associated with a mild inflammatory state. Recent researches pointed out the skin as central regulator of sodium balance and conditions the traditional “nephroprotective view”. Hypertonic skin sodium storage is associated with osmotic and immunological disregulation expressed by activation of toxicity-sensing pathways in macrophages, stimulation of lymphangiogenesis facilitating skin sodium clearance. The aim of this study is to evaluate in a model of normotensive rat the effect of two different dietary sodium regimens on the interstitial sodium levels, lymphangiogenesis and tissue macrophages expression.

Design and method: Two groups of normotensive rats (Wistar Kyoto) were fed for three weeks with two different dietary regimens, respectively, High Salt Diet (HSD, NaCl 8%) and Low Salt Diet (LSD, NaCl 0.08%). Intestinal subcutaneous sodium concentration was measured by microdialysis procedure. Tissue evaluation of Macrophage component, endothelial and lymphatic capillary density was statistically significant for a number of substances considered as the markers of endothelial dysfunction.
INCREASED HDL CHOLESTEROL LEVELS RELATE TO ENDOTHELIAL GLYCOCALYX INTEGRITY IN OLDER TREATED PATIENTS WITH ESSENTIAL HYPERTENSION

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Objective: Endothelial dysfunction indicates target organ damage in patients with arterial hypertension. The integrity of endothelial glycocalyx (EG) plays a vital role in vascular permeability, inflammation and elasticity as well as finally to cardiovascular disease (CVD). We aimed to investigate the role of increased HDL cholesterol levels (HDL-C), which usually are considered protective against cardiovascular disease, in endothelial glycocalyx integrity in older hypertensive patients.

Design and method: One hundred-twenty (120) patients with arterial hypertension under treatment (mean age 66+9 years, females) and no history of previous cardiovascular disease were divided regarding HDL-C tertiles in two groups. In group HDLH, HDL-C was < 71 mg/dl (two lower HDL-C tertiles, n = 79, mean age 66+9 years, 45 males). Increased perfusion boundary region (PBR) of the sublingual arterial microvessels (ranged from 5–9 micrometers) using Sideview Darkfield imaging (Microscan, Glycocheck) was measured as a non-invasive accurate index of reduced EG thickness.

Results: No significant differences were found within groups regarding age, central and brachial systolic and diastolic BP as well as PP, smoking habit, LDL-C levels and PWV. PBR 5–9 was significantly decreased in group HDLH (p = 0.04). In the whole population, HDL-C was inversely related with PBR 5–9 (r = -0.22, p = 0.01). In a multiple linear regression analysis model, using age, BMI, smoking habit, HDL-C, LDL-C and office SBP, as independent variables, we found that BMI (Beta = 0.25, p = 0.006) independently predicted PBR 5–9 in the whole population.

Conclusions: We found that endothelial function, represented by EG levels, seems to be protected even in older hypertensive patients with extremely increased HDL-C levels and no history of cardiovascular disease. The possible role of EG, as a novel cardiovascular risk index in essential hypertension, needs to be further evaluated.

CR6 INTERACTING FACTOR 1 DEFICIENCY PROMOTES ENDOTHELIAL INFLAMMATION BY SIRT1 DOWNREGULATION

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Objective: CR6 interacting factor 1 (CRIF1) deficiency impairs mitochondrial oxidative phosphorylation complexes, contributing to increased mitochondrial and cellular reactive oxygen species (ROS) production. CRIF1 downregulation has also been revealed to decrease sirtuin 1 (SIRT1) expression and impair vascular function. Inhibition of SIRT1 disturbs oxidative energy metabolism and stimulates nuclear factor kappa-light-chain-enhancer of activated B cells (NF-kB)-induced inflammation.

Design and method: Therefore, we hypothesized that both CRIF1 deficiency-induced mitochondrial ROS production and SIRT1 reduction play stimulatory roles in vascular inflammation.

Results: Plasma levels and mRNA expression of proinflammatory cytokines (tumor necrosis factor (TNF)-α, interleukin (IL)-1β, and IL-6) were markedly elevated in endothelium-specific CRIF1-knockout mice and CRIF1 silenced endothelial cells, respectively. Moreover, CRIF1 deficiency-induced vascular adhesion molecule-1 (VCAM-1) expression was consistently attenuated by the antioxidant N-acetyl-cysteine and NF-kB inhibitor (BAY11). We next showed that siRNA-mediated CRIF1 downregulation markedly activated NF-kB, SIRT1 overexpression not only rescued CRIF1 deficiency-induced NF-kB activation but also decreased inflammatory cytokines (TNF-α, IL-1β, and IL-6) and VCAM-1 expression levels in endothelial cells.

Conclusions: These results strongly suggest that CRIF1 deficiency promotes endothelial cell inflammation by increasing VCAM-1 expression, elevating inflammatory cytokines levels, and activating the transcription factor NF-kB, all of which were inhibited by SIRT1 overexpression.

ATHEROSCLEROSIS PROGRESSION IN PATIENTS WITH BREAST CANCER IN THE SHORT-TERM PERIOD: THE EFFECT OF LIPOPROTEIN (A)


Objective: The cardiovascular care of patients who have cancer, have received broad attention. Inflammatory status associated with malignancies and promoted atherosclerosis during cancer therapies have been established. Lipoprotein (a) (Lp(a)) is a proven risk factor for atherosclerosis (AS) progression. Lp(a) blood level is quite stable during proinflammatory conditions. We aimed to evaluate the association between Lp(a), IgM and IgG autoantibodies against apoB100-containing lipoproteins and its Cu2+ oxidized (ox) modifications with the progression of carotid AS in patients with breast cancer after 6 months of cancer therapy.

Design and method: 50 women with newly diagnosed breast cancer (HER2-positive, stage II-III), mean age 50 (40;57) years were enrolled. Lipid profile, serum Lp(a), IgM and IgG autoantibodies against Lp(a) and low density lipoprotein (LDL) or ox-Lp(a) and on-LDL were assessed before the onset of neoadjuvant cancer therapy with trastuzumab, paclitaxel, doxorubicin, cyclophosphamide, Ca-rotid intima-media thickness (CIMT), the percentage of stenosis of the common carotid (CCA) and internal carotid (ICA) arteries was analyzed at baseline and after 6 months. New stenosis > 20% or increase of preexisting stenosis > 5% of carotid arteries was considered as AS progression. CIMT increase was considered at > 0.1 mm.

Results: AS progression was revealed in 25 (50%) patients; CIMT increase was observed in 20 (40%) patients. Patients with CIMT increase had the higher values of Lp(a) concentrations at baseline (18.8 mg/dl (11.2;32.6) against 5.6 mg/dl (3.7;17.9), p = 0.01). Lp(a) plasma level above 11.5 mg/dl was a risk factor for CIMT increase (OR 6.0 (1.7;21.2), p = 0.005; AUC 0.71 (95% CI 0.56–0.86, p = 0.01, figure 1). The conventional risk factors (age, BMI, arterial hypertension, smoking) as well as the plasma levels of total cholesterol, LDL, triglycerides, IgM and IgG autoantibodies against Lp(a), LDL or its oxidized modification did not possess the prognostic value for carotid AS progression in this 6-month study.

Design and method: 50 women with newly diagnosed breast cancer (HER2-positive, stage II-III), mean age 50 (40;57) years were enrolled. Lipid profile, serum Lp(a), IgM and IgG autoantibodies against Lp(a) and low density lipoprotein (LDL) or ox-Lp(a) and on-LDL were assessed before the onset of neoadjuvant cancer therapy with trastuzumab, paclitaxel, doxorubicin, cyclophosphamide, Car-rotid intima-media thickness (CIMT), the percentage of stenosis of the common carotid (CCA) and internal carotid (ICA) arteries was analyzed at baseline and after 6 months. New stenosis > 20% or increase of preexisting stenosis > 5% of carotid arteries was considered as AS progression. CIMT increase was considered at > 0.1 mm.

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Conclusions: We speculate that Lp(a) level above 11.5 mg/dl in HER2+ breast cancer patients may indicate a predisposition to the progression of atherosclerosis in the short-term period of cancer treatment.

VASCULAR EFFECTS OF ANTI-CANCER CISPLATIN THERAPY

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Objective: Cisplatin-containing chemotherapy is an effective cure for the majority of men with testicular cancer. However, patients treated with cisplatin are at increased risk of cardiovascular events. It is not clear whether this reflects primarily early direct vascular toxicity, or a latent pro-atherogenic state. We hypothesised that cisplatin-containing chemotherapy induces acute endothelial injury and a prothrombotic state.

Design and method: We conducted a prospective study of patients with testicular cancer who attended the Beatson West of Scotland Cancer Centre. Patients were recruited into 3 groups according to management: (1) surveillance, (2) 1–2 cycles of adjuvant cisplatin-containing chemotherapy (3) 3–4 cycles of curative cisplatin-containing chemotherapy. Patients attended 6 visits over 9 months, each visit including an assessment of endothelial function by % flow-mediated dilatation (FMD) and collection of venous blood for analysis. Visit 1 was <8 weeks following orchidectomy, visit 2 was <24 hours after initial cisplatin cycle and subsequent visits were at 6 weeks, 3 months, 6 months and 9 months.

Results: 26 patients were recruited between January 2016 and August 2017. 9 patients were managed with surveillance, 10 received 1–2 cycles of cisplatin and 10 received 3–4 cycles of cisplatin. In all patients receiving cisplatin, % FMD reduced from 15.0 ± 1.2 to 10.8 ± 0.7 within 24 hours (p = 0.01). On subsequent visits, % FMD was not significantly different from baseline. Serum cholesterol increased from 5.5 ± 0.2 to 7.2 ± 0.5 mmol/L at 6 weeks after receiving 3–4 cycles of cisplatin (p = 0.01). There was a trend to increasing serum triglycerides after cisplatin-containing chemotherapy.

Conclusions: Cisplatin-containing chemotherapy is associated with acute endothelial toxicity that recovers within 6 weeks, hypercholesterolaemia and a trend to hypertriglyceridaemia. Our observations may explain some of the early pro-thrombotic effects of cisplatin. These data should help develop therapeutic strategies to prevent short- and long-term adverse vascular effects of cisplatin-containing chemotherapy.

GENE INTERACTIONS OF ALPHA-ADDUCIN AND LANOSTEROL SYNTHASE IMPACT RENAL IMPAIRMENT IN SALT SENSITIVE HYPERTENSION

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Objective: We explored the roles of alpha-adducin (ADD1) and lanosterol synthase (LSS), genes coding for structural proteins of the cell membrane and Endogenous Oasunabin (EO), respectively, on renal Na handling and their genetic interactions in a large cohort of naïve hypertensive patients (NH) whose salt sensitive phenotype was characterized. Acute saline load (NaCl 308 mEq/2 h e.v.) was performed in 774 NHP (age 44.95 ± 9.61 years), and functional and hormone renal parameters were tested.

Results: Under baseline conditions NH carriers of the LSS AA genotype showed lower GFR (n = 68, 115.7 ± 4.6 ml/min) compared to LSS C carriers (124.6 ± 1.4 ml/min, p = 0.066). After an acute saline test, GFR increased in both groups, while the urinary volume and urinary creatinine were lower in LSS AA. Analysis of gene-gene interactions demonstrated that NHs carrying both mutated GT ADD1 and homozygous for LSS C variants excreted the sodium load more rapidly than their ADD1*LSS mutated variants. On the other hand, an additive relationship was observed, with a significant right shift along the x axis. Finally, circulating EO was modified according to the LSS variant: in SS LSS AA, EO rose significantly during the recovery while in SR LSS AA, EO was suppressed as baseline Cutaneous Vascular Conductance (CVC), peak CVC and peak CVC minus baseline CVC. Pearson’s and Spearman’s correlations were used, based on the variable’s normality of distribution.

Results: We observed a significant negative correlation between peak CVC and 24-hour cBP (r = –0.564 for central systolic BP [cSBP], r = –0.458 for central diastolic BP [cDBP], day cSBP (r = –0.560), day cDBP (r = –0.460) and night cSBP (r = –0.457)

ASSOCIATION OF ENDOTHELIAL DYSFUNCTION IN MICROCIRCULATION USING LASER SPECKLE CONTRAST ANALYSIS WITH MARKERS OF ARTERIAL STIFFNESS

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Objective: Endothelial dysfunction has a key role in microcirculation promoting very early structural and vascular alterations that precede any clinically detectable vascular damage and contribute to the pathogenesis of hypertension. Small artery alterations though are interdependent with large artery lesions and interact in a vicious circle that sustains and exaggerates vascular damage. It has been speculated that a common denominator in that cross-talk between micro- and macrocirculation is endothelial dysfunction. In this study we evaluated the association of endothelial dysfunction of skin microcirculation using Laser Speckle Contrast Analysis (LASC) with central blood pressures (cBP) as recorded with the Mobil-O-Graph device, in treatment-naïve hypertensive patients.

Design and method: We studied a group of 31 untreated, hypertensive patients with new-onset essential hypertension, without cardiovascular comorbidities, mean age 50.3 ± 18.5 years. Central BPs were recorded in all subjects using the Mobil-O-Graph NG (IEM, Stolberg, Germany) device. In addition, microvascular blood flow of the skin forearm was evaluated using LASC (PeriCam PSI NR System, Perimed Järfälla, Sweden). Results of microvascular flow are expressed as baseline Cutaneous Vascular Conductance (CVC), peak CVC and peak CVC minus baseline CVC. Pearson’s and Spearman’s correlations were used, based on the variable’s normality of distribution.

Results: We observed a significant negative correlation between peak CVC and 24-hour cBP (r = –0.564 for central systolic BP [cSBP], r = –0.458 for central diastolic BP [cDBP], day cSBP (r = –0.560), day cDBP (r = –0.460) and night cSBP (r = –0.457)
(p < 0.05). In addition, peak CVC minus baseline CVC showed a significant negative correlation with all cBP parameters (p < 0.05). Baseline CVC showed a significant negative correlation with 24-h cSBP (r = –0.482) and day cSBP (r = –0.488) (p < 0.05).

Conclusions: A significant inverse relationship was revealed between most central BP parameters and markers of endothelial dysfunction of skin microcirculation in treatment-naïve patients with new onset essential hypertension. In this group of patients, the endothelial dysfunction of skin microcirculation may be already associated with a higher central hemodynamic load although the exact cause and effect relationship of this bidirectional communication between small and large arteries has not been fully elucidated yet.

THE SEVERITY OF INFLAMMATORY PROCESS AS A RISK FACTOR OF CARDIOVASCULAR COMORBIDITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Objective: The aim of the study was to evaluate the association of the markers of inflammation and coexisting cardiovascular pathology in patients with rheumatoid arthritis with the severity of inflammatory process.

Design and method: 620 patients with RA (diagnosis according to ACR / EULAR) from the rheumatology in-patient clinic with the mean age of 43.4 ± 10; 95.4% ACCP – positive patients, activity on DAS (Disease Activity Score) 28 II, III; 85.4% female with the disease duration for about 3–15 years were enrolled in the trial. We assessed the level of IL-1 with the use of ELISA.

Results: The constructed model surfaces indicated the interdependence of IL-1, the activity of DAS 28 and the level of LDH in RA patients. The correlative and regressive analysis of the results showed the statistically significant correlation of TG, LDG, SBP and markers of inflammation IL-1, DAS 28: p = 0.627 (p < 0.01), p = 0.527 (p < 0.01), p = 0.712 (p < 0.01), p = 0.776 (p < 0.01), p = 0.544 (p < 0.01), p = 0.514 (p < 0.01) accordingly. The correlation coefficient between hs-CRP and the indicators of the lipid profile revealed similar interconnections.

Conclusions: According to the results of modeling, disease activity on DAS 28 and markers of inflammation (IL-1 and hs-CRP) as a markers of the severity of inflammatory process in RA patients are risk factors for developing atherosclerosis and AH. The analysis of inflammation indicators in RA patients allows to assess the risk of developing and progressing atherosclerosis and AH. The data enables to select the best possible personified therapy for such patients at the early stage of the disease.
LATE-BREAKER POSTERS:
SESSION 1

EYES ON HYPERTENSION: SEVERE MICROVASCULAR RETINAL DYSFUNCTION IN HYPERTENSIVE PATIENTS FAILING TO ACHIEVE BLOOD PRESSURE TREATMENT TARGETS

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Objective: Endothelial dysfunction is crucial in the development, progression, and prognosis of cardiovascular diseases. Small studies in restricted collectives have pointed toward altered retinal endothelial impairment in uncontrolled essential hypertension. There has been no dedicated study to hypertensive patients to this point in time. It was, thus, the aim of this study to evaluate retinal vessel endothelial function - an easily assessable vasculature - in patients with hypertension and evaluate it against structural and functional gold standards.

Rationale: To investigate micro- and macrovascular function in hypertensive patients who have not achieved blood pressure (BP) treatment goal.

Materials & Methods: 80 patients with ill-controlled hypertension (median age 69 ± IQR = 15 years, mean systolic BP 150.4 ± SD = 11.4mmHg, diastolic BP 91.1 ± 9.4mmHg) were prospectively recruited. 74 healthy individuals (HC) age 56 ± 28 years, mean systolic BP 122.2 ± SD = 9.9mmHg, diastolic BP 76.2 ± 7.1mmHg). Microvascular retinal endothelial function was measured via dynamic retinal vessel analysis (DVA). This non-invasive technique measures mainly NO-dependent vascular dilation.

Results: Arterial retinal vascular function (DIA) was significantly impaired in patients with ill controlled hypertension (HTN) compared to HC (mean FID 2.77 ± 0.24% vs. 3.86 ± 0.24 %, p = 0.001). Also, post-flicker constriction was found reduced in HTN (2.77 ± 0.24% vs. 3.86 ± 0.24%, p = 0.046). Static retinal vascular analysis revealed significantly (p = 0.001) lower AER in HTN (0.818 vs 0.808 vs. 0.854 vs 0.007, p = 0.001). PWV was significantly increased in HTN compared to HC (PWV 7.2 ± 0.2 ms-1 vs. 8.7 ± 0.3 ms-1, p < 0.001), Augmentation index at 75/min heart rate was 22.2% in HC versus 25.3 ± 1.5% in HTN (p = 0.045). PWV correlated negatively with FID(r = -0.24, p = 0.003). FMD was reduced (5.66 ± 0.35% vs. 6.23 ± 0.42%) yet not significantly so (p = 0.3). Interestingly, FMD exhibited the often-reported negative correlation with vascular baseline diameter (r = -0.45, p < 0.001) but FID did not exhibit such a correlation (r = -0.02, p = 0.84). 61% of HTN (49/80 patients) received no drug therapy at examination, 3% received 3 or more antihypertensive drugs. Balance for potential confounders was achieved (maximum standardized mean difference 0.18 for LDL; sufficient overlap).

Discussion & conclusions: Our results demonstrate profound alterations in microvascular function of patients with hypertension. Whether these results have clinical or prognostic impact needs to be carefully evaluated in further clinical studies.

BLOOD PRESSURE CONTROL, TREATMENT AND THERAPEUTIC ADHERENCE IN HYPERTENSION, NON-VALVULAR ATRIAL FIBRILLATION AND ORAL ANTICOAGULANT TREATMENT TAQ-PRES PROJECT

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Objective: To analyze the degree of blood pressure control in patients over 65 years, with hypertension (HT), non-valvular atrial fibrillation (NVAF) and oral anticoagulant therapy (OAC) in Primary Care (PC).

To analyze the clinical profile in this type of patients, coexistence with other cardiovascular risk factors (CVRF), differences by gender and age, as well as possible determinants of blood pressure control.

Design and method: Multicenter, descriptive, transversal, retrospective study. Tree urban and one rural PC centers collaborated in the project. All patients attended in any of the centers over 65 years, with diagnoses HT, NVAF and OAC were included. A systematic review of computerized medical history was made, taking anthropometric and analytical measurements, office blood pressure measurements, pharmacotherapy, risk scales and pharmacotherapeutic adherence.

Results: 1038 patients were included. Women 54.7%. The mean age was 81.4 years(SD 7.1), mean body mass index (BMI) 28.7(SD 5.4), smoking 4.8%, enolism 5%, sedentary lifestyle 35.4%, cognitive impairment 12.3%. Coexistence with other CVRF: dyslipemia 53.7%, diabetes 30.2%. Target organ injury: Nephropathy 32.8%, left ventricular hypertrophy 20.1%, peripheral artery disease 8%. Cardiovascular events: stroke 19.8%, coronary heart disease 16.3%, heart failure 26.7%. Mean systolic blood pressure (SBP) 132.6(SD 13.4), mean diastolic blood pressure (DBP) 74.6(SD 9.2). Controlled blood pressure (BP) in 66.7% of patients according to global mean measurements, in 54.7% according to total registered measurements. Statistically significant differences: mean age of patients with controlled BP<140/90 vs uncontrolled BP>140/90 p = 0.001; mean BMI of controlled patient<28.5 vs uncontrolled(29.4) p = 0.04; % diabetic patients controlled(74.5) vs uncontrolled(25.5) p = 0.005. The number of drugs was significantly higher in DM(p<0.005), coronary heart disease(p<0.002) and heart failure(p<0.001).

Most prescribed drugs were aceonucaronol(65.7%) and beta blockers(43.5%). The overall pharmacotherapeutic adherence rate was significantly higher in women(p<0.003) and nephropathy (p<0.001).

Conclusions: The degree of blood pressure control was high respect to mean blood pressure measurements but suboptimal respect to total measurements. There is a high coexistence with other CVRF. Blood pressure control was better in older patients, lower BMI and DM.

SUBTYPES OF MASKED HYPERTENSION AND THEIR ASSOCIATIONS WITH TARGET ORGAN DAMAGE IN UNTREATED CHINESE PATIENTS


Objective: Masked hypertension is office normotension in the presence of ambulatory hypertension, which can be subdivided into isolated daytime, isolated nighttime or day-night hypertension. However, no previous studies contrasted the subtypes of masked hypertension in their associations with target organ damage.

Design and method: Consecutive untreated patients referred for ambulatory blood pressure (BP) monitoring to our Hypertension Clinic were recruited. The cutoff values for daytime and nighttime hypertension were a BP of 135/85 mmHg and 120/70 mmHg, respectively. Measures of target organ damage, including left ventricular mass index (LVMi), carotid-femoral pulse wave velocity (cPWV) and urinary albumin-to-creatinine ratio (ACR), were determined.

Results: The 1808 participants (mean age, 51 years; women, 52%) included 30.4% normotensive subjects, and 37.2% with masked hypertension, among whom 18% had isolated daytime hypertension, 12% isolated nighttime hypertension, and 70% day-night hypertension. After multivariate adjustment, patients with isolated daytime hypertension (7.9 vs 7.5 m/s, P = 0.003) had higher cPWV than normotensive subjects. While patients with isolated nocturnal hypertension (0.79 vs 0.58 mg/mmol, P = 0.002) had higher urinary ACR than normotensive subjects. Patients with masked day-night hypertension had consistently higher cPWV (7.8 vs 7.5 m/s, P < 0.001) and urinary ACR (0.74 vs. 0.58 mg/mmol, P < 0.001) than normotensives. For LVMi, no difference (P > 0.11) between any subtypes of masked hypertension and normotension was observed.

Conclusions: Masked hypertension was prevalent in this untreated outpatient cohort. Masked daytime hypertension was associated with arterial stiffness while nighttime hypertension was associated with kidney damage and day-night hypertension with both target organ measures.
HOMEBLOODPRESSUREMONITORINGANDE-HEALTH:INVESTIGATIONBYFOCUSGROUPSOFPATIENTS’EXPERIENCE WITH THE HY-RESULT® SYSTEM

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Objective: Hy-Result® is a web-based rule management software designed to help patients to comply with the home blood pressure measurement (HBPM) protocol and to self-interpret their results. The study Explore patients’ experience using the Hy-Result® system.

Design and method: Three focus groups with 24 hypertensives patients, general practitioners and 1 hypertension specialist were proposed to hypotensive patients who possess a blood pressure monitor at home and an internet access to use Hy-Result® for home blood pressure monitoring. A maximum variation sampling was performed and the analysis was thematic in a grounded theory approach. The researcher clustered patients’ responses into sub-themes and themes which were compared to highlighted concepts and issues which had been checked by the hypertension expert

Results: 1) Functionality. Hy-Result® is easy to use for all patients. The main drawback is the need to transcribe blood pressure values in absence of automatic data transfer. 2) Medical content. Hy-Result® contains essential information on arterial hypertension and home blood pressure monitoring. According to user interpretation, Hy-Result® generated appropriate reactions: alert, reassurance, delay before going to doctor’s office. For some patients information was obvious. 3) Feelings and expectations. Half of the patients trust Hy-Result®. They all agree that the application gives suggestions and not a diagnosis. Hy-Result® did not cause anxiety and the risk of exaggerated measurements have been discussed. 4) Physician-patient relationship. For patients, using Hy-Result® need to be a doctor’s request. They are aware that Hy-Result® does not replace the judgement of the doctor. Physician-patient relationship did not change, doctor still have the main role in arterial hypertension management.

Conclusions: Hy-Result® is a validated, easy to use, e-health tool for hypertensive patients undergoing HBPM. It can be considered for hypertensive patients of all ages. Most of the patients welcomed it as a complementary tool to facilitate discussion with their physician. Some patients expressed their doubts about Hy-Result®, considering that the system is only for people comfortable with technology. Patients are ready to use Hy-Result® on their doctors’ requests. We still need to evaluate the opinion of medical professionals concerning the system.

NON DIPPING PATTERN OF SYSTOLIC BLOOD PRESSURE DIPPING IN A PORTUGUESE HYPERTENSIVE POPULATION, IS HETEROGENEOUS AND SHOULD BE REDEFINED

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Objective: In 2010 authors publish that non dipper pattern of systolic blood pressure was an heterogeneous division. Bastos et al, 2010 Jul 1;12(7). We updated our population in terms of events and follow up and reanalyse.

Design and method: An hypertensive population n=1200 (645 women), ageing 51 ± 12 years, BMI 27 ± 5 Kg/m2, 53% under antihypertensive medication and without previous CV events were followed during 12.5 ± 5.1 years. There were 251 CV fatal/non-fatal events (147 strokes, 67 coronary, 37 others CV). Systolic blood pressure dipping (SBPD) can be analysed has a variable continuous or a has a dipping pattern extremedippers < 0.8 (EDp) = 76, normal dippers < 0.9 (Dp) = 514, non-dippers > 0.9 < 1.0 (ND) = 525 and reverse dippers > 1.0 (RD) = 83.

Results: When we analysed ND pattern we found it heterogenous. ND was divided in ND1 (>0.9 <0.95) n=207 and ND2 (>0.95 < 1) n = 312. In a Kaplan Meier curve analysis free of CV events there were a worst survival for those. ND1 compared to ND2 (log rank 5.6 p < 0.02) for Stroke (AVC) (log rank 5.3 p < 0.05). When SBPD were analysed including ND1 and ND2 in Kaplan Meier survival free of events RD > ND1 > ND2 > D > ED had worst CV events survival(log rank 26.9 p < 0.000,Stroke (log rank 18.7 p < 0.01), CV death (log rank 30.7 p < 0.000) global mortality (log rank 14.1 p < 0.01) ND1 has a similar histological behaviour as RD and ND2 has D.

In a multivariante Cox analysis, adjusted to age, gender, OBP, diabetes, BMI, CV therapy, SBPD including ND1 and ND2, was predictive of CV events (HR 0.87 (IC 0.77-0.99 p < 0.05) and CV death 0.65 (IC 0.43-0.98 p < 0.05).

Conclusions: In a Portuguese population, non dipping pattern is heterogenous and dividing it in ND1 and ND2 became more predictive of CV, Stroke, CV deaths and global deaths. Perhaps it’s time to look for the non dipping pattern and redefine it in ND1 and ND2 for a more precise CV prognosis.

CLINICAL IMPACT OF A PHARMACEUTICAL PROFESSIONAL SERVICE INTERVENTION WITH OR WITHOUT A MULTICOMPARTMENT MEDICATION IN NON-ADHERENT, UNCONTROLLED, CHRONIC HYPERTENSIVE, POLIMEDICATED PATIENTS IN SPANISH COMMUNITY PHARMACIES. SEFAC-SPD-VALOR STUDY

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Objective: Control of HBP in the Spanish community is far from optimal (only about 50%), and has a negative impact on treatments efficacy and worsens clinical outcomes. Adherence to medication can substantially reduce this risk.

To determine the clinical impact of a pharmaceutical professional service intervention with or without a multi-compartment medication (MOD) in non-adherent uncontrolled chronic hypertensive polimedicated patients living at home and analyze the degree of adherence improvement and blood pressure control.

Design and method: An epidemiological prospective multicenter trial to evaluate an intervention in community pharmacy on the managing of hypertension and adherence of treatment (Morinsky-Green Test), control group, pre and post measurements (1,3 and 6 months)

Results: Preliminary results in 75 and 51 valid patients at 3 and 6 months respectively, indicate that this service would help to increase adherence in non adherent patients (77% at 3 month and 76% at 6 month) with the use of MOD versus 30% at 3 month (p < 0.0001) and 30% at 6 month (p < 0.0017) in the control group.

Blood pressure showed a reduction of 23.3 mmHg (p < 0.0001) for systolic blood pressure (SBP) and 7.75 mmHg (p < 0.0001) for diastolic blood pressure (DBP) in the MOD group; vs. 10.06 mmHg (p < 0.05) and 5.04 mmHg respectively in the control group.

In addition, the number of antihypertensive drugs distributed to the patients diminished from 5.17 pills in the basal period to 1.86 pills (p < 0.0001) at 6 months in the MOD group and from 3.60 pills to 1.53 pills (p < 0.0019) in the control group.

It’s an ongoing trial, final results will be operational at the end of may 2018.

Conclusions: The present study shows how a pharmaceutical professional service intervention thru a MOD as a tool versus a control group, increased in both arms significantly adherence in non-adherent HBP polimedicated patients, diminished HBP significantly and reduced de number of pills in a 6 months period followed up. Differences were seen among arms due to the fact that pharmacist review the medication, evaluate interactions and maintain a continue follow up with patients in the MOD group.

HYPERTENSION SELF-MANAGEMENT DIGITAL SYSTEM: IS DRUG SELF-REPORTING RELIABLE?

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Objective: e-health technology offers new possibilities for the self-management of home blood pressure measurements (HBPM). Hy-Result is a validated rule management system designed to help users to comply with the HBPM protocol and self-interpret their HBPM readings. The algorithm takes in account HBPM readings and patient characteristics and produces a PDF file with an automatized interpretation of the BP levels and educational information in plain language. When entering data (including risk factors and comorbidities), the patient can provide his current antihypertensive treatment in a non-mandatory free text field and send his report to the physician or nurse. We assessed the accuracy of the treatment self-reported by system users.

Design and method: Observational, cross-sectional, retrospective study. Included patients consulting in an ESH excellence centre who had used the web system and e-mailed their PDF report to the centre. We checked the accuracy of the self-reported treatment (number of drug classes, name, dosage, number of daily intakes) compared to the medical prescription recorded in the medical file.

Results: Ninety four patients (35% females, average age 53,3) e-mailed their PDF reports; 10 reports were excluded because treatment was not self-reported (4) or not recorded during the consultation (6). Full concordance on the 4 criteria (4) or not recorded during the consultation (6). Full concordance on the 4 criteria was performed and the analysis was thematic in a grounded theory approach. The researcher clustered patients’ responses into sub-themes and themes which were compared to highlighted concepts and issues which had been checked by the hypertension expert
THE ASSOCIATIONS OF TARGET ORGAN DAMAGE WITH MORNING HYPTERTENSION BY VARIOUS DEFINITIONS

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Objective: Morning Hypertension (MHT) can be defined based on ambulatory blood pressure (BP) monitoring (ABPM) or home BP monitoring (HBPM). In which definition MHT is more associated with cardiovascular outcome remains unknown.

Design and method: From 2010–2015, we consecutively recruited untreated outpatients from our Hypertension Clinic. MHT was an average BP of at least 135/85 mmHg in the morning defined either based on HBPM, or the diary (the first 2 h after awakening) or short-clock time interval (6–10 AM) on the day of ABPM, irrespective of the BP levels at other time windows. We assessed carotid-femoral pulse wave velocity (cPWV) by SphygmoCor system, left ventricular mass index (LVMi) and carotid intima-media thickness (IMT) by ultrasonography, and urinary albumin/creatinine ratio (ACR) as measures of target organ damage.

Results: In the 1085 untreated patients (age 51.2 years), the prevalence of MHT was 63.7%, 65.1% and 48.7% based on the ABPM diary, short-clock time interval and HBPM, respectively. After adjustment for age, sex, and other cardiovascular risk factors, patients with MHT compared to normotensives had a significantly increased cPWV, urinary ACR and carotid IMT, irrespective of the definitions.

Conclusions: Morning hypertension was associated with target organ damage.

HOME BP LEVELS AND ARTERIAL STIFFNESS IN PATIENTS WITH MILD TO MODERATE ARTERIAL HYPERTENSION

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Objective: Home BP monitoring (HBP) known to be a stronger predictor of cardiovascular morbidity and mortality than office BP measurements. The aim of this study was to find target HBP levels bases on subclinical TOD indicators.

Design and method: We studied the 39 patients (24 women, 15 men), with an average age of 52.0 ± 1.4 years, 9 males) with confirmed true RHTN (mean of 4.2 ± 1.4 antihypertensive drugs intake) who underwent bilateral RDN procedure (Symplicity RDN System, Medtronic, USA). BP and BPV (by means of average real variability) were assessed by ABPM (BPlab, Petr Teleigin, Russia) at baseline, 12-month and 24-month after procedure.

Results: In overall population there was a decrease of both office and 24-hour SBP at 12 months after RDN (-26 ± 20.2 mmHg; -17.4 ± 10.8 mmHg; respectively, p < 0.05 for all), however further reduction at 24-month follow-up was only for “office” SBP (-22.8 ± 23 mmHg; p < 0.02 and -22.6 ± 17.6 mmHg; p = 0.3 respectively), 24-hour BPV decreased from 18.8 ± 4.4 mmHg to 17 ± 4.2 mmHg (-2.6 ± 3.7 mmHg; p = 0.0011) after 12 months and continued to decline to 15.36 ± 2.9 mmHg (-3.3 ± 2.5 mmHg; p = 0.002) two years after procedure.

Conclusions: The study enrolled 22 consecutive patients (mean age 56 ± 10.2 years, 3 males) with confirmed true RHTN (mean of 4.2 ± 1.4 antihypertensive drugs intake) who underwent bilateral RDN procedure (Symplicity RDN System, Medtronic, USA). BP and BPV (by means of average real variability) were assessed by ABPM (BPlab, Petr Teleigin, Russia) at baseline, 12-month and 24-month after procedure.

Aim of the present study was to assess effect of RDN on blood pressure levels and BPV during 2-years follow-up.

Design and method: The study enrolled 22 consecutive patients (mean age 56 ± 10.2 years, 3 males) with confirmed true RHTN (mean of 4.2 ± 1.4 antihypertensive drugs intake) who underwent bilateral RDN procedure (Symplicity RDN System, Medtronic, USA). BP and BPV (by means of average real variability) were assessed by ABPM (BPlab, Petr Teleigin, Russia) at baseline, 12-month and 24-month after procedure.

Results: In overall population there was a decrease of both office and 24-hour SBP at 12 months after RDN (-26 ± 20.2 mmHg; -17.4 ± 10.8 mmHg; respectively, p < 0.05 for all), however further reduction at 24-month follow-up was only for “office” SBP (-22.8 ± 23 mmHg; p < 0.02 and -22.6 ± 17.6 mmHg; p = 0.3 respectively), 24-hour BPV decreased from 18.8 ± 4.4 mmHg to 17 ± 4.2 mmHg (-2.6 ± 3.7 mmHg; p = 0.0011) after 12 months and continued to decline to 15.36 ± 2.9 mmHg (-3.3 ± 2.5 mmHg; p = 0.002) two years after procedure. In 15 patients RDN provided decrease of BP level > 20 mmHg in 7 patients resulted in 10 mm Hg decrease. Both groups had a significant reduction of BPV in 24-month (-5.0 and -1.3 mmHg respectively; p < 0.01). There was a positive correlation between change of SBP, 24-h SBP and 24-h BPV at 24-month visit compared to baseline (r = 0.654 for office SBP/BPV; p = 0.02 and r = 0.628 for 24-h SBP/BPV; p = 0.02).
Conclusions: RDN resulted in significant reduction of 24-BPV in patients with both marked and moderate decrease of blood pressure level indicating additional positive impact on adverse prognostic features of hypertension.

ANALYSIS OF 24 HOURS BLOOD PRESSURE PATTERN IN NONHYPERTENSIVE CHRONIC HEART FAILURE PATIENTS


Objective: Ambulatory blood pressure monitoring (ABPM) permites the evaluation of 24 hours blood pressure pattern. It is well defined the prognosis value of the abnormalities in the circadian variation in hypertensive patients. In the pathophysiology of heart failure, neurohumoral mechanism plays an important role. Nevertheless, the circadian variation in nonhypertensive heart failure patients has not been well evaluated.

Design and method: We studied 80 patients with a clinical diagnosis of nonhypertensive CHF. They were followed-up by the Heart Failure Unit. We perfromed a 24 h ambulatory blood pressure monitoring as well as an echocardiogram and analycal test.

Results: A total of 80 patients. Mean age: 62.7 ± 12. Males: 72.5%. Mean BMI: 29.6 ± 5 Kg/m2. Mean time of follow-up of CHF: 69 ± 66 months. Associated risk factors: dyslipidemia 25% Diabetes 20% obesity 45% active smoking 30%, ex-smoking 27.5%.

Conclusions: Nonhypertensive heart failure patients had, in majority, an abnormal pattern of ABPM, as it is shown on table 2.

IS THERE A RELATIONSHIP BETWEEN VITAMIN D3 AND HYPERTENSION AND THE NUMBER OF ANTIHYPERTENSIVE DRUGS USED?

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Objective: In our study we wanted to search is there a relationship between vitamin D3 and hypertension and the number of antihypertensive drugs used.
Results: There was no significant relationship between vitamin D3 level and the number of antihypertensive drugs used (p: 0.349). Also there was no significant relationship between vitamin D3 level and blood pressure presence (p:0.083). Also there was no significant relationship between vitamin D3 level and the number of antihypertensive drugs used (p: 0.349).

Conclusions: Further work in this subject is necessary.

RELATION BETWEEN PULSE WAVE AND HEART FAILURE IN HYPERTENSIVE PATIENTS

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HYPERTENSIVE PATIENTS

C. Alcantara2, P. Alcantara1, V. Ramalhinho1, F. Veloso2, C. Santos Moreira1.

Objective: The increased central aortic stiffness has been identified as an independent risk factor for heart failure and end-organ damage. Carotid-femoral pulse wave velocity (PWV) measures the stiffness over large part of the aorta, and objective of this study is evaluate the relation between carotid-femoral pulse wave and cardiac parameters.

Design and method: We compared three groups of hypertensive patients with the same age and sex: SD - with systolic dysfunction, DD - with diastolic dysfunction and NLV - with normal LV function. All participants underwent a comprehensive echocardiographic study including carotid artery sonography, and assessments of arterial stiffness and wave reflections. Patients with uncontrolled hypertension, uncontrolled diabetes mellitus, recent myocardial infarction (within 3 months), atrial fibrillation, valvular heart disease, recent stroke (within 3 months) or established peripheral artery disease were excluded. The model was ANOVA oneway and regression analysis.

Results: There are no differences in sex, office and ambulatory Diastolic Blood Pressure (DBP). The office and ambulatory systolic blood pressure (SBP), aortic systolic (ASBP) and diastolic blood pressure (ADBP) are different among the three groups (SD SBP 118.2 ± 18.6; DD SBP 136.1 ± 21.3; NLV SBP 128.7 ± 18.3p < 0.01); (SD ASBP 108.8 ± 17.6; DD ASBP 124.1 ± 20.4; NLV ASBP 116.6 ± 16.2p < 0.01), (SD ADBP 65.4 ± 9.5; DD ADBP 80.1 ± 11.1; NLV ADBP 72.8 ± 11.7p < 0.01). The carotid-femoral pulse wave velocity was different (SD PWV 12.7 ± 4.3; DD PWV 13.6 ± 4.1; NLV PWV 11.6 ± 3.3p < 0.01) and central augmentation index (SD CAI 23.2 ± 14.1; DD CAI 26.2 ± 13.5; NLV CAI 21.3 ± 13.3p < 0.01). We found a relation between PWV and left ventricular mass index, and between CAI and relation A/E waves and E/E'.

Conclusions: The present study expanded the usefulness of carotid-femoral pulse wave velocity and central augmentation index as a risk factor for cardiovascular disease in patients with advance disease. We found that these parameters can be used to establish a relation to cardiac function in patients with hypertensive disease and could be used to predict the vascular lesions that these patients might have.

AMBULATORY BLOOD PRESSURE MONITORING AFTER ONE CARDIOVASCULAR EVENT IN PREDICTION OF A SECOND CARDIOVASCULAR EVENT

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Objective: In patients with previous cardiovascular (CV) event it is not clear whether Ambulatory Blood Pressure Monitoring 24 H (ABPM) has prognostic value for recurrence. The objective was to compare ABPM values after a first CV event between patients with (2EV) and without (1EV) a second CV event and to evaluate if ABPM has a role in secondary prediction.

Design and method: We studied 187 hypertensive patients with ABPM after a first CV event. ABPM data in 2EV vs 1EV were compared.

Results: Of the 187 patients (74.3 % male) aged (66.6 ± 10.7 years, followed for 2.3 ± 1.9 years, 158 were 1EV and 29 were 2EV. In the 2EV, mean age was 67.2 ± 9.5 and 72.4% were male. Comparison of the ABPM parameters between the 2EV vs 1EV showed: 24H systolic blood pressure (SBP) (134 ± 15 vs 125 ± 13 mmHg, p:0.002), day SBP (138 ± 15 vs 129 ± 13 mmHg, p:0.002), night SBP (128 ± 18 vs 118 ± 16 mmHg, p:0.003), 24H pulse pressure (PP) (62 ± 13 vs 55 ± 13 mmHg, p:0.004), day PP (63 ± 13 vs 55 ± 14 mmHg, p:0.005) and night PP (62 ± 14 vs 53 ± 14 mmHg, p:0.003). The Cox model, adjusted for gender and age, showed correlation with recurrent events for: 24H SBP (HR = 1.032, 95CI 1.005–1.060, p:0.021), day SBP (HR = 1.026, 95CI 1.001–1.052, p:0.043), night SBP (HR = 1.031, 95CI 1.007–1.055, p:0.011) and 24H PP (HR = 1.046, 95CI 1.013–1.081, p:0.007).

In the survival analysis, the 24H SBP ROC curve showed an AUC of 0.627 (p: 0.003). The value of 124 mmHg was the best cutoff of SBP (sensitivity 82.7%, specificity 51.2%) for prediction of secondary CV events. The survival Kaplan Meyer curve showed a worse prognosis for the 2EV with 24H SBP > 124 mmHg (log rank 6.032, p: 0.014) (not observed in the 135 mmHg 24H SBP Kaplan Meyer, p:0.224).

Conclusions: In patients with previous cardiovascular events, higher values of 24H, daytime and night-time SBP are more predictive of cardiovascular events. In our 2EV population, a 24H SBP higher than 124 mmHg is more predictive of secondary events.

INTER-ARM DIFFERENCES IN BLOOD PRESSURE AND MORTALITY: INDIVIDUAL PATIENT DATA META-ANALYSIS AND DEVELOPMENT OF A PROGNOSTIC ALGORITHM (INTERPRESS-IPD COLLABORATION)

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Objective: Study-level meta-analyses have associated inter-arm differences (IAD) in systolic blood pressure (SBP) with increased mortality. However key areas of investigation remain, such as determining the additional contribution of IAD to prognostic risk estimation for cardiovascular and all-cause mortality, and determining the minimum value for IAD that defines elevated risk. We are conducting an individual participant data (IPD) meta-analysis to address these questions.

Design and method: Systematic review and IPD meta-analysis; we identified prospective studies that measured SBP in both arms during recruitment, and invited contribution of eligible datasets to the Collaboration. Study datasets were cleaned and combined into a single dataset for analyses. A non-random sample of four datasets were reserved for model validation; remaining data were analysed in fixed effect 1-stage meta-analyses with multivariable time-to-event regression modelling. Analyses of IAD dichotomised using cut-offs by 1mmHg increments from 0 to 20 mmHg, adjusted for age, gender and baseline SBP, were compared to identify a lower limit of IAD associated with increased all-cause mortality using random effects 2-stage models.

Searches Data

Searches to January 2017 yielded 4448 unique citations, 152 full texts were screened, 60 potentially relevant datasets were identified and their authors contacted. Data from 24 studies (57,434 eligible individual adult patients) were received.

Results: In complete case analysis of 35,900 records (the deriviation cohort), absolute systolic IAD was associated with increased all-cause mortality: fully adjusted hazard ratio (HR) 1.01, 95% confidence interval (95%CI) 1.00 to 1.02 per mmHg of IAD. Other significant model variables were age, gender, baseline SBP, current smoking, total cholesterol, and diagnosis of hypertension or diabetes. Incremental analyses of 50,661 records showed increasing HRs associated with rising IAD cut-offs, and suggested that an IAD of 7 mmHg or more is associated with increased risk of all-cause mortality.

Conclusions: This IPD meta-analysis confirms the role of systolic IAD as an independent risk marker for all-cause mortality, with a threshold of 7 mmHg as a lower limit for increased mortality risk. We continue to model cardiovascular outcomes and will present full results to the meeting.

URINE ALBUMIN-TO-CREATININE RATIO IS ASSOCIATED WITH ASYMPTOMATIC INTRACRANIAL ATHEROSCLEROTIC STENOSIS IN HYPERTENSIVE PATIENTS

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Objective: Intracranial atherosclerotic stenosis (ICAS) contributes to nearly 50% of stroke in China, especially in patients with hypertension. Urine albumin-to-creatinine ratio (ACR) has been related to stroke and other atherosclerotic cardiovascular diseases. However, there is limited information about the effect of ACR on early impairment of cerebral vessels. Hereby we assessed the association between ICAS and ACR in a stroke-free hypertensive population.

Design and method: Computed tomography angiography was performed to detect atherosclerotic stenosis of intracranial arteries in 889 hypertension patients. A random spot urine was sampled to evaluate ACR. Logistic regression was carried out to analyze the association of ACR with the presence, extent and lesion number of ICAS. Risk factors which we previously identified were also added in the adjustment to determine whether the association of elevated ACR with ICAS was independent.

Results: There were 336 patients (37.8%) with ICAS. Elevated ACR (> = 30 mg/g) was associated with ICAS after adjustment of confounding factors (OR = 1.65, 95% CI: 1.21–2.27). This association remained significant in patients who were male, > 65 years and without diabetes. Patients with elevated ACR were more prone to develop moderate to severe stenosis (OR = 1.57, 95% CI: 1.16–2.12) and more lesions (OR = 1.58, 95% CI: 1.16–2.15). The association of elevated ACR with ICAS was independent of previously discovered risk factors.

Conclusions: Our findings suggested that ACR was associated with asymptomatic ICAS in an aged stroke-free hypertensive population. ACR may serve as a convenient and independent early marker of ICAS in clinical practice.

DIFFERENCES IN LABORATORY FINDINGS OF HYPERTENSIVE PATIENTS DEPENDING ON RISK FACTORS, SETTLEMENT AND AGE

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Objective: Hypertension is a chronic disease with growing incidence. Monitoring of laboratory parameters is important in global cardiovascular risk assessment. Evaluation and comparison of laboratory results and risks in patients included in distinct age groups and those from urban and rural settlements.

Design and method: The study was conducted on 127 hypertensive patients during the first three months of 2017 at an urban outpatient unit specialized on cardiovascular diseases. Serum samples of patients were processed with Konelab20XTi analyzer using photometric method. Glycemia and lipid profile, kidney and liver function were determined. Urine tests were performed using the HandURReader equipment. Statistical processing of data was made using the GraphPad InStat program. Threshold of significance was set at p < 0.05.

Results: Mean age of the patients was 63 years, 56.7% were male subjects. Significant difference (p = 0.0475) occurred between serum HDL-cholesterol concentration of rural (average 75.6 mg/dl ± 12.5 SD) and urban patients (average 49.1 mg/dl ± 13.0 SD). Significantly higher serum urea levels were found in the rural subgroup (mean: 44.3 mg/dl ± 13.0 SD) compared to those from urban settlements (mean: 36.4 mg/dl ± 15.0 SD). Pathological urine compounds were found in 43.3% of rural patients and in 29.9% of urban subjects. Significant difference could be observed between the comorbidities present in these subgroups: diabetes was twice as frequent in the rural subgroup compared to urban subjects, prevalence of dislipidemia was three times higher in the urban group compared to rural patients. Significant difference could be observed between creatinine-based glomerular filtration rate (average 57.7 mL/min) of elderly subjects (>70 years) compared to higher values of younger patients, especially those under 60 years of age. No significant difference could be noticed between glycemia, serum uric acid, triglyceride, total cholesterol concentration and transaminase activity of different subgroups based on age or settlement.

Conclusions: We can conclude that rural patients present higher protective HDL-cholesterol level compared to urban subjects and lower prevalence of dislipidemia, probably related to their different diet, this might also be the background of their higher serum urea concentration.

CLINICAL AND BIOCHEMICAL CORRELATIONS OF HYPERURICEMIA IN ESSENTIAL HYPERTENSION.

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Objective: Arterial hypertension and metabolic syndrome are clinical conditions leading to cardiovascular complications secondary to atherosclerosis. Hyperuricemia as a one of components of metabolic syndrome might directly damage arterial wall and cause atherosclerosis. Matrix metalloproteinases are involved in many processes associated in arterial wall damage and formation of atherosclerotic plaque. Their role in vascular pathology connected with hyperuricemia is unknown. Aim of the study was to identified clinical and biochemical differences between patients with mild primary arterial hypertension with and without of hyperuricemia with a particular evaluation of the wide spectrum matrix metalloproteinases serum activity.
Design and method: Among patients with essential arterial hypertension (AH) stage 1 or 2 never treated by antihypertensive, hyperlipemic or hyperuricemic therapy we distinguished two groups. Asymptomatic hyperuricemia was defined as a serum uric acid over 356 µmol/l in females and over 416 µmol/l in males. The study participants were divided into two groups. Group 1 (G1) involves patients with asymptomatic hyperuricemia and AH, group 2 (G2) consisted of patients with normal uric acid and AH. We obtained in both groups anthropometric and clinical data including office and 24-hour ABPM. Several measures of subclinical organ damage were also obtained. In all the patients we assessed basic laboratory parameters and matrix metalloproteinases activity (MMP1, MMP2, MMP3, MMP9, TIMP1).

Results: Hypertensive, hyperuricemia patients in G1–group have higher diastolic and systolic nighttime blood pressure (SBP: 119±11 mmHg vs. 113±11 mmHg, p = 0.037; DBP: 72±9 mmHg vs. 67±9 mmHg, p = 0.043). BMI (29.75 kg/m2 vs. 26.70 kg/m2, p = 0.002), higher waist circumference (97 cm vs. 87 cm, p = 0.003) and higher triglycerides (1.56 mmol/l vs. 1.20 mmol/l, p = 0.032), metalloproteinases 3 activity (MMP3) (19.41 µg/ml vs. 14.29 µg/ml, p = 0.01) than patients without hyperuricemia in G2–group. Among analyzed subclinical organ damage parameters was observed negative correlation between decrease eGFR below 90 ml/min/1.73m2 and uric acid concentration (R = -0.37, p < 0.05). Considering analyzed MMPs activity only MMP3 activity was higher in G1 than G2. Serum uric acid concentration in univariate linear regression remained in significant association with MMP3 activity (R2 = 0.99, B = 0.3, p = 0.002). This relationship was still significant after adjustment to age sex and BMI.

Conclusions: Patient with essential arterial hypertension and hyperuricemia are characterized by higher prevalence of other metabolic syndrome components as a visceral obesity and hypertriglyceridemia. Uric acid concentration is associated with MMP3 activity, which is metalloproteinase initiating the cascade of other metalloproteinases responsible for degradation of structural vascular wall fibroproteins.

ADVANTAGE OF MOCA AS COGNITIVE ASSESSMENT OVER PBEIL IN HYPERTENSIVE PATIENTS WITH MILD COGNITIVE IMPAIRMENT

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Objective: Correlations between blood pressure (BP), pulse wave velocity (PWV) and the Montreal Cognitive Assessment test (MOCA) with Berg’s Card Sorting Test (BCST) from battery of Psychology Experiment Building Language in hypertensive patients with mild cognitive impairment (MCI). The usefulness of MOCA and BCST in assessing the cognitive disorders.

Design and method: 32 patients with hypertension and MCI qualified by MOCA. The global cognitive assessment based on the neuropsychological tests: MOCA and BCST (computerized version of the Wisconsin Card Sorting Test). In BCST the percentage of correct (CA) and incorrect answers (IA), perseverative answers (PA), perseverative PE and non-perseverative errors (NPE) were assessed. The score MCI in MOCA test is < 26. The ambulatory blood pressure monitoring and PWV were performed. The Pearson test was used to analyze the correlation, the t-student test to the statistical analysis.

Results: The mean systolic BP was 126.75 ± 12.83 mmHg and the mean diastolic BP 76.94 ± 7.94 mmHg. The mean PWV was 11.83 ± 1.73 m/s and MOCA was 24.06 ± 9.98 points. The mean value of CA was 75.49 ± 8.69%, IA 24.5 ± 8.7%, PA 38.42 ± 7.46%, PE 17.1 ± 7.1% and NPE 7.42 ± 2.7%. PWV correlated with score of MOCA (r = -0.743, p < 0.05) and has positive correlation with BP. MOCA has significant correlation with SBP (r = -0.4867) and DBP (r = -0.4913). We showed: negative correlation MOCA with percentage of CA; positive with IA, PA, PE and NPE. PWV has negative correlation with CA, IA, PA and PE; positive with CA and NPE.

Conclusions: Lower pressure values are associated with more correct answers of BCST. The higher PWV indicates higher BP and lower MOCA result. Suprising correlations with BCST: the higher PWV is associated with the more correct answers, while the lower is with larger percentage of incorrect answers; the higher MOCA result, more errors and less correct answers. Arterial stiffness contributes to MCI in hypertensive patients, so more research are needed to decide if computerized form of cards sorting test is useful to recognize the executive function disorders. The study indicates that MOCA is better in the assessment of cognitive function.

ARTERIAL STIFFNESS AS A PROGNOSTIC FACTOR FOR HYPERTENSIVE ENCEPHALOPATHY

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Objective: Although hypertension (HT) is a well-established risk factor for stroke, it is also known about hypertensive encephalopathy (HE) when neurologic sequela of chronic HT appear as multifocal/diffuse MRI findings and can be asymptomatic. The aim of this study was to assess vascular markers as prognostic factors for HE.

Design and method: We evaluated 127 (75 male) patients aged 63 (57.68) with HT. Neurological exam included assessment of motor functions, coordination, cognitive functions etc. The brain MRI images of these patients were reviewed. Arterial stiffness indices (pulse wave velocity, PWV; augmentation index, AIx; arterial stiffness index, ASI) were obtained using oscillometry-based method during 24-h ABPM (Vasotens technology).

Results: Baseline characteristics of patients are shown in table 1.

| Table 1 |
|-----------------|-----------------|-----------------|-----------------|
| History of hypertension, years, n (SD) | Grade I of HT, n (%) | Grade II of HT, n (%) | Grade III of HT, n (%) |
| 11 (8) | 26 (21) | 69 (54) | 32 (25) |
| Non-disabling subcortical minor stroke in the past, n (%) | Diabetes mellitus, n (%) | Left ventricular hypertrophy, n (%) | Hemodynamically significant brachiocephalic arterial stenoses, n (%) |
| 44 (35) | 26 (21) | 115 (89) | 19 (15) |
| 30 (24) |

Stepwise discriminant analysis defined a model of the 6 signs that determine HE (Wilks’ Lambda: 0.34199 approx. F (12.82) = 4.8516 p < 0.0001) including 24-h PWV > 8.2 m/s; ASI > 171; minor stroke in the past; history of hypertension > 15 years; 24-h mean BP > 104 mmHg; 24-h pulse pressure > 55 mmHg. There were statistically significant correlations between vascular markers (PWV, ASI, AIx) and the severity of MRI structural changes in brain (number of foci, severity of leukoarosis, enlargement of subarachnoid and of perivascular spaces, ventricular enlargement).

Conclusions: Along with previous stroke, duration of HT history, mean and pulse BP, such vascular markers as arterial stiffness indices have an independent association with HE.

INCIDENCE AND PREDICTORS OF NEW ONSET TYPE 2 DIABETES AMONG HYPERTENSIVE-OBESE PATIENTS

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Objective: Objectives: Calculate the incidence rate and predictors of progression to new onset Type 2 diabetes mellitus (T2DM) in hypertensive patients. Methods: An analytical retrospective cohort study was conducted in 9 primary care centers located at urban area of Qatif. It included 438 high risk patients with essential hypertension, 234 (53.4%) obese and 204 (46.6%) non-obese, who had normal fasting blood glucose and hemoglobin A1c or at prediabetes stage at baseline. Participants were followed for a mean duration of 38.3 months (1399.3 person-years). T2DM was diagnosed based on the American Diabetes Association criteria. Incidence rates for T2DM was calculated and its predictors were estimated using the Cox proportional hazards model.

Design and method: The incidence rate for new onset T2DM among all, obese and non-obese patients with essential hypertension were 82.9 (95% confidence interval (CI): 68.8–99.1), 100.7 (95% CI: 79.5–125.9), and 63.8 (95% CI: 46.7–85.1) per 1,000 person-years respectively. Yearly incidence of T2DM was the highest in the first and second years of follow up. It was 10.3% and 11.4% among obese, respectively, while it was 7.3% and 9.5% among non-obese, respectively. After two years of follow up, yearly incidence continued rising among obese patients, only. Predictors of new onset T2DM were female gender, family history of diabetes, dyslipidemia, fasting blood glucose and body mass index.

Conclusions: In hypertensive patients, new-onset T2DM was highest in the first two years of follow up, particularly among obese patients. Targeting modifiable risk factors is mandatory to decrease the chance of onset.

FERNANDEZ’ STROKE: HYPERTENSION AND HYPOTENSION AND CARDIOVASCULAR RESOLUTIONS

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Objective: Practitioners/Researchers presently do not know that the knowledge of the coverage determinations of High Blood Pressure Oxygen Stroke(s)/Hemorrhage or...
of Low Blood Pressure Oxygen Stroke(s)/Syncope (BP < 70/40) including their ICD Codes, are missing from their Diagnosis and Treatment of Syncope (BP > 200/110? or BP < 70/40). The following organizations must Correct the ICD’s, and the Manuals or Guidelines involved in the Diagnosis and Treatment of Syncope in order to reduce the Systemic Number of Cryptogenic Strokes, Number of Syncope, Mortality and Morbidity Rates, and Medical Costs: • HHS (MAC), 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients with Syncope • VA/DoD (Champions) Clinical Practice Guideline for the Diagnosis and Management of Hypertension in the Primary Care Setting • European Society of Cardiology (ESC) (Chairperson), Guidelines for the Diagnosis and Management of Syncope (Version 2009) • WHO (Unknown), International Classification of Diseases (ICD) (For the Practitioner to Diagnose and Treat Syncope (BP < 70/40) and get paid). Design and method: This original contribution of all new, currently-updated, evidenced-based epidemiology is presently available in the clinical setting with knowledge of Syncope/Stroke/Transient Loss of Consciousness in the Fernandez’ Stroke report. SCIENTIFIC DATA A prolonged (6) year Blood Pressure Monitored Fernandez’ Madam X Syncope Clinical Study was conducted in contrast to the conventional strategy-based-on-laboratory testing and resulted in: • A Class of Recommendation (COR) of 1 (beneficial, useful, effective), • A level of evidence of A (by its observation in any clinical setting). Results: This Stroke report has translated this knowledge into actionable-recommendations of what to do when a person faints, provides new strategies, describes an effective mechanism-specific treatment, conclusively identifies the specific risks to the patient, guides the therapy, and reduces Syncope/Stroke/Transient Loss of Consciousness recurrences. Conclusions: All the Practitioner has to do is monitor the patient’s Blood Pressure and follow the treatment procedures. This will mitigate the Syncope symptoms but will not cure any other underlying diseases; And when the Issuers for the ICD’s, Manuals and Guidelines make their corrections the Syncope systemic number of falls, strokes, mortality, morbidity, and medical costs will decrease.

NON-SURGICAL PERIODONTAL TREATMENT IMPROVES CARDIOVASCULAR ADAPTATION TO ORTHOSTATIC CHALLENGE IN THE SHORT-TERM

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Objective: Periodontal health status influences systemic health, and periodontal treatment (PT) has been shown to improve systemic inflammation and endothelial dysfunction. The latter has been associated with orthostatic intolerance. We hypothesized that single-stage scaling (SSS) and full mouth disinfection (FMD) may affect cardiovascular (CV) response to orthostatic challenge in otherwise healthy subjects who needed non-surgical PT (NSPT).

Design and method: 20 age-sex-BMI-matched patients (10 M;10F) aged 42.5 ± 13.9 years who needed NSPT underwent SSS (n.12) or FMD (2 sessions 48 h apart; n.8) based on disease severity. Systolic and diastolic BP (SBP; DBP; mmHg) and heart rate (HR; bpm) were measured with a validated automatic device (Omron M6 Comfort It) in clino- (3x) and orthostatism (within 1¢ after standing) before and after each treatment and 7 days after completion of treatment. Within- and between-group analyses were performed. Data were expressed as mean ± SD. Significance level was set at p < 0.05.

Results: Overall, baseline CV parameters were as follows: SBP 120.2 ± 13.9mmHg, DBP 74.6 ± 11.6mmHg, HR 70.1 ± 11.6bpm in clino-; SBP 126.8 ± 14.5mmHg, DBP 82.2 ± 7.8mmHg, HR 77.7 ± 12.3bpm in orthostatism. No statistical difference was observed between treatment groups. Soon after each treatment session (acute effect), a non-significant increase in BP and a reduction in HR were observed in the population overall compared to baseline (clino: SBP +1.18mmHg, p = 0.52; DBP +2.05mmHg, p = 0.18; HR -4.93bpm, p = 0.0001; ortho: SBP +3.25mmHg, p = 0.26; DBP +3.1mmHg, p = 0.11; HR -2.15bpm, p = 0.07). Seven days after treatment (final effect), a significant (except for oDBP) decrease in the CV parameters compared to the basal condition was observed in the population overall in both conditions (clino: SBP -5.48mmHg, p = 0.03; DBP -4.27mmHg, p = 0.01; HR -4.48bpm, p = 0.002; ortho: SBP -6.22mmHg, p = 0.01; DBP -1.05mmHg, p = 0.59; HR -4.33bpm, p = 0.03). No statistical difference was observed in the acute or late effects on CV parameters between treatments.

Conclusions: NSPT determined a significant delayed reduction in BP and HR that persisted after orthostatic challenge, irrespective of treatment. These results are in line with previous findings on endothelial-mediated effects of NSPT. Longer follow-up is needed in order to verify any longer persistence of these effects and their potential impact on CV health.
EFFECTS OF BACKGROUND STATIN THERAPY ON LOCAL RIGIDITY PARAMETERS IN PATIENTS WITH STEMI

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Objective: to analyze the carotid artery stiffness parameters in patients with STEMI.

Design and method: 85 patients were included in the study: 75 men and 10 women. The main group received atorvastatin 80 mg/day; the comparison group received atorvastatin 20 mg/day. The first group included 46 patients (41 men and 5 women), the average age was 51.2 ± 9.5 years. The second group consisted of 39 people (36 men and 3 women), aged 52.7 ± 8.2 years. The groups were matched by age, sex, height, BMI, offi ce BP.

Results: The Aix has signifi cantly increased in both treatment groups: in the 1st group - from 0.85 (0.63, 1.12) to 0.94 (0.79, 1.13) mm2/kPa. There was a decrease in PWV measured locally in the carotid arteries at 6%; from 1.2 (0; 4.2) to 4.2 (2.5, 8.5%) p < 0.05; in the 2nd - from 1.06 (-0.14, 2.6) to 4.9 (2.3, 6.3%) p < 0.05.

Conclusions: high-dose atorvastatin therapy has a signifi cant positive eff ect on stiffness parameters of carotid arteries and IMT in STEMI patients according to radiofrequency analysis of the ultrasound signal.
CARDIAC MAGNETIC RESONANCE-DERIVED STRAIN ANALYSIS AND MOLECULAR BIOMARKERS OF FIBROSIS IN HYPERTENSIVE HEART DISEASE

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Objective: Preclinical cardiac dysfunction can be assessed using cardiac magnetic resonance (CMR) imaging-derived strain analysis. Molecular biomarkers of fibrosis have shown association with clinical outcomes, preclinical target organ damage and histologically proven myocardial fibrosis. The aim was to investigate the relationship of CMR-assessed strain with circulating biomarkers of fibrosis in hypertensives with left ventricular hypertrophy (LVH).

Design and method: CMR and assessment of biomarkers of fibrosis were performed in CVD-free hypertensives with positive ECG-derived criteria for LVH. Longitudinal, circumferential and radial strain were assessed using CMR-feature tracking. The concentrations of molecular biomarkers of collagen synthesis (PICP, PIIINP) and collagen degradation (CTTP, MMP-1) were measured using commercial kits. Pearson’s correlation and multiple linear regression analysis controlling for gender, age, height, weight, heart rate and 24-h systolic BP were performed in order to assess the relationship between available variables.

Results: 36 hypertensives (83% males, mean age 50.6 ± 4.3) underwent CMR imaging, and strain analysis was performed in 33 participants. Correlation models showed a significant relationship of longitudinal strain with CTTP; In fully adjusted regression models, longitudinal strain was associated with CTTP (beta = 0.46, p = 0.025, R2 = 0.25) (figure 1), and circumferential strain was inversely associated with MMP-1 (beta = −0.38, p = 0.047, R2 = 0.32). PICP and PIIINP were not independently associated with strain parameters.

Conclusions: Myocardial strain was associated with molecular biomarkers of collagen degradation: A decrease in longitudinal or circumferential strain (i.e., “less negative” values) was related to higher levels of CTTP and lower levels of MMP-1, respectively.

20-YEAR TRENDS OF CHARACTERISTICS AND OUTCOMES OF STROKE PATIENTS WITH ATRIAL FIBRILLATION

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Objective: The accurate knowledge of secular trends in prevalence, characteristics and outcomes of patients with ischemic stroke (IS) and atrial fibrillation (AF) allows better projections into the future. We aimed to report the overall, age- and sex-specific secular trends of characteristics and outcomes of patients with acute IS and AF between 1993 and 2012 in the Athens Stroke Registry.

Design and method: We used Joinpoint regression analysis to calculate the average annual percent changes and 95% confidence intervals.

Results: Among 5314 stroke patients, 1044 (31.5%) had AF. Between 1993–2012, there was an average annual reduction of 0.8% (95%CI:-1.5%;0.0%) in the proportion of AF-patients among all AIS patients, whereas the proportion of newly-diagnosed AF-patients among all AF-patients increased annually by an average of 7.1% (95%CI:5.4%;8.9%). Among all AF-patients, there was an average annual reduction of 2.9% (95%CI:2.7%;3.2%) in the proportion of previously-known AF-patients, followed by an annual average reduction of 2.4% (95%CI:1.2%;3.6%) in the proportion of previously-known AF-patients not receiving any antithrombotic treatment at admission. During that period, there was an increase in the average annual proportion of previously-known AF-patients treated with anticoagulants (6.4%, 95%CI:1.2%;11.9%) and aspirin (2.3%, 95%CI:0.4;5.0%) at admission; an average annual increase in the proportion of AF-patients who were prescribed anticoagulant was apparent both for patients with mRS < 4 (3.5%) and mRS:4–5 (13.1%), while the proportion of AF-patients who were prescribed aspirin or no antithrombotic at discharge was annually reduced (5.8% for mRS < 4; 1.6% for mRS:4–5 and 7.1% for mRS < 4;5.3% for mRS:4–5 respectively). Stroke recurrences were annually reduced by an average of 5.8% (95%CI:–8.6;–3.0%), along with cardiovascular events (6.5%, 95%CI:–3.8;4.7%) and deaths (7.9%, 95%CI:9.2;–6.5%).

Conclusions: Between 1993 and 2012, the proportion of AF-patients on proper antithrombotic treatment and the rate of newly-diagnosed AF increased significantly. Rates of stroke recurrence, cardiovascular events and mortality reduced significantly.
ORAL PRESENTATIONS IN POSTER AREA

DIAGNOSIS AND TREATMENT

ANTI-INFLAMMATORY FACTOR DEL-1 PROTECTS FROM ANGIOTENSIN II-DEPENDENT VASCULAR REMODELING AND HYPERTENSION

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Objective: Hypertension is the leading cause of mortality worldwide. Critical contributor to pathophysiology of hypertension is vascular remodeling, which is mediated by angiotensin II (ANGII) driven T-cell inflammation and production of interleukin 17 (IL-17). Thus, anti-inflammatory approaches have been proposed as a potential therapeutic strategy. We tested the role of an endogenous anti-inflammatory factor, developmental endothelial locus-1 (Del-1), in prevention of ANGII-induced vascular remodeling and hypertension.

Design and method: Mice overexpressing endothelial Del-1 (Del-1 Tg) and WT mice, which were repeatedly injected with soluble Del-1 (50 mg per injection) were used. Hypertension and vascular remodeling were induced with ANGII infusion using osmotic minipumps (Alzet®) for 4 weeks. Systolic blood pressure (SBP) was measured via tail-cuff method. Aortic remodeling was assessed by quantification of adventitial fibrosis, elastin and medial thickness. Aortic inflammatory cells were quantified with flow cytometry, whereas endothelial dysfunction was assessed using Mulvany myography.

Results: After 4-weeks of ANGII infusion, Del-1 Tg mice had lower (P < 0.01) SBP compared to WT littermates. Del-1 Tg mice had less (P < 0.01) aortic medial thickness, less adventitial collagen (P < 0.01) and more elastin (P < 0.01) area compared to WT mice. MMP2 activity was significantly (P < 0.01) less in Del-1 Tg mice than in WT. Endothelium-dependent relaxation of aorta was stronger (P < 0.01) in Del-1 Tg mice than in WT. Del-1 Tg mice had less (P < 0.05) CD45+ leukocytes, TCRB+ T-cells, as well as CD4+ T-helper and CD8+ T-lymphocytes in aorta compared to WT mice. TCRB+/IL-17+ double positive T-cell count was also less (P < 0.05) in Del-1 Tg than in WT mice. Injections of soluble Del-1 in WT completely protected from ANGII-induced development of hypertension and aortic remodeling. Del-1 injected mice had lower (P < 0.05) SBP compared to vehicle treated mice. Del-1 injections resulted in less aortic medial thickness (P < 0.05) and adventitial collagen area (P < 0.05), as well as lower MMP2 (P < 0.05) activity. Endothelium-dependent relaxation was stronger (P < 0.01) in Del-1 injected mice.

Conclusions: Our results demonstrate that Del-1 protects from ANGII-dependent development of hypertension and vascular remodeling via limitation of inflammation and maintenance of endothelial function. Its proof of efficacy via exogenous injections presents Del-1 as a potential therapeutic agent.

HIGH SODIUM CONCENTRATION MODULATES DENDRITIC CELLS IMMUNE FUNCTIONS

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Objective: Excessive Na+ intake is associated with the development of hypertension, which is characterized by cardiovascular disease (CVD) risk factors. A moderate increase in sodium concentration from 140 to 200 mM is transferred to dendritic cells (DCs) from hypertensive to normotensive leads to the development of hypertension in animals. DCs modulate both the innate and adaptive immune response. However, the effect of high [Na+] on DCs remains unclear in humans.

Design and method: DCs derived from human blood monocytes, differentiated for 6 days in RPMI 10% fetal calf serum (FCS) supplemented with GM-CSF (66 ng/ml) and IL4 (25 ng/ml) then stimulated during 48 h with LPS (2.5 or 50 ng/ml) at different [Na+] (140 vs 200 mM). We studied DCs morphological changes by confocal microscopy, analyzed cell viability, expression of CD25, CD83, CD86 and CD80 costimulatory markers, FICT-DEXTRAN endocytosis, reactive oxygen species (ROS) production and CCR7 chemokine receptor expression flow by cytometry. We studied DCs CCL19-driven chemotaxis using transwell migration assay with 8 mm pore size. We measured secreted cytokines (IL-12p70, IL-6, IL-23, IL-10, TGF-b) using ELISA. We also looked for MAP Kinase activity and SGK1 expression by western blot.

Results: At high [Na+] of 200 mM as compared to normal [Na+] of 140 mM, we found that DCs viability was maintained (over 84.5 ± 5%). DCs morphology changed towards a more elongated aspect. CD25, CD83 CD80 and CD86 expression significantly decreased (-67.7 ± 32.3%, -60.4 ± 14.5%, -25 ± 20.8%, -13.6 ± 10.3%, respectively, p < 0.0001). There were also less ROS production (-36 ± 12.3, P < 0.005) and a persistence of endocytosis capacity (+108.3 ± 44.6%, P < 0.005). CCR7 expression (-59.3 ± 15.3%, P < 0.0001) and CCL19-driven chemotaxis (-49.7 ± 25.6%, P < 0.0005) index significantly decreased. Cytokine measurement showed a reduced secretion of IL-12p70, IL-6 and IL-23 (-78.5% ± 9%, -66.6 ± 9.2%, -90.4 ± 7.12%, respectively, P < 0.0001) and an increase of IL-10 and TGF-b (+111.5 ± 51%, +191.1 ± 110.4, respectively, P < 0.005). At high [Na+] reduced phosphorylation of p38 (+43.13 ± 25%, P < 0.03) leads to a higher ERK ½ protein phosphorylation (+30.57.2 ± 11.6%, P < 0.0078) and greater expression of SGK1 protein (+35.078 ± 11.5%, P < 0.005).

Conclusions: High [Na+] concentration downregulates pro-inflammatory human DCs immune response to LPS and inhibits their migration towards lymph nodes, through MAP Kinase signaling pathway and SGK1-related mechanisms. However, the implication of these changes in the development of hypertension remains unknown.

CLASSIFICATION OF NOCTURNAL BLOOD PRESSURE PROFILE USING FUZZY SYSTEMS

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Objective: Implement a fuzzy inference system for a nocturnal profile classification model, for knowing the nocturnal blood pressure behavior of the patients and with this gain knowledge of the current health condition of such patients, in order to prevent a cardiovascular event.

Design and method: A fuzzy system for the classification of nocturnal blood pressure is implemented, and this because the original tests that were performed with a traditional system of rules did not produce the desired results. The fuzzy system was empirically designed based on a medical article of nocturnal hypertension, in which the author defines that in order to obtain the profile of nocturnal blood pressure, the information of the ABPM obtained in the day and night should be separated. From which the quotient to obtain the night profile of patients is calculated, and from this the range of each membership function is obtained, which are those that provide us each level of classification. The fuzzy system has two inputs which are the quotient of the systolic pressure and the quotient of the diastolic pressure and as output the night profile of the patient.

Results: Tests were performed with a group of 200 patients, comparing the results of the traditional system rules with the fuzzy system, and having better results with the second, because the traditional system rules requires precise information. Tests are carried out with different architectures in which different types of membership functions were used, such as: trapezoidal and Gaussian, having better results with the fuzzy system with trapezoidal membership functions. A random sample of 30 patients was collected obtaining 99% of correct classification with the fuzzy system in comparison with the traditional system rule, which correctly classified 53.3% of the patients, with a standard deviation of 3.86. The table shows the comparison of the different experiments, being those marked with bold those that correctly classified.

Conclusions: Fuzzy logic allows us to handle inaccurate information, which helps us obtain good results, which can be noted in the reported experiments, where this type of classification is more efficient than the traditional system rules.

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EUSTAR: EUROPEAN SOCIETY OF HYPERTENSION TELEMEDICINE IN ARTERIAL HYPERTENSION REGISTER 2018: DESIGN AND RATIONALE

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Objective: Failing to reach blood pressure (BP) goals is a major problem in treatment of hypertension, causing a high socioeconomic burden, sequel morbidities and strongly increased mortality. Recent studies demonstrated that interventional decentralized telemonitoring (idTM®) can strongly improve BP management in hypertension including high risk patients. In the EDiMed-Project (efficiency analysis of services in telemedicine) - supported by German Ministry for education and research - the cost-benefit ratio was analyzed and a positive socioeconomic impact was found.

Design and method: This project aims at establishing a telemonitoring system that allows to extend this service to all European Excellence centers for hypertension treatment and ultimately to all physicians treating hypertensive patients in Europe. For this effort, the unique software SciTIM® providing highest standard of data security was developed for the register to allow: Making idTM® available to physicians and patients across Europe Establishing a system the project will generate interfaces to the most commonly used medical data management systems. In addition, system will provide a user interface for data collection from medical measurement devices and be open for all possible providers and also for other data than the first two parameters blood pressure and body weight.

RELATIONSHIP BETWEEN UNATTENDED AND ATTENDED BP VALUES AND PRECLINICAL ORGAN DAMAGE

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Objective: It has been suggested that measurement of “unattended” or “automated oscillatory (AOBP)” blood pressure values may provide advantages over conventional BP measurement; some hypertension guidelines now suggest this approach as the preferred one for measuring office BP. Data on the relationship between AOBP and cardiovascular events are much less solid as compared to those obtained with the standard BP measurement; on the other hand, some study suggested that AOBP might be more strictly correlated with hypertensive target organ damage than “attended” BP. The aim of our study was to evaluate the relationship between “attended” or “unattended” BP values and target organ damage in 261 subjects attending the outpatient clinic of an ESH Excellence Centre.

Design and method: BP values were measured by the physician with an automated oscillometric device (Omron HEM 9000Ai, mean of 3 measurements), after 5 minutes of rest; thereafter, the patient was left alone and unattended BP was measured automatically after 5 minutes (3 measurements at 1 minute interval).

Results: Patient’s mean age was 61 ± 16 yrs, mean BMI 26.1 ± 4.2, 60% were female, 88 % had a previous diagnosis of hypertension (64% treated). Systolic unattended BP was lower as compared to attended SBP (130.1 ± 15.7vs138.6 ± 17.2 mmHg). Left ventricular mass index (LVMi) was similarly correlated with unattended and attended pulse pressure (PP) (r = 0.277 and r = 0.299, p < 0.05, respectively). LVMi was similarly correlated with unattended and attended pulse pressure (PP) (r = 0.277 and r = 0.299, p < 0.05, respectively). Carotid IMT was significantly and similarly correlated with both attended and unattended BP values (CBMax-IMT: r = 0.172 and r = 0.153 for attended and unattended SBP, p < 0.05 and: r = 0.459 and r = 0.436 for attended and unattended PP, p < 0.001). The differences between correlations were not statistically significant.

Conclusions: Measurement of BP “unattended” or “attended” provides different values, being unattended BP lower as compared to attended BP. Our results suggest that attended and unattended BP values are similarly related with cardiac and vascular hypertensive target organ damage.

AN HIGHER WHITE-COAT EFFECT IN THE FIRST HOURS OF AMBULATORY BLOOD PRESSURE MONITORING IS ASSOCIATED WITH MORE BLOOD PRESSURE PEAKS DURING THE WHOLE DIURNAL PERIOD

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Objective: White-coat effect (WCE) is a common finding also in ambulatory blood pressure monitoring (ABPM) and like in office blood pressure (BP) measurement can determine an over-diagnosis of arterial hypertension. In our previous work we found that WCE magnitude (WCEm) is correlated with an higher BP variability during the entire 24-hours ABPM period but the effective BP load remain to be established.

Design and method: We analysed 421 ABPMs (M/F 146/275) characterized by the first systolic BP value at least 10 mmHg higher than mean diurnal systolic BP (mDBSBP). WCEm was calculated as the mean value of the first two hours of recording, both for systolic and diastolic BP (sysWCEm and diaWCEm, respectively). The diurnal BP load was estimated with BP peaks, i.e. the number of systolic and diastolic BP values respectively 10 and 5 mmHg higher than mDBSBP and mean diurnal diastolic BP (mDBBP). We evaluated the correlations between
WCEm, BP peaks and drug classes (angiotensin-converting enzyme/angiotensin receptor blockers, beta-blockers, calcium channel blockers, thiazide diuretics, alpha-blockers, central alpha-agonists and anti-aldosterone) with a multivariate regression analysis with a p-value < 0.01 considered as statistically significant.

**Results:** Mean age was 65 ± 1 years (M/F 66 ± 1/64 ± 1 years, n.s.) and overall mDSBP and mDDBP were 137 ± 1 and 79 ± 0.5 mmHg, whereas sysWCEm and diaWCEm were respectively 150 ± 1 and 86 ± 1 mmHg, without gender differences. Systolic and diastolic peaks were respectively 12.5 ± 0.1 and 13.5 ± 0.1; only the first was directly correlated with age (r = 0.21; p < 0.01) whereas neither of the two was correlated with drug therapy. Both systolic and diastolic peaks were significantly correlated with sysWCEm (respectively r = 0.17 and r = 0.19; p < 0.01) but not with diaWCEm; they were also correlated with mDSBP and mDDBP (respectively r = 0.35 and r = 0.31; p < 0.01).

**Conclusions:** In patients with an higher sysWCEm, systolic and diastolic BP peaks are increased confirming an influence of WCE on the entire diurnal period of ABPM, suggesting that in patients with WCE the alarm reaction persists well beyond the two initial hours of recording alarm.
ORAL PRESENTATIONS IN POSTER AREA

EPIDEMIOLOGY AND MANAGEMENT

CLINICAL SIGNIFICANCE OF ELEVATED ANKLE-BRACHIAL INDEX DIFFERS DEPENDING ON THE AMOUNT OF APPENDICULAR MUSCLE MASS: THE J-SHIPP AND THE NAGAHAMA STUDY

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Objective: Low ankle-brachial index (ABI) is associated with cardiovascular risk factors. In contrast, the clinical implication of high ABI is less understood, though several cross-sectional studies reported that high ABI was associated with cardiovascular risk factors. From our preceding study, we suspected that body composition may be a determinant for high ABI, and consequently modulate the clinical significance of high ABI.

Design and method: Datasets of two studies employing independent cohorts, the anti-aging study cohort (n = 1,765, 65 ± 9 years) and Nagahama study (n = 8,039, 58 ± 13 years), were analyzed in this study, in which appendicular muscle mass was measured by computed tomography and bioelectrical impedance analysis, respectively. Brachial and ankle blood pressure were measured using a cuff-oscillometric method.

Results: In the anti-aging study cohort, there was a significant correlation between the thigh muscle cross-sectional area (CSA) and ABI (r = 0.310, p < 0.001). The association of thigh muscle area (b = 0.387, p < 0.001), but not fat area, was independent of body mass index (p = 0.662) and other possible covariates, including systolic brachial blood pressure (p = 0.054), carotid hypertrophy (p = 0.559), and arterial stiffness (b = 0.102, p = 0.001). Although there was a significant sex-differences in the thigh muscle area, muscle CSA was identified as an independent determinant for ABI (b = 0.286, p < 0.001, VIF = 4.87) even in a sex (women: b = –0.087, p = 0.055, VIF = 4.19) included regression model. This positive association was replicated in the Nagahama cohort. When the subjects were subdivided by 75 percentiles of ABI and appendicular muscle mass, multinomial logistic regression analysis identified insulin resistance as an independent determinant for elevated ABI with normal muscle mass (coefficient = 0.134, p = 0.010), whereas insulin resistance was inversely associated with elevated ABI in cases with high muscle mass (coefficient = –0.268, p = 0.001).

Conclusions: Appendicular muscle mass was a strong determinant for ABI. The clinical background, particularly insulin resistance, of individuals with elevated ABI might differ based on the amount of muscle mass.

DETECTION OF NON-ADHERENCE TO ANTI-HYPERTENSIVE TREATMENT THROUGH THE USE OF THE ELECTRONIC PRESCRIPTION SYSTEM IN PATIENTS REFERRED TO A TERTIARY HYPERTENSION CLINIC

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Objective: To know and evaluate the level of adherence to antihypertensive treatment through the information provided by the electronic prescription computerized system.
Design and method: A retrospective, cross-sectional study was conducted in the tertiary hypertension clinic of the Bellvitge’s Hospital. Patients visited from June 2015 to July 2017 and with resistant hypertension diagnosis and/or aged less than 50 years were included. The data analyzed from the electronic prescription included: class of drug, prescribed dose and number of boxes collected in pharmacy each month. Adherence to the medication was evaluated during a 24-month long follow-up using the formulas: Number of theoretical boxes – (starting treatment date – final date of follow-up) × (daily intake unit)/(number of tablets of each box). Adherence (%) = number of boxes actually dispensed/number of theoretical boxes x100. The data analysis was performed using the SPSS package, a level of significance P < 0.05 was set in all cases.

Results: We included 261 patients according to criteria. The average age was 61 ± 14.2 years, being 29.9% under 50 years. 84% of patients had resistance hypertension. (Table 1). Figure 1 shows the distribution by amount of drug classes. We detected an adherence to medication of less than 80% in 23.4% patients, being 29.9% under 50 years. 84% of patients had resistance hypertension. Patients treated with < 2 classes of drugs had lower adherence (cut-off > 80%) compared to those taking > 3 classes (58.1% vs. 79.8% p < 0.001).

Also, we observed an inverse correlation between age and adherence (r = -0.25 p 0.0001). Patients under 50 years had lower (average) adherence to those over (79.1 ± 22.2% vs 96.2 ± 17.3% p = 0.001), (Fig. 3).

Conclusions: The low adherence rates detected with electronic prescription computerized system were similar to values published in previous studies based on more complex methods (use of questionnaires, urinary metabolites, electronic boxes). Despite its intrinsic limitations, our method allowed to detect an high percentage of non-adherence.

In our cohort, younger patients and those who take fewer drugs presented the lowest levels of adherence.

**DISCREPANCIES IN CARDIOVASCULAR RISK STRATIFICATION IN HYPERTENSIVE PATIENTS – RESULTS FROM THE SWISS HYPERTENSION COHORT STUDY (HCCH)**

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**Results of this analysis indicate that the application of the SCORE CV risk stratification model alone may lead to significant underestimation of CV risk leading to inadequate therapeutic management and worsening of prognosis in, particularly high or very high risk, hypertensive patients.**

**MARKERS OF ARTERIAL STIFFNESS AND SUBCLINICAL VASCULAR DAMAGES IN OBESE CHILDREN**

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**Objective:** We aimed at investigating the influence of weight excess and traditional cardiovascular risk factors on vascular structure and function in a sample of obese children.

**Design and method:** Overweight or obese children (BMI > 90th percentile for sex and age) included in this observational study underwent office and ambulatory BP measurements (ABPM) and the assessment of carotid intima-media thickness (cIMT), endothelial function by the Flow Mediated Dilation (FMD) technique, carotid distensibility (cDC) by ultrasound and stiffness index (SI) by digital photoplethysmography.

**Results:** Sixty-six obese and 4 overweight children were enrolled (age 11.5 ± 2.4 years; female n: 30). Carotid IMT directly correlated with 24h- and nighttime SBP; cDC showed inverse correlations with BMI and waist circumference and 24h-BP. Unexpectedly, SI resulted inversely related with several indexes of weight excess. Most of these correlations remained significant after adjustment for age, sex, BMI and BP. In a replication set of 40 obese children SI, but not Pulse Wave Velocity (PWV), was still inversely associated with BMI.

**Conclusions:** These data suggest that arterial structure and elasticity are negatively affected by weight excess and BP levels, even in childhood. Surprisingly, SI might not be a reliable marker of vascular stiffness in obese children, because this measure is probably confounded by other factors including vasodilation.
MECHANISMS OF HYPERTENSION

SUBCLINICAL RENAL DAMAGE IS ASSOCIATED WITH A REDUCED CHOROIDAL THICKNESS IN PATIENTS WITH PRIMARY HYPERTENSION

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Objective: The retina is considered the easiest accessible window to study the state of the systemic microcirculation, even if the choroid is the most important vascular layer of the eye. Our understanding of the choroid has been greatly increased in last years since the introduction of advanced techniques of optical coherence tomography (OCT). Our study was aimed to assess choroidal thickness by using Swept-Source OCT (SS-OCT) in essential hypertensive patients (EHs) with and without subclinical renal damage (SRD).

Design and method: We enrolled 100 EHs of which 65 without kidney damage and 35 with SRD. In all the participants SS-OCT and a routine biochemical work-up were performed. Glomerular filtration rate (GFR) was estimated by the CKD-EPI equation (eGFR). SRD was defined, by the presence of microalbuminuria or eGFR between 30 and 60 mL/min/1.73 m2. OCT measurements were performed according to the Early Treatment Diabetic Retinopathy Study (ETDRS) protocol, that divides the macula into 9 subfields. The circular grid consists of 3 concentric rings. The inner and outer rings are further divided into quadrants: temporal, nasal, superior, and inferior.

Furthermore, we calculated the average of the individuals values of the four quadrants separately for the inner and the outer ring. The average of all the 9 regions of the ETDRS grid (including the inner, the outer and the central rings) was also calculated.

Results: EHs with SRD showed thinner choroidal thicknesses than those without kidney damage (all p < 0.05), even after adjustment for age (figure). Overall choroidal thickness correlated significantly and directly with eGFR (r = 0.36) and negatively with urinary albumin excretion (r = −0.39). The association of choroidal thickness with SRD was confirmed in multiple logistic regression analyses once the effect of age, anti-hypertensive therapy and triglycerides was accounted for. The odds ratio of having SRD associated with a standard deviation increase of overall choroidal thickness was 0.43 (0.24–0.75, 95% confidence interval; p = 0.007).

Conclusions: Our study confirms the close relationships between changes in ocular microcirculation and renal dysfunction.

TRANSGLUTAMINASE-2 CONTRIBUTES TO REACTIVE OXYGEN SPECIES PRODUCTION IN MICE INFUSED WITH ANGIOTENSIN-II

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Objective: Transglutaminase type II (TG2) is a pleiotropic enzyme that exhibits various activities and it is involved in diverse biological functions, including cell signaling, cytoskeleton rearrangements, displaying enzymatic activities. We previously demonstrated that TG2 may contribute to angiotensin II-induced reduction of NO bioavailability as well as to the impaired vascular functional and structural alterations induced by angiotensin II. Here we hypothesized that TG2 may contribute to increased production of reactive oxygen species (ROS) in the vasculature of angiotensin-II-treated mice.

Design and method: TG2-knockout mice (TG2-K/O, weeks old, n = 6) and age-matched wild type (WT) control mice were treated or not with angiotensin-II (400ng/kg/min) for 14 days. TG2 activity in aorta was measured by ELISA. ROS production in aorta was evaluated by dihydroethidium staining. The expression of angiotensin type1 receptor (AT1R), TG2, NOX-1, and Erp72 (the positive modulator of NOX-1) was evaluated in aorta by immunoblotting, communoprecipitation analysis was also performed.

Results: As expected, TG2-K/O lacked TG2 expression and activity. Angiotensin-II significantly increased (2-fold) TG2 expression and activity only in WT. AT1R expression in aorta was not influenced by Angiotensin II treatment in both WT and TG2K/O mice. ROS production was similar in WT and TG2-K/O and increased only in angiotensin-II-treated WT (+19%, p < 0.01). NOX-1 and Erp72 expression was similar in WT and TG2-K/O. Angiotensin-II significantly increased NOX-1 (+23%, p < 0.01) and Erp72 (+29%, p < 0.01) only in WT. Only in aorta from WT and not from TG2-K/O, TG2 was successfully immunoprecipitated by AT1 and Erp72, indicating that TG2 is able to interact with both proteins, and suggesting that it may be involved in angiotensin II- induced NOX modulation and ROS production.

Conclusions: Angiotensin-II increased ROS production and NOX-1 expression and activation only in presence of TG2 in WT. TG2 interacts with both AT1R and Erp72. Thus, TG2 may contribute to NOX-induced ROS production in mice treated with angiotensin-II.

RETNAL ARTERIOLAR MICRO-CONSTRICTIONS EVALUATED WITH ADAPTIVE OPTICS: A NOVEL MARKER IN HYPERTENSION

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Objective: Retinal arteriolar remodeling is an early marker of subclinical target organ damage in arterial hypertension. Through adaptive optics which is totally noninvasive and highly accurate, it is possible to measure changes in arteriolar diameter within 1 mm accuracy. The aim of this study was to evaluate a new marker describing internal diameter variability of the supero-temporal arteriole in hypertensive patients before and after blood pressure control.

Design and method: Adaptive Optics RTX1® Camera (ImagineEye, Orsay, France) was used to capture three consecutive images along the supero-temporal arteriole. Wall Thickness (WT) and internal diameter (ID) were measured to calculate Wall-to-Lumen Ratio (WLR) and Wall Cross-Sectional Area (WCSA). A coefficient of variation (CV) for ID was calculated for each group by the following formula: (standard deviation ID/mean ID)*100 over three consecutive measurements. Subjects with a CV > 75% were classified as irregular. Uncontrolled hypertensive subjects in the irregular group were given an antihypertensive pharmacological treatment and were reevaluated 1 month after.

Results: 44 patients were analyzed (mean age 47.7 ± 11). Median CV ID in the irregular group was 11% [IQR 9.0–15.0] as compared to 2.0% (regular group) [IQR 1.0–4.0], p < 0.001. Patients in the arteriolar irregular group had an increase in home blood pressure (148.3/96.3 vs 130.7/ 82.6 mmHg, p < 0.01). They had
significantly decreased ID (82.24 ± 13.5 vs 89.9 ± 14.8, p = 0.01) and increased WLR (0.311 ± 0.07 vs 0.262 ± 0.04, p = 0.025) whereas no differences were observed in WT and WCSA. 

At one-month follow-up, along with a significant blood pressure reduction, which was associated with arteriolar enlargement and WLR reduction, a decrease in median ID CV was observed (11%[IQR 9.0–15.0] to 4.2% [IQR 1.8–6.05], p = 0.014).

### Conclusions:

Artificial micro-constrictions are observed in a subset of hypertensive patients with the use of adaptive optics camera. A decrease in blood pressure is accompanied with their disappearance. Beyond classical retinal microvascular remodeling indexes, Adaptive Optics may allow the definition of novel markers of microvascular remodeling that are associated with hypertension.

FIMASARTAN REDUCES ANGIOTENSIN II-INDUCED CELLULAR SENESCENCE IN HUMAN CORONARY ARTERY SMOOTH MUSCLE CELLS BY INHIBITING CYR61 AND ERK/P38MAPK/P3 SIGNALING PATHWAY

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**Objective:** Angiotensin II (Ang II) has been linked to vascular senescence; however, the molecular mechanism(s) by which this occurs remain unknown. We hypothesized that Ang II induced vascular smooth muscle cell (SMC) senescence by regulating the expression of cysteine-rich angiogenic protein 61 (CYR61). Also, we evaluated the role of Ang II type 1 receptor blocker (ARB), fimasartan in vascular senescence.

**Design and method:** We treated human coronary artery smooth muscle cells (hCSMCs) with Ang II and measured senescent cells by senescence associated β-galactosidase (SA-β-Gal). To evaluate the effect of Fyr61 on calcification, VSMCs were transfected with adenoviral vectors expressing Fyr61 (Ad-Fyr61) at 100 multiplicities of infection (moi). As a control, an adenoviral vector expressing only green fluorescent protein (Ad-GFP) was used.

**Results:** SA-β-Gal (+) cells were increased in Ang II group (18.75 ± 1.75%) compared with the control (11.7 ± 2.75%), which was significantly attenuated by fimasartan administration (6.5 ± 1.0%). Molecular markers related with cellular senescence, p53 and p16 expressions, were both significantly increased by angiotensin II (p53: 1.39 ± 0.1, p16: 1.19 ± 0.06 fold vs control, both p < 0.05), which were completely suppressed by fimasartan (p53: 1.02 ± 0.07, p16: 0.97 ± 0.07 fold vs control, both p = 0.002). In addition, it was confirmed that CYR61 was induced by AngII. As CYR61 was independently increased, the number of SA-β-Gal positive cells was increased (33.0 ± 3.1% vs 9.5 ± 1.3% in control), and as CYR61 was inhibited, the number was decreased (11.0 ± 0.5% vs 24.7 ± 0.9% in AngII). Also, Fimasartan inhibited the activation of ERK and p38 MAPK by Angiotensin II. As ERK was inhibited, CYR61 and p53 decreased. And as p38 MAPK was inhibited, CYR61, p53 and p16 decreased.

**Conclusions:** In conclusion, fimasartan provides anti-senescence effect by suppressing CYR61 and ERKp38 MAPK/p35 signaling pathway in hCSMCs. In addition, this anti-senescence effect will be a basis for identification of pleiotropic effect by ARBs.

CARDIORESPIRATORY EFFECTS OF HIGH TEMPERATURE ELECTRONIC CIGARETTES VAPING

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**Objective:** The new generation of electronic cigarettes (e-cigarettes) deliver high energy to heat the carriers allowing vaporization process, mainly composed of propylene glycol (PG) and glycerol (GLY). At high temperature, PG and GLY undergo combustion instead of vaporization, and produce volatile carbonyls, which are strong cardiovascular toxicants. The primary study outcome was the impact of vaping on skin microcirculatory blood flow as assessed by transcustaneous gas tensions and endothelial -dependent vs. -independent microcirculatory skin vasoreactivity. Secondary outcomes included continuous hemodynamic parameters, as well as biomarkers of acute lung injury (chb cell protein 16 (CC16)) and oxidative stress. (ClinicalTrials.gov identifier, NCT03036644)

**Design and method:** Twenty-three young tobacco smokers were exposed to 25 puffs of a PG/GLY mix (50:50) vaporized at 60 watts, or sham-vaping, in a randomized placebo-controlled single-blind crossover design.

**Results:** E-cigarettes vaping decreased transcutaneous oxygen tension during 60 minutes with the nadir reached at 30 minutes after exposure (mean ± SEM) (mmHg, 84 ± 2 to 70 ± 4; p < 0.001; Figure 1.A). Vaping increased heart rate (bpm, 59 ± 2 to 69 ± 3 (p < 0.001; Figure 1.B)) as well as systolic (mm Hg, 109 ± 2 to 120 ± 4 (p = 0.003; Figure 1.C)) and diastolic (mm Hg, 67 ± 1 to 75 ± 2 (p < 0.001; Figure 1.D)) blood pressure during the vaporization. In contrast, vaping did not impair skin microvascular function, assessed by local heating (p > 0.2) and iontophoresis of acetylcholine (p > 0.1; Figure 1.E) and nitroprusside (p > 0.8; Figure 1.F). E-cigarettes increased CC16 in the median (IQR) (mg.L-1, 4.6 [3.6–6.75] to 5.65 [4.5–7.4]; p = 0.003) and in the urine (ng.mg-1, 7.875 [2–73.8] to 10.42 [3.2–56.9]; p = 0.032), induced small airways bronchoconstriction, as reflected by the rise of forced expiratory flow 25%-75% (L.s-1, 2.5 [1.7–2.6] to 2 [1.4–2.4]; p = 0.001) and forced mid-expiratory flow rate (L.s-1, 4.2 [3.5–5.4] to 3.7 [3.1–4.9]; p = 0.001) but did not modify plasma myeloperoxidase (p > 0.6) and its oxidation protein products (p > 0.8), and superoxide anion production in human umbilical vein endothelial cells (p > 0.1).

**Conclusions:** Intense nicotine free e-cigarettes vaping decreases transcutaneous oxygenation, increases lung injury markers and small airways resistances but does not exert deleterious effects on microvascular endothelial function and oxidative stress.
DIETARY SODIUM-INDUCED CHANGES IN THE MICROCIRCULATORY SYSTEM OF THE SKIN ARE ASSOCIATED WITH BLOOD PRESSURE RESPONSE IN HEALTHY MALES


Objective: Studies indicate that not only the kidney but also the skin microcirculation might be pivotal for a sodium-sensitive blood pressure (BP) response. While high sodium diet (HSD) is associated with reduced density of blood capillaries, animal studies showed an increment of skin lymphatic capillaries in both amount and size. We investigated sodium-induced changes in both lymphatic and blood skin microcirculation of healthy males in relation to blood pressure (BP).

Design and method: We performed a randomized crossover study in healthy males. 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. Endothelia of blood (CD31) and lymphatic capillaries (D2–40) were identified through immunohistochemistry.

Results: Overall (n = 12, mean age 22 years), there was no BP increase after HSD vs. LSD (mean arterial pressure (SD): 78 (5) vs. 78 (5), p = 0.66). HSD increased lymphatic cross sectional surface area (p = 0.01). No differences in lymphatic or blood capillary density were observed. There was a correlation between lymphatic and blood capillary density after LSD but not after HSD (fig 1a). Differences in mean arterial pressure between LSD and HSD correlated with changes in blood capillary density (fig 1b), but not with lymphatic capillary density or cross sectional surface area.

Conclusions: HSD is associated with skin lymphangiogenesis and a loss of correlation between the lymphatic and blood microcirculation. Blood microcirculatory changes correlate with BP response, possibly playing a role in sodium-sensitive hypertension development.