

The following abstracts were omitted from the previously published conference proceedings of Hypertension Sydney 2012 (September 2012 - Volume 30 - e-Supplement 1)

## S8: CHRONOBIOLOGY OF BP

### 58 NIGHTTIME AMBULATORY PRESSURE PREDICTS RENAL DYSFUNCTION

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#### Introduction:

Ambulatory blood pressure monitoring (ABPM) is a superior predictor of target organ damage when compared to clinic blood pressure. While the relationship between renal function and hypertension is well established more work is needed to clarify which ABPM measure predicts future kidney disease. Our aim was to evaluate the relationship between baseline and follow-up ambulatory blood pressure and creatinine clearance (CrCl) in a community dwelling cohort.

#### Methods and results:

3,978 patients underwent ABPM monitoring and of these, 398 patients underwent follow up ABPM within 2 years. Mean age

was 64.5 years and there were 150 males. The mean daytime systolic blood pressure (SBP) was 147.6 (+/-17.3) at baseline (Day<sub>1</sub>) and 143.6 (+/-14.74) at follow up (Day<sub>2</sub>). The corresponding nighttime mean SBP was 129 (+/-19.06) (Night<sub>1</sub>) and 126.6 (+/- 17.05) (Night<sub>2</sub>). Creatinine clearance (CrCl) was calculated at follow up and the mean CrCl was 79.8 (+/- 25.7). The correlation between CrCl and the 4 values are as follow: Day<sub>1</sub> -0.12 (p=0.03), Day<sub>2</sub> -0.13 (p=0.01), Night<sub>1</sub> -0.24 (p=0.0001) and Night<sub>2</sub> -0.26 (p= 0.0001). In a Cox proportional-hazard model, when adjusted for age and sex, nighttime SBP was a stronger predictor of CrCl at baseline (p=0.00075) and at follow up (p=0.03) than the corresponding daytime SBP. There was no significant predictive difference between baseline and follow-up nighttime SBP after adjustment.

#### Conclusion:

Nighttime SBP appears to be a better predictor of renal function than daytime SBP. Our study, in keeping with the NICE guidelines, shows no additional predictive benefit of follow up ABPM.

## POSTER SESSION P1: ENDOTHELIAL FUNCTION

### 96 DECAFFEINATED GREEN TEA EXTRACT IMPROVES HYPERTENSION AND INSULIN RESISTANCE IN A RAT MODEL OF METABOLIC SYNDROME

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Background: Oxidative stress and endothelial dysfunction are closely associated with hypertension and insulin resistance (IR) in metabolic syndrome (MetS). It is still controversial whether green tea extract (GTE) may have blood pressure (BP) lowering effect. Decaffeinated GTE might be presumed to have strong antioxidative effect and BP-lowering effect as compared with catechins. Thus we investigated whether decaffeinated-GTE could attenuate hypertension and IR by improving endothelial dysfunction and reducing oxidative stress in a rat model of MetS. Methods and Results: 20 Otsuka Long-Evans Tokushima Fatty (OLETF) rats at 13 weeks old, MetS rats, were randomized into a saline treated group (OLETF; n=10) and a group treated with

decaffeinated-GTE (25 mg/kg/day) (GTE-OLETF; n=10). Intraperitoneal glucose tolerance tests and BP measurements were performed at 13 and 25 weeks. Decaffeinated-GTE significantly reduced BP (OLETF vs. GTE-OLETF; 130±7 vs. 121±3 mmHg, p=0.01), fasting/postprandial 2 hour glucose (141±18/159±13 vs. 115±7/132±16 mg/dL, p=0.009/0.002) and insulin levels (4.8±2.3 vs. 2.4±1.3 ng/mL, p<0.001). Decaffeinated-GTE significantly reduced vascular reactive oxygen species (ROS) formation and NADPH oxidase activity, and improved endothelium dependent relaxation in the thoracic aorta of OLETF rats. Decaffeinated-GTE also suppressed the expression of p47 and p22 phox (NADPH oxidase subunits) in the immunohistochemical staining, and stimulated phosphorylation of endothelial nitric oxide synthase (eNOS) and Akt in the immunoblotting of aortas.

Conclusions: Decaffeinated-GTE reduced the formation of ROS and NADPH oxidase activity and stimulated phosphorylation of eNOS and Akt in the aorta of a rat model of MetS, which resulted in improved endothelial dysfunction and IR, and eventually lowered BP.

## POSTER SESSION P1: EPIDEMIOLOGY

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### IN VITRO VASCULAR REACTIVITY AND RESPONSE TO CHRONIC INHIBITION OF ALDOSTERONE IN THE THORACIC AORTA OF POLYCYSTIC KIDNEY DISEASE RATS

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**Objectives:** Chronic kidney disease (CKD) is associated with changes in vascular endothelial and smooth muscle function. Aldosterone has been implicated in altered endothelial function and enhanced smooth muscle contractile responses. We have previously shown elevated aldosterone levels in Lewis polycystic kidney disease (LPK) rats. We therefore aimed to determine vascular reactivity in the LPK and the effect of treatment with an aldosterone antagonist.

**Methods:** LPK and Lewis were treated with spironolactone (20mg/kg/day p.o.) or diluent from 4-12 weeks old (mixed sex, total n=41). Thoracic aortic rings were used to construct cumulative concentration-responses to noradrenaline (NA,

$1.0 \times 10^{-10}$ – $3.0 \times 10^{-4}$ M) and potassium (KCl, 5–100mM) to investigate vascular contractility. Relaxation was investigated in phenylephrine (PE, 1 $\mu$ M) pre-contracted aortic rings, testing endothelium-dependent and -independent responses to acetylcholine (ACh,  $1.0 \times 10^{-10}$ – $1.0 \times 10^{-5}$ M) and sodium-nitroprusside (SNP,  $1.0 \times 10^{-11}$ – $1.0 \times 10^{-6}$ M), respectively.

**Results:** There was a leftward shift in the concentration-response curves to NA and KCl (maximum - NA:  $1.0 \pm 0.1$  vs.  $1.7 \pm 0.1$ g, KCl:  $1.0 \pm 0.1$  vs.  $1.6 \pm 0.1$ g, LPK vs. Lewis,  $P < 0.001$ ), indicating increased sensitivity and reduced compliance of LPK aortic rings. Vasodilatation mediated by ACh and SNP was significantly impaired (ACh at  $1.0 \times 10^{-3}$ M:  $50 \pm 8$  vs.  $82 \pm 6\%$ , SNP at  $1.0 \times 10^{-6}$ M:  $69 \pm 10$  vs.  $99 \pm 1\%$ , LPK vs. Lewis,  $P < 0.001$ ), suggesting endothelial dysfunction and decreased vessel compliance, respectively. Spironolactone pretreatment did not significantly improve vasoconstrictor responses nor ACh- and SNP-mediated relaxation in the LPK.

**Conclusions:** LPK demonstrated impaired vascular reactivity that was not improved after treatment with spironolactone. Aldosterone is therefore not likely driving vascular stiffness or impaired endothelial function in this model of CKD.

## POSTER SESSION P1: GENE ASSOCIATION

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### INCREASED PREVALENCE OF ESSENTIAL HYPERTENSION IN YOUNG ADULTS WITH HIGH HETEROPLASMY LEVELS OF THE MELAS M.3243A>G MUTATION

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**Background:** Growing evidence exists linking mitochondrial DNA<sup>1</sup>, its mutations<sup>2</sup>, and mitochondrial dysfunction<sup>3</sup> to the pathogenesis of hypertensive disease. No reports on the prevalence of hypertensive disease in adult patients with confirmed mitochondrial diseases (mitoD) have been described.

**Methods:** We performed a retrospective chart review of adult patients with mitoD between January 1999 and January 2012 at our center. We grouped them into age categories to allow comparison with previously reported Canadian Health Measures Survey (CHMS)<sup>4</sup> prevalence data.

Age category, years	mitoD		CHMS*		p-value**
	Non-hypertensive	Hypertensive	Non-hypertensive	Hypertensive	
20-39	4	5	1,152	33	<0.0001
40-59	20	6	996	238	0.63
60-79	11	12	502	593	0.85

Table 1. Sample size: Canadian Health Measures Survey (CHMS)<sup>4</sup> vs. hypertensive and non-hypertensive patients with mitoD.

\*Canadian Health Measures Survey (CHMS)<sup>4</sup>.

\*\* The prevalence within each category was compared with CHMS data<sup>4</sup> using Chi squared analysis with a confidence interval of 95%.

**Results:** 23 subjects with hypertensive disease were identified for a crude prevalence of 39.7% (95% CI 27–53%) as compared to the CHMS<sup>4</sup> age predicted prevalence of 30.5%. When analyzed by individual age group, there were no significant differences between the observed and the CHMS<sup>4</sup> predicted prevalence rates in the 40 years and older cohorts (age category 40-59,  $p=0.63$ ; age category 60-79,  $p=0.85$ ). However, the hypertensive disease rates were significantly higher than predicted in the under 40 years cohort (55.6 vs. 2.8%,  $p < 0.001$ , CI 21–86%), in which hypertensive patients with the MELAS m.3243A>G mutation were significantly clustered ( $p < 0.01$ ). This younger MELAS cohort (n=4, mean age=24 years) with essential hypertension had heteroplasmy levels (mean=68%) that were significantly higher than the levels found in the older non-hypertensive MELAS cohort (n=8, mean age=52 years, mean=33%) ( $p=0.04$ ).

**Conclusion:** Relative to age, gender and mitoD subtype, young adults with high heteroplasmy levels of the MELAS m.3243A>G mutation demonstrates an increased prevalence of essential hypertension. Further prospective data are needed to confirm this initial finding, which has potentially important treatment implications<sup>5</sup>.

## POSTER SESSION P1: LARGE ARTERY FUNCTION

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### INCREASED INTRINSIC STIFFNESS OF AORTIC VASCULAR SMOOTH MUSCLE CELLS; A NOVEL MECHANISM FOR HYPERTENSION

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**Objectives:** An increase in vascular stiffness is a fundamental component of hypertension, which has been thought to be mediated by changes in the extracellular matrix (ECM). Our hypothesis, that increased arterial stiffness in hypertension is due in part to intrinsic mechanical properties of vascular smooth muscle cells (VSMC), has not been examined previously.

**Methods and Results:** Adult spontaneously hypertensive rats

(SHR) (16 weeks old) and age-matched Wistar-Kyoto normotensive (WKY) rats were studied. Aortic pressure was higher in SHR than WKY (mean arterial pressure 123±4 versus 96±6 mmHg,  $p<0.05$ ). Aortic stiffness (pulse wave velocity) was also higher in SHR (7.65 mm/ms) vs. WKY (3.27 mm/ms,  $p<0.01$ ). Aortic VSMCs stiffness was continuously recorded using atomic force microscopy (AFM), and temporal oscillations in VSMC elasticity, which represent the dynamic properties of elasticity, were observed and analyzed by Eigen decompensation. VSMC stiffness was consistently increased in SHR (24.0 kPa) vs WKY (11.8 kPa) ( $p<0.05$ ). The oscillations in elasticity were significantly different between the two groups in terms of frequency and amplitude ( $p<0.05$ ). ML-7, a highly specific inhibitor of myosin light chain kinase (MLCK), produced a greater reduction in the VSMC elasticity from SHR aorta compared to WKY rats ( $p<0.05$ ). Furthermore, ML-7 altered the oscillations in VSMC elasticity in SHR, but not WKY.

**Conclusions:** Thus, increased vascular stiffness in hypertension occurs not only at the level of the ECM, which has been recognized for some time, but also in VSMCs, a concept not considered previously.

## POSTER SESSION P1: LIFESTYLE AND NUTRITION

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### TOBACCO DEPENDENCY AMONG URBAN KNOWN HYPERTENSIVE VERSUS NON-HYPERTENSIVE CIGARETTE SMOKERS – A COMMUNITY BASED STUDY AT KARACHI, PAKISTAN

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**Objective:** To compare tobacco dependency using 'Fagerström Nicotine Dependence Scale' among hypertensive patients versus non-hypertensive cigarette smokers in Karachi, Pakistan.

**Methods:** Randomized cross-sectional population based survey was conducted in Karachi from November 2008 to January 2009. The 'Fagerström Nicotine Dependence Scale' was administered after translation in Urdu and pre-testing to collect the data from eligible study subjects of age 15 to 69 years who reported as current smokers. Frequencies and independent samples t-test were used for analysis through SPSS 11.5.

**Results:** There were 2006 study subjects including 92 (4.6%) who reported as current smokers. Mean age (SD) for smokers in study was 45.2±13.2. All subjects reporting as smokers were male and reported known cases of hypertension among smokers were 26.8% (n=92). Average Fagerström Test for Nicotine Dependence (FTND) score was 2.6 ± 2.5 (n=89) among current smokers. It was observed that the significant tobacco dependency (FTND Score ≥ 5) among hypertensive and non-hypertensive were 29% (n=17) and 21% (n=72) respectively. However there was no significant difference between both groups (p value = 0.731; CI 95%).

**Conclusion:** The prevalence of smoking in this study in urban Pakistan was reported low as compared to previous studies. However tobacco dependency among hypertensive and non-hypertensive subjects was high without significant difference. It is important to formulate community based strategy for quitting tobacco smoking at mass level.

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### REGULATIONS OF HYPERTENSION AND CHOLESTEROL METABOLISM BY FRUIT VINEGAR BEVERAGES

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**Background & Objectives:** An elevated level of blood cholesterol levels are positively correlated with hypertension and cardiovascular diseases. Higher intake of cholesterol levels by food has been proven to result cardiovascular diseases and hypertension. Even though, currently there are treatments to control the above diseases people would prefer to rely on the natural health products. Fruit vinegar beverages has been introduced to the North American market as a functional beverage and shown its ability to reduce the blood pressure levels. The present study was carried out to investigate the effects of four different vinegar beverages, on *in-vivo* hypertension and cholesterol metabolism.

**Design and methods:** Seventy-two spontaneously hypertensive rats (SHR) were housed in individual cages. After seven days of adaptation, they were grouped in to six groups including two controls and four treatment groups (apple, blueberry, cranberry and tomato) and fed an AIN-93G diet with addition of 2% cholesterol for four weeks. Treatments were given to SHR by gavage feeding method.

**Results:** After four weeks blueberry vinegar beverage was able to reduce to the diastolic blood pressure levels of the rats ( $P<0.05$ ). Serum TC levels and triglyceride levels of control group was significantly different ( $P<0.05$ ) from the treatment groups. Blueberry and apple vinegar beverages resulted higher serum High Density Lipoprotein (HDL) values ( $P<0.05$ ) compared to the control group. Body weight of the control group was significantly different ( $P<0.05$ ) from the treatment groups after four weeks of study.

Conclusions: In conclusion fruit vinegar beverages were able to reduce the blood pressure levels and regulate the serum cholesterol levels of SHR.

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#### **NUTRITIONAL STATUS & BODY COMPOSITION OF NORMAL VS. HYPERTENSIVE ADULT POPULATION**

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Objectives & Background: To find out variation in nutritional status and body composition of normal vs. hypertensive subjects.

Designs & methods: A total of 200 participants i.e.100 normal and 100 hypertensive aged 30-70 years were selected randomly. Nutritional status was assessed through stature, weight, mid upper arm circumference, waist to hip ratio, triceps, biceps, subscapular, supra-iliac, and BMI using standard procedures. Body composition by Bioelectrical Impedance Analysis (BIA) estimated fat mass, fat free mass, body water. Blood pressure of all subjects was taken.

Results: Blood pressure values were found to be statistically significant different ( $p<0.05$ ) among normal and hypertensive subjects. The difference for MUAC, biceps and waist circumference was observed to be statistically significant ( $p<0.05$ ) among both groups. For BMI, no significant difference ( $p>0.05$ ) was seen among both groups among males while among females significant difference ( $p<0.05$ ) has been observed among both groups. Pertaining to body composition analysis a significant difference ( $p<0.05$ ) was appeared for % fat and % total body water among both groups. Higher fat % was present among hypertensive population than normal ones. More fat % was present among females than males. Higher values of extracellular water (%) and intracellular water (%) has been found among normal group as compared to hypertensive group. For this, a statistical difference was found.

Conclusions: Body fat % was found to be higher and body water was lower among hypertensive group than normal ones. Therefore, body composition assessment may provide better information on likelihood of developing chronic diseases in future than BMI.

## **POSTER SESSION P1: OBESITY AND THE SYMPATHETIC NERVOUS SYSTEM**

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#### **RELATION BETWEEN LOW LEVEL OF THE DOPAMINE EXCRETION AND PERSISTENT BLOOD PRESSURE ELEVATION IN PATIENTS WITH ABDOMINAL OBESITY**

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Objective: Recent research data suggest that dopaminergic system influence on angiotensin and blood pressure (BP) regulation. We have studied possible relation between arterial hypertension(AH), low dopamine excretion rate (DER) and abdominal obesity (AO).

Design and methods: In our study there were 118 patients with previously untreated mild to moderate AH (men – 63(53.3%) , mean age  $44.7\pm 2.6$  years. 72 patients had AO with BMI range 30-40kg/m<sup>2</sup>. Depending on DER all patients have been divided into two groups. First group was consisted of 48 patients with low

DER, second – 70 patients with DER within normal for age limits (800-1000 mmol/l). All patients of group 1 and 29 in group 2 had AO.

Results: In all patients we measured aldosteron (A), angiotensin-II (AT-II), prolactine (Pr), leptine (Lep) and DER in urine. Patients of the first group have demonstrated positive relation between A level and BMI ( $r=0,5$ ;  $P<0,001$ ), Pr level and BMI ( $r=0,57$ ;  $P<0,001$ ) and negative relation between concentration of A, A-II, Pr and DER ( $r=-0,32$ ;  $r=-0,41$ ;  $r=-0,33$ , respectively; all  $P_s<0,01$ ). In patients with normal DER (second group) there were no changes in Pr and A levels, and increased levels of AT-II. However patients with AH and AO with normal DER have demonstrated rise in Lep levels as well.

Patients of the first group were receiving as antihypertensive treatment selective D2-receptor agonist bromocriptin or agonist of D1,D2,D3,D4 receptors –pramipexole. After 4 weeks of treatment BP, DER (186,4% rise) and A level (49,5% fall) have reached normal limits.

## **POSTER SESSION P1: PARENTAL AND CHILDHOOD INFLUENCES ON ADULT HYPERTENSION**

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#### **PREVALENCE OF HIGH BLOOD PRESSURE IN SCHOOL CHILDREN IN UAE**

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Introduction: Hypertension is a major health problem in developed and developing countries. Early identification of children at risk for hypertension is important to prevent serious complications.

Objectives: (1) To evaluate the relationship between body mass index (BMI), dietary habits, exercise pattern and the tendency of developing hypertension in school children and (2) To analyze the awareness of hypertension, associated life style and related diseases among students in schools of UAE.

Materials & Methods: A cross-sectional study among 575 school children, selected by random sampling was conducted in schools of UAE. Personal data and related information was collected through a pre-tested questionnaire. Blood pressure, weight and height was measured through standardized techniques and quetelet index used to determine BMI. Statistical analysis was

done using SPSS 17 software.

Results: Blood pressure of children showed positive correlation with anthropometrics characteristics. In our study 28% of children were in pre-hypertensive stage, 10% had BP in range of 140/90-159/99mmHg. 59% of the children were in overweight

category and 54% were obese. 49% of children who were not doing any exercise had high BP. 55% of overweight children had high BP and 44% eating fast food also had high BP. It was seen in our study that 63% of children were not aware of risk factors associated with high BP and its preventive measures.

## POSTER SESSION P1: PATHOGENESIS OF HYPERTENSION

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### EFFECTS OF BRIEF EXPOSURE TO A HIGH-SALT DIET IN DAHL SALT-SENSITIVE RATS: EVIDENCE FOR 'SALT MEMORY' DURING HYPERTENSION DEVELOPMENT

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Objectives: We and others have shown that treatment of SHR or Dahl salt-sensitive rats with renin-angiotensin-aldosterone (RAA) system inhibitor at the time of hypertension development causes a sustained reduction of blood pressure. The aim of this study was to examine the effects of temporary exposure to a high-salt diet on blood pressure and markers of end-organ damage in Dahl salt-sensitive rats.

Methods: Dahl salt-sensitive rats (n=24) were divided into 4 groups, and fed from age 6 to 14 weeks with low-salt (0.12%NaCl), normal-salt (0.8%NaCl) high-salt (7%NaCl) or high-NaAA (12.7%NaAA, containing high-sodium alone) diet. After these treatments, all group were returned to a normal-salt diet. The effects on systolic blood pressure and urine albumin excretion were examined regularly until age 28 weeks.

Results: Transient treatment with a high-salt diet caused an elevation in blood pressure not only during the treatment period, but also after returning to the normal-salt diet. 3 months after treatment cessation, blood pressures were still elevated in the rats transiently exposed to a high-salt diet (Control:  $146 \pm 10$  mmHg, high-salt  $198 \pm 9^{**}$ ,  $p < 0.01$ ). Similarly, urine albumin excretion was elevated in the high-salt rats at the end of the study. No such effect was seen in the NaAA group. At age 28 weeks, the high-salt group rats demonstrated increases in plasma renin activity, aldosterone, with a similar trend for renal renin mRNA.

Conclusion: These results suggest that transient high-salt diet treatment results in a sustained elevation of blood pressure and activation of RAA system in Dahl salt-sensitive rats.

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### THE ROLE OF CAPILLARY INTEGRITY, FLUID DISTRIBUTION AND THUS ATRIAL FILLING PRESSURE AND FORGOTTEN RED CELLS IN SODIUM SENSITIVE (DIASTOLIC BLOOD PRESSURE RESPONSIVE) SUBJECTS

John B. Myers<sup>1</sup>

<sup>1</sup>*Well-spring's Universal Environment.*

Background: It has been appreciated that renal function actively affects cardiac dynamics whereas the heart has been thought of as a passive (pre-renal) bystander in the renal-cardiac dynamic. Ochodnick et al(1) have shown that proteinuria and focal glomerulosclerosis is predicted by renal interlobular arteriolar endothelial response to Acetylcholine in uninephrectomised rats

subjected to left coronary artery ligation, indicating the importance of endothelial function.

Objective: To utilize the above evidence to support the microcirculation hypothesis of "essential hypertension"(2,3) which proposes that efferent arteriolar tone in the kidney and pre-venular arteriolar tone systemically act to control filtration fraction and capillary flow to maintain right atrial pressure, which is an exaggeration of the physiological circulatory functional arrangement(4) (cardio-renal interaction) controlling body sodium and fluid.

Results: The outcome that glomerulosclerosis and proteinuria in uni-nephrectomised rats with myocardial infarction was predicted by endothelial function in interlobular arteries supports the hypothesis of the primary role of capillary endothelium in the cardiac-renal interaction as glomerulosclerosis and proteinuria are capillary, i.e. endothelial effects that relate to arteriolar function and atrial stretch as conceptualized in the Balance Equation of Blood Pressure Regulation(4) and the microcirculation hypothesis of "essential" hypertension(2,3).

Conclusions: Demonstration of a connection between the heart and the kidney based on endothelial function supports the microcirculation hypothesis of "essential hypertension" and of capillaries in the physiology of sodium and fluid homeostasis afforded by cardio-renal interaction.

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### THE ROLE OF CAPILLARY INTEGRITY, FLUID DISTRIBUTION AND THUS ATRIAL FILLING PRESSURE AND FORGOTTEN RED CELLS IN SODIUM SENSITIVE (DIASTOLIC BLOOD PRESSURE RESPONSIVE) SUBJECTS

John B. Myers<sup>1</sup>

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Background: The role of the micro-circulation and angiogenesis inhibition has recently been recognised(1), but the role of the micro-circulation, fluid distribution and red cells and pathophysiology of sodium sensitivity in addition to altered renal sodium handling has been forgotten(2,3).

Study Design: The randomised effect of sodium intake was studied in 117 subjects (1mmol/kg/day vs. 3mmol/kg/day) for two weeks following a run-in period(4).

Results: Weight gain was mildly inversely related to reduced CrCl as measured on the reduced sodium diet but did not differ between patients in whom HCT rose when sodium intake was increased (n=43) and in those in whom HCT fell (n=74). In these patients plasma sodium increased on the high sodium diet but blood pressure did not change, whereas in subjects in whom HCT rose with increased sodium intake plasma sodium did not change but diastolic blood pressure rose.

Conclusions: Fluid distribution towards the extravascular compartment plus into red cells with diminution of the plasma compartment explains the findings as weight change did not differ between groups. The findings indicate that red cells are an

important buffer to the rise in plasma sodium that accompanies an increase in sodium intake in sodium sensitive subjects. The effect of fluid shifts that raise atrial filling pressure is the dynamic factor to which the rise in arteriolar tone is secondary, not primary and acts as a negative feedback to the raised right atrial filling pressure through control of systemic capillary flow and renal mechanisms enhancing glomerular filtration in sodium sensitive subjects.

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### 'SALT MEMORY' OF HYPERTENSION IN SPONTANEOUSLY HYPERTENSIVE RATS (SHR) REQUIRES BOTH SODIUM AND CHLORIDE IONS.

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Objective: We have recently reported that brief exposure of Dahl salt-sensitive rats to a high-salt diet at the time of hypertension development causes a sustained increase of blood pressure. The aim of this study was to examine the presence of this 'salt memory'

of hypertension in SHR, and the contribution of sodium and chloride ions to this effect. Methods: Male SHRs (n=30) were divided into five groups, and fed during an early stage of development (from age 6 to 14 weeks) with a low-salt (0.12% NaCl), normal-salt (0.8% NaCl) or high-salt (7% NaCl) diet. Other rats were given a high-sodium/normal-chloride (12.7% NaAA) or normal-sodium/high-chloride diet

(11.6% AACL). After these treatments, all groups were returned to a normal-salt diet. The effects on systolic blood pressure and urine albumin excretion were examined regularly until age 24 weeks. Results: Transient treatment with a high-salt diet caused an elevation in blood pressure not only during the treatment period, but also after returning to the normal-salt diet, suggesting the presence of 'salt memory' in SHR. No such effect was seen in rats treated with high-sodium alone or high-chloride alone. An increase in proteinuria and renal arteriolar hypertrophy was recognized in the high salt group, together with a marginal elevation in renin-angiotensin-aldosterone (RAA) system activity. Conclusion: These results show that transient high dietary salt induces a sustained elevation of blood pressure, suggesting the presence of 'salt memory' in SHR. Both sodium and chloride ions were found to be essential for the development of this memory phenomenon.

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### GPCR STIMULATED HYPOTHALAMIC PVN $G_{\alpha 12}$ PROTEIN-GATED PATHWAYS – THE KEY TO RENAL SYMPATHETIC NERVE MEDIATED SODIUM HOMEOSTASIS AND THE LONG-TERM CONTROL OF BLOOD PRESSURE

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Aim:

We have demonstrated CNS  $G_{\alpha 12}$  proteins, which are highly expressed in the hypothalamic PVN, mediate the renal sympathoinhibition and natriuresis evoked by  $\alpha_2$ -adrenoceptor activation and volume expansion *in-vivo*. Therefore, we examined the role(s) of PVN  $G_{\alpha 12}$  proteins in fluid & electrolyte homeostasis and MAP regulation following elevated dietary salt-intake.

Methods:

Intact or bilateral renal denervated (RDNX) Sprague-Dawley rats received a bilateral PVN or posterior hypothalamic (PH) infusion of a scrambled (SCR) or  $G_{\alpha 12}$  oligodeoxynucleotide (ODN-300ng/site/day) and a normal 0.4% (NS) or high 8% NaCl (HS) diet for 7-days. On day-7 MAP, 24h metabolic balance, plasma norepinephrine, (NE) and PVN  $G_{\alpha 12}$  protein levels were determined (N=5/group).

Results:

HS-intake evoked a significant 3-fold site-specific increase in PVN  $G_{\alpha 12}$  proteins. ODN-mediated PVN  $G_{\alpha 12}$  down-regulation, but not PH miss-injection or PVN SCR ODN pre-treatment, caused renal nerve-dependent sodium retention (24h  $Na^+$  balance [meq] PH  $G_{\alpha 12}$  + HS  $0.5 \pm 0.2$ , PVN  $G_{\alpha 12}$  + HS  $2.3 \pm 0.4^*$ , PVN  $G_{\alpha 12}$  RDNX + HS  $0.8 \pm 0.3\tau$ ), global sympathoexcitation (plasma norepinephrine [nmol/L] PH  $G_{\alpha 12}$  + HS  $17 \pm 4$ , PVN  $G_{\alpha 12}$  + HS  $75 \pm 9^*$ , PVN  $G_{\alpha 12}$  RDNX + HS  $24 \pm 6^*$ ) and hypertension (MAP [mmHg] PH  $G_{\alpha 12}$  + HS  $128 \pm 3$ , PVN  $G_{\alpha 12}$  + HS  $140 \pm 2^*$ , PVN  $G_{\alpha 12}$  RDNX + HS  $131 \pm 3^*$ ) \* $p < 0.05$  vs. PH  $G_{\alpha 12}$  + HS,  $\tau p < 0.05$  vs. PVN  $G_{\alpha 12}$  + HS.

Conclusion:

Renal nerve dependent dysregulation of sympathetically driven sodium retaining mechanisms occurred following PVN  $G_{\alpha 12}$ -protein down-regulation evoking salt-sensitive hypertension. We conclude PVN  $G_{\alpha 12}$  protein-gated pathways regulate renal nerve-dependent sodium excretion to facilitate sodium homeostasis and maintenance of a salt-resistant phenotype – R01HL107330.

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### Using complex system entropy method of data mining on biomedical pattern of essential hypertension: a survey of the literature

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Background: Complex system entropy method of data mining is a technique for discovering useful information hidden in related databases, which has recently been used by medical, chemical and Pharmaceutical industries. It may enable us to detect the interesting and hidden biomedical patterns in the field of cardiovascular disease, and reveal potential biological mechanisms underlying essential hypertension (EH).

Methods: We summarized 597 experimental and clinical studies linking with EH and evaluated the related physicochemical indexes, the most related physicochemical indexes and their complicated correlations were figured out using a complex system entropy method of data mining.

Results: By analysis and calculation of published data, the top twenty physicochemical indexes were ranked by the incidence coefficient, including 24 hour blood pressure, left ventricle ejection fraction, heart rate variability, followed by urea acid, lipid protein, triglyceride, SOD, etc. These findings agreed with evidence accumulated from previous studies. Given that urea acid is an important cardiovascular risk factor, there is the potential for an increased risk that accelerates the development of essential hypertension. Besides that, it was found that these multiple biochemical changes also indicated dyslipidemia, kidney dysfunction and oxidative stress associated with the severity of EH, suggesting the possibility of new treatment of EH.

Conclusion: Complex system entropy method of data mining had been an appropriate and sufficiently sensitive method to analyze the biomedical mechanisms underlying EH. These physicochemical indexes may play a discriminate role in the patho-physiology of EH and could provide important targets for pharmaceutical interventions.

## POSTER SESSION P1: RESISTANT HYPERTENSION

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### ALDOSTERONE AND RESISTIN ARE RELATED WITH PATHOPHYSIOLOGY OF RESISTANT HYPERTENSIVE

Silvia Ferreira-Melo

Background: Obesity has been associated with resistant hypertension (RHTN) by high aldosterone and adipocytokines plasma levels. Resistin is a hormone produced by adipocyte tissue implicated in endothelial dysfunction and vascular stiffness in hypertensive subjects. However, the role of both aldosterone and resistin in the development of resistant hypertension is not clearly understood. Methods: Office BP, aldosterone and resistin plasma levels (ELISA), endothelial function (brachial flow-mediated dilation, FMD) and vascular stiffness (pulse wave velocity-PWV) were evaluated in 93 RHTN patients. Pearson's correlation was used to analyze the association between aldosterone and resistin with the other variables. Results: RHTN patients had (mean±SD): age (58.0±10.8 y.o.), BMI (30.89±4.83kg/m<sup>2</sup>), Systolic BP (SBP) (147±17mmHg), Diastolic BP (DBP) (87±11 mmHg), PP (60±15 mmHg), aldosterone levels (119.5±66.8 pg/mL), resistin levels (11.4±5.8 ng/mL), FMD test response (7.8± 1.8%) and pulse wave velocity (PWV= 11.5±1.8 m/s). Aldosterone plasma levels correlated with SBP (p< 0.001; r=0.41), PP (p< 0.001; r=0.35), FMD response (p< 0.05; r= -0.23), but not resistin (p>0.05). Both resistin and aldosterone plasma levels correlated with PWV (p< 0.05; r=0.32; p< 0.001; r= 0.43, respectively). Conclusion: Despite the importance of resistin in endothelial dysfunction in RHTN, aldosterone may surpass the importance of this adipocytokine in resistant hypertension pathophysiology, playing an important role in the mechanisms of antihypertensive therapy resistance.

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### EFFECT OF SODIUM RESTRICTION ON DOSE OF CAPTOPRIL IN PATIENTS WITH SEVERE HYPERTENSION UNCONTROLLED ON THERAPY

John B. Myers<sup>1</sup>

<sup>1</sup>Well-spring's Universal Environment

Background: Though presented at the first ACE (Angiotensin Converting Enzyme) inhibitor meeting in Milan in 1981 this study, with Morgan TO and Waga S, was not published in proceedings as the editors' view was that it was poorly written and time did not permit a rewrite, remains a landmark report demonstrating the effectiveness of salt restriction as a renin-angiotensin modifying strategy that potentiates the effectiveness of oral ACE inhibitor therapy.

Study Design: 9 adult patients (8 males) with previously uncontrolled severe hypertension despite treatment with other than an ACE inhibitor were treated with the first orally active ACE inhibitor, Captopril and sodium restriction plus other drugs including Frusemide. 24h urinary sodium excretion was used as the measure of sodium intake.

Results: Average sodium intake (2-3mmol/kg/day) was reduced to <1mmol/kg/day. Captopril dose titration permitted average doses of around 37.5mg tds in sodium restricted patients compared to the recommended 150mg tds. Addition of Lasix 40mg stabilised the blood pressure response. Ageusia in 3 patients helped to reduce sodium intake. All males responded to the combination above, while one also required Prazosin and a Calcium channel blocker and emergency saline infusion because of severe hypotension on the reduced sodium intake (20-30mmol/day). The female patient did not respond to ACE plus sodium restriction but did respond to several drugs of which alpha methyl Dopa was the most effective given tds.

Conclusions: Reduced sodium intake permits blood pressure control with lower doses of ACE inhibitor and is recommended as first line treatment in male patients.

## POSTER SESSION P1: RISK STRATIFICATION

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### ABDOMINAL OBESITY, RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM ACTIVITY AND COMMON CAROTID ARTERIES INTIMA-MEDIA THICKNESS

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Aim. Abdominal obesity (AO) leads to increasing of RAAS activity and common carotid arteries intima-media thickness (CCA IMT).

Material and methods. We studied 285 patients (47.3±0.6) with AO (IDF, 2005) and 30 non-obese (NO) subjects. 52,1% of obese patients had arterial hypertension (AH). 29.1% of obese patients had atherosclerotic plaques (AP) in CCA. Plasma renin activity (PRA) investigated by radioimmune assay, CCA IMT - by ultrasound duplex scan.

Results. PRA and CCA IMT were higher in obese patients versus NO subjects (PRA: 4.0±0.7 and 2.0±0.7 ng/ml/h, p=0.03; CCA IMT left: 1.1±0.3 and 0.6±0.01cm, p=0.0001; CCA IMT right: 0.8±0.01 and 0.6±0.02 cm; p=0.0001). PRA and CCA IMT were higher in obese patients with AH versus obese patients without

AH (PRA: 6.0±1.3 and 1.7±0.2 ng/ml/h, p=0.0001; CCA IMT left: 1.3±0.6 and 0.2±0.02 cm, p=0.0001; CCA IMT right: 0.9±0.02 and 0.7±0.01 cm; p=0.0001). PRA and CCA IMT were higher in obese patients with AP in CCA versus obese patients without AP in CCA (PRA: 8.3±3.8 and 2.6±0.5 ng/ml/h, p=0.04; CCA IMT left: 1.9±0.9 and 0.7±0.01cm, p=0.0001; CCA IMT right: 1.0±0.03 and 0.7±0.01 cm; p=0.0001). We revealed correlations between PRA and CCA IMT (r=0.2; p=0.03), waist circumference (WC) (r=0.1; p=0.04), systolic blood pressure (SBP) (r=0.3; p=0.001), diastolic BP (DBP) (r=0.2; p=0.002), duration of obesity (r=0.2; p=0.03), and between CCA IMT and BMI (r=0.4; p=0.001), age of patients (r=0.4; p=0.001); CCA IMT and WC (r=0.3; p=0.0001), SBP (r=0.3; p=0.0001), DBP (r=0.3; p=0.0001).

Conclusions. PRA and CCA IMT increase in patients with AO accompanied by AH and atherosclerosis.

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### CONTROL OF CARDIOVASCULAR DISEASE RISK FACTORS AMONGST HYPERTENSIVE PATIENTS AT DIFFERENT CARDIOVASCULAR RISK OVER A 10 YEAR PERIOD IN A PRIMARY CARE SETTING

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**Objective:** Patients with hypertension usually have more than one cardiovascular disease (CVD) risk factor placing them at medium to high risk for CVD events. Our study aims to examine the control rates of blood pressure (BP) glycaemia and lipids among hypertensive patients of different risk categories over a 10-year period

**Method:** This is part of a randomly selected retrospective cohort study of patients at a primary care clinic. Individual CVD risk was computed using the General Framingham CVD risk score. Patients were classified into low (<10% risk), medium (10%-20%) and high risk (>20%). Target BP was defined according to clinical practice guidelines. Achievement of target BP, glucose and lipid levels in 1998, 2002 and 2007 were captured.

**Results:** 580 hypertensive subjects with complete data were included in the analysis. Mean age was 57.4(SD± 9.8)years; 37.2% male. At baseline, 50(8.6%), 149(25.7%) and 381(65.7%) patients were in low, medium and high risk groups respectively. Target BP was seen in less than a third of the patients with high risk compared to higher control rates of more than half in those with low risk at the end of 10 years follow-up.(Table 1) A similar pattern was seen with LDL-cholesterol control.

Table 1 Control rates of CVD risk factors over 10-years

Risk category	Control rates (%)								
	BP			Ldl-cho			HBA1C*		
	1998	2007	P value	1998	2007	P value	1998	2007	p value
Low	48	58.0	0.001	10	68.0	0.001	4.0	6.0	0.001
Medium	22	53.7	0.007	9.4	59.1	0.001	4.7	15.4	0.007
High	7.6	31.8	0.001	8.4	45.1	0.001	14.7	18.6	0.001

\*In only those with diabetes mellitus

**Conclusion:** Although the overall control of BP, LDL and HbA1C improved over time in all risk categories, control in the high-risk group is far from optimal. Use of risk stratification to identify

those at highest risk should be encouraged to improve management and hence reduce CVD events in those most at risk.

### 329 DIFFERENCES OF CAROTID INTIMA-MEDIA THICKNESS, PLAQUE SCORE AND PLAQUE AREA STENOSIS ACCORDING TO MULTIVESSEL DISEASE IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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**Background:** Carotid intima-media thickness (IMT) and plaques are used as surrogate markers of cardiovascular disease. But, it is still unclear whether carotid parameters play a role for stratifying established coronary artery disease (CAD). Therefore, we investigated the relationships between carotid parameters and extent of CAD in patients with acute myocardial infarction (AMI).

**Methods:** Among 1351 patients received consecutively carotid ultrasound examination from Sep 2011 to May 2012, 137 patients diagnosed with AMI were enrolled (104 men and mean age 64.9±12.7 years). IMT, plaque score (PS) and % plaque area stenosis (AS) were compared according to multivessel disease (>2 vessel disease). PS was computed according to the presence of plaque in 4 different locations of both carotid arteries.

**Results:** There were no differences in baseline characteristics. But the higher proportion of non-ST-segment elevation myocardial infarction is observed in MVD group (54.9% vs. 30.4%, p=0.007). MVD group had higher incidence of plaques and SS (85.7% vs. 56.5%, p<0.001 and 20.7±9.5 vs. 12.2±7.9, p<0.001). Mean carotid IMT, PS and %AS were also higher in MVD group (0.84±0.21 vs. 0.76±0.15, p=0.033; 2.5±1.6 vs. 1.3±1.6, p<0.001; and 37.8±22.4% vs. 20.3±21.0%, p<0.001). PS was correlated with mean IMT, %AS values as well as SS and extent of coronary disease (r=0.415, p<0.001; r=0.770, p<0.001; r=0.189, p=0.027; and r=0.334, p<0.001).

**Conclusion:** MVD in AMI patients was associated with increased CIMT, higher PS and %AS. PS showed significant correlation with the extent and severity of coronary artery disease in AMI patients.

## POSTER SESSION P1: STROKE

### 348 EFFICACY OF NITRIC OXIDE IN STROKE - A PROSPECTIVE RANDOMISED CONTROLLED TRIAL IN ACUTE STROKE

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**Rationale:** Acute hypertension is associated with a poor outcome after stroke. No large trials have assessed the effect of altering BP during the acute phase of stroke on outcome. We are testing whether nitric oxide, a multimodal molecule given as glyceryl trinitrate (GTN), is safe and effective in improving outcome after acute stroke. Furthermore, around half of all patients admitted with acute stroke are taking antihypertensive therapy immediately prior to the stroke. No data exist as to whether it is beneficial or safe to stop or continue this treatment during the acute phase.

**Funding:** The Medical Research Council.

**Design:** ENOS is a prospective, international, multicentre, randomised, parallel-group, blinded, controlled trial. 3,500 - 5,000 ischaemic or haemorrhagic stroke patients with systolic BP 140-220 mmHg, and within 48 hours of onset will be included. Subjects will be randomised to 7 days of single-blind treatment with transdermal GTN or control. Those patients taking prior antihypertensive therapy will also be randomised to continue or temporarily stop this for 7 days. ENOS is conducted over a secure internet site. The primary outcome is modified Rankin Scale at 90 days which is carried out by a blinded assessor. The analysis will be by intention to treat.

**Trial status:** As at 26<sup>th</sup> April, 2012, 2990 patients had been recruited from 155 centres (Australia, Canada, China, Denmark, Egypt, Georgia, Hong Kong, India, Italy, Malaysia, New Zealand, Philippines, Poland, Republic of Ireland, Romania, Singapore, Spain, Sri Lanka and UK). More centres welcome to join.

### COMPARISON OF CIRCADIAN BLOOD PRESSURE PATTERNS BETWEEN PATIENTS WITH TIA OR MINOR STROKE AND CONTROLS

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<sup>6</sup>Monash medical center, Victoria, Australia

Background: The circadian rhythm in blood pressure (BP) is classified into different patterns, with dipper recognised as the Conclusion: Patients with TIA/minor stroke have similar HRV and circadian BP patterns when compared to controls. This differs from studies of acute stroke where impaired HRV and abnormal BP pattern are more likely to be present and treatment according

normal pattern. Abnormal circadian blood pressure (BP) patterns have been found to commonly present in patients with stroke. The circadian BP pattern and the relationship with autonomic nervous function in patients with TIA or minor stroke is uncertain.

Methods: Patients with TIA/minor stroke recruited within 7 days after onset and age-sex group matched control participants were assessed using a 24-hour ambulatory BP monitor (Spacelab 90217) and an ECG-based Heart Rate Variability (HRV) test. The four BP patterns are dipper, non-dipper, reverse dipper and extreme dipper patterns.

Results: 76 patients (mean age 68 years, 59% male) and 82 controls (mean age 66 years, 54% male) were recruited. No statistically significant differences were found on the distribution of circadian BP patterns and the HRV variables comparing patients and controls. A greater proportion of subjects with a history of hypertension (n=79) had abnormal circadian BP patterns (risk difference -0.17, 95% CI -0.32 to -0.01, p=0.04) and lower HRV (p<0.05) than subjects without hypertension (n=61).

to different circadian BP variations has been recommended. Further studies are needed to provide more information on the influence of autonomic nervous system and circadian BP patterns for TIA and minor stroke.

## S12: LARGE ARTERY FUNCTION

### ARTERIAL WAVES AND RESERVOIRS IN HYPERTENSION

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The shape of the blood pressure (BP) waveform has been used for diagnostic purposes in hypertension for over a century and is indicative of ventricular-arterial interactions arising from the functional and structural characteristics of the circulation. The circulation is complex and a complete 3-dimensional description of its time-dependent behaviour is currently beyond computation, consequently simpler models have been used to understand the BP waveform and its relationship to cardiovascular function in hypertension. One of the simplest models of the circulation first proposed by Hales in 1733 [1] is the 'Windkessel' model where the arterial circulation is approximated by a compliant reservoir coupled to outflow via a resistance. This approach has been largely superseded by models that consider the BP waveform to be the product of additive forward and backward waves (due respectively to ventricular ejection and reflection of the ejection wave). This approach has been fruitful but is not without

problems, notably that it predicts simultaneous 'self-cancelling' forward and backward waves in diastole. More recently we and others [reviewed in 2] have proposed a simple heuristic model (the wave-reservoir model) that combines elements of the Windkessel and wave models. This approach accords a role to large arterial compliance and the change in arterial volume over the cardiac cycle, (termed the reservoir) while also allowing a major role for wave reflections and re-reflections in shaping the morphology of the pressure and flow waveforms (excess pressure). While a simplification, this approach is supported by experimental evidence in humans and animals. Importantly, parameters derived from this model appear to have improved prognostic value over other measures of the BP waveform. In an analysis of the CAFE sub-study of the ASCOT trial the integral of excess pressure was a significant predictor of all cardiovascular events (hazard ratio [95% confidence interval] = 2.2 [1.5-4.0], p<0.001) and was independent of age, sex, treatment, and conventional cardiovascular risk factors, including brachial BP, central systolic BP, central pulse pressure, augmentation index and heart rate.

1. Hales, S. Statistical Essays Containing Hemostatics, London, 1733.
2. Tyberg et al. Med Biol Eng Comput. 2009;47:221-32.

## S21: LATE BREAKING ABSTRACTS

### MULTIPLE BIOMARKERS AND IMPROVEMENT IN THE PREDICTION OF CHD OUTCOME: ANGLO-SCANDINAVIAN CARDIAC OUTCOME TRIAL (ASCOT) NESTED CASE-CONTROL STUDY

Peter S Sever<sup>1</sup>, Choon L Chang<sup>1</sup>, Paul Welsh<sup>2</sup>, Neil R Poulter<sup>1</sup>, Naveed Sattar<sup>2</sup>

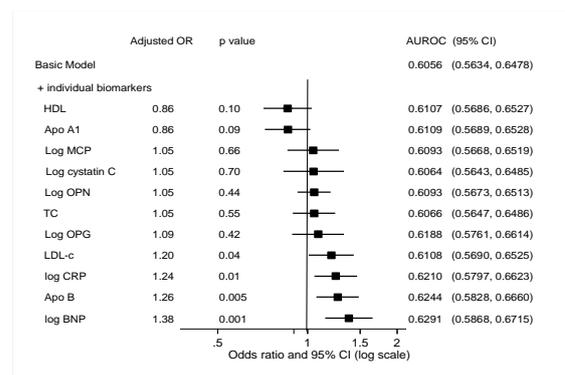
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Background: The usefulness of contemporary biomarkers when added to a predictive model using traditional risk factors remains

uncertain. We compared the predictive value of 11 blood biomarkers: markers of dyslipidaemia (total cholesterol, HDL-c, LDL-c, Apo A, Apo B); inflammation (C-reactive protein(CRP), Monocyte Chemoattractant Protein-1(MCP), Osteopontin(OPN), and Osteopontin(OPN)); cardiac and renal dysfunction (Nt-proBNP, cystatin C).

Methods and Results: 273 incident CHD cases and 563 matched controls from ASCOT participants were included in analyses. Nt-proBNP was the strongest independent risk factor in the conventional non-lipid model (OR 1.38 (1.15-1.65) per increment SD), followed by Apo B (OR of 1.26 (1.07-1.48)). The addition of Nt-proBNP improved the area under the Receiver Operating Characteristic curve (AUROC) (0.629 (0.587-0.672) vs 0.606

(0.563-0.648), with continuous net reclassification improvement (NRI) of 20.2% (p=0.006). Model with Apo B was the second most predictive model (AUROC: 0.624, NRI 14.0%). In a stepwise conditional logistic regression model that included 8 newer biomarkers, Apo B, Nt-proBNP and OPG significantly related to CHD events (ORs 1.68 (1.25-2.25); p=0.001, 1.37 (1.12-1.67); p=0.002 and 1.46 (1.07-2.01); p=0.02 respectively) and significantly increased AUROC (0.662 vs 0.611; p=0.01). This led to 55.7% of cases being reclassified to a higher and 34.8% to lower continuous risk threshold.



Conclusion: Apo B and Nt-proBNP are stronger predictors of CHD risk than LDL-c in this cohort. Other biomarkers were significantly independent predictors of CHD but incremental predictive value was modest. The predictive power of traditional risk factor models may be strengthened by including Apo B, Nt-proBNP and OPG.

## POSTER SESSION P2: BLOOD PRESSURE MANAGEMENT

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### CHANGES TO ANTIHYPERTENSIVE MEDICINES DURING HOSPITAL ADMISSION FOR THE ELDERLY

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Background and objectives: Understanding current patterns of antihypertensive utilization, especially among the elderly population, is essential for ensuring optimal clinical care. The aim of this study is to understand patterns of antihypertensive use and medication changes during hospitalisation in elderly hospitalized patients. Design and methods: A retrospective, cross-sectional medical records survey of medicine use and blood pressure control in 646 elderly (>65 years) patients (n=646) admitted to a large tertiary Australian teaching hospital during 2010 was conducted. Blood pressure control was assessed according to the current Australian guidelines<sup>1</sup>. Results: This study presents the results from the first 117 patients. Almost two thirds (62.4%) of patients had a documented history of hypertension. The mean age of the hypertensive patients was 81.3 years (range: 65.4-95.8) and 66 % (n=48) were female. The most commonly prescribed antihypertensives on admission (23.7%) and on discharge (24.8%) were ACEIs. During hospitalisation 45% of patients experienced changes to their antihypertensive regimen despite the majority of patients (n=82.2%) being admitted for non-cardiovascular related indications. Only one patient was admitted with for management of hypertension. Information on pre-admission blood pressure control was unavailable for most patients (83.6%) and for the patients for whom BP on admission was known, 35.6% were considered to be at target. On discharge, 63.9% of patients had a target BP reading. Conclusions: The hospitalised elderly represent a vulnerable population. Many patients experienced to changes to their antihypertensive regimens during hospitalisation despite a lack of long term information about blood pressure control.

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### HYPERTENSION: MOSTLY A PROBLEM OF AWARENESS OR ADHERENCE TO TREATMENT?

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Background: Hypertension (HT) represents the most important cardiovascular (CV) risk factor, but the target blood pressure is not reached in the majority of hypertensive treated patients. Aim of this work was to evaluate a sample of population to assess: 1- prevalence of HT and of treated "target patients"; 2- to compare these findings with those already available; 3- to evaluate the awareness that HT is a CV risk factor.

Methods: 1098 subjects (mean age 58y, M=596, F=500, M/F:0.84) were evaluated. CV risk factors, HT management and comorbidities were collected and blood pressure (BP) was measured.

Results: Among the 1098, 652 declared themselves "normotensive" and 446 "hypertensive". In 802/1098(73%), BP values were <140/90mmHg, while in 296(27%) were ≥140/90; among these last, 180/446(40%) belonged to the group of "hypertensive", thus representing "non-target patients". No differences in terms of risk factors and medications were found when comparing "non-target patients" vs "target patients" (with the exception of coronary artery disease). An inverse relationship between number of drugs and pressure target was confirmed. Among "non-target patients", 30(16%) were not treated and 43(23%) did not remember the therapy.

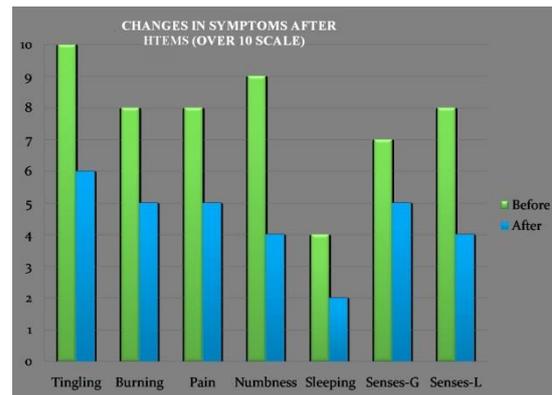
Conclusions: Our data are consistent with those reported in literature regarding HT prevalence in Italy. On the contrary, the rate of "target patients" resulted significantly higher compared to literature (60% vs 30-35%), as significantly higher resulted the number (98/446, 22%) who did not remember the treatment. Our results suggest that the failure of BP control is related both with a poor therapy compliance and a weak awareness.

## IS IT A PROMISING MIRACULOUS THERAPY? HIGH-TONE EXTERNAL MUSCLE STIMULATION ELECTROTHERAPY IN THE TREATMENTS OF RESISTANT AND IRREVERSIBLE SYMPTOMATIC PERIPHERIC POLYNEUROPATHY WITH DIABETES MELLITUS, CHRONIC KIDNEY DISEASE AND PRIMARY HYPERTENSIVES

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**Introduction and Aims:** Chronic resistant peripheral neuropathies are leading disturbances in DM, CKD and PH patients. It has been known for thousand years applications of electrical energy by religious genius or unique animals such as electric fish in bottom of oceans yoga, transcendental meditation, biofeedback approaches are reasonably somewhat effective. **Methods:** 20 DM patients with peripheric neuropathies on lower limbs with severe tinglings, burnings, pains, numbness, sleeping disturbances, general or local sensing abnormalities ( 7 parameters ), 20 CKD and 10 PH patients with same symptoms included into study. Patients had severe medical treatments including analgesics, antidepressives, anti-anxiotics, vit B complex, gabapentin like drug therapy, several types of physical therapies recently. HMTE device, HiTop 181-H ( GBO Medizintechnik ) applied to groups as three times a week for one hour during one month.

Before study and after treatments, SBP, DBP, MAP, HR with Mobil-O-Graph NG automated continuously BP recorder (APC Cardiovascular), EMG-ENG detections, HbA1c, albumin, CRP values, for sympathetic nervous system NE, E, Dopamin, PRA, aldosteron, All levels determined. Results before and after compared according to universal criteria. Decrements in physical symptoms categorized in a scale as from 10 to 1 degree decrementally or from 1 to 10 gradually. **Results:** All three categories faced miraculous decrements at least 2 or 3 scales in peripheral symptoms on lower limbs for 7 parameters. Working and walking capacities improved dramatically and psychosocial behaviours changed, felt themselves like never before. SBP, DBP, MAP, HR were significantly decreased as expected at least 20% (figure 1 and 2). We expect hormonal values to be in accordance with dramatical clinical improvements as well.



**Conclusions:** New treatment modality appears to have miraculous effects to be accepted officially and privately in state and private treatment centers. If we consider prevalences of 5% for DM, 8% for CKD and at least 27% for PH in world presently we believe those patients have rights to be treated in reasonable fashion with this novel modality. This is a sine qua non humanitarian task.

## 519 POOR COMPLIANCE AND UNFAVORABLE CARDIOVASCULAR OUTCOME IN HYPERTENSIVE PATIENTS: AN IMPORTANT AND UNDERESTIMATED HEALTH ISSUE

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**Objective:** Cardiovascular disease is characterized by significant prevalence and cost in the managed care setting. Despite overwhelming evidence in favor of periodic evaluation about own disease states, above all after prior cardiovascular event, patient's attitude to these potential opportunity remains often suboptimal. We performed the study to establish the benefits of an adequate compliance to periodic cardiology evaluation and the potential interventions to improve clinical outcomes. **Design and Method:** 120 hypertensive patients (62 ± 13 years old) with ST-elevation myocardial infarction (STEMI) treated by primary percutaneous coronary intervention (PCI) were enrolled to a scheduled control visit (at 30 days and every 4 months) with appropriate instrumental exam, as it is stress test to evaluate residual ischemia (at 4 month and every years) and echocardiography to evaluate cardiac performance improvement (at 6 month and every years), and a periodic telephone contact with trained personal (Physician or nurse). The dataset of information was collected during the period between July 2005 and December 2008 and the statistical analysis was conducted by dividing the population in non-compliance group (nc-Group) and in compliance group (c-Group). **Results:** The primary outcome (death, reinfarction, re-hospitalization or residual ischaemia) occurred in 28 patients (23.3%) in the nc-Group compared with 92 patients (76.4%) in the c-Group (odds ratio: 0.96; p=0.003) with event-free survival significantly higher in the last group (Log Rank test p=0.002). **Conclusions:** To overcome the issues surrounding the lack of patient's compliance, our interventions was designed not only on the optimal medical strategy but also on successful patient and provider – focused behavioral strategies. Interventions for improving adherence to periodic follow-up will provide an opportunity to decrease morbidity, mortality, and hospitalization associated with cardiovascular disease.

### ESTIMATION OF AORTIC FLOW VELOCITY FROM DERIVED AORTIC PRESSURE WAVEFORMS

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#### Background:

Ascending aortic flow waveform can be generated from ascending aortic pressure if ascending aortic impedance can be gauged from age.

#### Methods:

Radial artery pressure waveforms (applanation tonometry) were transformed using generalised transfer function (GTF) to generate aortic pressure. Age-specific impedance transfer function (ITF) was then used to generate aortic flow. Data were obtained in 160 male patients (age 33-80) undergoing cardiac catheterisation for

suspected coronary disease. Doppler flow and applanation tonometry studies were undertaken within 1 hour.

#### Results:

Generated flow waves showed an early systolic peak which corresponded well to the initial pressure peak (106±8 msec after the wavefoot). Flow fell to near zero at the incisura and remained at this level through diastole. Late systolic flow was lower in the older than in the younger patients, with concavity in older persons corresponding to convexity of the pressure waveform. The Doppler flow wave was broad, representing different flow velocities. The peak of the inner envelope was approximately 60% of the other envelope, when this could be clearly seen. Peak flow velocities were 102.5 (SEM 1.5) cm/s (Doppler, outer envelope), 62 cm/s (Doppler, inner envelope) and 55 (SEM 2) cm/s (GTF/ITF formula).

#### Conclusions:

Generated flow waves show aging changes which are not apparent in Doppler flow patterns; they are realistic in shape and applicable on the basis of LV weakening and variably increased early wave reflection. High peak flow calculated from Doppler waves may be due to the narrow outflow tract. MRI flow waves show lower values.

## POSTER SESSION P2: CENTRAL HEMODYNAMICS

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### MEASUREMENT OF CENTRAL BLOOD PRESSURE USING SUPRA-SYSTOLIC BRACHIAL CUFF: A METHOD OF COMPARISON OF PULSECOR AND SPHYMOCOR IN 1117 PATIENTS.

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Background: Estimated aortic (or central) systolic pressure (cSBP) differs from peripheral pressure and may be a better predictor of cardiovascular events. SphygmoCor<sup>®</sup> (AtCor, Sydney, Australia) uses applanation tonometry to derive cSBP by application of a generalised transfer function to radial pulse waveforms. PulseCor<sup>®</sup> (PulseCor, Auckland, New Zealand) is a new device that estimates cSBP from suprasystolic brachial cuff waveforms. We compared blood pressures measured by both devices

Methods: 1117 individuals (69.6±6yrs) underwent consecutive radial (SphygmoCor) and brachial (PulseCor) waveform measures. Method comparison was performed by Bland Altman analysis in Stata 12.0.

Results: Measurements made by the two devices were similar (Table 1). cSBP estimated by PulseCor tended to be higher than SphygmoCor, although the difference was within the American Association for the Advancement of Medical Instrumentation (AAMI) standards (< 5mmHg and SD<sub>diff</sub> was <8mmHg). Bland Altman analysis showed no systematic bias between devices across the range of blood pressures measured (Figure 1).

Variable	PulseCor	SphygmoCor	Difference	LOA
cSBP, mmHg	136.3±15.1	133.1±15.8	3.2±4.4	-5.4, 11.7
cDBP, mmHg	85.7±10.3	85.4±10.4	0.3±0.9	-1.5, 2.2

Table 1. Close agreement in central haemodynamics between PulseCor and SphygmoCor

DBP, diastolic blood pressure; SBP, systolic blood pressure; LOA, limits of agreement. Data are means (SD).

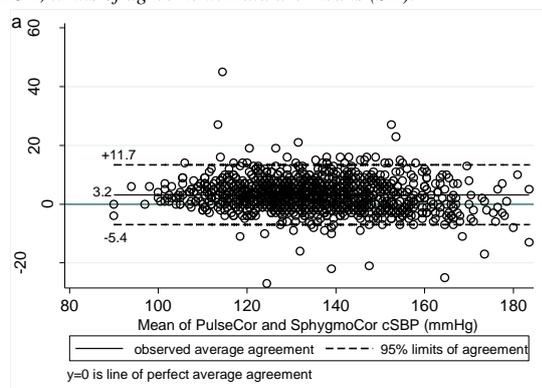


Figure 1. Bland-Altman plot between Pulsecor and SphygmoCor

Conclusions: PulseCor and SphygmoCor give similar estimates of central blood pressures. The slightly higher cSBP measured by PulseCor could relate to the use of brachial rather than radial pressure to calibrate SphygmoCor.

### ACCURATE, NONINVASIVE, TRANSCUTANEOUS DOPPLER (USCOM) MEASURES OF CARDIAC OUTPUT AND VASCULAR RESISTANCE MAY IMPROVE GUIDANCE OF ANTIHYPERTENSIVE THERAPY

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Background: Optimal control of hypertension remains challenging, suggesting protocols to guide antihypertensive therapies could be improved. Blood pressure (BP) level is used to define hypertension, and is a target for hypertensive management guidelines. However BP is the product of cardiac output (CO) and systemic vascular resistance (SVR),  $BP = CO \times SVR$ . Therefore

hypertension may be a consequence of high CO, high SVR, or both. Further, CO and SVR are the targets of anti-hypertensive therapy, with BP the measured variable. Consideration of hypertension as cardiogenic, raised CO, vasogenic, raised SVR or mixed types may improve guidance of therapy. Transcutaneous Doppler (USCOM, Uscom Ltd, Australia) provides simple, noninvasive and accurate measurements of CO with validation from 0.12l/min to 18.7l/min across many clinical applications including pre-eclampsia. The device is simple to operate and generates 22 parameters of cardiovascular performance instantaneously including Stroke Work and Cardiac Power. SVR is calculated from CO and BP.

Case History: A 74yo female with severe uncontrolled hypertension (BP=187/85, mean BP=115mmHg, HR=104, SW=1886mJ) was treated with fluid control and glyceryl trinitrate 1.5ug/min/kg. USCOM examination demonstrated CO=12.3L/min and SVR=697Dyne.s.cm<sup>-5</sup>. The GTN and CRRT was ceased resulting and a further USCOM examination performed 30minutes later (BP=154/76, mean BP=102mmHg, HR=112, SW=1107mJ, CO=10.7L/min, SVR=866Dyne.s.cm<sup>-5</sup>)

	Sys/Dia	MAP	SV	SVI	SVR	SVRI	CO	CI	HR	SVV	CPo	SW
Base	185/90	122	119	80	697	1040	12.3	8.2	104	23	3.2	1886
Post Tx	154/76	102	99	67	866	1292	10.7	7.1	112	27	2.1	1107
Day2	145/68	94	78	52	1007	1503	7.2	4.9	93	24	1.5	965
Norm	116/65	82	66	40	1479	2486	4.8	2.8	72	<15	1.0	800

Table 1. Haemodynamic variables monitored at baseline, 30 minutes post cessation of treatment, and 16 hours later, compared to normal values.

Conclusion: Simple noninvasive USCOM measurements of CO and SVR are feasible, and may improve our understanding of the pathophysiology of hypertension and guide more accurate and cost-effective delivery of individualised anti-hypertensive therapy.

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#### HYPERTENSIVE MANAGEMENT GUIDELINES: HAS A FOCUS ON BLOOD PRESSURE MASKED THE IMPORTANCE OF CARDIAC OUTPUT AND VASCULAR RESISTANCE?

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Background: Control of hypertension can be difficult, suggesting current practices to guide antihypertensive therapies may be improved. Blood pressure (BP) is used to define hypertension, and is the target for hypertensive management guidelines. However BP is the product of the physiologic variables of cardiac output (CO) and systemic vascular resistance (SVR),  $BP = CO \times SVR$ . Further the direct targets of interventional therapy are reduced CO and/or reduced SVR, and consequently reduced BP. However the relationship between CO and SVR is complex, compensatory and interdependent. The addition of accurate and noninvasively acquired CO and SVR targets to hypertensive management guidelines is physiologically rational and may improve the control of hypertension.

Method: Six current hypertension management guidelines from the US, Europe, UK, Australia, Japan and Latin America were reviewed. The number of pages and words in each guideline were determined using the Microsoft Word Count function, and specific searches made for <CO>, cardiac output, <SVR>, vascular resistance, <BP> and blood pressure and the results tabulated.

Results: In 446 pages of hypertensive guidelines from 6 different global organisations blood pressure was mentioned 3,131 times. Vascular resistance was mentioned 12 times, and cardiac output 11 times. While BP target values were recommended in all guidelines, no CO or SVR targets were included in any of the guidelines.

Source	Pages	Words	CO	Cardiac Output	SVR	Vascular Resistance	BP	Blood Pressure
ACC 2011	76	69,251	0	6	0	5	346	220
ESC+ESH 2007	75	78,312	0	3	0	1	76	821
NICE 2011	36	7,155	0	0	0	0	0	101
Aust 2010	39	13,281	0	0	0	0	136	19
Japan 2008	189	105,263	0	2	0	6	3	1267
Latin Am 2009	31	15,299	0	0	0	0	0	142
Total	446	289,007	0	11	0	12	561	2570
All	446	289,007	11		12		3131	

Table 1. Summary of content of six hypertension management guidelines and the frequency with which the physiologic variables

associated with blood pressure are mentioned.

Conclusion: Inclusion of CO and SVR targets in hypertension management guidelines is physiologically rational and may improve our understanding of hypertension and guide more accurate and cost-effective delivery of individualised anti-hypertensive therapy.

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**NEW NONINVASIVE CENTRAL HAEMODYNAMIC NOMOGRAMS TO SIMPLIFY HYPERTENSIVE MANAGEMENT IN NEONATES, CHILDREN AND ADULTS**

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Background: Control of hypertension can be difficult despite established blood pressure (BP) targets, widespread therapeutic guidelines and substantial public spending. As mean BP is the product of cardiac output (CO) and systemic vascular resistance (SVR), the underlying pathophysiologic cause of hypertension may be elevated CO, elevated SVR, or both. While antihypertensive therapies target the reduction of the primary variables CO and SVR, there are no recommended target values. The relationship between BP, CO and SVR is complicated by their interdependence and the autonomic regulation which preserves BP and perfusion pressure, but masking independent derangements of CO and SVR. Therapeutic protocols based on normalisation of accurate CO and SVR values may improve control of hypertension.

As SVR and BP are instantaneous measures showing beat to beat variation, the use of stroke volume (SV) in place of CO, may be more appropriate. Further, as CO = SV x HR, and HR is modulated by baroreceptor effectors to preserve CO, SV may be a more sensitive measure of instantaneous cardiac performance. Both SV and SVR correlate with morphometry so the BSA indexed values of SVI and SVRI may provide logical central cardiovascular haemodynamic targets.

USCOM (Uscom Ltd, Australia) measured SVI and SVRI, and contemporaneous oscillometric BP values were derived from 3750 normal subjects ranging from neonates to 75yrs from 9 global centres, and reference nomograms derived.

Conclusion: These nomograms provide new normative targets for central haemodynamics and may guide more accurate and cost-effective delivery of individualised anti-hypertensive therapy in neonates, children and adults.

Age	SV	SVI	SVR	SVRI	CO	CI	SW	CPo	MAP
Neo	4.2-6.8	20.2-30.4	3679-6457	1204-1606	0.62-0.94	3.1-4.0	17-57		41-59
5	37.4-52.0	47.9-63.7	1166-1787	11947-1405	3.18-4.67	4.1-5.7	233-578		52-58
10	56.2-83.9	48.4-68.2	949-1541	1116-1867	4.1-6.6	3.5-5.4	354-1068		63-95
12-16	79.4-105.2	53.3-70.5	740-1242	1102-1850	5.61-8.15	3.7-5.6	432-1262		67-103
26-35	63-89	35-50	848-1583	1454-2767	4.8-6.8	2.9-4.2	779-1069	0.8-1.3	89-99
46-55	63-81	36-51	1084-1587	1712-2766	4.2-5.9	2.4-3.7	680-865	0.8-1.1	77-87
>55	55-71	35-46	1205-1646	1876-2565	3.5-4.8	2.2-3.1	509-700	0.5-0.8	78-86

Table 1. Normal haemodynamic and blood pressure values across neonates, children and adults from six expert centres (n=3750).

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**THE TIGHT HEART RATE CONTROL HAS NO ANY SIGNIFICANT INFLUENCE ON CENTRAL AORTIC PRESSURE IN PATIENTS WITH ISCHEMIC HEART DISEASE AND ARTERIAL HYPERTENSION**

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Background: The value of augmentation index (AIx) is largely determined by the level of blood pressure (BP). However, the contribution of heart rate (HR) to aortic AIx remains unclear.

Objective: to study the effects of HR lowering therapy on central aortic pulse pressure (CAPP) parameters in patients (pts) with ischemic heart disease (IHD) and controlled arterial hypertension (AH).

Materials and methods: 15 pts with IHD and controlled AH (mean age 55.8±1.3 years), were enrolled in to this study and followed for 3 months. The tight HR control was achieved by combine use of beta-blockers and If inhibitor ivabradine. The CAPP values were measured by means of applanation tonometry using SphygmoCor device.

Results: Parameters applanation tonometry at the beginning of the study were: aortic systolic BP (aSBP) 109,9 ± 1,6 mm Hg. HR 68,7 ± 1,5 b/min. Aortic diastolic BP (aDBP) 76,1 ± 1,1 mm Hg. Pressure augmentation (AP) 9.2 [4.9, 13.6] mm Hg. AIx 21,8 [14,2; 33,3%]. AIx @ HR75 26,2 [10,3; 33,1%]. Time of reflection (Tr) 136,7 ± 2,5 msec. Buckberg index (SEVR) 165,1 ± 4,4%. After 3 months of observation significant reduction of HR was noted (- 17,7% , p <0.01). Parameters of CAPP remained unchanged: aSBP 106,1 ± 1,2 mm Hg. aDBP 71,6 ± 1,3 mmHg. AP 7.4 [3, 8, 14] mm Hg. AIx 17,8 [11,2; 31,1%]. AIx @ HR75 22,1 [9,2; 29,3%]. Tr 147,6 ± 3,9 milliseconds. Reducing SEVR 8.3% (from 165,1 ± 4,4% to 181,9 ± 5,6%).

Conclusions: HR lowering therapy has no significant effect on CAPP in pts with IHD and controlled AH.

## POSTER SESSION P2: CLINICAL TRIALS

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### EFFICACY AND TOLERABILITY OF FIMASARTAN, A NEW ANGIOTENSIN RECEPTOR BLOCKER, COMPARED WITH LOSARTAN (50/100MG): 12-WEEK, PHASE III, MULTICENTER, PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND, PARALLEL-GROUP, DOSE ESCALATION CLINICAL TRIAL IN MILD TO MODERATE HYPERTENSION

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Background: Fimasartan is a newly developed angiotensin receptor blockers (ARBs) that has not been compared with other ARBs. Objectives: We determined non-inferiority of fimasartan to losartan with regard to the efficacy and tolerability in patients with mild to moderate hypertension.

Methods: This was a randomized, multicenter, double-blind, parallel group, dose-escalation, phase III, non-inferiority trial. Patients aged 18 to 70 years with mild to moderate hypertension were randomized to receive either fimasartan 60/120mg or losartan 50/100mg daily. The primary end point was non-inferiority of improvement in mean siDBP for 12-week treatment. The incidence and severity of adverse drug reactions (ADRs) were evaluated to assess their tolerability. Results: 506 patients were randomly allocated to receive fimasartan (n=256) or losartan (n=250). There was no significant difference in baseline demographic characteristics between the two treatment groups. At week 12, siDBP was significantly decreased from baseline in both groups [-11.26±7.53 mmHg in the fimasartan group and -8.56±7.72 mmHg in the losartan group (p<0.0001)]. The between-group difference was 2.70 mmHg (p=0.0002) and the lower limit of the two-sided 95% CI (1.27 mmHg) was higher than the pre-specified non-inferiority margin (-2.5 mmHg). The incidence of ADRs were 7.84% and 10.40% in the fimasartan and losartan groups, respectively (p-value=0.3181). Conclusions: The reduction of siDBP after 12 weeks of treatment with fimasartan 60/120 mg was non-inferior to that of losartan 50/100mg. There was no significant difference in tolerability between the groups.

## POSTER SESSION P2: COMORBIDITIES OF HYPERTENSION – CARDIAC DYSFUNCTION

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### CORRELATION IN ACUTE CORONARY SYNDROMES BETWEEN ARTERIAL HYPERTENSION, OXIDATIVE STRESS, PLATELETS HYPERACTIVITY, ENDOTHELIAL DYSFUNCTION AND PROGNOSIS

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Aims: To evaluate in patients with non ST elevation acute coronary syndrome (ACS) the correlations between arterial hypertension, oxidative stress, platelets hyperactivity, endothelial dysfunction and prognosis

Methods: 240 patients (pts), with ACS were divided in 2 groups: Group HTA (128 pts) with ACS and arterial hypertension; Group non HTA (112 pts) with ACS without arterial hypertension. Biomarkers for platelets hyperactivity (ASPItest, ADPtest by Multiplate®), endothelial dysfunction. (von Willebrand factor activity, flow mediated dilatation), oxidative stress (Total antioxidant status, Myeloperoxidase) and major acute cardiovascular events (MACE) were evaluated for 2 years of follow up. Statistic analysis: multiple regression, chi square test. Results:

	Group HTA	Group non HTA	p
Total ACS patients - 240	128 (53.3%)	112(46.7%)	ns
Cardiovascular death	15(11.7%)	3(2.7%)	0.05
Nonfatal AMI	21(16.4%)	6(5.4%)	0.025
Stroke	10(9.4%)	2(1.8%)	0.05
Ejection fraction < 40%	35(27.3%)	13(11.6%)	0.05
Global wall motion score index (WMSI) >1.7	40(31.3%)	15(13.4%)	0.05
ASPItest >30U	45(35.2%)	23(20.5%)	0.05
ADPtest >50U	21(16.4%)	13(11.6%)	ns
Von Willebrand factor activity >169.7%	31(24.2%)	13(11.6%)	0.05
Flow mediated dilatation < 4.5%	38(29.7%)	15(13.4%)	0.05

Total antioxidant status <1.3 mmol/l	35(27.3%)	13(11.6%)	0.025
Myeloperoxidase MPO IgG ELISA > 20 U	31(24.2%)	10(8.9%)	0.05

Conclusions: In patients with ACS and HTA a significantly increased incidence of: cardiovascular death, acute myocardial infarction, stroke, low left ventricle ejection fraction, high global wall motion score index, high oxidative stress, platelets hyperactivity and endothelial dysfunction were observed at 2 years of follow up in comparison with group with ACS without HTA.

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### THE EFFECT OF VALSARTAN ON LEFT VENTRICULAR HYPERTROPHY AND BIOCHEMICAL MARKERS IN PATIENTS OF MILD TO MODERATE HYPERTENSION

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Objective: The aim of the present study was to examine the effects of an angiotensin II receptor antagonist, valsartan, on echocardiographically proven left ventricular hypertrophy (LVH) and biochemical markers in patients with mild to moderate hypertension.

Methods: 154 outpatients with hypertension were recruited at Eulji University Hospital. The left ventricular mass index (LVMI) was calculated by echocardiography. Hs-CRP, NT-proBNP, peripheral branchial pressure were measured in all patients included in this study. All of them were diagnosed mild to moderate hypertension. They were divided into 4 groups, according to receiving daily dose of valsartan to control BP.

Results: Dramatic decrease of systolic blood pressure, diastolic blood pressure of brachial artery were achieved in 4 groups. All subjects who entered the study, LVMI decreased significantly (p-value < 0.001). After only 24 weeks of valsartan therapy, the

mean LVMI decreased significantly, from 178.94±49.9 to 167.62±45.58 g/m. Also, a significant decrease was observed after 24 weeks at 4 groups compared to baseline. There were no significant differences of biochemical markers in 4 groups compared to baseline. However, only NT-proBNP decreased significantly in valsartan + HCTZ (hydrochlorothiazide) group after 24 weeks ( P<0.05).

Conclusions: In hypertension patients with LVH, treatment with valsartan, an angiotensin II receptor antagonist, reduced left ventricular mass. Also, this drug may be decreased biochemical markers in hypertension patients. The long-term risk-reduction effects will have to be evaluated in further trials.

Key words: Hypertension; Angiotensin II receptor blocker; Left Ventricular Hypertrophy ; CRP ; NT-proBNP

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### NON-DIPPER TYPE BLOOD PRESSURE VARIATION IN ADULT KAZAKHS ORIGINATES FROM THEIR CHILDHOOD

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Objectives and Background: Many cases of non-dippers and hypertension have been documented amongst the elderly Kazakhs living in Xinjiang, China. The purpose of this study was to discover whether or not such a large numbers in non-dippers still exist among young Kazakhs and to compare these to another similar aged minority, the Uyghurs, living in the same region.

Design and Methods: The total number of subjects were 280, dividing into four groups: 1.middle-aged Kazakhs (30-35 years old, n=93), 2.middle-aged Uyghurs (30-35 years old, n=97), 3.young Kazakhs (8-10 years old, n=42), 4. Young Uyghurs (8-10 years old, n=48). We performed ambulatory blood pressure monitoring (ABPM) and defined non-dippers as having a nighttime systolic blood pressure (SBP) drop of < 10% compared to daytime SBP. We analyzed SBP variation with the maximum entropy method (MEM).

Results: Non-dippers in middle-aged Kazakhs were 52 %, whereas those in Uyghurs were 18 %. Those in young Kazakhs were 28 %, whereas those in Uyghurs were 4 %. Similarly to elder Kazakhs, middle-aged and young Kazakhs still exhibited a greater percentage of non-dippers. MEM analysis revealed that both middle-aged and young Kazakhs and Uyghurs still exhibited the SBP variation having a frequency of 24-hr periodicity with high spectral density (PSD) and that of ultradian periodicity with low PSD. PSD in young-aged Kazakhs did not differ from that in young Uyghurs.

Conclusions:

The numbers of non-dippers in middle-aged and young Kazakhs were still larger than those in Uyghurs. The circadian periodicity did not differ between Kazakhs and Uyghurs.

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### CHANGING ECHOCARDIOGRAPHIC PARAMETERS AND CHARACTERISTICS OF THE DAILY BLOOD PRESSURE MONITORING IN POSTMENOPAUSAL WOMEN WITH METABOLIC SYNDROME

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Objective:

To study the connection of left ventricular hypertrophy with laboratory and instrumental characteristics of postmenopausal metabolic syndrome.

Design and Methods:

We conducted a history and physical examination, lipid profile, fasting glucose, glucose tolerance test, echocardiography, daily monitoring of blood pressure and compare them with those of our clinic in 2004-2005. Diet, the regularity of the recommended medications varied.

Results:

No significant changes in left ventricular mass index and its not there, but the number of women with left ventricular hypertrophy (31 vs 22). In patients with newly diagnosed left ventricular hypertrophy (n = 9), we found an increase in 5 years at an average body weight of 7 kg, increased waist circumference - 6 cm, marked increase in levels of total cholesterol, LDL, triglycerides, reduced HDL density and increase in blood glucose both fasting and oral glucose tolerance test. The essential dynamics of indicators of daily monitoring of blood pressure were observed by us. We also analyzed changes in left ventricular mass and its index, depending on the dynamics of body weight. When weight gain, these indicators were growing at maximum. This is consistent with our data on the most pronounced increase in body mass index and waist circumference in patients with first-time occurrence of left ventricular hypertrophy.

Conclusion:

The hypertrophy of the left ventricular myocardium occurs in postmenopausal women with weight gain, a significant increase in abdominal obesity, the deterioration of lipid and carbohydrate profile. Dynamics of blood pressure do not affect the development of left ventricular hypertrophy.

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### ATRIAL FIBRILLATION IS RELATED TO INFECTIONS IN ACUTE MYOCARDIAL INFARCTION

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Background: Infections are common trigger of acute myocardial infarction (AMI) and inflammation is well-known contributing factor to atrial fibrillation (AF). The aim of this study is to analyze potential relation between AMI, AF and infection. There is no paper in PubMed aiming to investigate this inter-relation, out of 28 search results with the terms „acute myocardial infarction atrial fibrillation infection“ on April 1st, 2012.

Patients and Methods: 816 AMI patients were studied, hospitalized from 1998 to 2005, before (primary) PCI was available in our institution.

Results: Infections were 3 times more prevalent among AF patients (20.59% vs 6.79%, p=0.000455). Mortality was also higher in patients with AF (13.21% vs 5.43%, p=0.0010). If AF was not converted to sinus rhythm, it was even better prognosticator of in-hospital death (p<0.0001). Moreover, heart rate was significantly higher in AF patients, increasing myocardial oxygen demand. Patients with AF were older (70.82 6.64 vs 62.18 10.59, p<0.0001). Diabetes mellitus was more prevalent in AF group (49.06% vs 34.13%, p=0.0183) and plasma glucose level was higher (10.31 6.23 vs 8.44 4.97, p=0.0100). Left bundle branch block was more common in AF patients (p=0.0039). As

expected, cigarette smoking was less prevalent in patients with AF.

Conclusion: We demonstrated, for the first time, three times more prevalent infections in AMI patients with AF. It is plausible that this relation between infections and AF is causative. Since AF increases mortality in AMI, it is additionally important to prevent AF in AMI patients with infection.

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#### IMPAIRED ENDOTHELIAL FUNCTION AND HYPOTENSION EPISODES IN PATIENTS WITH MODERATE-SEVERE HEART FAILURE

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Objectives and Background: Hypotension is associated with increased mortality in patients with heart failure (HF) [Lee T.T. et al., 2006]. It is unknown whether impaired endothelial function predisposes to hypotension episodes in this group.

Design and Methods: Reactive hyperemia index [RHI, peripheral arterial tonometry (EndoPAT 2000, Israel)] and number of hypotensive episodes [blood pressure (BP) <100/60 mmHg daytime and <90/50 mmHg nighttime during non-invasive 24-h BP monitoring (GE Healthcare Tonoport, USA, 15-min daytime interval between BP measurements, and 30-min nighttime interval)] were measured in 17 stable HF patients with NYHA class III-IV. Hypotension index was defined as the ratio of the number of hypotensive episodes to the total number of successful BP measurements.

Results: At least one episode of hypotension was present in 14 (82.4%) patients. Hypotension indices for SBP and DBP were 4.6% (0.0; 42.6) and 3.7% (0.6; 17.9), respectively. Lower RHI values, i.e. impaired endothelial function, were associated with increased systolic, but not diastolic hypotension episodes ( $r=0.78$ ,  $p=0.01$  and  $r=-0.21$ ,  $p=0.53$ , respectively). There was a strong positive association between RHI values and EF ( $r=0.83$ ,  $p=0.006$ ). Lower EF was also associated with hypotension episodes ( $r=-0.63$ ,  $p=0.007$  and  $r=-0.64$ ,  $p=0.006$  for SBP and DBP, respectively), and this association remained after adjustment for RHI ( $r=-0.65$ ,  $p=0.04$ ).

Conclusions: Both impaired endothelial function (i.e. lower RHI) and systolic dysfunction (i.e. lower EF) seem to predispose to hypotension episodes in patients with moderate-severe HF. It is unknown whether strategies selectively improving endothelial function and/or cardiac contractility reduce the incidence of hypotension episodes in these patients.

References:

Lee T.T., Chen J., Cohen D.J., Tsao L. The association between blood pressure and mortality in patients with heart failure. *Am Heart J.* 2006;151(1):76-83.

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#### ELDERLY HYPERTENSIVE PATIENTS: SILENT WHITE MATTER LESIONS, BLOOD PRESSURE VARIABILITY, BAROREFLEX IMPAIRMENT AND COGNITIVE DETERIORATION

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Aims:

To evaluate the glycemic, and lipid profile and to state a relationship with body mass index (BMI) and genre, trying to identify a profile related to cardiovascular risk (CVR) in essential hypertensives (HT).

Methods:

We studied retrospectively 444 subjects classified as NT (ABPM day time <135/85 mmHg, n=94) or HT (ABPM day time  $\geq$ 135/85 mmHg, n=350), subdivided by genre and, according to their BMI, in normal weight (NW: 18.5-24.9 Kg/m<sup>2</sup>), overweight (OW: 25-29.9Kg/m<sup>2</sup>) or Obese (Ob: 30-33.9Kg/m<sup>2</sup>). Fasting and 120min: glycemia (Gly b, Gly 120, mg%) and insulinemia (Ins b, Ins 120, U/ml), total cholesterol (Chol t), HDLc and LDLc fractions and triglycerides (TG; all in mg%) were measured.

Results:

NT females failed to show a specific metabolic profile. HT females showed a tendency to metabolic syndrome as BMI increase (Gly b NW: 87.1 $\pm$ 4.3, OW: 98.4 $\pm$ 5.01, Ob: 129.8 $\pm$ 3.8,  $p<0.02$ ; HDLc NW: 60.0 $\pm$ 5.8, OW: 54.4 $\pm$ 6.0, Ob: 52.5 $\pm$ 4.9,  $p<0.05$ ; TG NW: 104.5 $\pm$ 11.1, OW: 148.7 $\pm$ 12.6, Ob: 153.5 $\pm$ 5.3,  $p<0.02$ ). NT males behave as HT women. HT males, showed a tendency to increase Gly b (NW: 92.7 $\pm$ 3.2, OW: 102.1 $\pm$ 4, Ob: 106.3 $\pm$ 4.7,  $p<0.05$ ), TG (NW: 144.8 $\pm$ 9.7, OW: 146.4 $\pm$ 5.9, Ob: 206.5 $\pm$ 11.5,  $p<0.05$ ) with decrease in HDLc (NW: 48.0 $\pm$ 2.3, OW: 46.3 $\pm$ 1.4, Ob: 43.2 $\pm$ 1.5,  $p<0.05$ ). In HT males LDLc increase as BMI increased (NW: 111.6 $\pm$ 5.5, OW: 129.7 $\pm$ 4.4, Ob: 137.6 $\pm$ 5.0,  $p<0.05$ ).

Conclusions:

A different tendency for metabolic syndrome is observed depending on genre and BMI either being the subjects NT or HT. This emphasizes the need to precociously determine the risk profile to start with the adequate treatment.

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#### CORONARY IMPLANTATION OF SIROLIMUS-ELUTING STENT IMPAIRS THE AORTIC COMPLIANCE IN PATIENT WITH CORONARY ARTERY DISEASE

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Introduction. To the best of our knowledge, any studies evaluated potential influence on arterial stiffness, measured by pulse wave velocity (PWV), of percutaneous coronary intervention (PCI) and stenting.

Methods. 150 patients were enrolled and underwent coronary angiography. In 68 patients was performed coronary stenting (PCI group). PWV was invasively obtained before and after coronary stenting.

Results. Coronary stenting produced a significant augment of PWV (from 4.59 to 5.82 m/s,  $P=0.000$ ). In contrast, the sub-population which performed angiography without PCI (noPCI group), didn't show any significant change in PWV. The analysis of PCI group demonstrated that only implantation of Sirolimus eluting stent (SES) caused a significant increase of PWV (from 4.62 to 6.15 m/s,  $P=0.029$ ). In a stepwise multiple regression model stent length, glycaemia and body mass index were significantly associated with increase of PWV, accounting for a total of 51.7% of the variation ( $P=0.009$ ). In particular, stent length accounted for 39.6% of the variance in PWV augmentation; glycaemia and body mass index explained an additional 12.1% of its variability. In the same analysis performed in PCI group, stent length accounted for 65.3% of the variance ( $P=0.024$ ) and other than glycaemia and body mass index, also implantation of SES explained an additional 18.5%.

Conclusion. We have shown, for the first time, a significant association between SES implantation and an central stiffness worsening.

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#### URINE NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY REVEALS DISTINCT PATTERNS OF MYOCARDIAL SUBSTRATE METABOLISM IN PATIENTS WITH CORONARY ARTERY DISEASE (UNSTABLE ANGINA PECTORIS)

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##### Background:

Coronary artery disease is the leading cause of morbidity and mortality in China, and unstable angina pectoris claims more than 770 thousand lives every year. Based on the great potential of urinary metabolites, <sup>1</sup>H-NMR metabolic profiling technologies may offer the possibility of identifying novel biomarkers and pathways activated in unstable angina pectoris.

##### Methods:

Urine samples of 28 unstable angina pectoris patients and 23 healthy people were analyzed by <sup>1</sup>H-NMR spectroscopy in this study. Each spectroscopy divided into regions of 0.005ppm width

(water region was excluded) was integrated. After processing the data, partial least squares discriminant analysis (PLS-DA) was performed using SIMCA-P+ software (v11.5, Umetrics, Sweden)

##### Results:

The score plot of PLS-DA showed good separation between case and control on the level of urinary metabolites. Several metabolites of unstable angina pectoris patients were altered, including the increased levels of proline, alanine, isoleucine, glucose, valine, histine, hippurate and the decreases levels of citrate, creatinine and taurine, which still need more clinical studies to verify the results. Multiple biochemical changes indicated alteration of myocardial substrate use and energy dysfunction in patients with unstable angina pectoris. These findings added great value to urinary metabolites, also revealed potential biological mechanisms underlying unstable angina pectoris.

##### Conclusion:

The NMR-based metabolomics approach demonstrates good performance to identify urinary biomarkers and provides new insights into metabolic process related to unstable angina pectoris.

## POSTER SESSION P2: ENDOCRINE

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#### MEASUREMENT OF PERIPHERAL BLOOD 18-OXO-CORTISOL LEVELS CAN DISCRIMINATE SURGICALLY CURABLE PRIMARY ALDOSTERONISM AMONG HYPERTENSIVE PATIENTS, OMITTING MANY STEPS OF DIAGNOSTIC WORKUP

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Background: Primary aldosteronism (PA) is still underdiagnosed in general practice, because it is diagnosed and treated by the long steps, such as screening, confirmation testing and subtype diagnosis. Adrenal venous sampling (AVS) is most reliable subtype differentiating method, but it is costly, invasive and needs expert radiologists.

Objectives: To determine the role of peripheral plasma levels of 18-oxo-cortisol (18-oxo-F), which is a derivative of cortisol found in PA, in discriminating surgically curable aldosterone

producing adenoma (APA) from essential hypertension (EH) or bilateral hyperaldosteronism (BHA).

Design and Methods: Peripheral plasma levels of 18-oxo-F were measured in 79 EH patients and 237 PA patients by highly sensitive LC MS/MS. AVS lead the diagnosis of 121 BHA patients and 116 APA patients (including 29 patients with CT negative micro APA). APA was confirmed by clinical examinations after adrenalectomy and histological workup (including immunohistochemical analysis of steroidogenic enzymes).

Results: Plasma aldosterone concentration (PAC), aldosterone renin activity ratio (ARR) and peripheral plasma 18-oxo-F in APA patients were significantly higher than those in EH or BHA ones. ROC curve analysis in diagnosis of APA versus EH or BHA demonstrated that an area under the curve was higher in the order of 18-oxo-F, PAC and ARR. Especially, CT-positive APA (87 cases) can be diagnosed by peripheral plasma 18-oxo-F levels over 4.8 ng/dl, with sensitivity of 0.8 and specificity of 0.97.

Conclusions: By measurement of peripheral blood 18-oxo-F levels, APA can be discriminated from EH and BHA which should be medicated, omitting many steps of diagnostic workup.

## POSTER SESSION P2: GLOBAL, INDIGENOUS AND ETHNIC POPULATIONS

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#### HYPERTENSION AND DIABETES IN AFRICAN FAMILIES SHARING THE SAME GRANDFATHER: A CASE REPORT

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Introduction: Growth seems to share several genes with cardiovascular diseases such as hypertension and diabetes. In animal models, salt susceptibility required full expression of testosterone by genes located on chromosomes Y, but

chromosome X did not affect blood pressure (BP). Accordingly, testosterone is needed for full expression of salt-induced hypertension in male salt sensitive rats. Likewise, Fat distribution genes found on chromosome X P21-22 provide spontaneous mutation located on chromosome X dominant while mutations on Y chromosome offer males offspring's possibility to be less affected by the disease.

Purpose of the study: To verify the incidence of hypertension and diabetes in descendants from 5 families having the same grandfather and different grandmother.

Results: Family I (FI): 3 girls and 2 boys. One of the boy developed stroke at adulthood. FII: 1 boy developed hypertension and stroke. FIII: 1 girl who became hypertensive associated to diabetes. FIV: 1 boy and 1 girl who were hypertensive and

diabetics. FV: 3 girls and 2 boys. One of the girls was hypertensive and diabetic with the younger son aged 27 treated for diabetes today. The sex ratios male and female were 2:1 for hypertension, 1:1 for diabetes.

Conclusion: Chromosomes X and Y are involved in transmission of diabetes and hypertension, via related genes.

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### PREVALENCE OF METABOLIC SYNDROME AND RISK OF CARDIOVASCULAR DISEASE IN IMPAIRED GLUCOSE TOLERANCE SUBJECTS

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Metabolic Syndrome is the aggregation of conditions that together increases the risk of cardiovascular disease and diabetes mellitus in both normal glucose tolerance (NGT) and impaired glucose tolerance (IGT) subjects. It is estimated that around 20 to 25 per cent of the world's adult population have the metabolic syndrome. Over the last 20 years the prevalence of metabolic syndrome has steadily increased in all populations, and making it one of the major global public health challenge. The objective of this study is to estimate the prevalence of metabolic syndrome and cardiovascular risk factors in impaired glucose tolerance (IGT) subjects.

204 Impaired glucose tolerance and 30 normal glucose tolerance subjects of both genders were selected for the present study according to the American Diabetes Association ADA criteria, on the base of two hour glucose tolerance test. Anthropometric characteristics like Waist circumference, BMI, systolic blood pressure, and diastolic blood pressure were measured with standard techniques. Biochemical parameters like fasting blood sugar, fasting insulin, cholesterol, triglycerides, HDL-C, and LDL-C were determined by standard techniques, the HOMA-IR values were calculated with the help of formula.

It is concluded from the present study that the prevalence of metabolic syndrome is significantly increased according to AACE, ATPIII definition criteria's in impaired glucose tolerance subject, the study emphasizes strongly that MS is major factor to enhance the incidence of type2 diabetes and cardiovascular diseases in impaired glucose tolerance subjects. It is suggested

that preventive measures and treatment can reduce the incidence of CVD and type2 diabetes in our population.

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### PREVALENCE, AWARENESS AND CONTROL OF ARTRIAL HYPERTENSION AND CARDIOVASCULAR RISK FACTORS IN BULGARIA

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Objective: Assessment of the recent prevalence, awareness and control of the arterial hypertension (AH) and concomitant risk factors (RF) in Bulgarian population.

Design and method: A cross-sectional study, devoted to the World Hypertension Day 2011y., organized by the Bulgarian Hypertension League. Included 1831 persons from 58 different cities, towns and villages- 764 males and 1067 females, mean age 54,3±18,1 (19-83) years. Information about awareness and presence of AH and cardiovascular risk factors was gathered. Blood pressure (BP), blood sugar (BS), waist circumference was measured (WC), body-mass index (BMI) calculated.

Results: The prevalence of AH in different age groups for man (m) and woman (w) was detected. About 1033 persons (76.4%) - 499 males (72.2%) and 800 females (79.1%), p<0.001 were informed of the threshold values of BP. AH treatment: RAAS blockers 72.8%, Diuretics 56.3%, CaC blockers 32.4%, single pill combination 32%. With controlled hypertension were 351 hypertensives (57.4%) (no gender difference). With newly detected hypertension- 398 (24.8%). 383 (26.8%) knew their WC - 129 (22.9%) males and 248 (29.8%) females (p<0.05); 74 (7.3%) knew their BMI. Increased WC was found in 1073 (58.6%), 54.3% females vs. males 45.8%, (p<0.05). BMI >25 was found in 1054 (57.6%). Diabetes mellitus was present in 177 (10.0%). Dyslipidemia was present in 438 (25.2%) - 154 (22.5%) and 269 (26.5%) of females, p<0.05.

Conclusions: The prevalence of AH and cardiovascular risk factors in Bulgarian population is high. The awareness about AH is relatively high, but the control of BP in the established hypertensives is not satisfactory.

## POSTER SESSION P2: PRIMARY CARE – MEETING THE NEEDS OF THE CLINIC

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### PREDICTORS OF FUTURE THREE ANTIHYPERTENSIVE MEDICATION USE IN PATIENTS WITH ELEVATED BLOOD PRESSURE

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Objectives: Many hypertensive patients require two or more anti-hypertensive agents to achieve target BP. Factors that predict the need for three antihypertensive agents are not well identified. This study examines the predictors of three antihypertensive drug use in a hypertensive population over a 10-year period.

Methods: This is part of a 10-year retrospective cohort study of 1547 randomly selected adult patients registered at a primary care

clinic. Patients with hypertension in this cohort were selected for this analysis. Demographic data, BP and anti-hypertensive drug use in 1998, 2002 and 2007 were captured from patient records. BP control was defined as <140/90 mmHg in those with hypertension alone and <130/80 mmHg in hypertensives with diabetes

Results: 886 patients with hypertension were included. Mean age was 56.5(SD±10.0) years. 35% were male. BP in 1998 and 2007 was 146.0/87.8mmHg and 136/79.5mmHg respectively. BP control at baseline was 15.4% and 37.4% in 2007

At baseline 13(1.5%) patients were on 3 antihypertensive medication. At the end of 10 years, use of 3 agents increased to 222 (25.1%)

Logistic regression was performed. The independent predictors at baseline of future 3 antihypertensive medication use was SBP (OR 1.022, 95% CI 1.013-1.031) and weight(OR1.019, 95% CI 1.007-1.032).

Conclusion: Use of 3 antihypertensive agents over a 10-year period is low. This is reflected by the poor level of target BP achieved. Higher SBP and heavier weight were factors that predict the need for many agents. This suggests that many patients will need 3 drugs or more to achieve target BP.

#### 715 DIFFERENCES IN CHOICE OF THERAPY FOR HYPERTENSION IN PATIENTS WITH CORONARY HEART DISEASE AND IN HIGH RISK INDIVIDUALS

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The Aim: This study was to analyse the choice of therapy for hypertension in Bulgaria.

Materials: We have conducted two descriptive, cross-sectional, epidemiological studies: BULPRAKT-HEART-study (BULgarian PRospective Analysis of the physicians' Knowledge and Therapy choice in HEART Disease Treatment And Prophylaxis) and EUROASPIRE (European Action on Secondary and Primary Prevention by Intervention to Reduce Events) III.

Results: 63% of Bulgarian general practitioners (GPs) preferred to use ACE-inhibitors in monotherapy, 10%- diuretics, 12%- beta-blockers, 7%- calcium channel blockers (CCBs). 79% preferred for combination therapy ACE-inhibitors, 53%- diuretics, 34%- beta-blockers, 20%- CCBs. In patients with coronary heart disease (CHD), beta-blockers were used in 82%, ACE-inhibitors- in 62%, CCBs - in 22%, diuretics- in 43%. In high risk patients beta-blockers were used in 27%, ACE-inhibitors in 63%, CCBs- in 26%, diuretics- in 28%. ACE-inhibitors were equally preferred and used in hypertension treatment. The preference for CCBs and diuretics in combination therapy is nearly equal to the prescription rate. Beta-blockers are used almost as preferred for the treatment of high risk individuals, but much more than their preferences in case of hypertension in CHD patients. Only concerning beta-blockers GPs sharply differentiated between preferences and application according to the presence of CHD. This is not observed for CCBs use.

Conclusions: Bulgarian GPs prefer and use CCBs and diuretics in combination therapy; they prescribe considerably ACE-inhibitors for mono and combination therapy. Beta-blockers are less used in

the treatment of isolated hypertension and lots of hypertensive patients with CHD are treated by beta-blockers.

#### 720 REDUCTION OF BETA-BLOCKER PRESCRIPTION WITH EVALUATION OF OVERALL CARDIOVASCULAR RISK IN HYPERTENSIVE PATIENTS

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Background and Objective: Optimal treatment of hypertension targets overall cardiovascular (CV) risk control beyond blood pressure control alone. The impact of the regular assessment of CV risk was evaluated.

Methods: General physicians in the primary clinics and cardiologists in the tertiary hospitals were asked to collect data for at least five sequentially recruited patients with newly diagnosed mild-to-moderate hypertension. The pattern of CV risk management (each CV risk factor separately, personal bimodal classification as high/low risk, or use of the official CV risk assessment tool) was assessed. Change of CV risk was compared according to presence/absence of subsequent assessment.

Results: 1) 1171 patients cared by 23 cardiologists and 1057 patients cared by 193 general physicians were assessed. 2) General physicians tend to care each CV risk factor separately (49% vs 39%) whereas cardiologists tend to care the hypertensive patients according to official CV risk assessment tool (13% vs 5%). Interestingly, more general physicians (81%) responded to assess the CV risk regularly than cardiologists (30%) did. 3) Irrespective of regular assessment of CV risk, blood pressure was similarly controlled. However, high density lipoprotein, and triglyceride levels were significantly lower following regular assessment of CV risk with wider prescription of additional dyslipidemia medication including fibrate, niacin and bile acid resin. 4) Interestingly, the prescription of beta-blockers was significantly lower in patients who were evaluated their CV risk regularly.

Conclusion: With regular CV risk evaluation, residual CV risk was better controlled. Beta-blocker prescription rate might be reduced following subsequent CV risk evaluation during follow up.

## POSTER SESSION P2: RENAL ASPECTS OF HYPERTENSION

#### 744 THE ASSOCIATION BETWEEN FASING LIPID LEVELS AND THE RISK OF INCIDENT VASCULAR, AND ALL-CAUSE MORTALITY: THE TAIPEI ELDERLY HEALTH EXAMINATION COHORT STUDY

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Objective:

To evaluate the association between fasting lipid levels and vascular cause-specific and all-cause mortality in a prospective cohort study.

Methods: From 2001 to 2008, 115329 Taipei City elderly (aged over 65) citizens received free Physical Health Examination (PHE) at hospitals in Taipei. The PHE included medical history, physical examination and routine blood, urine and stool laboratory evaluation. Fasting lipid measures included total cholesterol (TC), triglyceride (TG) and high-density lipoprotein cholesterol (HDL-C). The cause of death was retrieved from the National Registry of Mortality. We used hazard ratio (HR) from Cox proportional hazard model with repeat measures to assess mortality risk for Lipid levels, while controlling for potential confounding factors (sex, age, pulse, disease history, BMI and velocity of weight change).

Results:

A total of 7367 deaths occurred between 2003-2008. During an average 4.7-year follow-up, 1729 subjects had vascular-related deaths (946 cardiovascular disease, 636 cerebrovascular disease, and 147 hypertensive disease), while only . All three lipids measures were significantly associated with an increased risk of all-cause mortality, while only TC and HDL-C were associated with an decreased HR of vascular-related deaths. Among cause-specific mortality, HDL-C were significantly associated with a lower risk of hypertensive mortality (HR=0.57, 95% CI:0.37-0.88), cerebrovascular disease (HR=0.60, 95% CI:0.47-0.76) and cardiovascular disease (HR=0.68; 95% CI:0.56-0.83). However, TC was not associated with hypertensive mortality (HR=1.31; 85% CI:0.68-1.98).

#### Conclusion:

In the Taipei Elderly Health Examination Cohort Study, TG was weekly associated with vascular mortality. The association between high LDL-C and low mortality risk (vascular-specific and all-cause) was nonetheless strong and consistent.

#### 750

### DUAL AND TIME-DEPENDENT EFFECT OF L-NAME TREATMENT ON THE CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEMS

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**Objectives:** We aimed to analyze the time course effect of N<sup>G</sup>-nitro-L-arginine methyl ester (L-NAME) on nitric oxide synthase (NOS) particular isoforms, NF-κB (p50, p65) and I-κB expressions, total NOS activity and blood pressure (BP) in rats. **Design:** 12-week-old male Wistar rats were treated with L-NAME (40 mg/kg/day) for four or seven weeks. **Results:** Both 4- and 7-week-L-NAME treatments increased BP, however, NOS activity decreased in all tissues investigated after 4-week-L-NAME treatment only. Interestingly, prolongation of the treatment to 7 weeks increased NOS activity in the aorta and heart, while decreased it in the brainstem, cerebellum and brain cortex highly significantly. Endothelial NOS expression in the aorta and heart increased after 4-week-L-NAME treatment, and this increase was amplified after 7 weeks. On the other hand, eNOS in the above brain regions remained unchanged after 4-week-L-NAME treatment and prolongation led to significant decrease of eNOS expression in these tissues. Neither nNOS nor iNOS changed during the treatments. NF-κB (p65) expression increased in both cardiovascular and brain tissues after 4-week treatment. Prolonged treatment decreased it in the aorta and heart. **Conclusions:** Increased expression of eNOS may be responsible for increased NOS activity in the cardiovascular system after 7-week-L-NAME treatment. Decreased expression of eNOS led, however, to the highly significant decrease of NOS activity in brain regions. NF-κB (p65) protein expression seems to be responsible for eNOS expression regulation. Since BP increase persisted after 7-week-L-NAME treatment, we hypothesize that central regulation of BP is predominant in this form of hypertension. Supported by APVV-0742-10, VEGA-2/0190/11.

#### 752

### TRANSCATHETER RENAL DENERVATION: SAFETY AND EFFICACY FOR BLOOD FLOW OF KIDNEY FOR PATIENTS WITH HYPERTENSION

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#### Objective.

We studied the renal blood flow with a significant reduction in blood pressure after sympathetic denervation of the RF arteries.

#### Methods.

Study was initiated in essentially hypertensive patients with BP>160/100mm Hg despite three or more antihypertensive drugs. All participants of research have given the informed agreement. Primary efficacy endpoints: changes in BP, secondary – changes in renal blood flow(ultrasound dopplerography velocity (V) and resistive index (RI)) at 1weeks and 6months after RSD. Transcatheter RSD was done bilaterally using transfemoral access(4-8 ablation points, target t=50C, power limit=8watt, duration=2 min). The patients were instructed to maintain pharmacotherapy unchanged during the study.

#### Results.

TRD was performed in 35patients (aged 52±10 years). Two treated patients refused to continue in the study, 2 patient moved and was lost to follow-up. Of remaining 29 patients 18 reached 6 month of follow-up. One case immediate damage of kidney was detected by intraoperational control angiography.3 patients had protein concentration in morning urine Initially=0.36g/l, after RSD 1w=0-0.29g/l. We have not found significant decrease in glomerular filtration. Only 1 patient had change in serum creatinine Initially=106mcmol/l, at 1w RSD=137mcmol/l. No significant changes: in renal blood flow were found initially/during1st week/at 6 months of follow-up: Vtrunc 79,4±25,8/79,5±24,9/75,7±17,9cm/s p=0,97/0,33; Vsegm. 44,7±12,4/43,2±10,3/40,2±10,2 cm/s p=0,36/0,71. But the RI in the segmental arteries was significantly decreased after RSD 0,62±0,05/0,58±0,06/0,59±0,06 p=0,003/0,026.

#### Conclusion.

This study showed that renal endovascular RSD not damage blood flow and function of the kidney in patients with resistant hypertension. TRD also reduced peripheral vascular resistance after the procedure.

#### 758

### ACID-BASE BALANCE OF RENAL VENOUS BLOOD IN PATIENTS WITH SECONDARY HYPERTENSION

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#### Background and Aims

Accessing the literature did not reveal any data regarding the state of Acid-Base Balance (ABB) in Renal Venous Blood (RVB). During study of differential diagnostic arterial hypertension, plasma renin activity and other renal hormones we simultaneously investigated ABB of RVB in patients with secondary hypertension. The aim of this study was to explore the level of renal ischemia in patients with different lesions of the kidney and renal artery accompanied with arterial hypertension by determination of ABB in RVB.

#### Methods

44 patients with different kinds of renal artery (RAL) and small kidney lesions (SKL) and 18 with polycystic kidney disease (PKD) have been studied by measuring pO<sub>2</sub>, SO<sub>2</sub>%, pCO<sub>2</sub>, pH, BE, BB, HCO<sub>3</sub>, TCO<sub>2</sub> in abdominal aortas and RVB.

#### Results:

Abdominal	aortas-
pO <sub>2</sub> :97.7±3.9;SO <sub>2</sub> :%97.2±3.5;pCO <sub>2</sub> :34.97±1.78	
RVB of RAL - pO <sub>2</sub> :62.5±4.3;SO <sub>2</sub> :%90.1±1.8;pCO <sub>2</sub> :35.11±0.96	
RVB of RAL (opposite side)	-
pO <sub>2</sub> :65.0±3.4;SO <sub>2</sub> :%91.2±0.95;pCO <sub>2</sub> :34.95±0.72	
RVB of SKL - pO <sub>2</sub> :70.4±4.9;SO <sub>2</sub> :%91.8±0.8;pCO <sub>2</sub> :39.2±1.99	
RVB of SKL (opposite side)	-
pO <sub>2</sub> :81.6±6.4;SO <sub>2</sub> :%95.0±1.3;pCO <sub>2</sub> :34.95±0.72	
RVB of PKD (right side)	-
pO <sub>2</sub> :57.9±2.8;SO <sub>2</sub> :%89.2±2.5;pCO <sub>2</sub> :33.7 ±1.51	
RVB of PKD (left side)	-
pO <sub>2</sub> :59.4±3.8;SO <sub>2</sub> :%90.2±1.9;pCO <sub>2</sub> :32.63±1.71	

#### Conclusions

The obtained results have shown that the essential data in ABB in RVB in patients with secondary hypertension is very stable and there is a statistically non-significant difference between lesion and opposite side RVB in RAL and SKL. Furthermore, only in patients with PKD are levels of pO<sub>2</sub> and pCO<sub>2</sub> in RVB statistically lower than other groups. The remaining data of ABB in patients with secondary hypertension is statistically no different to normal levels and confirms stable ABB in RVB even in patients with PKD.

759

### DUAL ROLE OF KIDNEYS IN BLOOD PRESSURE REGULATION IN PATIENTS WITH AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE (ADPKD)

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#### Background and Aims

Hypertension is a common complication of ADPKD. A role of the renin-angiotensin system (RAS) has been proposed, but human studies have shown conflicting results in correlation between plasma renin activity and blood pressure in ADPKD. The aim of this study was to investigate the role of renin-angiotensin pressor and kallikrein-kinin-prostaglandins depressor systems in the development of hypertension in ADPKD.

#### Methods

42 patients with ADPKD and hypertension aged 19-64 years old (mean age 39.9±2.7 years) were studied. Final diagnosis of ADPKD was based on decreased renal function signs, ultrasonography and CT. Renal angiography was performed in 16 patients in order to make a differential diagnosis of arterial hypertension to further determine pressor and depressor agent activity in renal venous blood (RVB). Renin activity, angiotensin I (ANGI) and prostaglandin (PGF<sub>2α</sub>, PGE<sub>2</sub>) content were defined using radioimmune assays and the Hestrin method for kallikrein.

#### Results

Results in right and left renal veins (RRV/LRV).

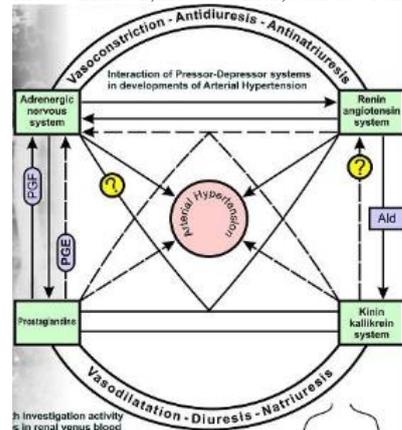
Renin activity (ng/ml/h)–  
RRV:5.88±0.41;LRV:5.86±0.50;control: 0.2,-2.7

ANGI content (ng/ml)  
RRV:3.67±0.04;LRV:3.51±0.33;control:0.5

PGF<sub>2α</sub> content (ng/ml)  
RRV:1.20±0.02;LRV:1.15±0.01

PGE<sub>2</sub> content (ng/ml)–RRV:3.9±0.14;LRV:4.44±0.24

Kallikrein (mmol/l)  
RRV:5.22±1.02;LRV:6.77±1.2;control:4.14±0.18



#### Conclusions

Renin activity and ANGI content in RVB are increased statistically identically on both sides specifying the activation of a pressor system. Normal PGF<sub>2α</sub> content also confirms the activated RAS pressor corresponding to hypertension. Kallikrein concentration, but especially PGE<sub>2</sub> content specifies the raised synthesis of PGE<sub>2</sub> and preserved high activity of depressor agents in this group. Thus, the obtained results have shown not only main role of RAS but more there very impotent role of depressor agents in the pathogenesis of hypertension where the adequate synthesis of depressor agents can explain the mild course of hypertension in ADPKD.

## POSTER SESSION P3: BP MEASUREMENT

362

### CUFF METHODS FOR 24 HOUR BLOOD PRESSURE MEASUREMENT INDUCE AROUSAL REACTIONS DURING SLEEP COMBINED WITH BLOOD PRESSURE ELEVATIONS

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**Background:** The 24 hours cuff based blood pressure measurement is widely used for the diagnosis of hypertension. An important advantage, compared to traditional cuff methods, is the long-term measurement of blood pressure. However, the measurement is not continuous, which limits its application in sleep diagnostics. Another disadvantage in this context might be the mechanical stress of inflated cuffs. Here we hypothesized that inflation of the cuff induces disturbances of heart and circulatory control via an arousal reaction during sleep.

**Methods:** To test the hypothesis, nine patients were polysomnographically investigated (SOMNOscreen®, Somnomedics, Germany). EEG, EOG, EMG, heart rate, snoring, and the systolic blood pressure, via determination of the pulse transit time, were continuously monitored. Ambulatory blood pressure was measured using a device from spacelabs healthcare, USA. **Results:** We observed 107 micro arousals related to the inflation of the cuff in the patients. Micro arousals were

characterized by significant increases of the mean EEG frequency and heart rate. Most important, the systolic blood pressure also increased significantly. Remarkably, the inflation of the cuff did not affect cardiovascular control during the waking state. **Conclusion:** Inflation of the cuff can influence the measurement of the blood pressure by inducing micro arousals. This can lead to false positive results. The finding is important in view of ambulatory blood pressure monitoring and for blood pressure measurement in sleep laboratories.

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### AGREEMENT BETWEEN CLINIC BP AND 24-HOUR AMBULATORY BP MEASUREMENTS

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**Background:** Although ambulatory blood pressure (BP) monitoring is considered superior to a clinic-based measurement, the relationship between them has not been well addressed. Agreement analysis is used to uncover systematic differences between two measurement methods, not to identify similarities. **Methods:** Patients with TIA/minor stroke recruited within 7 days after onset and age-sex group matched control participants were monitored using a standard clinic BP measurement protocol and 24-hour ambulatory BP monitor (Spacelab 90217). Lin's concordance coefficient and the reduced major axes regression were used to calculate the agreement between each BP measurement type. **Results:** There were 158 subjects recruited; 76 patients (mean age 68 years, 59% male) and 83 controls (mean

age 66 years, 54% male). The mean clinic BPs were generally higher than the mean 24-hour ambulatory BPs (net difference: 16/7 mmHg for patients and 10/4 mmHg for controls). A poor agreement between them was identified: SBP: Rho = 0.5 (95% CI 0.4–0.6); Slope = 1.36, Intercept = -29.76; DBP: r = 0.7 (95% CI, 0.6 to 0.8), slope = 1.0, intercept = 4.8. There was a proportional increase in the difference between the two measurements as SBP increased, and a fixed difference in DBP. **Conclusion:** The agreement between clinic BP measurement and 24-h ambulatory BP measurement was found to be poor for both SBP and DBP. For people with high systolic BPs, ambulatory BP measurement is recommended. Further large trials are needed to confirm these findings.

## POSTER SESSION P3: CEREBRAL BLOOD FLOW AND COGNITION

894

### CHANGE IN PULSATILE CEREBRAL ARTERIAL PRESSURE AND FLOW WAVES AS A THERAPEUTIC TARGET

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**Background:** Present concepts on central blood flow following brain trauma do not account for hemodynamic findings.

**Methods:** Eight unconscious, paralysed, ventilated, patients with 15-30 minutes spontaneous intracranial pressure (ICP) elevation ("plateau waves") were studied in the Head Injury ICU of Addenbrooke's Hospital following brain trauma. Radial intra-arterial pressure (RP), ICP with Codman intraparenchymal sensor, and middle cerebral artery (MCA) flow velocity (bilateral, transcranial Doppler) were measured. RP waves were converted to aortic pressure (AoP), using SphygmoCor MX™, and the AoP wave onset was advanced to correspond to MCA flow onset. Cerebral perfusion pressure (CPP) was measured as instantaneous [AoP – ICP]. Recordings were taken before and at the peak of slow ICP plateau waves.

**Results:** With elevation of mean ICP (28 to 53 mmHg;  $p < 0.001$ ), mean CPP (60 to 37 mmHg;  $p < 0.001$ ), and mean MCA flow velocity (53 to 42 cm/s;  $p < 0.01$ ) were reduced. No significant change in AoP was found. Simultaneous changes in pulsatile phenomena included increase in amplitude of ICP fluctuations (7.8 to 18.1 mmHg,  $p < 0.01$ ) and change in the ICP waveform to resemble AoP, with peak in late systole but augmentation relatively higher. Findings are attributable to compression and narrowing of brain blood vessels by rising cerebral volume and ICP, together with ill-effects of early wave reflection from the lower body.

**Conclusions:** Hemodynamic monitoring supports the value of measures such as decompressive craniectomy to reduce elevated ICP and vascular narrowing, and of vasodilator therapy to reduce peripheral wave reflection.

895

### PARTICLE IMAGE VELOCIMETRY ENABLES NON-INVASIVE AND REPEATABLE MEASUREMENT OF BLOOD FLOW AND WALL SHEAR-STRESS IN RETINAL MICROVASCULATURE

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**Introduction:** Microvascular dysfunction is central to the aetiology of cardiovascular disease but techniques to monitor the progression of microvascular disease are limited because non-invasive, absolute quantification of blood flow and wall shear stress (WSS) is not possible.

**Objective:** To develop a non-invasive methodology which enables absolute quantification of WSS and blood flow.

**Methods:** Sprague-Dawley rats (n=6) were anaesthetised (2-4% isoflurane) and placed in a heated restrainer. The optical power of the cornea was negated and retinal microvasculature visualised (at 12x) via a Leica MZ16F dissecting microscope. Global motion of erythrocytes in second order (100µm) retinal arteries and veins was captured at 1500 frames/sec (12-bit greyscale, Y6 camera, IDT, USA) and particle image velocimetry image analysis used to calculate erythrocyte velocity from which flow and WSS were derived. Blood flow and WSS responses to acute phenylephrine induced increases and sodium nitroprusside induced decreases in systemic MAP were measured over a 100mmHg range.

**Results:** Basal mean flow rate in arteries was 18.5 µl.min<sup>-1</sup> (CV=36.9%) and mean maximum WSS = 3566.5 s<sup>-1</sup> (CV=18%). In veins, mean flow rate was 17.8 µl.min<sup>-1</sup> (CV=21.1%) and mean maximum WSS = 2119.0<sup>-1</sup> (CV=11%). Whilst blood flow varied dramatically with systemic blood pressure (0 to 65.6 µl.min<sup>-1</sup>), WSS remained constant until systemic MAP fell by over 25mmHg.

**Conclusions:** Particle image velocimetry of erythrocyte motion in retinal microcirculation allows non-invasive quantification of blood flow and WSS and lends itself to longitudinal applications. WSS is more tightly regulated than flow and may be a useful parameter to track microvascular function longitudinally.

### PODCAST: PREVENTION OF DECLINE IN COGNITION AFTER STROKE TRIAL: A FACTORIAL RANDOMISED TRIAL OF BLOOD PRESSURE AND LIP LOWERING

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**Rationale:** Stroke and dementia are common, economically costly to society, and devastating to patients and their family. Elevated BP and cholesterol are common after stroke and may be associated with increasing cognitive decline. Although BP-lowering post-stroke may reduce cognitive decline, there is little evidence that lipid lowering is effective in preventing cognitive decline. Critically, it is unknown whether BP and cholesterol should be lowered intensively, or moderately as per current guidelines. The trial aim is to determine if intensive BP and/or lipid lowering therapy after stroke is better in preventing cognitive decline, compared to current guideline treatment.

**Design:** PODCAST is a prospective, randomised, open-label, blinded end-point, controlled, partial factorial, phase IV trial. The start up phase will assess feasibility of the study over 3 years in 600 patients. The main phase will assess the efficacy of intensive treatment in a further 2,800 patients over 8 years in total. The target Systolic Blood Pressure is <125 mmHg for the intensive BP lowering group and <140 mmHg for the guideline group. For the intensive lipid lowering group the target Low Density Lipoprotein-Cholesterol (LDL-C) is <2 mmol/L and <3 mmol/L for the guideline group. The primary outcome is Addenbrooke's Cognitive Examination. Secondary outcomes include vascular events, quality of life, functional outcome, depression and death.

**Trial status:** The trial has UK Ethics and NHS RD approvals and has recruited 27 patients to date.

**Funding:** The start-up phase is funded jointly by The Stroke Association UK and Alzheimer's Society UK.

### 897

#### TILT TABLE TESTING IN PATIENTS WITH SUSPECTED EPILEPSY

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#### Background

Around 20% to 30% of epileptic patients may have been misdiagnosed and neurocardiogenic syncope (NCS) is probably a frequent mistaken cause.

#### Methods

We retrospectively analyzed clinical records of 107 patients with previous epilepsy and medicated with antiepileptic drugs, who were referred for HUTT, in the period from January 2000 to December 2010.

#### Results

Among all, 73 (68 %) patients were women with a mean age of 38 ± 17 years. HUTT was positive in 67 (63%) patients. Follow-up data were available in 94 (88%) patients, with a mean follow-up period of 72 months. Thirty-three (35%) patients previously diagnosed with epilepsy were found to be misdiagnosed (positive HUTT and clinical features not consistent with epilepsy). Twenty-one (22%) patients had dual diagnosis of NCS and epilepsy (HUTT positive but presence of clinical features supporting epilepsy). There was no significant difference in the type of HUTT response between the misdiagnosed group and the dual diagnosis group (p>0.05). Misdiagnosed patients (isolated NCS with typical clinical reproduction at HUTT) stopped taking antiepileptic medication and 15% of them received new pharmacological treatment (midodrine or B-blocker) and most

were reassured and advised to increment salt and water intake and perform physical countermanouevres. Syncope recurrence was reported in 57% of the patients. No relevant difference between positive and negative HUTT groups (49% vs 69%; p>0.05) were observed but it was significantly lower in the misdiagnosed group of patients (42% vs 64%; p=0.037).

#### Conclusion

NCS is frequently an important cause of epilepsy misdiagnosis. HUTT is often crucial to make an accurate diagnosis and to select the appropriate treatment in patients presenting with transient loss of consciousness to reduce recurrence.

### 898

#### TRANSCRANEAL DOPPLER EVALUATION DURING HEAD-UP TILT CHALLENGE

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#### Background:

Neurally mediated syncope (NMS) pathophysiology is still controversial. Interest shifted from cardiac to central mechanisms, particularly concerning cerebral autoregulation. Attention has mainly focused in the perisyncopal period. Our study aimed to compare cerebral hemodynamics in supine, initial and final head-up tilt (HUT) in NMS and healthy subjects.

#### Methods:

12 NMS and 12 control subjects were studied in supine position for 10 minutes and in 70° HUT for 45 minutes or till syncope. They were monitored with transcranial Doppler for bilateral middle cerebral artery (MCA) blood flow velocities (BFV) and with Finapres for noninvasive continuous arterial blood pressure (BP). Mean BFV, cerebrovascular resistance index (CVRI) and mean BP were compared between supine, and minute-to-minute in the first and last 5 minutes of HUT.

#### Results:

One NMS and 3 controls subjects were excluded due to poor quality data. In the first minutes of HUT, both groups showed increase in BP and CVRI and decrease in BFV, although the temporal profile registered a more gradual response of BP and BFV in the NMS group, not reaching statistical significance. In the last 5 minutes of HUT, while controls had no hemodynamic changes, in NMS we observed a steady decrease of BFV (p<0.05) and increase of CVRI (p<0.05), before any BP change.

#### Discussion:

Paradoxical vasoconstriction in the minute preceding syncope has been consistently demonstrated in NMS, but we detected these changes at least five minutes before syncope. Furthermore, in the initial HUT period our NMS subjects showed a trend to delayed hemodynamic changes. These data are consistent with an abnormal adaptation profile to orthostatic stress in NMS that could be due to impaired autonomic nervous system control and cerebral autoregulation.

### 899

#### CEREBRAL HEMODYNAMIC AND ANTIHYPERTENSIVE DRUGS: ARE THERE ANY ADVANTAGES?

Oksana Gulkevych

National Scientific Centre “M.D.Strazhesko Institute of Cardiology of AMS of Ukraine”

**Objective:** To evaluate the influence of different antihypertensive drugs such as beta-blockers, calcium channel blocker, ACE

inhibitor on carotid structure and cerebral blood flow in essential hypertension (EH) patients (pts).

**Design and Methods:** Doppler ultrasonography and 24h blood pressure monitoring were performed in 146 EH pts (48,8±0,94 years; 108males) before and after 12 weeks antihypertensive treatment. Diameter of the common carotid artery (DCCA), common carotid intima-media thickness (CCIMT), systolic (Vmax) and diastolic (Vmin) blood flow velocity in CCA and medium cerebral artery (MCA) were measured. The cerebrovascular resistance index (CVRI) was calculated using measurements from Doppler ultrasonography of CCA, MCA and systemic blood pressure. All pts were divided to Carvedilol 25-50mg (n=37), Betaxolol 10-20mg (n = 41), Amlodipin 2,5-5mg (n = 34), Spirapril 6mg (n = 34) treatment. Statistical analysis was performed by pair variant method.

**Results:** Decrease of blood pressure was similar with all four drugs. However, Betaxolol, Amlodipin, Spirapril decreased DCCA (accordingly: -8%, p<0,05; -4%, p<0,05; -3%, p<0,05) and Carvedilol increased it (+3%, p<0,05). The CCIMT was decreased significantly with Betaxolol and not significantly with other drugs. All drugs did not significantly change blood flow velocities in CCA but in MCA they significantly increased initially low Vmin. The CVRI of CCA and MCA were significantly decreased with all drugs.

**Conclusion:** In spite of different influence on carotid structure all used drugs significantly improved the cerebral hemodynamic by decreasing cerebral vessels resistance. These positive effects are caused by blood pressure reduction.

#### 900

### **AUTOPHAGY CASCADE CORRELATES WITH PHENOTYPIC ALTERATION OF NEUROVASCULAR ENDOTHELIUM IN A MOUSE MODEL OF ALZHEIMER DISEASE**

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#### **Background:**

Alzheimer disease (AD) is characterized by progressive neuronal disorder that cause dementia, and is recognized as a major cause of death in the elderly population. Recent our *in vitro* findings suggest the possible involvement of autophagy-associated endothelial dysfunction in the pathogenesis of AD.

#### **Methods:**

To investigate whether autophagy cascade affects phenotype alteration of neurovascular endothelium in the development of AD, electron microscopy (EM) and immunohistological analysis were performed on brain tissues of APP23, a mouse model of AD, and age-matched wild type mice.

#### **Results:**

The Morris water maze test showed cognitive disturbance in 8-month old APP23 mice but not in wild type mice. Interestingly, EM revealed that the densities of hippocampal capillary were significantly lower in APP23 mice as compared to those in wild type mice. The reduction in hippocampal microvessels was more apparent in 24-month old APP23 mice. Immunostaining with antibodies against  $\beta$ -amyloid (A $\beta$ ) and alpha-smooth-muscle-actin showed that A $\beta$  deposition was not limited to neural cells but to microvessels in hippocampus and cortex. Notably, EM analysis revealed autophagy induction in hippocampal capillary endothelium in 8-month old APP23 mice. In addition, the number of microvessels with autophagic endothelium was significantly increased in 24-month-old APP23 mice. Furthermore, the advanced stages of autophagy fused with lysosome were detected in both neurovascular endothelium and neural cells.

#### **Conclusions:**

Present results indicate that phenotypic alteration of neurovascular endothelium might be the earlier pathological

events in brain with AD, suggesting important implications for therapeutic approaches of AD.

#### 901

### **POSITRON EMISSION TOMOGRAPHY OF 18-FLUORINE DEOXYGLUCOSE BRAIN DISTRIBUTION IN HYPERTENSIVE PATIENTS WITH AND WITHOUT OBSTRUCTIVE SLEEP APNEA SYNDROME**

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#### **Background:**

Sleep apnea is known to be associated with the higher risk of stroke [Valham F. et al., 2008], and regional cerebral blood flow abnormalities could mediate this association. We assessed the peculiarities of regional cerebral blood flow in hypertensive patients with and without obstructive sleep apnea syndrome (OSAS).

#### **Design and methods:**

18-fluorine deoxyglucose (18 FDG) brain distribution was examined during wakefulness [Ecat Exact 47, Ecat Exact HR+, Germany, tissue metabolic activity was assessed by «Standard Uptake Value»] in 10 hypertensive subjects with OSAS and in 6 non-OSAS hypertensives (matched by demographic and clinical parameters).

#### **Results:**

There were 5 areas of reduced 18-FDG accumulation in non-OSAS subjects (left thalamus in 3 subjects, right thalamus in 5 subjects, right and left caudate nucleus in one case, mediobasal areas of right temporal lobe in one case) compared to 12 areas in OSAS patients: left and right frontal lobes (one subject in each case); left and right parietal lobes (one subject in each case); anterior part of left cingulate gyrus (n=1); left and right subconvex area (n=3 and n=1); mediobasal areas of right temporal lobe (n=4); left and right caudate nucleus (n=5 and n=7); left and right thalamus (n=5 and n=6). Comparative analysis included only 2 regions: left thalamus (8.5±0.8 vs 8.7±0.3 units, p>0.05), and right thalamus (8.3±0.9 vs 8.5±0.2 units, p>0.05). OSAS patients had higher frequency of the reduced 18-FDG accumulation during wakefulness ( $\chi^2=4.46$ ; p=0.07).

#### **Conclusions:**

Hypertensive subjects with OSAS seem to have higher frequency of cerebral loci with reduced metabolic activity.

#### **References:**

Valham F, Mooe T, Rabben T, Stenlund H, Wiklund U, Franklin KA. Increased risk of stroke in patients with coronary artery disease and sleep apnea: a 10-year follow-up. *Circulation*. 2008;118(9):955-60.

#### 902

### **THE ROLE OF CATECHOLAMINE UPTAKE PATHWAYS IN VASCULAR ABNORMALITIES ASSOCIATED WITH DEPRESSION-LIKE SYMPTOMS IN RATS**

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<sup>2</sup>Center for Psychiatric Research, Aarhus University Hospital, Denmark

#### **Background:**

Depression and cardiovascular disease are known to occur simultaneously but the reason for this is unclear. Interestingly, hypertension has been suggested in association with anti-depressive treatment. In a chronic mild stress (CMS) model of depression only some rats develop depression-like symptoms ('anhedonia' evidenced by reduced sugar intake), while others are stress-resistant ('resilient').

#### Methods:

We have assessed *in vitro* isometric force in the middle cerebral (MCA) and mesenteric small arteries (MSA) from resilient and non-stressed rats, and anhedonic rats after 8 weeks CMS. Protein levels were quantified by Western blotting.

#### Results:

Anhedonic rats had a reduced cardiac output and unchanged blood pressure suggesting increase in total peripheral resistance (TPR).

MSA from the three groups responded similarly to noradrenaline (NA) but the potentiating effect of the neuronal reuptake inhibitor, cocaine, was increased in anhedonic rats compared with resilient and non-stressed rats. This is in accordance with upregulation of the neuronal NA transporter (NET) protein in MSA from anhedonic rats. In contrast, corticosterone-sensitive extra-neuronal monoamine uptake was diminished in MSA after CMS. This was associated with a reduced expression of the OCT2 transporter protein.

MCA from anhedonic rats was more sensitive to serotonin (5-HT) in comparison with resilient and non-stressed rats. Cocaine and corticosterone were without effect on 5-HT responses of MCA.

#### Conclusions:

Our results indicate that depression-like symptoms in rats are associated with changes in vascular catecholamine uptake pathways and sensitivity to agonists in a vascular bed specific manner. These changes can be important for the TPR elevation in anhedonic rats.

### 903 CEREBRAL PERFUSION AND COGNITIVE FUNCTION IN POST-STROKE PATIENTS WITH HYPERTENSION

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Kagoshima University

#### Objective:

To estimate cerebral perfusion and cognitive function in post-stroke patients with hypertension before and after hypotensive therapy.

#### Research design and methods:

The treatment group comprised 28 post-stroke patients (mean age  $\pm$  standard deviation [SD],  $57.8 \pm 8.3$  years) with previously untreated or ineffectively treated essential hypertension. All patients underwent brain xenon-enhanced computed tomography (Xe-CT) scanning and comprehensive neuropsychological testing, both before and after 24 weeks of hypotensive therapy using the angiotensin II receptor blocker (ARB) olmesartan medoxomil. The control group comprised 20 age-matched post-stroke patients (mean age  $\pm$  SD,  $56.6 \pm 8.5$  years) without hypertension, carotid atherosclerosis, coronary artery disease, or psychiatric disorders.

#### Results:

The hypertensive patients had significantly lower levels of cerebral perfusion (4–8%) in all brain regions, a 25% decrease in attention and psychomotor speed, and an 18% decrease in mentation compared with the control subjects. Following 6 months of hypotensive therapy, the hypertensive patients experienced an increase in cerebral perfusion by 8–15% in all brain regions, an 18–36% improvement in attention and psychomotor speed, and an average 19% improvement in abstract mentation.

#### Conclusions:

Hypertensive patients showed marked signs of cerebral hypoperfusion and impaired cognitive function, as indicated by decreased attention, reduced psychomotor speed, and slow mentation; however, these symptoms were improved by 24 weeks of hypotensive treatment with an ARB.

### 904 PULSE PRESSURE AMPLIFICATION PREDICTS MENTAL SPEED BEYOND BRACHIAL BLOOD PRESSURE

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#### Background:

Although brachial blood pressure (BP) is an established predictor of cognitive decline, the association between central pressure and cognition has received little attention. This is surprising given that 1) brachial BP differs in magnitude to aortic pressure and 2) blood is delivered to the brain through the aorta and carotids and not the brachial artery. A relatively novel biomarker called Pulse Pressure Amplification (PPA) captures the discrepancy between central and peripheral BP yet has not been equated to cognitive outcomes.

#### Methods:

We examined the cross-sectional association between PPA and mental speed in 155 healthy participants aged 50–70 years. Participants completed computerized cognitive tests designed to assess simple and two-choice reaction time with millisecond precision. Brachial BP was measured three times and averaged before aortic BP was derived through applanation of the radial artery. PPA was calculated as peripheral/central pulse pressure.

#### Results:

In correlation analysis, higher PPA was associated with faster mental processing. Hierarchical linear regression indicated that PPA explained 6.8% of the variance in choice reaction time scores over and above brachial systolic pressure ( $\beta = -.27$ ,  $\Delta R^2 = 0.68$ ,  $p < 0.001$ ) and 7% beyond brachial pulse pressure ( $\beta = -.26$ ,  $\Delta R^2 = 0.07$ ,  $p < 0.001$ ). When controlling for standard cardiovascular risk factors these relationships remained significant but were attenuated. PPA was not associated with simple reaction time above and beyond the combination of peripheral BP and cardiovascular risk factors.

#### Conclusions:

This study is perhaps the first to show that PPA predicts specific cognitive processes more so than brachial BP.

### 905 CARDIAC REPOLARIZATION- RELATIONS TO EXECUTIVE COGNITIVE FUNCTIONING IN THE SWEDISH WORKING POPULATION

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#### Background:

Otherwise healthy persons in the work force may at times experience cognitive symptoms, such as difficulties in focusing attention, thinking clearly, in remembering adequately and in making decisions in their jobs and elsewhere.

We have previously shown that cognitive symptoms in the working population is related to lower ability in executive functions required in working memory tasks. However, it is not

known whether this lower cognitive ability is linked to physiological stress/allostatic load.

As sympathetic activity is a key component in both dynamic and cumulative stress responses, the aim of the current study was to test the relation between measures of autonomic regulation of sympathetic activity- cardiac repolarization variability (QTVI)- and cognitive functioning, using cognitive tests that are sensitive to effects that are caused by stress.

#### Method:

233 (116 cases) male and female participants were drawn from the general gainfully employed Swedish population (from the Swedish Longitudinal Occupational Survey of Health) reporting either a high or a low level of cognitive symptoms. For all participants, ECG recordings and neuropsychological testing

covering different cognitive domains, including executive functions, were performed.

#### Results:

In women, but not in men, cardiac repolarization variability was related to poorer ability in executive functions that are required in working-memory tasks while being unrelated to others, after controlling for demographical factors.

#### Conclusion:

Autonomic dysregulation of sympathetic activity may be both partly driven by- as well as negatively affect- poor executive cognitive ability. These factors may together drive the development of hypertension among women in the working population.

## POSTER SESSION P3: NOVEL VASCULAR THERAPEUTIC TARGETS

943

### TM5441, a novel PAI-1 inhibitor, protects against the development of hypertension, hypertrophy, and fibrosis due to NOS inhibition

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Background: Long-term inhibition of nitric oxide synthase (NOS) by L-arginine analogues such as N<sup>o</sup>-nitro-L-arginine methyl ester (L-NAME) has previously been shown to induce hypertension and perivascular fibrosis in animal models. NOS inhibition is also known to induce the expression of plasminogen activator inhibitor-1 (PAI-1) in vascular tissue. Our lab previously reported that PAI-1 deficient mice (PAI-1<sup>-/-</sup>) were protected against hypertension and vascular fibrosis due to long-term L-NAME treatment. These findings led to the hypothesis that pharmacological inhibition of PAI-1 activity is protective against the L-NAME-induced hypertension in wild-type (WT) mice. In this study, we investigated the effects of TM5441, a novel PAI-1 antagonist, on systolic blood pressure, hypertrophy, and periaortic fibrosis.

Methods and Results: WT C57BL/6 mice and TM5441-treated animals (20mg/kg/day) were administered L-NAME (1mg/mL) for 8 weeks. Systolic blood pressure (SBP) measurements were taken every 2 weeks. After 8 weeks, we found that TM5441 significantly attenuated the development of hypertension compared to animals that had received L-NAME alone (SBP 162.62±21.18 vs. 182.99±13.21 mm Hg, p=0.009). We also observed significant reductions in left ventricle wall thickness (p=0.03) and mass (p=0.02). Additionally, TM5441-treated mice had a 34% reduction in periaortic fibrosis relative to WT animals on L-NAME (p=0.003).

Conclusions: Pharmacological inhibition of PAI-1 is protective against the development of hypertension, hypertrophy, and periaortic fibrosis in mice treated with the NOS inhibitor L-NAME. These findings indicate that PAI-1 inhibition can offer a novel therapeutic approach in the prevention of hypertension caused by conditions or risk factors that induce endothelial dysfunction in humans.

946

### EFFECTS OF A POTENT ANTIOXIDANT ON VASCULAR FUNCTION IN CVD PATIENTS AND VOLUNTEERS

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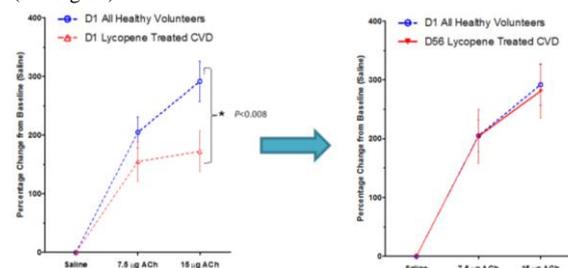
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Background: Lycopene is a powerful anti-oxidant in tomatoes. We investigated its effects on vascular function by oral supplementation.

Design: 36 stable cardiovascular disease (CVD) patients on statins and 36 healthy volunteers (HV) were randomised to 7mg lycopene (Ateronon) or placebo daily for 2 months (Clintrials NCT01100385). Forearm blood flow responses to acetylcholine (ACh - endothelium dependent vasodilatation; EDV), sodium nitroprusside (endothelium independent vasodilatation; EIDV) and L-N-monomethyl-arginine (basal NO synthase) were measured using venous plethysmography, arterial stiffness (Sphygmocor), blood pressure (BP) and serum biomarkers were measured pre- and post therapy.

Results: Both groups were well matched (CVD - age 67±5 vs. HV - 64±11), although the CVD group had a higher clinic systolic BP (138±10 vs. 125±15 mmHg, P<0.001) and higher central systolic BP (128±10 vs. 116±16mmHg, P<0.001). At baseline, the CVD group had impaired EDV to ACh compared with HV (30% lower; 95% CI: -45% to -10%, P=0.008). Lycopene improved EDV in CVD patients by 53% (95% CI: +9% to +93%, P=0.03 vs. placebo) but not EIDV or NO. No change was seen in EDV, EIDV or NO responses in HV. BP, BP variability, arterial stiffness, LDL and hs-CRP did not change in lycopene treated groups. After lycopene treatment, CVD patients had similar EDV responses compared to HV at baseline (3% lower; 95% CI: -30% to +30%, P=0.85) suggesting normalisation of vascular function (see Figure).



Conclusion: Lycopene improves vascular function in patients with stable CVD. This was not due to effects on conventional cardiovascular risk factors. Further studies are warranted.

961

#### ENDOTHELIN-1-INDUCED OXIDATIVE STRESS AND INFLAMMATORY CELL INFILTRATION ARE ASSOCIATED WITH EXAGGERATED ATHEROSCLEROSIS IN HIGH-FAT DIET-FED APOLIPOPROTEIN E KNOCKOUT MICE

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Background: Endothelin (ET)-1 plays an important role in generation of reactive oxygen species (ROS) and inflammation in the vasculature. ET-1 has been implicated in the pathogenesis of atherosclerosis since plasma and tissue ET-1 are increased in human and animal models of atherosclerosis. We observed that ET-1 overexpression exacerbates high-fat diet (HFD)-induced atherosclerosis in *apolipoprotein E* knockout (*apoE*<sup>-/-</sup>) mice. We hypothesized that ET-1-induced ROS and inflammation contribute to the development of atherosclerosis.

Design and methods: Eight-week-old male transgenic mice overexpressing preproET-1 in the endothelium (eET-1), *apoE*<sup>-/-</sup>, eET-1/*apoE*<sup>-/-</sup> and wild type mice were fed a HFD for 8 weeks. Aortic atherosclerotic lesions were quantified using Oil Red O staining. ROS production using dihydroethidium staining and monocyte/macrophage and T cell infiltration using immunofluorescence with MOMA-2 and anti-CD4 antibodies, respectively, were determined in perivascular fat, media and plaque in ascending aortic sections.

Results: eET-1/*apoE*<sup>-/-</sup> presented 3.8-fold more atherosclerotic lesions in whole aorta compared to *apoE*<sup>-/-</sup> ( $P < 0.01$ ). ET-1 overexpression caused 2.6-, 1.9- and 1.9-fold increase in ROS production in perivascular fat, media and plaque of *apoE*<sup>-/-</sup>, respectively ( $P < 0.05$ ). ET-1 overexpression increased monocyte/macrophage infiltration by 5- and 8-fold in perivascular fat and media, respectively ( $P < 0.05$ ). CD4<sup>+</sup> T cell

infiltration was observed in perivascular fat and plaque of 3 and 5 of 6 eET-1/*apoE*<sup>-/-</sup> compared to 0 and 1 of 6 *apoE*<sup>-/-</sup>, respectively ( $P < 0.05$ ).

Conclusions: The results suggest that ET-1 play an important role in progression of atherosclerotic lesions by increasing the oxidative stress and monocyte/macrophage and T cell infiltration in the atherosclerotic aorta, including the perivascular fat.

969

#### LOWERING OF BINDING AFFINITIES OF AGONISTS TO THEIR RECEPTORS BY INHIBITION OF RHO-ASSOCIATED KINASE (ROCK) IN RAT AORTA

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Sustained smooth muscle contraction is mediated by extracellular Ca<sup>2+</sup> influx through L-type Ca<sup>2+</sup> channels and RhoA/ROCK-dependent Ca<sup>2+</sup> sensitization, accepting stimulatory signals initiated by agonists through G protein-coupled receptors. In this study, in isolated rat aortic rings, the MLCK inhibitor wortmannin (WM) of 10 μM, which completely abolished high K<sup>+</sup>-evoked contraction, left 8%, 6%, or 17% of the contraction induced by 100 nM endothelin (ET)-1, 1 μM norepinephrine (Nep), or 3 μM U46619 (thromboxane analog), respectively. These remaining contractions were completely abolished by application of the ROCK inhibitor Y-27632 of 10 μM. Therefore, the WM-insensitive contractions were suggested to be caused by direct phosphorylation of MLC by ROCK. The contraction induced by ET-1 or Nep was incompletely depressed by application of the ET<sub>A</sub> receptor antagonist BQ-123 of 1 μM or the α<sub>1</sub>-adrenergic receptor antagonist prazosin of 1 nM, respectively. The ET-1- and U46619-evoked contractions were slowly relaxed by rinsing the muscle rings with the solution without agonists. The agonist-evoked contractions were also incompletely or slowly depressed by 1~10 μM Y-27632. However, combination of Y-27632 with corresponding antagonists and muscle-rinsing with solution containing Y-27632 produced rapid and complete relaxation of the contractions. The reduction effect of 10 nM nifedipine or 10 μM verapamil on the contractions was enhanced co-treatment with Y-27632. The combination treatment of Y-27632 and WM did not produce such synergistic inhibition of the contractions. These results suggested that the RhoA/ROCK pathway is not only involved in the Ca<sup>2+</sup> influx, but also in binding affinities of agonists to their receptors.

## POSTER SESSION P3: PREGNANCY AND HYPERTENSION

991

#### ASSOCIATION OF ESTROGEN SYNTHESIS GENES; CYP19A1, HSD3B1 AND HSD3B2 WITH HYPERTENSIVE DISORDERS IN PREGNANCY

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Background: Hypertension in pregnancy is a multifactorial disorder caused by a complex combination of environmental factors and several predisposing genes. Because estrogen modulates placental vascular development, estrogen synthesis genes are considered to be plausible candidate genes for hypertension in pregnancy.

Objectives: This haplotype-based case-control study aimed to estimate whether polymorphisms in maternal estrogen synthesis genes (*CYP19A1*, *HSD3B1*, and *HSD3B2*) are associated with preeclampsia and gestational hypertension. Methods: In 69 preeclampsia and 62 gestational hypertension patients and 155 age-matched, primiparous, healthy controls, genotyping of 5 single nucleotide polymorphisms (SNPs) of *CYP19A1* (rs1870049, rs936306, rs700518, rs700519, and rs4646), 3 SNPs of *HSD3B1* (rs3765945, rs6203, and rs1047303), and 2 SNPs of

*HSD3B2* (rs2854964 and rs1819698) was performed using TaqMan SNP allelic discrimination methods. Results: For rs700158 of *CYP19A1*, the frequencies of the AG + GG genotype and G allele were significantly higher in preeclampsia patients than in controls (P = 0.037, and P = 0.033, respectively). Logistic regression analyses indicated that the AG + GG genotype of rs700158 was a risk factor for preeclampsia (odds ratio = 2.15, P = 0.026). In addition, the frequency of the G-G haplotype

constructed using rs700158-rs4646 was also significantly higher for preeclampsia (P = 0.017). However, polymorphisms in *HSD3B1* and *HSD3B2* were not associated with hypertension in pregnancy. Conclusions: We confirmed that rs700158 of *CYP19A1*, as well as the haplotype constructed using rs700158 and rs4646 are useful genetic markers of preeclampsia in the Japanese population.

## POSTER SESSION P3: RENIN-ANGIOTENSIN SYSTEM

1021

### THE EFFECT OF RAAS BLOCKADE AGENT ON CONTRAST MEDIUM INDUCED ACUTE KIDNEY INJURY(CIAKI) AFTER CORONARY ANGIOGRAPHY

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Background: The effect of RAAS blockade agent on CIAKI has not been clarified yet, therefore we tried to find out the effect of RAAS blockade on CIAKI after coronary angiography.

Design and methods: We reviewed charts of patient performed coronary angiography in our hospital from May 2009 to July 2011. The groups of patients with RAAS blockade agent

(RAAS(+)) and without (RAAS(-)) were total 414 and 1058 case, respectively.

Results: Among patients without diabetes mellitus, development of CIAKI depending on treatment with RAAS blockade within 72hours were higher (HR 1.47, P=0.019).

In subgroup analysis for patients with diabetes mellitus, development of CIAKI depending on treatment with RAAS blockade was not different (HR 1.04, P=0.881).

Conclusion: Among patients without diabetes mellitus, using RAAS blockade agents before coronary angiography may have harmful effect on CIAKI compared to not using that medication after adjusting all other risk factors of CIAKI. In sub-analysis for patients with diabetes subjects, that harmful effect of RAAS blockade on CIAKI was not observed.

## POSTER SESSION P3: SALT CONSUMPTION AND BLOOD

1056

### 24 HOUR URINARY EXCRETION OF SALT IN MONGOLIANS

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<sup>2</sup>WHO, Mongolia; <sup>3</sup>George Institute, Sydney, Australia

Background:

Hypertension is a main risk factor for cardiovascular diseases in Mongolia. There is strong evidence for a direct relationship between dietary sodium consumption and blood pressure. Salt intake can be estimated by measuring urinary excretion of sodium.

Methods:

24-hour urine samples were collected from 983 adults 25-64 years of age from Ulaanbaatar, the capital city of Mongolia and

four provinces. The urinary level of sodium was determined using the ion-selective method, and the amount of salt was calculated based on the urinary concentration of Na.

Results:

The mean urinary concentration of salt was 11.1 g/day. There was no statistically significant difference in the excreted amount of salt detected between males and females (11.3 g/day vs. 10.8 g/day, p>0.05) or between adults living in the capital city and those living in the rural provinces (11.5 g/day vs. 10.7 g/day, p>0.05) or between the age groups (9.8 g/day in the 25 to 34 year age group; 11.5 g/day in adults aged 35 to 44; 11.5 g/day in 45-54-year-old participants and 11.7 g/day in the 55 to 64 age group, p>0.01).

Conclusions:

The survey results demonstrate that the salt intake per day of Mongolians is higher than that of other populations and is more than twice the WHO target intake of 5g of salt per day. This highlights the need for a population salt reduction strategy and provides a solid baseline from which to monitor future change.

## S28: OPTIMAL BP

1096

### TREATMENT GOALS AND PITFALLS IN THE MANAGEMENT OF HYPERTENSION

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In the last decade, guidelines on the management of hypertension have recommended a goal of < 140/90 mmHg for office blood pressure in hypertensive patients at low-to-moderate risk, and a goal of < 130/80 mmHg in patients at high risk because of diabetes, cardiovascular, cerebrovascular or renal disease. However, more recent insights have led to a reappraisal of these recommendations, namely that the goal blood pressure of <

140/90 mmHg can be recommended in most hypertensive patients with few exceptions. A less strict BP goal may be considered in elderly hypertensive patients, particularly in patients older than 80 years (systolic blood pressure < 150 mmHg), and a lower goal may be considered in patients with chronic kidney disease and overt proteinuria (systolic blood pressure < 130 mmHg) and in diabetic patients (diastolic blood pressure < 85 mmHg). No direct evidence is yet available on blood pressure goals for out-of-office blood pressure, neither for home blood pressure nor for ambulatory blood pressure.

Pitfalls in the management of hypertension are numerous, mostly related to lack of adherence to guidelines by the physician. More or less frequently encountered pitfalls include: the use of improper cuff size for the measurement of blood pressure; lack of consideration of the regression towards the mean phenomenon over several visits; overtreatment of patients with white-coat hypertension; undetected masked hypertension; lack of attention to lifestyle measures; focus on blood pressure rather than on all of the cardiovascular risk factors; physician's inertia and undetected low adherence to treatment.