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Selected Abstracts

Guest Editors

Ines Drenjančević, Osijek

Bojan Jelaković, Zagreb

Akos Koller, Pécs

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Prevalence of Arterial Hypertension and Obesity in Seven Year Old Children

Aberle N., Katić M., Tomac V., Sarka J., Josipović M.

Neda **Aberle**, neda.aberle@inet.hr, Pediatrics Clinic, Clinical Hospital Centre Osijek, Osijek, Croatia
Martina **Katić**, mkatic983@gmail.com, Pediatrics Clinic, Clinical Hospital Centre Osijek, Osijek, Croatia
Višnja **Tomac**, visnja.tomac@yahoo.com, Pediatrics Clinic, Clinical Hospital Centre Osijek, Osijek, Croatia

Introduction: Hypertension is closely related with obesity in children because of bad diet and lack of physical activity.

Aim was to show prevalence of increased values of arterial blood pressure in 7 year old children and its relation with obesity and overweight.

Methods: The arterial blood pressure has been measured 3 times. Normal blood pressure: values at or lower than the 90th percentile. Blood pressure levels above the 90th percentile but lower than the 95th percentile are termed as prehypertension. Hypertension is defined as values of blood pressure at or above the 95th percentile for gender, age and height.

Nutritional status was calculated by the WHO classification criteria: overweight (85th and 95th pct.), obesity (BMI >95th pct.), underweight (BMI ≤ 5–10 pct.)

Results: During our research we have examined 447 children by the age of 7 years old (range age was from 6.1 till 7.8). Proportion of boys and girls was almost equal (51.45%:48.55%). Elevated values of arterial blood pressure had 6.04% examinees (3.13% girls and 2.90% boys). Girls had statistically higher values of the arterial blood pressure than boys ($p=0.13667$). Prehypertension was registered in 3.58% and hypertension was detected in 2.46%. Obesity as a risk factor for hypertension was registered in 50 persons (11.88%), and 18% had hypertension. Overweight was detected in 64 persons (14.31%), and 12.5% had hypertension. Children with normal weight had hypertension in 2.9% and underweight children in 5.3%.

Conclusion: Obesity is a very important factor for developing hypertension in children. In our research adipose and overweight children had significantly higher values of arterial blood pressure than children with normal values of BMI.

Hypertension in childhood is a great risk for developing future cardiovascular disorders, with proper prevention we can prevent long-term consequences.

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Hypertension as the Most Prevalent Etiological Condition in Chronic and Transitory Atrial Fibrillation in Patients at Canton Hospital Zenica

Abdović E., Abdović S., Blažević V.

Enes **Abdović**, enes.abdovic@telekabel.ba, Cantonal Hospital Zenica, Zenica, Bosnia and Herzegovina
Slaven **Abdović**, sabdovic@gmail.com, Referral Center for Pediatric Gastroenterology and Nutrition, Children's Hospital Zagreb, Croatia
Velibor **Blažević**, vblazevic@bih.net.ba, Cantonal Hospital Zenica, Zenica, Bosnia and Herzegovina

Introduction: Atrial fibrillation (AF) is the most prevalent sustained cardiac arrhythmia in developed countries. It is a disease of the elderly and it is common in patients (pts) with structural heart disease. Hypertension, heart failure and valvular heart disease are predisposing factors to AF.

Aim: To evaluate predisposing factors for transitory and chronic AF.

Methods: From June 2000 to May 2010, 2760 consecutive pts with AF were studied during echocardiographic check-up. According to the 2-D transthoracic echocardiography, pts were divided into groups based on dominative underlying heart diseases. Electrocardiographically documented AF was subdivided into two groups: intermittent and chronic. Binary logistic regression was used to investigate relationship between gender, age, hypertension, diabetes and underlying heart diseases with the type of AF.

Results: The median age was 72 years, ranged between 16 and 95 years. Chronic AF was noted in 69.7% pts. The number of men and women with AF was about equal, 50.1% were men. Hypertensive heart disease (HHD) was the most common underlying heart disease (39.3%) followed by dilatative cardiomyopathy (DCM), 24.7%, coronary heart disease (CHD), 15.0% and valvular heart disease (VHD), 11.6%. Lone AF was diagnosed in only 27 pts, mostly in younger males (average age 47 ± 9 years, men 62%). Hypertension and diabetes mellitus were found in 71.3% and 17.4% pts, respectively, primary in females. A significant frequency of transient AF was observed in younger pts, lone AF (OR=2.28, 95% CI=2.13–8.62) and in pts with hypertension regardless the presence of other concomitant heart diseases (OR=1.7, 95% CI=1.36–2.14). Chronic AF was more usual in older (OR=1.04, 95% CI=1.03–1.05), DCM (OR=2.04, 95% CI=1.31–3.18) and VHD (OR=3.23, 95% CI=1.97–5.32).

Conclusion: HHD was by far the most prevalent associated medical condition. Chronic AF was predominant in groups with advanced cardiac remodeling such as DCM and VHD, mostly elderly.

Arterial Hypertension in Peritoneal Dialysis Patients

Altabas K., Mihaljević D., Kovačević Vojtušek I., Janković N., Klarić D., Jakić M., Čala K., Pavlović D.

Karmela **Altabas**, karmela.altabas@gmail.com, Sestre Milosrdnice University Hospital, Department of Nephrology and Dialysis, Zagreb, Croatia
Dubravka **Mihaljević**, dmihaljevic@gmail.com, Department of Dialysis, Osijek University Hospital, Osijek, Croatia

Ivana **Kovačević Vojtušek**, ikovacevicvojtušek@gmail.com, Department of Nephrology and Dialysis, Merkur University Hospital, Croatia

Nikola **Janković**, nikola.jankovic@bol-svduh.htnet.hr, Department of Nephrology and Dialysis, Sveti Duh University Hospital, Zagreb, Croatia

Dragan **Klarić**, dragan.klaric@zg.t-com.hr, Department of Nephrology and Dialysis, Zadar General Hospital, Zadar, Croatia

Marko **Jakić**, marko.jakic@gmail.com, Department of Dialysis, Osijek University Hospital, Osijek
Krešimir **Čala**, Department of Nephrology and Dialysis, Sestre Milosrdnice University Hospital, Zagreb, Croatia
Draško **Pavlović**, draskop@kbsm.hr, Department of Nephrology and Dialysis, Sestre Milosrdnice University Hospital, Zagreb, Croatia

Introduction: Arterial hypertension is seen in the majority of dialysis, i.e. haemodialysis and peritoneal dialysis patients.

Aim: The goal of present cross-sectional observation study was to investigate the prevalence of hypertension in peritoneal dialysis pts and the use of antihypertensive drugs.

Methods: Total of 5 dialysis centres were included in the study. Age, sex, peritoneal dialysis duration, systolic and diastolic blood pressure were recorded, as well as antihypertensive drugs used: beta-blockers (BB), calcium channel blockers (CCB), diuretics (D), angiotensin –converting enzyme inhibitors (ACEI), angiotensin II-receptor blockers (ARB), alfa-blockers (AB) and central acting drugs (CAD).

Results: Hypertension was defined as blood pressure > 130/90 mmHg or less if patients were on antihypertensive treatment.

Total of 98 (mean age 56.6 ± 12.1 years) patients were included in study. On continuous ambulatory peritoneal dialysis (CAPD) were 68 (69%) patients and 30 on automated peritoneal dialysis (APD). CAPD patients were on dialysis for 29.9 ± 24.5 months, and APD patients for 23.5 ± 14.6 months. Arterial hypertension was observed in 96, i.e. 97% of patients. The average blood pressure was 137.5 ± 13.3 systolic and 82.7 ± 8.4 mmHg diastolic. There was no difference between CAPD and APD patients.

The most often used antihypertensive drugs were CCB, in 53 patients (54%), after that BB in 39 (39.7%) of patients, ACEI in 36 (36.7%) of patients. ARB were used in 26 (26.5%) of patients, CAD in 17 (17.3%) and AB in 12 (12.2%) of patients. The diuretics were used in 54 (55.1%) of patients. Two or three antihypertensive drugs were used in majority of patients.

Conclusion: The prevalence of arterial hypertension is very high in peritoneal dialysis patients. Management of hypertension in

dialysis, i.e. peritoneal and haemodialysis patients is still a challenge for nephrologists. It is obvious that multidrug regiment is necessary.

Investigation of Parameters of Blood Vessels with the Finometer Device in Diabetic and Non-Diabetic Hypertensive Patients

Bajcsi D., Légrády P., Fejes I.

Dóra **Bajcsi**, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Péter **Légrády**, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Imola **Fejes**, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary, Hungary

Introduction: The condition of blood vessels as a cardiovascular risk factor and subclinical target organ damage have been subjected to intensive research.

Aim: We investigated the different parameters characteristic to blood vessels in diabetic and non-diabetic treated hypertensives.

Methods: Sixteen non-diabetic (HT, age: 53.44 ± 1.96 yr, duration of HT: 5.75 ± 1.15 yr), 12 T2DM (DMHT, age: 54.5 ± 1.33 yr, duration of HT: 12.75 ± 2.5 yr, duration of DM: 7.69 ± 1.77 yr) treated hypertensives and 10 normotensive, normoglycaemic healthy control people (C, age: 49.7 ± 2.22 yr) were investigated. We calculated the total systemic peripheral resistance (TPR), the ascending aorta characteristic impedance (Zao) and the total arterial compliance (Cwk) at the current diastolic pressure with the non-invasive Finometer device in resting supine position and after standing up. Further we calculated in supine position the arterial stiffness index (ASI) with the Cardiovision device. Cardiac autonomic neuropathy (CAN) was assessed by means of the five standard CV reflex tests.

Results: The fasting blood glucose was significantly higher only in diabetic patients. The group HT and DMHT did not differ significantly from group C by treated blood pressure values. All the patients group were CAN positive (CAN: C: 0.8 ± 0.29 , HT: 3.94 ± 0.47 , DMHT: 4.25 ± 0.66). After standing up the TPR and the Zao values increased in all groups. In group DMHT the change of the TPR was the lowest and the change of the Zao was the biggest. Both in supine position and after standing up the the TPR was the highest in group HT and the lowest in group C. The Zao in both position also in group HT was the highest. Similarly the ASI too. After standing up the Cwk decreased in all groups, and in both position it was the lowest in group HT and the highest in group C.

Conclusion: The arterial stiffness is more expressed in diabetic hypertensives than in hypertension alone, which can be well characterized with the Finometer device.

Artery Plaque Score and Arterial Hypertension

Buljan K., Butković-Soldo S., Pribić S.

Krunoslav **Buljan**, krunoslavbuljan@net.hr, Clinical Hospital Centre Osijek, Osijek, Croatia

Silva **Butković-Soldo**, Clinical Hospital Centre Osijek, Osijek, Croatia

Sanda **Pribić**, Health Centre Osijek, Osijek, Croatia

Introduction: Atherosclerotic plaque is the primary pathomorphologic manifestation of atherosclerosis, where the thickness of intima and media, is 1.3mm and more. Ultrasonography of carotid arteries is an accessible and safe method in plaque detection. Plaque score (PlaS) is a sum of thicknesses of registered plaques in a precisely defined region of carotid arteries, and it is significant because of its correlation with some subtypes of cerebrovascular insult and some lesions of coronary arteries.

Aim: The aim of study is to identify the intensity of atherosclerotic plaque in a population of age 50 to 59, in dependance of presence of arterial hypertension or additional risk factor, from atherosclerosis risk factors category (hypercholesterolemia, diabetes, tobacco).

Methods: The study included 148 examinees (79 women, 69 men) from age 50 to 59. From the total number of participants, 66 of them had no risk factors (32 women, 34 men), and they were the control group. 28 participants had hypertension only (16 women, 12 men), while 53 examinees had at least one more major risk factor besides hypertension (31 women, 22 men).

Ultrasonic carotid arteries exam in B mode, was made with standard protocol.

Intensity of atherosclerotic disease of carotid arteries was evaluated with a modified PlaS in 6 categories (0–5).

Results: Control group had average plaque thickness of 0.75mm (men), and 0.18 (women) (average PlaS 0.4 and 0.1). Participants with isolated hypertension had plaque thickness 2.58mm (men), and 2.47mm (women), (PlaS 1.3 for both), while those with additional risk factors measured 4.93mm (men), 3.11mm (women). Healthy participants had plaque in 18.2%, those with hypertension in 78.6%, while those with additional risk factors in 96.3%.

Conclusion: By using a noninvasive and accessible method of carotid ultrasonography, it is possible to detect the thickness of plaque, and in that way, to recognize the risk groups for atherosclerotic diseases.

Influence of High Salt Diet on Microvascular Reactivity in Young Healthy Female Human Subjects

Čavka A., Grizelj I., Begić I., Jelaković B., H Lombard J., Mihaljević I., Koller A., Drenjančević I.

Ana **Čavka**, Department of Physiology and Immunology, School of Medicine University of Josip Juraj Strossmayer in Osijek, Osijek, Croatia

Ivana **Grizelj**, Department of Physiology and Immunology, School of Medicine University of Josip Juraj Strossmayer in Osijek, Osijek, Croatia

Ivana **Begić**, Department of Internal Medicine, Clinical Hospital Center Osijek, Osijek, Croatia

Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Julian **H Lombard**, Department of Physiology, Medical College of Wisconsin, Wisc., USA

Ivan **Mihaljević**, Clinical Institute of Nuclear Medicine and Radiation Protection, Hospital Centre Osijek, Osijek, Croatia

Akos **Koller**, Department of Physiology, New York Medical College, N.Y., USA

Ines **Drenjančević**, Department of Physiology and Immunology, School of Medicine University of Josip Juraj Strossmayer in Osijek, Osijek, Croatia

Introduction: Increase in salt intake significantly alters vascular reactivity to different physiological stimuli. However, the effects of high salt (HS) intake on microvascular endothelial response in healthy young people without pre-existing conditions such as diabetes and hypertension are still unknown.

Aim: The aim was to assess effects of acute salt loading on microvascular reactivity to reactive hyperemia in young healthy women, using non-invasive Laser Doppler Flowmetry (LDF). Circulating concentration of cell adhesion molecules (CAMs): ICAM, VCAM and E-selectin, as indicators of endothelial function were measured. Eleven normotensive women (21±3 years) were instructed to maintain a low-salt (LS) diet (less than 40 mmol Na/daily) during 7 days and simultaneously divided into HS group (N=5) (intake of 200 mmol Na/daily) or placebo group (N=6). LDF was performed before and after salt diet protocol as measurement of relative changes in blood flow after 1- and 2-minute occlusion.

Results: In the HS group there was a statistically significant decrease in microvascular reactivity after 1-minute occlusion (endothelium-dependant mechanisms) with no difference after a 2-minute occlusion (maximum dilation ability), before and after HS diet. Concentration of VCAM was significantly decreased after HS diet with no difference in concentrations of other CAMs. The increased urinary volume, decreased urinary sodium, and increased urinary potassium concentration in subjects on LS diet, and increased urinary sodium concentration in subjects on HS diet confirmed consistency of experimental protocol and subjects' adherence to diet. Although plasma renin activity and serum aldosterone concentration decreased in HS diet and increased in women on LS diet, they didn't reach statistical significance.

Conclusion: This study shows that even 1 week of HS intake may have negative effect on vascular reactivity, decreasing blood flow in reactive hyperemia by affecting endothelial function, as shown in decreased levels of VCAM. Increased number of subjects in further study is needed.

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Vasomotor Effects of Hemolysed Blood in Isolated Rat Cerebral Arteries

Cseple P., Vamos Z., Toth P., Hamar J., Koller A.

Peter **Cseple**, Department of Pathophysiology and Gerontology, University of Pecs, Faculty of Medicine, Pecs, Hungary, Hungary

Zoltan **Vamos**, Department of Pathophysiology and Gerontology, University of Pecs, Faculty of Medicine, Pecs, Hungary, Hungary

Peter **Toth**, Department of Physiology, New York Medical College, Valhalla, N.Y., USA

Janos **Hamar**, University of Pecs, Faculty of Medicine, Dept. of Pathophysiology and Gerontology, Hungary

Akos **Koller**, University of Pecs, Faculty of Medicine, Dept. of Pathophysiology and Gerontology, Hungary, Department of Physiology, New York Medical College, Valhalla, N.Y., USA

Introduction: Hemorrhagic stroke is followed by increased vascular resistance and thus reduced blood flow to the affected area. The underlying vasoconstrictor mechanisms have not yet been elucidated.

Aim: We hypothesized that hemolysed blood has substantial effects on the vasomotor tone and responses of isolated cerebral arteries.

Methods: The middle cerebral artery (MCA) and basilar artery (BA) from male rats were isolated, cannulated and placed in a pressure-myograph chamber. The diameters of vessels were measured in the presence of 80 mmHg intraluminal pressure. The vasomotor function of the vessels was studied in response to administration of hemolysed blood (HB, 40 μ L). Vasomotor responses of vessels to acetylcholine (ACh 10-4M), sodium nitroprusside (SNP 10-4M) and nifedipine (10-6M) were obtained in control, in the presence of HB and after washout of HB. At the end of the experiments the passive diameters (PD) of vessels were determined in Ca²⁺-free Krebs solution.

Results: The active basal diameters of MCA and BA were 170 $\pm$ 4.5 μ m and 264 $\pm$ 7.5 μ m, respectively; whereas their PDs were 269 $\pm$ 10 μ m and 404 $\pm$ 10 μ m, respectively. HB reduced the basal diameter of both MCA and BA (MCA: to 143 $\pm$ 4 μ m, 84.1 $\pm$ 4% of AD; BA: to 204 $\pm$ 13 μ m, 77 $\pm$ 4% of AD). After washing out of HB, the diameters of MCA and BA were 187 $\pm$ 7 μ m and 284 $\pm$ 9 μ m, respectively. In control ACh, SNP and nifedipine elicited substantial dilations (16 $\pm$ 2%, 23 $\pm$ 3% and 31 $\pm$ 2%) of cerebral arteries. In contrast, presence of HB decreased the dilation to ACh, SNP and nifedipine (12 $\pm$ 2%, 16 $\pm$ 2%, 21 $\pm$ 2%). After washout of HB dilations were 5 $\pm$ 1%, 10 $\pm$ 3%, 18 $\pm$ 2%, respectively.

Conclusion: The present study suggests that the hemolysed blood has substantial vasoconstrictor effect and inhibits both endothelium-dependent and -independent dilator mechanisms. Elucidating

the underlying mechanisms of extravasated hemolysed blood-induced vasomotor dysfunction could contribute to the proper treatment of patients with hemorrhagic stroke.

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Prevalence, Treatment, Control and Distribution of Hypertension in Endemic Nephropathy

Dika Ž., Pećin I., Karanović S., Vuković Lela I., Premužić V., Fištrek M., Laganović M., Fodor L., Kos J., Željko Vrkčić T., Jurić D., Cvitković A., Bitunjac M., Kuzmanić D., Jelaković B.

Živka **Dika**, 1Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Ivan **Pećin**, Department of Metabolic Diseases, UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Sandra **Karanović**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Ivana **Vuković Lela**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Vedran **Premužić**, Department of Nephrology and Arterial Hypertension UHC Zagreb, School of Medicine University of Zagreb, Croatia

Margareta **Fištrek**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Mario **Laganović**, Department of Nephrology and Arterial Hypertension, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia

Ljiljana **Fodor**, Department of Internal Medicine, Division for Nephrology and Arterial Hypertension, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Jelena **Kos**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Tajana **Željko Vrkčić**, Department of Nephrology and Arterial Hypertension, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia

Duško **Kuzmanić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Aim: Hypertension (H) is not a characteristic of endemic nephropathy (EN) and occurs only at the advanced stages of the renal disease. The aim of the study was to determine prevalence, treatment, control and distribution of hypertension in EN.

Methods: In total 1138 adult farmers were included: 852 from Croatian EN villages (339 M and 513 W) and 286 from control village (112 M and 174 W). There were no gender nor age differences between these groups ($p>0.05$). The EN population was classified according to WHO criteria as diseased (D), suspected of having EN (S), at risk (R), and others (O). Blood pressure (BP) was measured four times by mercury sphygmomanometer following ESH guidelines, and the mean value was calculated. H was defined as BP $>140/90$ mmHg and/or administration of antihypertensives.

Results: The study showed no difference in H prevalence between EN villages and control village, with the prevalence being 50.58% vs. 44.31% ($p=0.5271$), both in M (51.87% vs. 42.57%, $p=0.9114$) and in W (50.55% vs. 50.41%, $p=0.2305$). H prevalence was the lowest in the „O“ group (M: 40.4%, W: 50.53%) and the highest in the „S“ group (M: 72.16%, W: 100%). However, subjects in the „S“ group were also the oldest ($p<0.0001$). However, no difference in BMI when compared to other EN groups was found ($p>0.05$). More W were treated in EN than in control villages (68.18 vs. 54.9 %; $p=0.0173$). Compared to the control villages, we found no differences in the control of all H patients (10.28% vs. 12.31 %; $p=0.5036$) or treated H patients (23.68% vs. 22%; $p=0.759$). Unlike the control villages, control of H among the overall EN hypertensive population was better in W than in M (16.67% vs. 5.34%; $p<0.0001$) as well as in treated H (24.44% vs. 14.86%; $p=0.1916$).

Conclusion: The prevalence of H in EN villages did not significantly differ from the one in the control, non endemic villages. The higher-than-expected prevalence of H among persons in the “S” category is likely due to their being of older age. Compared to EN villages, the observed poorer control among W in the control villages might be explained by the lower number of treated H women ($p=0.3764$) and the higher number of obese ones ($p<0.0001$).

Table: Distribution of SNPs in TLR2 and TLR4 genes in hypertensive subjects

Number of hypertensive subjects	TLR4 (rs4986790)			Statistics	TLR2 (rs3804100)			Statistics
	AA	AG	GG		TT	TC	CC	
85	72	13	0	$p=0.945$	82	3	0	$p=0.003$

myocardial infarction. The control group consisted of 120 sex and age matched blood donors without records of coronary disease. In the both groups there were 84 hypertensive subjects. Following the approval of the study by the Medical Ethical Committee of the Clinical Hospital Center Osijek, all participants gave informed written consent. From the data regarding age, sex, blood pressure, diabetes and cigarette smoking were obtained the medical records. Genomic DNA was extracted from peripheral blood with DNA kit (Intron Biotechnology, Seoul, S. Korea). SNPs on TLR2 gene rs3804100 and TLR4 gene rs4986790 were determined by Real time PCR with *TaqMan* probes obtained from *Applied Biosystems*.

Results: There were 59 smokers in the patients group (49%) and significantly less in the control group (only 24 vs. 20%, $p<0.001$). Diabetes mellitus was not present in the control group. TLR2 TC rs3804100 allele was statistically significantly less frequent in the hypertensive patients (a protective allele).

Conclusion: TLR2 TC allele of SNP rs3804100 might be protective against hypertension. However, TLR4 SNP rs4986790 was not associated with hypertension. Further research in other large population based studies is needed to confirm these findings.

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Hypertension Protective Allele of Toll-Like Receptor 2 Polymorphic Gene

Džumhur A., Wagner J., Zibar L., Barbić J.

Andrea **Džumhur**, andrea.dzumhur@gmail.com, Hospital Center Osijek, Osijek, Croatia

Jasenka **Wagner**, Clinical Hospital Center Osijek, Osijek, Croatia

Lada **Zibar**, ladazibar@gmail.com, Medical School Osijek, University J.J. Strossmayer Osijek, Croatia

Jerko **Barbić**, jbarbic@mefos.hr, School of Medicine Osijek, Croatia

Introduction: Low grade inflammation has been shown to play a central role in cardiovascular disease and hypertension. Toll like receptors (TLRs) are crucial molecules for activation of immune system. While single nucleotide polypeptides (SNPs) in TLR4 gene were associated with different cardiovascular diseases, less is known about TLR2 gene. We analyzed the distribution of TLR2 and TLR4 SNPs among hypertensive subjects from the case control study performed at our institution.

Methods: Hypertensive subjects were chosen from the case control study. In the patients group were 120 patients with an acute

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Cumulative Incidence of Arterial Hypertension in Normotensive Subjects Cohorta

Erceg M., Ivičević Uhernik A., Kern J., Vuletić S.

Marijan **Erceg**, marijan.erceg@hzjz.hr, Croatian National Institute of Public Health, Zagreb, Croatia

Ana **Ivičević Uhernik**, ana.ivicovic@hzjz.hr, Croatian National Institute of Public Health, Zagreb, Croatia

Josipa **Kern**, jkern@snz.hr, Andrija Štampar“ School of Public Health, School of Medicine, University of Zagreb, Zagreb, Croatia

Silvije **Vuletić**, svuletic@snz.hr, Andrija Štampar“ School of Public Health, School of Medicine, University of Zagreb, Zagreb, Croatia

Introduction: The public health significance of hypertension is the result of the finding that hypertension is an independent risk factor for cardiovascular diseases. The risk grows continually as the blood pressure surpasses the values considered normal.

Aim: To establish age and sex differences in cumulative incidence in normotensive subjects cohort.

Methods: From a sample of the Croatian Health Survey for 2003 a cohort was formed of normotensive subjects on whom the same survey was repeated in 2008. The arterial blood pressure was measured by mercury sphygmomanometer, with standard cuff. Values were read twice and used to compute the mean for every respondent. This second survey included a total of 1381 respondents. Criteria for inclusion into the group of subjects with elevated blood pressure were: statement on taking antihypertensive drugs, and/or average systolic pressure >140 mmHg, and/or average diastolic pressure >90 mmHg. Results were expressed as percentage points of the incidence of arterial hypertension and their 95%-confidence intervals (hereinafter referred to as 95%CI).

Results: In the male group, cumulative incidence of arterial hypertension was recorded at 36.9% (95%CI =32.1–41.6), while women had a corresponding rate of 33.0% (95%CI=30.1–36.0). The highest cumulative incidence was registered in the oldest age group (65+), with a rate of 58.3% (95% CI=47.8–68.9) in men, and 52.2% (95% CI=46.8–63.6) in women. The rate of 45-to-64-year-old men figured 35.5% (95%CI=28.3–42.7), their female counterparts 41.7% (95% CI=36.6–46.8). The lowest incidence was documented between the ages of 18 and 44, in which group men had 25.9% (95% CI=18.7–31.1), and women 20.6% (95% CI=17.0–24.1).

Conclusion: Arterial hypertension incidence increased with age and no significant sex differences were noted within respective age groups. Further studies should concentrate on analyzing other risk factors correlated with newly diagnosed cases of arterial hypertension. Their detection is crucial for the planning and evaluation of prospective prevention programs.

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Diagnosis of Subclinical Atherosclerosis: Ankle/Brachial Index as a Screening Method

Farkas K., Járαι Z., Kolossváry E., Kiss I.

Katalin **Farkas**, Department of Angiology of Internal Medicine, St. Imre Teaching Hospital, Budapest, Hungary
Zoltán **Járαι**, First Department of Medicine, Semmelweis University, Budapest, Hungary
Endre **Kolossváry**, Department of Angiology of Internal Medicine, St. Imre Teaching Hospital, Budapest, Hungary
István **Kiss**, Department of Nephrology of Internal Medicine, St. Imre Teaching Hospital, Budapest, Hungary

Introduction: Epidemiological data have shown that patients with clinical, but also preclinical stages of peripheral arterial disease (PAD) are characterized by a high risk of cardiovascular mortality. PAD can already be diagnosed in asymptomatic stage, with a simple, noninvasive test, defining the ankle/brachial index (ABI). Low ABI is an indicator of increased cardiovascular risk in asymptomatic subjects.

Methods: In the ÉRV program of the Hungarian Society of Hypertension hypertensive patients were screened for the presence of peripheral PAD. Ankle/brachial index and major cardiovascular risk factors were recorded before the 5 years long prospective phase of the program. A total of 21 892 hypertensive men and women (9162 males; mean age: 61.45 years) who were attended at 55 hypertension

outpatient clinics in Hungary, during a 17 month period, were included in the study.

Results: The prevalence of PAD defined by low ABI (≤ 0.9) was 14.0%. In the two blood pressure target group (140/90 mmHg and 130/80 mmHg) the ratio of patients with controlled blood pressure was 45% and 33%, respectively. The prevalence of PAD (ABI ≤ 0.9) was 10.9% in the controlled and 16.1% in the uncontrolled group ($p < 0.0001$). During the control visits a significant decrease of the blood pressure was observed.

Conclusion: The prevalence of PAD (low ABI value) is high in hypertensive patients. Uncontrolled hypertension increases the risk of PAD. The results indicate, that ABI screening is a simple and cost-effective method for the diagnosis of preclinical atherosclerosis, which may improve cardiovascular risk prediction.

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Inflammation and Prehypertension

Fištrek M., Karanovic S., Vuković Lela I., Čapkun V., Cvitković Ante, Miletić-Medved M., Čvorišćec D., Bitunjac Milan, Kuzmanić Duško, Pećin I., Laganović M., Kos J., Dika Ž., Jelaković B.

Margareta **Fištrek**, University Hospital Center Zagreb, University of Zagreb, School of Medicine, Croatia
Sandra **Karanović**, University Hospital Center Zagreb, University of Zagreb, School of Medicine, Croatia
Ivana **Vuković Lela**, University Hospital Center Zagreb, University of Zagreb, School of Medicine, Croatia
Marica **Miletić-Medved**, Public Health Institute Brodsko-Posavska County, Slavonski Brod, Croatia
Dubravka **Čvorišćec**, University Hospital Center Zagreb, Clinical Institute of Laboratory Diagnosis, School of Medicine Zagreb University, Croatia
Duško **Kuzmanić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia
Ivan **Pećin**, University Hospital Center Zagreb, Department of Metabolic Diseases, Internal Medicine Clinic, School of Medicine Zagreb University, Croatia
Mario **Laganović**, Department of Nephrology and Arterial Hypertension, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia
Jelena **Kos**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia
Živka **Dika**, 1Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia
Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Introduction: Whether the inflammation is an initial event in the development of hypertension or a consequence of endothelial damage, and whether WBC might be a marker for it, is still an open question.

Aim: To evaluate the association between prehypertension status and inflammatory markers (white blood cells - WBC) in 816 subjects (350 men and 466 women).

Methods: After an extended questionnaire and clinical exam BP was measured following the ESH/ESC guidelines and subjects were classified in groups with optimal BP (OBP), normal BP (NBP), prehypertension (PH), stage 1, 2, 3 hypertension and isolated systolic hypertension (ISH). Fasting blood was drawn and WBC count, number of neutrophils, lymphocytes and other WBC were determined. Subjects treated with anti-inflammatory drugs and antibiotics were excluded.

Results: In our group OBP, NBP, PH, stage 1, 2, 3 hypertension and ISH were diagnosed in 16.2%, 12.6%, 11.1%, 12.9%, 9.4%, 5.9% and 21.2% subjects, respectively. BP categories were significantly related to the WBC count ($\chi^2=14.2$; $p=0.027$). There was no significant difference in WBC count in PH group and we failed to find any differences in WBC count and neutrophils between OBP vs. NBP vs. PH ($p>0.05$). However, we observed the difference between stage 3 vs. OB, NBP and PH ($p=0.008$, 0.002 , 0.001 , respectively) and stage 2 vs. PH ($p=0.01$). Similar results were observed with neutrophils ($\chi^2=18.1$; $p=0.006$), and again significant differences between stage 3 vs. OB, NBP, PH ($p<0.01$) were determined. There were no differences in lymphocytes and other WBC between BP categories ($p>0.05$).

Conclusion: WBC are related to BP values only in advanced phases of hypertension. There was no differences in WBC among subjects with OBP and PH, thus inflammation was not an apparent characteristic of prehypertension (although it seems to be important in advanced stages of hypertension) and/or that WBC are not very sensitive biomarker.

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Endovascular Intervention Effects in Patients with Atherosclerotic Renovascular Hypertension on Brachial and Central Blood Pressure and Pulse Wave Velocity

Fodor Lj., Premuzic V., Perkovic D., Jelakovic B.

Ljiljana **Fodor**, lfimima3@gmail.com, Department of Nephrology and Arterial Hypertension UHC Zagreb, Croatia
Vedran **Premuzić**, Department of Nephrology and Arterial Hypertension, UHC Zagreb, Croatia
Dražen **Perkovic**, Department of Radiology, UHC Zagreb, Croatia
Dusko Kuzmanic1, Department of Nephrology and Arterial Hypertension, UHC Zagreb, Croatia
Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, UHC Zagreb, School of Medicine University of Zagreb, Croatia

Background: Renovascular hypertension (RVH) is one of the most common forms of secondary hypertension. The aim was to analyze the effect of endovascular intervention in 14 patients (mean age 64.66 ± 11.27) with atherosclerotic RVH on PWV(pulse wave velocity) and the other traditional risk factors.

Methods: Arterial stiffness was determined by TensioMed™ arteriography. Peripheral BP was measured by Omron BP monitors. Ambulatory blood pressure measurement (ABPM) was done with the

SpaceLabs 90207 device. In all patients were determined serum creatinine, glucose and lipid levels. All measurements were analyzed before and 6 months after endovascular interventions.

Results: The mean peripheral BP was $165/93$ mmHg, and $146/83$ mmHg in control. The average ABPM was $122/78$ mmHg and $116/73$ mmHg in the control, and MAP (mean arterial pressure) $95.14 (\pm 17.04)$, and in control $90.78 (\pm 15.96)$. Augmentation index of brachial artery was $24.10 (\pm 13.29)$, and in control $21.07 (\pm 31.87)$. Aortic augmentation index was $29.20 (\pm 15.5)$, and in control $43.79 (\pm 17.42)$. PWV was $11.91 (\pm 4.6)$ m/s, and in control $20.19 (\pm 23.08)$ m/s. There was a statistically significant difference between man and woman in body height (165.83 vs. 177.37 cm), weight (72.5 vs. 91.87 kg), as well as the level of triglycerides (1.36 vs. 2.4 mmol/L) and HDL cholesterol (1.67 vs. 1.01 mmol/L). These factors also were significantly different between patients with left sided renal artery stenosis compared to the right, and also left sided had elevated serum creatinine (129.5 μ mol/L) compared to the right (88.71 μ mol/L).

Conclusion: PWV was initially $11.91 (\pm 4.6)$ m/s and in control increased to $20.19 (\pm 23.08)$ m/s. Although, there were no statistical differences among some of the parameters (due to the small sample size), there were significant differences between body height, weight, triglycerides and creatinine in relation to the localization of renal arterial stenosis.

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Lack of Relation Between Endothelial Function and Carotid Artery Stiffness in Young, Healthy Male Subjects

Horváth T., Pintér A., Kollai M.

Tamás **Horváth**, Institute of Human Physiology and Clinical Experimental Research, Semmelweis University, Budapest, Hungary
Alexandra **Pintér**, Institute of Human Physiology and Clinical Experimental Research, Semmelweis University, Budapest, Hungary
Márk **Kollai**, Institute of Human Physiology and Clinical Experimental Research, Semmelweis University, Budapest, Hungary

Introduction: The tonic relaxant influence of the endothelium on vascular smooth muscle, reducing stiffness of the vessel wall, has been established in muscular conduit arteries. Stiffening of arteries with advancing age and risk factor exposure predominantly involves the elastic aorta and carotid arteries. It is not known to what extent the stiffness of large elastic arteries is under endothelial control. This study was designed to investigate the relationship between endothelial function and stiffness of the carotid artery, a representative of central elastic arteries.

Methods: Conduit artery endothelial function was assessed in 30 subjects by measuring brachial artery flow mediated dilatation (FMD). Carotid artery elastic parameters were calculated from carotid pulse pressure measured by local tonometry and from pulsatile distension determined by echo wall-tracking. Systemic arterial stiffness was assessed by aorto-femoral pulse wave velocity (PWV). Relations between variables were determined by univariate correlation analysis.

Results: All measured values fell within age related normal ranges. FMD was inversely related to age and DBP ($r = -0.49$ and -0.48 , respectively; $p < 0.01$ for both). FMD was also significantly and inversely related to PWV ($r = -0.46$; $p < 0.05$), but was not related to any parameter of carotid artery elasticity,

Conclusion: In healthy young male subjects carotid artery elasticity is not related to conduit artery endothelial function, suggesting that large elastic vessel function may not be significantly influenced by the endothelium.

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Heart Rate is Related to Diastolic Blood Pressure

Karanović S., Vuković Lela I., Premužić V., Fištrek M., Čapkun V., Laganović M., Dika Ž., Kos J., Jurić D., Cvitković A., Bitunjac M., Pećin I., Kuzmanić D., Reiner Ž., Jelaković B.

Sandra **Karanović**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Croatia

Ivana **Vuković Lela**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Vedran **Premužić**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Margareta **Fištrek**, University Hospital Center Zagreb, University of Zagreb, School of Medicine, Croatia

Mario **Laganović**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, School of Medicine University of Zagreb, Croatia

Živka **Dika**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Jelena **Kos**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Ivan **Pećin**, University Hospital Center Zagreb, Department of Metabolic Diseases, Internal Medicine Clinic, School of Medicine Zagreb University, Croatia

Duško **Kuzmanić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Aim: Recent studies renewed, too often neglected, interest in association of heart rate (HR), hypertension and cardiovascular morbidity. Our aim was to investigate the relationship of HR and blood pressure (BP) in general population.

Methods: Out of 1375 subjects enrolled in the epidemiologic survey conducted in Croatian rural area, 495 untreated subjects (216 men and 279 women) were included into the study. Exclusion criteria were: antihypertensive therapy, acute illness, chronic terminal disease and serious disability, dementia and pregnancy. BP and HR were

measured three times in a sitting position using OMRON device, and mean values were calculated. Subjects were classified into groups with optimal BP ($<120/80$ mmHg), prehypertension ($120/80$ – $140/90$ mmHg) and hypertension ($>140/90$ mmHg). HR values were divided into quartiles (I <69.5 , II 69.6 – 76.5 , III 76.6 – 85.5 , IV >85.6).

Results: Median age of the whole group was 45 (range 19–90). Although statistical significance was not revealed regarding BP categories and quartiles of HR ($p=0.365$), lower values were observed in subjects with optimal BP compared to values obtained in the hypertensive group. Statistical significance in HR was found between prehypertensive and hypertensive groups (76.44 ± 11.48 , and 78.96 ± 12.56 , respectively; $p=0.04$). Linear regression analysis between HR and BP showed no significance ($p=0.360$). Significant correlation was found only between diastolic BP and HR ($p=0.006$) what was also confirmed by the multiple regression analysis ($p=0.0073$).

Conclusion: Significant correlation between diastolic BP and HR was found. Although we could not find statistical significance, our study suggest a trend of increased HR in hypertensive subjects comparing to those with prehypertension.

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Hypertension and Salt Intake – Preliminary Results from Study Obtained in Undeveloped Rural Part of Croatia

Keranović A., Dražić I., Gardijan B., Križančić J., Modrić Ž., Vrkljan A.M., Sović S., Vitale K., Jelaković B.

Adis **Keranović**, School of Medicine, School of Public Health "Andrija Štampar" University of Zagreb, Croatia

Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Introduction: Previous studies suggest that there is a high prevalence of hypertension in rural areas, as well as high salt consumption.

The aim: To determine prevalence of hypertension and awareness of harmful effects of salt on blood pressure and health.

Methods: Adult farmers from three villages in Sisačko-moslavačka County (Central part of Croatia) were enrolled. After clinical exam, blood pressure was measured following ESH guidelines using Omron devices, and data on socioeconomic status, education level, medical and family history as well data on awareness of harmful effect of salt were obtained from questionnaire.

Results: In this pilot, preliminary study we have analyzed data obtained in 106 persons (57 W, 49 M). As generally in rural parts of Croatia, majority were of older ages: age group 44–65 25.7% and 33.3% men and women, respectively; age group 45–64 25.7% men and 33.3 % women, respectively; age group 65–84 62.9% men and 55.6% women, respectively. Hypertension was confirmed in 77.6% of men and 75.4% of women. Hypertension was newly diagnosed in 6 men (15.8%) and 10 women (23.5%). Majority of farmers are aware that salt intake is related to hypertension (71.4%), but also most of them did not know, what the main sources of salt in every day meals are (69%). We failed to find differences between hypertensive and normotensive subjects. Salt intake was above recommended values (5 gr NaCl/day) in all enrolled farmers.

Conclusion: Our pilot study confirmed previous results on high prevalence of hypertension in rural areas, as well as on high salt consumption. Awareness was poor as it is in other parts of Croatia. We hope that final results of our study will attract attention of national and local public health authorities to apply proper therapeutic measures.

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Intraoperative BP Oscillations and 24-Hour Dipping Status in Surgical Patients

Kristić M., Miličević N., Kristek J., Krajinović Z., Pinotić K., Vizjak V., Kvolik S.

Marica **Kristić**, KBC Osijek, Department of Anesthesiology and Intensive Care, Croatia

Nevenka **Miličević**, KBC Osijek, Department of Anesthesiology and Intensive Care, Croatia

Jozo **Kristek**, KBC Osijek, Clinic of Surgery, Croatia
Vedrana **Vizjak**, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Slavica **Kvolik**, Clinical Hospital Centre Osijek, University JJ Strossmayer, School of Medicine, J. Huttlera 4, 31000 Osijek, Croatia

Aim: Preoperative dipping status may be predictive for blood pressure (BP) oscillations during anesthesia. Searching PubMed database with search terms 'anesthesia' and 'dipping status' retrieved no publication on this topic. In this prospective open study we compared 24-hour dipping status and intraoperative BP oscillations in a cohort of surgical patients.

Methods: Differences in the BP were studied in a group of 22 consecutive surgical patients, 65 ± 7.8 years undergoing vascular surgery in general anesthesia with propofol, rocuronium and fentanyl. Continuous 24-hours preoperative BP values were recorded using Mobil-O-Graph portable device during the hospitalization and evaluated by specialist in hypertension. Patient categories were recognized as deeper with satisfactory BP control (group D, night-time BP < 15-20% from baseline), non deeper (group ND, night-time BP < 15% from baseline) and non deeper with >15% of critical night time BP measurements $\pm$ 20% from baseline (group ED, extreme deeper). Perioperative BP values were recorded through invasive BP monitoring. Statistical analysis was performed using SPSS.

Results: Only 4/22 vascular patients had normal preoperative dipping status. The most pronounced oscillations were recorded during the night-time. An average of 17.8% of all night-time measurements was considered as critical. Dipping status significantly correlated with variability of systolic BP (SBP) during the night-time ($p=0.33$, $r=0.64$), whereas negative correlation was registered for dipping status and minimal day-time diastolic BP ($p=0.009$, $r=0.74$). Maximal 24-hour SBP was 163 ± 14.4 mmHg, whereas maximal intraoperative SBP was registered after intubation (168.3 ± 37 mmHg, $p=0.76$, ns). A total number of 24-hour critical BP measurements significantly predicted intraoperative BP oscillations and maximal intraoperative BP, and ($p<0.001$). ED patient category (7/21) had enhanced perioperative BP oscillations as recorded by SBP standard deviation (awake BP SD in ED = 39.5 mmHg vs. 19.7 in D group, $p>0.05$).

Conclusion: This study revealed that preoperative BP oscillations significantly correlate with that registered during anesthesia.

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The Impact of Individual Blood Pressure Components on the Type and Degree of the Left Ventricular Hypertrophy

Kunišek J., Zaputović L., Žuvić Butorac M., Kunišek L., Vučković Rapačić S.

Juraj **Kunišek**, Thalassotherapia Opatija, Croatia

Luka **Zaputović**, Clinical Hospital Center Rijeka, Department of Internal Medicine, Division of Cardiology, Croatia

Marta **Žuvić Butorac**, University of Rijeka, Technical Faculty, Rijeka, Croatia

Aim: We sought to determine which of the individual components of arterial pressure has the greatest impact on the shaping of left ventricular hypertrophy (LVH) pattern/degree.

Methods: The study included 192 patients (87 men), aged 43–80 years (median 68 years) with LVH. The subjects were classified into three groups with regard to the type of hypertrophy (concentric, eccentric and asymmetric) and into three subgroups with regard to the degree of hypertrophy (mild, moderate and severe). After discontinuing all medications for a period of 48 hours, blood pressure was measured, electrocardiography, and echocardiography were performed. Antihypertensive drugs and the duration of previous treatment were taken into consideration. What was sought was the correlation between the systolic, diastolic, mean arterial pressure and pulse pressure on one side, and the LVH type/degree on the other.

Results: The pulse pressure was significantly greater in the case of concentric LVH, more so than in cases of eccentric and asymmetric LVH ($p=0.029$), the values of which were mutually identical. It rose with the LVH degree (not significantly, $p=0.217$). The systolic pressure has a similar tendency ($p=0.177$). The diastolic and mean arterial pressure were not significantly different, neither in regard to the type, nor the degree of LVH.

Conclusion: The pulse pressure has the strongest impact on the shaping of the LV geometry, particularly in the case of the concentric type. With the reduction of pulse pressure (primarily systolic pressure in elderly) we shall prevent the adverse (primarily concentric) remodeling of the left ventricle.

Influence of Metabolic Syndrome on Circadian Blood Pressure Regulation in Newly Diagnosed Essential Hypertensives

Kos J., Laganović M., Premužić V., Kuzmanić D., Dika Ž., Željковиć Vrkić T., Fištrek M., Fodor L., Rončević T., Jelaković B.

Jelena **Kos**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Mario **Laganović**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Vedran **Premužić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Duško **Kuzmanić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Živka **Dika**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Tajana **Željковиć Vrkić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Margareta **Fištrek**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Ljiljana **Fodor**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Tomislav **Rončević**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Bojan **Jelaković**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Introduction: Metabolic syndrome may affect circadian changes in blood pressure.

Aim: We aimed to assess a possible influence of metabolic syndrome (MS) on circadian blood pressure (BP) regulation in newly diagnosed hypertensives.

Methods: In the study 103 previously untreated, otherwise healthy patients were included (60 M, 43 F, average age 37 ± 9.1 years) with newly diagnosed essential hypertension (HT) without target organ damage and normal renal function. BP was measured using mercury sphygmomanometer and ambulatory BP monitor (ABPM). Body mass index (BMI), waist circumference (WC), fasting blood glucose (FPG), total cholesterol (TC), triglycerides (TG), HDL cholesterol (HDL), GFR (MDRD) were determined in all patients. MS is defined according to modified ATP III criteria. Following ABPM parameters were analyzed: average 24 hour, daytime and nighttime values of BP; blood pressure load (BPL), dipper vs non-dipper status, BP variability and heart rate. Patients with white-coat hypertension were excluded.

Results: MS was diagnosed in 30 % males and 16% females. We did not observe differences between non-MS and MS group for office BP, 24h ambulatory BP, daytime, nighttime BP, BPL, BP vari-

ability or heart rate in whole group or according to gender. We found increased PP in ABPM both in daytime (55.2 ± 10.3 vs 47.9 ± 7.4 $p=0.002$) and nighttime period (52.9 ± 9.6 vs 47.6 ± 7.9 $p=0.024$). We observed increased percentage of non-dippers (51.3 vs 25.0 % $\chi^2 4.92$ $p=0.026$) in hypertensive group of patients with MS.

Conclusion: in patients with MS increased PP and subtle changes in circadian BP pattern were observed mainly influencing dipping status, which points toward increased CV risk already in the early phase of essential hypertension.

Changes of the Baroreflex-Sensitivity and Plasma Norepinephrine After Neurosurgical Decompression of the Medulla Oblongata on the Left Side in a Hypertensive Woman

Légrády P., Fehértemplomi K., Vörös E., Bajcsi D., Fejes I., Barzó P., Ábrahám Gy.

Péter **Légrády**, peter.legrady@freemail.hu, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Katalin **Fehértemplomi**, peter.legrady@freemail.hu, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Erika **Vörös**, Department of Radiology, University of Szeged, Szeged, Hungary

Imola **Fejes**, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Dóra **Bajcsi**, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Pál **Barzó**, Department of Neurosurgery, University of Szeged, Szeged, Hungary

György **Ábrahám**, 1st Department of Internal Medicine, Department of Neurosurgery, University of Szeged, Szeged, Hungary

Introduction: The baroreflex-sensitivity (BRS) is a good marker for the fast cardiovascular (CV) regulation and low BRS comes with higher CV risk. We investigated the changes of BRS and plasma norepinephrine (NE) after microvascular decompression (MVD) in a case of a therapeutically resistant hypertensive woman with microvascular pulsatile compression (MPC) of the rostral ventrolateral medulla on the left side.

Methods: The 57 year old woman blood pressure (BP) could not be normalised with 11 folder antihypertensive medication. The continuous systolic BP and ECG data were recorded with the Finometer (FMS, Arnhem, Netherlands) device before and after the operation. We calculated the time-domain up- and down-BRS and the frequency-domain alpha-index in the low-frequency (aLF) and high-frequency (aHF) spectra both in resting supine position and after standing up. The NE was evaluated also before and after the MVD.

Results: The BRS values calculated by both method after the MVD increased not only in the supine position but after standing up. Before MVD: (supine vs. standing) upBRS 5.80 vs. 2.51 , downBRS 5.49 vs. 3.82 , aLF 3.67 vs. 2.61 , aHF 3.70 vs. 2.01 [ms/mmHg]. After MVD: (supine vs. standing) upBRS 5.80 vs. 4.07 , downBRS 10.5 vs. 7.48 , aLF 7.51 vs. 3.89 , aHF 6.68 vs. 4.68 [ms/mmHg]. The BP was

normalised after the MVD with 5 folder drug combination. The NE significantly decreased after the MVD.

Conclusions: In resistant hypertension with MPC, the MVD results significant BP reduction and improving fast cardiovascular regulation.

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Dietary Salt Intake, Endothelial Function, and Vascular Oxidant Stress: Parallel Lessons from Humans and Animals

Lombard J.H., Durand M., Priestley J., Raffai G., Baer A., Drenjančević I., Zhu J.

Julian H. Lombard, Department of Physiology, Medical College of Wisconsin, Milwaukee, Wisc., USA

Matthew Durand, Medical College of Wisconsin, Wisc., USA

Jessica Priestley, Medical College of Wisconsin, Wisc., USA

Ines Drenjančević, Department of Physiology and Immunology, School of Medicine University of Josip Juraj Strossmayer in Osijek, Osijek, Croatia

Introduction: There is growing evidence that elevated dietary salt intake can contribute to endothelial dysfunction and increased mortality in humans. Experimental animal models that recapitulate the effects of elevated dietary salt intake in humans can be tremendously valuable in elucidating the mechanisms of endothelial dysfunction in salt-sensitive hypertension.

Methods: The responses of arteries to multiple vasodilator stimuli were evaluated in isolated cannulated resistance arteries, in situ arterioles, and aortic rings. Nitric oxide (NO) availability and superoxide levels were assessed with using DAF-2 and DHE staining, respectively. Studies were conducted in normotensive rats and hamsters, Dahl salt sensitive (SS) rats, and in consomic and congenic rat strains having the Brown Norway (BN) renin allele substituted into the Dahl SS genetic background. Animals were fed either a low-salt (LS; 0.4% NaCl) or high salt (HS; 4% NaCl) diet.

Results: Vascular relaxation in response to multiple vasodilator stimuli was impaired in animals switched to HS diet, and in Dahl SS rats fed LS diet, which exhibit chronically low angiotensin II levels due to an inability to regulate their plasma renin activity normally. Impaired vascular relaxation was paralleled by reduced NO levels and elevated superoxide levels. Vascular relaxation could be restored by chronic i.v. infusion of a subpressor dose of angiotensin II and by antioxidant treatment. Substitution of the BN renin allele into the SS genetic background also restored salt-sensitive vascular relaxation.

Conclusions: The deleterious effects of elevated dietary salt intake and lower than normal levels of circulating angiotensin II have been demonstrated in multiple normotensive animals, and in genetic models of salt sensitive hypertension such as the Dahl SS rat. The availability of multiple experimental animal models promises to provide crucial insight into the effects of elevated dietary salt intake and the mechanisms of early cardiovascular dysfunction in salt-sensitive humans.

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Investigation of the Baroreflex-Sensitivity in Different Cardiovascular Diseases

Majtényi P., Légrády P., Bajcsi D., Ondrik Z., Fehértemplomi K., Fejes I., Farkas K., Ábrahám G.

Petra Majtényi, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Péter Légrády, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Dóra Bajcsi, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Zoltán Ondrik, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Katalin Fehértemplomi, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Imola Fejes, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Katalin Farkas, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

György Ábrahám, 1st Department of Internal Medicine, University of Szeged, Szeged, Hungary

Introduction: The risk for cardiovascular events is high in patients with decreased baroreflex-sensitivity (BRS).

Methods: We investigated the spontaneous BRS in significant carotid artery stenotic (CS, n=14, age: 68.0±9.9 yrs, BMI: 25.7±3.8 kg/m²), diabetic (DHT, n=13, age: 56.0±5.1 yrs, duration of HT: 15.9±12.2 yrs, duration of DM: 11.2±7.1 yrs, BMI: 30.2±3.9 kg/m²) and non-diabetic hypertensive (HT, n=25, age: 55.4±7.0 yrs, duration of HT: 7.0±5.2 yrs, BMI: 28.6±3.8 kg/m²), haemodialysed (HD, n=23, age: 62.4±16.5 yrs, BMI: 26.6±3.6 kg/m²) patients and in healthy normotensives (C, n=13, age: 50.4±6.3 yrs, BMI: 26.7±3.5 kg/m²). The hypertensives in all groups were on combined drug treatment. Mean±SD are reported. The continuous BP and ECG data were recorded with the Finometer (FMS, Arnhem, Netherlands) device during 10 minutes long lying and after it 10 minutes long standing position. The data were analysed with the Nevrokard software. We calculated the up- and down-BRS by time-domain sequence method. In this work we attended to systolic BP. After stenting carotid artery data could be recorded only in lying position. After stenting the both way calculated BRS values increased in lying position.

Results: All the BRS values were the lowest in group HD in both positions (lying upBRS: 4.48±3.1, standing upBRS: 3.94±2.3, lying downBRS: 5.44±3.0, standing downBRS: 4.59±2.2 [ms/mmHg]). All the BRS values were higher in group HT compared to the other non-healthy groups (lying upBRS: 9.5±5.2, standing upBRS: 5.47±3.0, lying downBRS: 8.65±6.5, standing downBRS: 6.12±2.5 [ms/mmHg]). The spontaneous BRS increased after stenting and decreased after haemodialysis.

Conclusion: These data suggest the lonely hypertension has the lowest cardiovascular risk among different cardiovascular diseases. In any other or complicated cases the risk is higher.

Inhibition of Poly(ADP-Ribose)Polymerase Reduces Hypertension Induced Vascular Remodeling in Spontaneous Hypertensive Rat (SHR) Model

Magyar K., Vamos Z., Bruszt K., Balogh A., Kálai T., Hideg K., Seress L., Sumegi B., Koller A., Halmosi R., Tóth K.

Klara **Magyar**, University of Pecs, Medical School 1st Department of Medicine, Hungary
Zoltan **Vamos**, University of Pecs, Medical School 1st Department of Medicine, Hungary
Kitti **Bruszt**, University of Pecs, Medical School 1st Department of Medicine, Hungary
Andras **Balogh**, University of Pecs, Medical School Medical Biology3, Pecs, Hungary
Tamas **Kálai**, University of Pecs, Medical School Organic and Pharmacological Chemistry, Pecs, Hungary
Kalman **Hideg**, University of Pecs, Medical School Organic and Pharmacological Chemistry, Pecs, Hungary
Laszlo **Seress**, University of Pecs, Medical School Central Electron Microscope Laboratory, Pecs, Hungary
Balazs **Sumegi**, University of Pecs, Medical School Department of Biochemistry and Medical Chemistry, Pecs, Hungary
Akos **Koller**, University of Pecs, Medical School Department of Pathophysiology and Gerontology, Pecs, Hungary
Robert **Halmosi**, University of Pecs, Medical School 1st Department of Medicine, Hungary
Kálmán **Tóth**, University of Pecs, Medical School 1st Department of Medicine, Hungary

Introduction: Remodeling of large vessels and vasomotor dysfunction in resistance arteries are well known consequences of prolonged hypertension. Continuous elevated blood pressure triggers oxidative stress causing consequent poly(ADP-ribose) polymerase (PARP) activation.

Aim: Vasoprotective effect of L-2286 PARP inhibitor was assumed in spontaneously hypertensive rat (SHR) model.

Methods: Male 10-week-old SHR rats were divided into two groups: 1st group was treated with 5 mg/kg/day L-2286 orally for 32 weeks (SHR-L), 2nd received no treatment (SHR-C). Age-matched male CFY rats were used as normotensive controls (CFY). Intima-media thickness (IMT), arterial stiffness index (ASI), acetylcholine (ACh) and Na-nitroprussid induced relaxation were measured in carotid arteries. Ultrastructural morphology of aortas, PARP and apoptosis inducing factor (AIF) activation were measured. Involved signal transduction proteins were analyzed by Western blotting.

Results: L-2286 did not influence blood pressure in SHR and CFY rats. At the beginning of the study IMT and ASI were similar both in SHR and CFY rats. However, at the end of the study IMT and ASI values were higher in SHR-C compared to CFY (IMT: CFY: $41 \pm 2 \mu\text{m}$, SHR: $78 \pm 5 \mu\text{m}$; ASI: CFY: 4.1 ± 0.1 , SHR: 5.8 ± 0.3 ; $p < 0.01$), and were decreased significantly by L-2286 (SHR-L: IMT: $63 \pm 1 \mu\text{m}$, ASI: 4.3 ± 0.4 ; $p < 0.05$). Relaxation of carotid arteries to ACh significantly increased in SHR-L compared to SHR-C ($22.3 \pm 8\%$ vs. $41 \pm 5\%$, $p < 0.05$), but responses to SNP did not differ. In electron microscope

images increased fibroblast activation with collagen overproduction and endothelial lesions were observed in aortas of SHR-C. In contrast in SHR-L decreased collagen content was noticed. L-2286 treatment enhanced the phosphorylation of Akt-1 ($p < 0.05$), while phosphorylation of JNK and p38 MAPKs were significantly lower ($p < 0.05$) in carotid arteries of SHR-L. Translocation of AIF was elevated in SHR-L and decreased in SHR-C.

Conclusions: Thus chronic inhibition of PARP delays vascular remodeling and improves endothelial dependent vasomotor function due to its effect on prosurvival and antiapoptotic signal transduction pathways.

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Effects of Erythropoietin on Glucose Metabolism

Mikolás E.Z., Fisi V., Cseh J., Pap M., Szijártó I.A., Molnár G.A., Bekő V., Wittmann I.

Eszteella Zsóka **Mikolás**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Viktória **Fisi**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Judit **Cseh**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Marianna **Pap**, Department of Medical Biology, Medical School, University of Pecs, Hungary
István András **Szijártó**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Gergő Attila **Molnár**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Viktória **Bekő**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
István **Wittmann**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary

Introduction: Erythropoietin (EPO) is a glycoprotein hormone, which regulates erythroid cell production. Recently several publications came out about non-erythroid effects of EPO - in central nervous system and breast cancer cells among others. Until now there is no reference for the presence of EPO-receptor on fat cells.

Aims: We aimed to make human measurements by using Continuous Glucose Monitoring System (CGMS) including two EPO-, and insulin-treated diabetic patients. We examined the effects of EPO on intracellular signal transduction and glucose-uptake in 3T3-L1 cells.

Methods: In the course of our human examinations we compared the postprandial glucose levels of the patients before and after subcutaneous EPO-injection. The glucose levels were measured with

CGMS. We used deoxy-D-glucose isotope to measure the glucose-uptake of the cells under the effect of EPO. We examined the changes of Akt and Erk phosphorylation under the effect of EPO with Western blot method in 3T3-L1 cells.

Results: The postprandial glucose levels of the two patients were significantly lower after the EPO injection, than before it ($p < 0.05$). In our isotope experiments we found a significant increase of glucose uptake adding 0.15 ng/ml, 0.3 ng/ml and 0.625 ng/ml concentration of EPO ($p < 0.05$). We detected significant phosphorylation increase of Erk and Akt under the effect of EPO with 5 minutes of treatment in 3T3-L1 cells ($p < 0.05$).

Conclusion: EPO exerts physiological alterations in adipose tissue, which can explain the decrease of glucose level caused by the hormone. Our in vivo experiments in CFY rats are under way to detect the acute effects of EPO on blood glucose level.

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Salt Intake in the Croatian Adult Population: Implications for the Public Health

Miškulin M., Dumančić G., Dumić A., Ugarčić-Hardi Ž., Pitlik N.

Maja **Miškulin**, Institute of Public Health for the Osijek-Baranja County, Osijek, Croatia; Medical School Osijek, Josip Juraj Strossmayer University Osijek, Osijek, Croatia
Gabrijela **Dumančić**, Institute of Public Health for the Osijek-Baranja County, Osijek, Croatia
Albina **Dumić**, General Practice, Osijek, Croatia
Žaneta **Ugarčić-Hardi**, Faculty of Food Technology in Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia
Nada **Pitlik**, Institute of Public Health for the Osijek-Baranja County, Osijek, Croatia

Introduction: Excessive salt intake is the key factor in the epidemic of the pre-hypertension/hypertension.

Aims: The aim of this study was to identify the amount and major food sources of dietary salt in the adult population from Eastern Croatia, and to assess the significance of salt intake from several foodstuffs presumed to be important sources of the 'hidden salt' in the daily diet.

Methods: This cross-sectional epidemiological study was conducted during the June 2010 and had included 175 adult participants mean age 54.0 ± 12.5 (range 20 to 89) years from the Osijek area; 49.1% (86/175) males and 50.9% (89/175) females. By the use of specially designed questionnaire demographic data and data concerning the potential nutritional sources of the 'hidden salt' in the daily diet were collected. The weight, height and blood pressure of each participant were measured. The values of the salt content in 23 breads, 42 bakery products and 31 different salty snacks available in Croatian market were established. The amount of salt consumed daily through the cooking, consumption of bread, bakery products and salty snacks as well as the overall daily salt consumption for each participant has been calculated.

Results: The overall salt intake in observed population was 9.4 ± 3.9 (range 3.2 to 24.7) grams of salt daily. Most (56.4%) dietary salt was from salt added in home cooking, around 29.8% was from

daily consumption of bread, 12.8% was from daily consumption of various bakery products and only 0.7% from daily consumption of salty snacks.

Conclusions: To prevent and control prehypertension/hypertension and improve health, efforts to remove excess salt from the diets in the Eastern part of Croatia should focus on reducing salt in home cooking but also on reducing the amount of baked products in the daily diet of its inhabitants.

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Cerebrovascular Diseases in Chronic Kidney Disease with/without Hypertension

Nagy J.

Judit **Nagy**, Second Department of Medicine and Nephrological Center, University of Pécs, Hungary, Hungary

Introduction: The reason of the unfavorable life expectancy of patients with chronic kidney disease (CKD) is not only the development of end-stage renal failure but the frequent appearance of cardiovascular diseases (CVD). Chronic kidney damage itself is a cardiovascular risk state and the occurrence of CVD-associated diseases is significantly higher in chronic kidney failure.

Methods: Beside risk stratification and valid treatment of CVD (hypertension, diabetes mellitus, ischemic heart disease e.g.) we and the international nephrological community have left the cerebrovascular diseases of CKD patients out of consideration.

Results: Data from several studies show that up to 55% of patients suffering a stroke will die immediately, only 10% of stroke survivors can continue his/her profession, but the others will be permanently disabled. High blood pressure is a strong predictor of stroke and other CVD in most of the patients. In stroke risk reduction it is particularly important to reach the target blood pressure values. The main object of the „Live under 140/90 mmHg” program of the Hungarian Society of Hypertension is to familiarize with target blood pressure itself and how to reach target blood pressure.

Conclusion: In 2010, prevention, early diagnosis and management of stroke are the most important challenges of this program (The Brain Control Program). We think it is advisable to prepare and publish a clinical practice guideline in collaboration with stroke societies which is specific for CKD patients. This guideline would promote primary and secondary prevention of cerebrovascular diseases of CKD patients.

Relation of Hypertension and Helicobacter Pylori Infection as a Risk Factor for Acute Myocardial Infarction

Nakić D., Včev A., Patrk J., Zekanović D., Klarin I.

Dario **Nakić**, General Hospital Zadar, Croatia
Aleksandar **Včev**, School of Medicine, University J.J. Strossmayer in Osijek, Croatia
Jogen **Patrk**, General Hospital Zadar, Croatia
Dražen **Zekanović**, General Hospital Zadar, Croatia
Ivo **Klarin**, General Hospital Zadar, Croatia

Introduction: There are several studies which show association between low grade infections and development of atherosclerosis and coronary heart disease including acute myocardial infarction (AMI). Hypertension is one of the main risk factors of which prevalence is higher in patients with low socioeconomic status like a H.pylori infection.

Aim: We aimed to find out whether there is a link between hypertension and H.pylori infection in patients with AMI.

Methods: In this prospective study in one center, there were 100 patients with AMI undergoing coronary angiography. There were 67 men and 33 women, average age of 64.7 years, 56 had ST segment elevation (STEMI) and 44 were without ST segment elevation (non-STEMI) myocardial infarction. Control group for prevalence of H. pylori infection consists of 93 healthy individuals. H.pylori seropositivity was determined by enzyme link test Immulite.

Results: We found that 77% of hypertensive patients had average values 144/88 mmHg, 52% with grade I and 25% with grade II hypertension according to the JNC VII classification. The observed population was overweight with an average body mass index (BMI) of 27.3 kg/m², smoking as a risk factor was present in 50% patients, diabetes in 59% and hyperlipidemia in 67%. H.pylori infection was present in 29% of patients vs. 26% in the control group. The highest levels of systolic and diastolic blood pressure were found in the group of hypertonic patients without H.pylori seropositivity compare to groups with hypertension and H.pylori seropositivity and the group of normal blood pressure without H.pylori seropositivity. Highest levels of BMI were observed in group of hypertonic patients with H.pylori infection.

Conclusion: There was no association between H.pylori infection and hypertension as a contributing risk factor in the AMI. Association of obesity, hypertension and H.pylori infection is a result of life style among the obese patients. Further studies are needed to clarify the role of H. pylori infection with other risk factors in the acute myocardial infarction.

Hypertension in Elderly Patients with a Kidney Transplant

Orlić L., Sladoje-Martinović B., Vuksanović-Mikuličić S., Živčić Ćosić S., Rački S.

Lidija **Orlić**, Department of Nephrology and Dialysis, University Hospital Rijeka, 51000 Rijeka, Croatia
Branka **Sladoje-Martinović**, Department of Nephrology and Dialysis, University Hospital Rijeka, Rijeka, Croatia
Sretenka **Vuksanović-Mikuličić**, Department of Nephrology and Dialysis, University Hospital Rijeka, Rijeka, Croatia
Stela **Živčić Ćosić**, Department of Nephrology and Dialysis, University Hospital Rijeka, Rijeka, Croatia
Sanjin **Rački**, Department of Nephrology and Dialysis, University Hospital Rijeka, Rijeka, Croatia

Introduction: A large number of patients today with terminal kidney failure are elderly. For a small number of these elderly patients a kidney transplant is a possible method of treatment for terminal kidney failure. Hypertension appears after a transplant among a large number of these patients because the risk of hypertension is higher among this age group of transplant patients.

Aim: The goal of this work was to investigate the prevalence of hypertension among kidney transplant patients above the age of 65 and to analyze anti-hypertension therapy.

Methods: The investigation included 27 patients, 15 male and 12 female, above the age of 65 who received a kidney transplant at the Clinical Hospital Center Rijeka. The average age of the patients was 71.2±5.6 years. The average time spent on dialysis before the transplant was 2.7±2.1 years. The amount of time that had passed since the transplant was 6.6±4.6 years. The average values of creatinine were 135±38.2 μmol/L.

Results: Of the number of patients analyzed, 25 had hypertension. Among all of the patients hypertension appeared within the first year after the transplant.

In the anti-hypertension therapy five patients were taking one antihypertensive drug, 14 patients were taking two drugs and six patients were taking three or more drugs. The most frequently taken medicine was a calcium channel blocker and beta blocker. Of the analyzed patients, 13 achieved the target values for blood pressure.

Conclusion: From the data acquired we can conclude that most older kidney transplant patients have hypertension. Also, in half of these patients the target values for blood pressure were achieved. The most frequently used anti-hypertensives among older patients were calcium channel blocker.

Effects of Hyperhomocysteinemia on Various Hemorheological Parameters

Papp J., Sándor B., Tóth A., Rábai M., Vámos Z., Kenyeres P., Koller A., Tóth K.

Judit **Papp**, 1st Department of Medicine, University of Pécs, School of Medicine, Hungary, Hungary
Barbara **Sándor**, 1st Department of Medicine, University of Pécs, School of Medicine, Hungary, Hungary
András **Tóth**, 11st Department of Medicine, University of Pécs, School of Medicine, Hungary, Hungary
Zoltan **Vámos**, University of Pécs, Medical School 1st Department of Medicine, Hungary
Akos **Koller**, University of Pécs, Faculty of Medicine, Dept. of Pathophysiology and Gerontology, Hungary, Department of Physiology, New York Medical College, Valhalla, NY USA
Kálmán **Tóth**, University of Pécs, Medical School 1st Department of Medicine, Hungary

Introduction: Previous in vitro and clinical studies have shown that hyperhomocysteinemia (HHcy) contributes to the development of several cardiovascular diseases and increased peripheral vascular resistance, thus hypertension. However, its effects on blood rheology are not very well known.

Aim: Thus, the aim of the present study was to investigate the effects of HHcy on various hemorheological parameters.

Methods: Experiments were performed in a HHcy model of rats. For 6 weeks, animals received methionine (1g/kg body weight daily intake) in the drinking water known to increase serum level of homocysteine. Blood samples were taken from HHcy and control animals ($n = 12$, in both groups) and serum homocysteine level and hematocrit (Hct) were determined. After Hct standardization (40%), whole blood viscosity (WBV), plasma viscosity (PV), red blood cell (RBC) aggregation and deformability were measured using the Hevimet 40 capillary viscometer, the Myrenne RBC aggregometer and the LORCA.

Results: Serum homocysteine levels were elevated significantly in the animal group receiving supplemental methionine, when compared to the controls (6.4 ± 1.8 vs. 28.5 ± 23.9 $\mu\text{mol/l}$; $p < 0.01$). No significant difference was detected in Hct, WBV, PV and RBC deformability between the two groups. However, RBC aggregation, measured with the Myrenne, was significantly below the control values in rats receiving methionine supplementation (for M: 3.6 ± 1.4 vs. 1.7 ± 0.6 ; $p < 0.01$; for M1: 8.1 ± 2.5 vs. 5.1 ± 1.7 ; $p < 0.01$).

Conclusions: Although short-term HHcy did not affect most of the hemorheological parameters, it significantly decreased RBC aggregation. We assume that the reduced RBC aggregation compensates, at least in part, for the detrimental hemodynamic effects of HHcy. However, detrimental vascular effects of HHcy are not primarily due to the impairment of hemorheological parameters.

The Role of ACE Gene Polymorphism on Early Changes in Epithelial Proximal Tubule Renal Cells in Endemic (Balkan) Nephropathy

Pećin I., Čvorišćec D., Miletić-Medved M., Kovač-Peić A., Cvitković A., Sertić J., Leko N., Vitale K., Jelaković B.

Ivan **Pećin**, University Hospital Center Zagreb, Department of Metabolic Diseases, Internal Medicine Clinic, School of Medicine Zagreb University, Croatia
Dubravka **Čvorišćec**, University Hospital Center Zagreb, Clinical Institute of Laboratory Diagnosis, School of Medicine Zagreb University, Croatia
Marica **Miletić-Medved**, Public Health Institute Brodsko-Posavska County, Slavonski Brod, Croatia
Živka **Dika**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia
Jelena **Kos**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia
Ninoslav **Leko**, General Hospital Dr Josip Benčević, Slavonski Brod, Croatia
Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension, University Hospital Center Zagreb, Zagreb, Croatia

Introduction: Endemic nephropathy (EN) is a chronic tubulointerstitial nephritis with insidious clinical course. Tubular proteinuria and enzymuria are hallmarks of EN. The role of renin-angiotensin system (RAS) in EN has not yet been elucidated.

Aim: The aim of this study was to investigate the role of angiotensin-converting enzyme (ACE) gene polymorphism in EN focusing on the urinary N-acetyl-B-D-glucosaminidase (NAG) excretion.

Methods: 179 participants (122 women and 57 men) were stratified according to the modified WHO criteria: diseased ($N=9$), those at risk for EN ($N=84$), suspects of having EN ($N=35$), and others ($N=51$). After short questionnaire and clinical exam, blood and urine samples were taken for determination of serum creatinine, hemoglobin, low molecular weight proteins and NAG as well (as marker of proximal tubular cells early damage). ACE gene polymorphism was determined using PCR method.

Results: There were 58 (31.5%) DD, 78 (42.1%) ID and 43 (26.3%) II subjects. No differences in allele frequency and ACE genotypes were found between the subgroups ($p > 0.05$). We failed to find connection between ACE genotype and blood pressure ($p=0.125$), serum creatinine ($p=0.871$), proteinuria ($p=0.632$), hemoglobin levels ($p=0.368$) and markers of early proximal tubular cells damage (NAG as well ($p=0.825$)).

Conclusion: Based on our results ACE gene polymorphism do not influence EN. It does not affect on early changes in proximal tubule cells. These results need to be confirmed in further studies on greater number of patients.

Endovascular Treatment of Atherosclerotic Renal Artery Stenosis and Uncontrolled Hypertension: Characteristics of Patients and Intervention

Perkov D., Smiljanić R., Dobrota S., Fodor L., Premužić V., Jelaković B., Štern Padovan R.

Dražen **Perkov**, Department of Diagnostic and Interventional Radiology, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia
Ranko **Smiljanić**, Department of Diagnostic and Interventional Radiology, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia
Savko **Dobrota**, Department of Diagnostic and Interventional Radiology, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia
Ljiljana **Fodor**, Department of Internal Medicine, Division for Nephrology and Arterial Hypertension, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Vedran **Premužić**, Department of Internal Medicine, Division for Nephrology and Arterial Hypertension, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Bojan **Jelaković**, Department of Internal Medicine, Division for Nephrology and Arterial Hypertension, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Ranka **Štern Padovan**, Department of Diagnostic and Interventional Radiology, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Aim: To present characteristics of patients and endovascular procedures in treatment of atherosclerotic renal artery stenosis (RAS) and uncontrolled arterial hypertension.

Methods: In the period between February 2009 and July 2010 we treated 22 patients (11 male and 11 female, mean age 64.66 ± 11.27 years) by method of percutaneous transluminal renal angioplasty/stent implantation (PTRA-S) due to hemodynamically significant atherosclerotic RAS and uncontrolled arterial hypertension. Arterial blood pressure was measured by 24-hour Holter. Aortic and peripheral artery stiffness was measured non-invasive with Tensiomed Arteriograph device. Before PTRA-S, all the patients underwent color Doppler, MDCT of renal arteries and selective digital subtraction angiography (DSA) of renal arteries.

Results: In 22 patients we performed 26 endovascular interventions (23 implanted stents and 3 PTRAs) in 25 renal arteries. Out of 23 implanted stents, 22 were cobalt chromium renal stents, and only one was coronary bare metal stent (BMS). PTRA was performed with high-pressure renal balloon dilatation catheters. Average stenosis rate was 84.55 ± 11.20 % (range 68–95 %). Mean dilatation pressure of RAS was 12.71 ± 2.19 atm. All endovascular interventions were technically and hemodynamically successful. There were no major complications and no periprocedural deaths. Mean systolic pressure before procedure was 165.21 ± 27.79 mmHg, an mean diastolic pressure was 93.57 ± 14.96 mmHg. Mean brachial augmentation index (Aix) value was 24.10 ± 13.29 %, and mean aortic puls wave velocity (PWV) was 11.91 ± 4.60 m/s.

Conclusion: Endovascular intervention (PTRA-S) in treatment of patients with atherosclerotic RAS and uncontrolled hypertension is technically successful and safe. This method of treatment potentially allows better control of high blood pressure and reducing aortic and peripheral artery stiffness.

Microcirculation, Blood Pressure and Physical Exercise

Phillips S.

Shane **Phillips**, shanep@uic.edu, Departments of Physical Therapy and Medicine, University of Illinois at Chicago, Ill., USA

Introduction: Lifestyle interventions that involve exercise are commonly employed to prevent the development of cardiovascular disease. However, exercise-induced acute hypertension may increase reactive oxygen species (ROS) generation that scavenge nitric oxide (NO) and threaten vascular endothelial health. The situation is more complex in the microcirculation where NO participates less in vasodilation and ROS can play an important role in regulating vascular function when NO is reduced. Recent studies from our laboratory indicate that 1) conditioned subjects (EX) are protected from endothelial dysfunction in resistance arteries observed in sedentary (SED) subjects after acute weight lifting (WL) exercise and 2) the mechanism of maintained vasodilation to acetylcholine does not involve nitric oxide in EX subjects.

Methods: We studied healthy, lean SED and EX, who underwent blood pressure measurements during a single progressive 15 minute leg press WL session. Brachial artery flow-mediated vasodilation and nitroglycerin dilations were determined with ultrasound. Microvascular specimens were obtained with gluteal subcutaneous fat pad biopsies. Isolated microvessels from the same subjects were cannulated for vascular reactivity measurements to acetylcholine (ACh; 10^{-9} - 10^{-4} M) pre and post WL. Superoxide and H₂O₂ production was assessed with hydroethidine and DCF fluorescence in isolated microvessels.

Results: Despite similar increases in arterial pressure, SED subjects have reduced ACh-dependent vasodilation after a brief strenuous WL session compared to EX subjects. The H₂O₂ scavenger PEG-catalase reduced DCF fluorescence and ACh-induced dilations post WL and had no effect on pre-WL. DCF fluorescence was increased in microvessels from EX subjects post WL. The mitochondrial electron transport chain inhibitor rotenone reduced dilations to ACh in resistance arteries.

Conclusions: These data indicate that H₂O₂ contributes to the maintained dilation in resistance arteries after exposure to exercise-induced hypertension. Future investigations will advance our understanding of the relationship between H₂O₂ from endothelium during exercise and resistance artery function.

The Correlation of Endothelin-1 and Nitric Oxide with Mean Arterial Pressure Depends on Therapy with Angiotensin-Converting Enzyme Inhibitors in Diabetic Patients

Tomčić M., Musa D., Pravdić D., Petrović J., Markota I.

Monika **Tomčić**, Clinical Hospital Mostar, Bosnia and Herzegovina

Drinka **Musa**, Clinical Hospital Mostar, Bosnia and Herzegovina

Danijel **Pravdić**, Clinical Hospital Mostar, Medical School Mostar, Bosnia and Herzegovina

Josip **Petrović**, Clinical Hospital Mostar, Bosnia and Herzegovina

Ivica **Markota**, Clinical Hospital Mostar, Bosnia and Herzegovina

Introduction: Nitric oxide (NO) and endothelin-1 (ET-1) play an important role in modulation of vascular homeostasis. Recently, the role of NO and ET-1 in the pathogenesis of hypertension in diabetic patients has been proposed.

Aim: To investigate the changes in plasma and urine levels of NO and ET-1, and to assess the association of NO and ET-1 with arterial hypertension in diabetic patients with or without therapy with angiotensin-converting enzyme inhibitors (ACEI).

Methods: 30 diabetic patients with diabetic nephropathy, and 30 healthy control subjects were included. Blood pressure was measured with mercury sphygmomanometer. NO levels were determined in serum and urine by Griess reaction and ET-1 concentration was assessed by enzyme-linked immunosorbent assay (ELISA) using an ET-1 kit.

Results: The mean blood pressure was higher in diabetic patients (160/92 mmHg vs. 120/80 mm Hg, $p < 0.05$). Concentration of ET-1 was tended to be higher (N.S.) in plasma and urine in diabetic patients as compared to control subjects (10.63 pg/mL vs. 8.10 pg/mL; plasma and 12.05 pg/mL vs. 9.66 pg/mL; urine). Plasma and urine concentrations of NO were also higher in diabetic patients (7.49 $\mu\text{mol/L}$ vs. 5.88 $\mu\text{mol/L}$, $p < 0.05$; plasma), and urine (13.61 $\mu\text{mol/L}$ vs. 11.02 $\mu\text{mol/L}$, $p = 0.312$). In diabetic patients receiving ACEI therapy the increase in plasma ET-1 level was associated with systolic blood pressure decline ($R^2 = 0.1474$), and in those not receiving ACEI the increase in plasma ET-1 level was associated with an increase in systolic blood pressure ($R^2 = 0.4239$). The patients on ACEI therapy had lower systolic and diastolic pressure with increasing concentrations of NO ($R^2 = 0.1402$), while patients not receiving ACEI had an increase in both systolic and diastolic blood pressure with increasing plasma NO levels ($R^2 = 0.0111$).

Conclusion: In summary, NO and ET-1 play a significant role in blood pressure regulation in diabetic patients. The correlation of ET-1 and NO with blood pressure depend on the presence or absence of ACEI therapy.

Pulse Wave Velocity in Patients with Endemic (Balkan) Nephropathy Undergoing Hemodialysis

Premužić V., Laganović M., Leko N., Kovač-Peić A., Teskera T., Čvorišćec D., Bitunjac M., Illyes M., Pećin I., Karanović S., Vuković Lela I., Jelaković B.

Vedran **Premužić**, Department of Nephrology and Arterial Hypertension UHC Zagreb, School of Medicine, University of Zagreb, Croatia

Mario **Laganović**, Department of Nephrology and Arterial Hypertension UHC Zagreb, School of Medicine, University of Zagreb, Croatia

Ninoslav **Leko**, General Hospital Dr Josip Benčević, Slavonski Brod, Croatia

Anamarija **Kovač-Peić**, General Hospital Dr Josip Benčević, Slavonski Brod, Croatia

Dubravka **Čvorišćec**, Laboratory for Clinical Diagnosis UHC Zagreb, School of Medicine University of Zagreb, Croatia

Miklos **Illyes**, TensioMed Ltd. Budapest, Hungary

Ivan **Pećin**, Department for Metabolic Diseases, UHC Zagreb, School of Medicine University of Zagreb, Croatia

Bojan **Jelaković**, Department of Nephrology and Arterial Hypertension UHC Zagreb, School of Medicine University of Zagreb, Croatia

Introduction: Although our recent results showed that prevalence of hypertension (H) in endemic nephropathy (EN) villages is not different compared to other rural parts of Croatia, several decades ago it had been observed that blood pressure (BP) was normal in EN patients.

Aim: To determine arterial stiffness in EN patients undergoing hemodialysis (HD).

Methods: In 81 HD patients (40 M, 41 W) (age 58.27 ± 15.15 vs. 65.63 ± 11.71) from Dialytic Unit, General Hospital Slavonski Brod aortic pulse wave velocity (PWV) was measured by TensioMed Arteriograph. Brachial BP was measured using Omron device following ESH/ECS guidelines. There were 23 (12 M, 11 W) EN and 58 (28 M 30 F) non EN patients (mean age 70.56 ± 5.94 vs. 58.60 ± 14.75 , respectively; $p = 0.0003$).

Results: There were no significant differences in brachial and aortic augmentation indexes (Aix) as well in aortic PWV between EN and non-EN patients. Mean brachial and aortic Aix were 13.36 ± 27.16 and 38.23 ± 11.52 , while aortic PWV was 11.41 ± 2.05 . Patients with higher Aix values had higher mean arterial pressure (MAP) (114.83 ± 15.24 vs. 101.41 ± 13.92 , respectively; $p = 0.0017$), pulse pressure (PP) (73.74 ± 17.38 vs. 55.41 ± 15.91 , respectively; $p = 0.0002$) and aortic systolic blood pressure (SBPAO) (169.82 ± 26.97 vs. 130.96 ± 22.00 , respectively; $p < 0.001$), while EN patients with higher Aix values had higher SBPAO values (163.56 ± 30.87 vs. 134.62 ± 13.31 , respectively; $p = 0.029$). EN patients with higher PWV values had higher BMI (24.33 ± 4.00 vs. 20.33 ± 2.38) and lower phosphates (1.90 ± 0.15 vs. 2.15 ± 0.24).

Conclusion: There were no differences between EN and non-EN patients undergoing dialysis, whereas we have found differences between patients with higher Aix and PWV values and the increasing arterial stiffness marker values with higher MAP, PP and SBPAO.

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A Comparison of Frequency of Arterial Hypertension in Patients with Different Types of Acute Stroke During a Five-Year Period in the Osijek Area

Rostohar Bijelić B., Bijelić N., Hegeduš I., Kadojić D.

Bibijana Rostohar Bijelić, bibijana007@gmail.com, Scientific Research Unit, University Hospital Center Osijek, Osijek, Croatia

Nikola Bijelić, nbijelic@mefos.hr, School of Medicine Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

Ivana Hegeduš, ihegedu3@yahoo.com, Clinic of Neurology, University Hospital Center Osijek, Osijek, Croatia

Dragutin Kadojić, kadojic.dragutin@kbo.hr, Clinic of Neurology, University Hospital Center Osijek, Osijek, Croatia

Aim: To determine whether there is a difference in frequency of hypertension and other risk factors in patients suffering from various types and subtypes of stroke (S) in years 2004 and 2009.

Methods: A group of 130 patients suffering from acute S in year 2004 was compared to a group of 100 patients with the same disease in year 2009. In all patients, the diagnosis of S was determined using computed tomography of the brain, while other diagnostic procedures were performed as well. S was classified as hemorrhagic S (intracerebral hemorrhage and subarachnoid hemorrhage) and ischemic S which, according to TOAST classification, comprises large vessel S (LVS), small vessel S (SVS), cardioembolic S (CES), S of other determined etiology (OCS) and S of undetermined etiology (US).

Results: Average age of patients increased from 67.3 in year 2004 to 70.5 in year 2009. The ratio of male patients also increased. In year 2004 there were 7 patients for which the subtype of S could not be precisely determined, while in 2009 there were no such patients. Frequency of arterial hypertension, which is one of the most important risk factors for S increased from 78% in year 2004 to 83% in year 2009. There was some increase in frequency of diabetes and atrial fibrillation as well, while the frequency of hyperlipidemia, smoking and cardiomyopathies decreased.

Conclusions: The research showed that arterial hypertension still is the most frequent and the most important risk factor for S. There is also high frequency of other common risk factors such as hyperlipidemia, diabetes, atrial fibrillation and smoking. All of this emphasizes the need for education and increased activity in the field of primary and secondary prevention of S.

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Different Effect of IgA Nephropathy and Polycystic Kidney Disease on Arterial Stiffness

Sági B., Késői I., Tóth O.I., Vas T., Fazekas A., Kovács T., Wittmann I., Nagy J.

Balázs Sági, Nephrology Center and II. Department of Internal Medicine, Medical Faculty, University of Pécs, Pécs, Hungary, Hungary

István Késői, Nephrology Center and II. Department of Internal Medicine, Medical Faculty, University of Pécs, Pécs, Hungary, Hungary

Orsolya Ilona Tóth, Nephrology Center and II. Department of Internal Medicine, Medical Faculty, University of Pécs, Pécs, Hungary, Hungary

István Wittmann, PTE KK - 2nd Department of Internal Medicine and Nephrological Center, Hungary

Judit Nagy, Second Department of Medicine and Nephrological Center, University of Pécs, Hungary

Introduction: Renal function is a major predictor of cardiovascular disease. The effect of specific renal diseases on vascular function is unknown.

Methods: We studied 60 IgA nephropathy (IgAN) and 60 polycystic kidney disease (PKD) patients with chronic kidney disease (CKD) stages 1–4. Fifty control patients had normal kidney function. We measured pulse wave velocity by digital volume pulse method and derived stiffness index (SIDVP). We investigated the effect of the two homogenous type of CKD on the arterial stiffness.

Results: PKD patients had an increased SIDVP compared to IgAN patients and controls (11.14 m/s, 9.66 m/s and 8.87 m/s, $p < 0.001$) IgAN patients with CKD3–4 had significantly higher SIDVP, than controls (10.43 m/s and 9.15 m/s, $p < 0.05$ CKD3–4 vs. controls), IgAN patients with CKD1–2 had not. In PKD both the CKD3–4 and CKD1–2 patients had higher SIDVP than controls (11.41 m/s and 10.95 m/s vs. 8.87 m/s, $p < 0.001$). We found an inverse correlation between SIDVP and GFR in IgAN, but not in PKD.

Conclusion: In both PKD and in IgAN the arterial stiffness was increased comparing to controls. Arterial stiffening in PKD was independent from renal function and more pronounced than in IgAN. Vascular alterations are more severe and start earlier in PKD than in IgAN.

Correlation Between Plasma Leptin and Adiponectin Concentrations in Hypertensive Overweight Patients

Selthofer-Relatić K, Radić R., Steiner R., Vizjak V., Bošnjak I.

Kristina **Selthofer-Relatić**, selthofer.relatic@gmail.com, Internal Clinic, Clinical Hospital Centre Osijek, Croatia
 Radivoje **Radić**, rradic@mefos.hr, School of Medicine, University J.J. Strossmayer in Osijek, Croatia
 Robert **Steiner**, steiner.robert@kbo.hr, Internal Clinic, Clinical Hospital Centre Osijek, Croatia
 Vedrana **Vizjak**, vizjak.vedrana@kbo.hr, Internal Clinic, Clinical Hospital Centre Osijek, Croatia
 Ivica **Bošnjak**, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Introduction: Adipose tissue is the biggest endocrine organ, which secretes large numbers of adipokines, cytokines and chemokines. Leptin and adiponectin are part of a complex neurohumoral system of adipokines which are involved in the development of obesity-related cardiovascular diseases. Molecular mechanisms of their actions on development of left ventricular hypertrophy are not clear yet.

Aim: To determine the correlation of neurohumoral non-haemodynamic factors, leptin and adiponectin, in the same serum samples and their influence on development of left ventricular hypertrophy.

Methods: The study included 80 hypertensive patients, divided into four groups according to sex and left ventricular hypertrophy, with body mass index 25–30 kg/m², regular renal function and normal fasting serum glucose in the morning. Biochemical, anthropometric and cardiovascular level assessment was done to all patients. Adiponectin concentration was determined by enzyme immunoassay and leptin concentration by radioimmunoassay test.

Results: Overweight patients are characterized by higher plasma level of leptin and lower plasma level of adiponectin. Leptin and adiponectin concentrations did not correlate in the same serum samples. Also, leptin or adiponectin concentrations did not correlate with the left ventricular wall thickness, intraventricular septum and posterior wall.

Conclusion: Leptin and adiponectin present a part of a neurohumoral, non-haemodynamic system that contributes to the development of obesity – related arterial hypertension and left ventricular hypertrophy. The major effect of higher leptin and lower adiponectin concentrations are probably achieved through action on systemic haemodynamic factors (hypertension) and minor effect through action on local non-haemodynamic factors (leptin and adiponectin receptors in the myocardium). Pathophysiological mechanism of their actions is not understood yet. Also according to our results, we concluded that leptin and adiponectin concentrations are not in inversely-proportional relationship.

Comparison of Antioxidant Effects of Hydrogen Sulphide (H₂S) and Superoxide Dismutase (SOD) in Isolated Small Veins

Solymár M., Tanai E., Hamar J., Koller A.

Margit **Solymár**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary
 Edit **Tanai**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary
 János **Hamar**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary
 Akos **Koller**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary

Introduction: Recent studies suggest that H₂S is a potent antioxidant that can improve cardiovascular functions.

Aim: Thus we aimed to compare the antioxidant properties of hydrogen sulphide (H₂S) to that of superoxide dismutase (SOD) on superoxide-induced vasomotor activity.

Methods: Small gracilis veins of Wistar rats were mounted in a myograph (Experimetria-WPI) filled with Krebs solution (37°C) and gassed with 95% O₂. A basal tone was established, then 60 mM KCl was used to induce pre-contraction. Then the vasomotor effects of the superoxide generator pyrogallol (10⁻⁵ M) were measured. The chamber was washed out and the vessels were pre-contracted and incubated with SOD (120 U/ml). The contractions to pyrogallol were obtained again. Subsequently, the effect of the H₂S donor NaHS (10⁻⁵ M) was measured.

Results: In small veins KCl elicited a substantial vasomotor tone (0.63 ± 0.1 mN), which increased after pyrogallol administration (1.3 ± 0.2 mN, p < 0.05). In the presence of SOD the pyrogallol elicited contraction was significantly reduced (0.9 ± 0.2 mN, p < 0.05). In the presence of H₂S, the pyrogallol elicited contraction was similar to the control (1.3 ± 0.2 mN). Also, SOD significantly decreased the KCl induced vasomotor tone (0.5 ± 0.1 mN, p < 0.05), whereas H₂S did not affect it (0.6 ± 0.1 mN).

Conclusion: In the present study H₂S did not prevent the pyrogallol-induced contraction, whereas SOD significantly decreased it. These results suggest that the previously described antioxidant effects of H₂S are unlikely to be mediated by its direct interaction with superoxide.

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Chronic Hemodialysis Patients' View on Normal Blood Pressure Values- Impact on Compliance with Arterial Hypertension Treatment

Pandurović T., Špeh S., Zibar L., Stipanić S.

Tijana **Pandurović**, Medical School Osijek, University J.J. Strossmayer Osijek, Croatia
Dijana **Špeh**, Medical School Osijek, University J.J. Strossmayer Osijek, Croatia
Lada **Zibar**, Medical School Osijek, University J.J. Strossmayer Osijek, Croatia
Sanja **Stipanić**, University Hospital Centre Osijek, Osijek, Croatia

Introduction: Arterial hypertension (AH) is common among chronic hemodialysis (CHD) patients. It is associated with cardiovascular disease, which is highly responsible for morbidity and mortality within this population. We supposed that they frequently do not comply with the antihypertensive treatment, for complex reasons, including their distorted view on normal blood pressure values.

Aim: We examined the hypothesis that CHD patients hold higher blood pressure (BP) values for normal with consecutive poor BP control.

Methods: 202 CHD patients (25 to 85 years, mean 64±13) answered questionnaire on maximal normal BP, compliance to antihypertensives and symptoms upon BP variations. Data on history and current AH control were taken from records. Optimal BP before hemodialysis session was considered less than 140/90 mmHg, mean arterial pressure (MAP) less than 107 mmHg, corresponding to high normal BP (guidelines ESH-ESC 2007).

Results: 57% of patients declared maximal acceptable systolic BP higher than 139 mmHg (median 150 mmHg, 140–180). More than 50% would not take antihypertensives for BP lower than preferred. Most of them report symptoms by lower BP. Only half of them had normal predialysis MAP below 107 mmHg. The year of AH diagnosis differed significantly from the year of beginning of treatment ($p < 0.001$). 17.3% initiated antihypertensive treatment with a delay, even up to 40 years.

Conclusion: Chronic HD patients often consider normal BP higher than those recommended. Many of them had poorly regulated AH. It might be, at least in part, due to insufficient compliance to the treatment with antihypertensives. Except for the ignorance, different view on normal BP could be attributed to symptoms related to BP below the preferred. They seem to be somehow adapted to the higher BP. The question remains whether this is a consequence of delayed AH treatment or inadequate guidelines for this particular population of patients.

Increases in Intraluminal Flow Elicit Constrictions in Isolated Rat Middle Cerebral Arteries

Springo Z., Toth P., Doczi T., Koller A.

Zsolt **Springo**, Department of Pathophysiology and Gerontology, Medical School, University of Pécs, Hungary
Peter **Toth**, 1st Department of Pathophysiology and Gerontology, Medical School, University of Pécs, Hungary, Department of Physiology, New York Medical College, Valhalla, N.Y., USA
Tamas **Doczi**, 2nd Department of Neurosurgery, University of Pécs, Hungary
Akos **Koller**, 1st Department of Pathophysiology and Gerontology, Medical School, University of Pécs, Hungary, Department of Physiology, New York Medical College, Valhalla, N.Y., USA

Introduction: Changes in systemic pressure are accompanied with changes in intraluminal flow, as well.

Aim: Thus we hypothesized that – in addition to the pressure sensitive, myogenic mechanism - increases in intraluminal flow elicit constrictions of isolated cerebral arteries.

Methods: Middle cerebral arteries (MCA) were isolated from the brain of rats and studied in pressure-flow chamber. Changes in inner diameter were measured by a microangiometer to stepwise increases in intraluminal flow (at a constant intraluminal pressure of 80 mmHg). Intraluminal flow was established by increasing the pressure difference throughout the vessels (ΔP = up to 5 or 60 mmHg). Also, the passive diameters of vessels (in Ca^{2+} free solution) were measured as a function of pressure and flow. From the data wall shear stress (WSS) was calculated and statistical analysis performed.

Results: MCA (basal diameter: $181 \pm 6 \mu m$ at 80 mmHg) maintained a constant diameter in the face of increasing intraluminal pressure in a range of 40–150 mmHg (~58% of passive diameter). Whereas, in the presence of constant intraluminal pressure of 80 mmHg increases in flow significantly constricted MCA (from 61 ± 1.2 to $50 \pm 1.3\%$ of passive diameter, $p < 0.05$). Calculation of wall shear stress (WSS) also indicated that increases in flow elicited increases in WSS, which resulted in significant constrictions of MCA. The flow/WSS-induced constrictions significantly augmented pressure-induced constrictions in an additive manner.

Conclusion: In conclusion, we propose that constriction of cerebral arteries in response to increased flow has important physiological role in maintaining a relatively constant local cerebral blood flow and intracranial volume during increases in systemic blood pressure.

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The Method of Distance Measurement and Torso Length Influences the Relationship of Pulse Wave Velocity to Cardiovascular Mortality

Cseppekál O., Németh Z.K., Studinger P.,
Hadj Othmane T.E., Nemcsik J., Fekete B.C., Deák G.,
Egresits J., Szathmári M., Tislér A.

Orsolya **Cseppekál**, First Department of Medicine Semmelweis University, Budapest, Hungary
Zsófia K. **Németh**, First Department of Medicine Semmelweis University, Budapest, Hungary
Péter **Studinger**, First Department of Medicine Semmelweis University, Budapest, Hungary
Taha El **Hadj Othmane**, First Department of Medicine Semmelweis University, Budapest, Hungary
János **Nemcsik**, Division of Angiology and Nephrology, Department of Medicine, St. Imre Teaching Hospital, Budapest, Hungary
Bertalan Cs. **Fekete**, First Department of Medicine Semmelweis University, Budapest, Hungary
György **Deák**, First Department of Medicine Semmelweis University, Budapest, Hungary
József **Egresits**, Division of Angiology and Nephrology, Department of Medicine, St. Imre Teaching Hospital, Budapest, Hungary
Miklós **Szathmári**, First Department of Medicine Semmelweis University, Budapest, Hungary
András **Tislér** First Department of Medicine Semmelweis University, Budapest, Hungary

Introduction: The method of estimating the distance traveled by the pulse wave, used in the calculation of pulse wave velocity (PWV), is not standardized.

Aim: Our objective was to assess whether different methods of distance measurement influenced the association of PWV to cardiovascular mortality in hemodialysis patients.

Methods: 98 chronic hemodialysis patients had their PWV measured using three methods for distance estimation; PWV1: sternal notch–femoral site minus sternal notch–carotid site, PWV2: carotid–femoral site, PWV3: carotid–femoral site minus sternal notch–carotid site. Carotid–femoral distance was used to approximate torso length. Patients were followed for a median of 30 (range 1–51) months and the association of PWV and cardiovascular mortality was assessed using survival analysis before and after stratification for torso length.

Results: The three methods resulted in significantly different PWV values (11.2 (3.3), 14.8 (4.2), 12.6 (3.7) m/s, respectively). During follow up 50 patients died, 32 of cardiovascular causes. In log-rank tests only PWV1 tertiles but not those of PWV2 or PWV3 were significantly related to outcome (p-values 0.017, 0.257, 0.138, respectively). In adjusted Cox proportional hazards regression only PWV1 was related to cardiovascular mortality (HR for 1m/s higher PWV 1.18[1.03–1.35], 1.10[0.99–1.21], 1.13[1.00–1.27], for the three PWVs respectively). In stratified analysis, however, among patients with below median torso length all three PWV values were related to outcome, while in patients with above median torso length neither PWV methods resulted in significant relationship to outcome.

Conclusion: PWV calculated using the sternal notch–femoral distance minus sternal notch–carotid distance provides the strongest relationship to cardiovascular mortality. Longer torso weakens the predictive value of PWV, possibly due to more tortuosity of the aorta hence more error introduced when using surface tape measurements.

Does Oxidative Stress Affect the Vasoactive Effect of Insulin?

Szijarto I.A., Mérei Á., Fisi V., Fésüs G., Cseh J.,
Zsóka Mikolás E., Molnár G.A., Wittmann I.

Istvan Andras **Szijarto**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Ákos **Mérei**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Viktória **Fisi**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Gábor **Fésüs**, Heart Institute, Medical School, University of Pecs, Hungary
Judit **Cseh**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Eszteella **Zsóka Mikolás**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
Gergő Attila **Molnár**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary
István **Wittmann**, 2nd Department of Internal Medicine and Nephrological Center, Medical School, University of Pecs, Hungary

Introduction: The amount of oxidative stress may be different in various blood vessels, which could affect their vasoactive function.

Aim: To measure the total amount of the free radical markers o- and m-Tyr (o+m-Tyr) in the walls of various blood vessels, furthermore to determine the vasoactive properties of these vessels.

Methods: The relative o+m-Tyr (o-Tyr+m-Tyr/Phe) content of the vascular wall was measured with high-performance liquid chromatography system (HPLC). In our experiments we measured the acute vasoactive effects of acetylcholine (ACh), insulin (INS) and sodium-nitroprusside (SNP) on aortic (Ao), mesenteric (Me) and femoral (Fe) arteries isolated from rats. The vessels were precontracted by epinephrine with isometric myograph system.

Results: The highest oxidative stress was measured in the aortic wall, lower amount was detected in the mesenteric artery (o+m-Tyr: Ao vs. Me: 1.87 ± 0.194 vs. 1.255 ± 0.296 , $p \leq 0.05$). The o+m-Tyr extent of the femoral artery was significantly lower than in the aortic or mesenteric wall (Fe vs. Ao: 0.37 ± 0.15 vs. 1.87 ± 0.194 ; Fe vs. Me: 0.37 ± 0.15 vs. 1.255 ± 0.296 , $p \leq 0.05$). The EC50 value of ACh and INS was significantly different in every vessel, it was the highest in the aorta, followed by the mesenteric artery and it was the lowest in the femoral artery (log EC50: Ao vs. Me vs. Fe: ACh: -4.101 ± 0.35 vs.

-6.01±0.078 vs. -7.183±0.102; INS: -0.2259±0.0815 vs. -1.018±0.087 vs. -1.304±0.038, $p \leq 0.05$). The EC50 value of SNP was significantly higher in the aorta compared to the mesenteric and femoral artery (log EC50 SNP: Ao vs. Me: -8.648±0.185 vs. -9.909±0.192; Ao vs. Fe: -8.648±0.185 vs. -10.08±0.078, $p \leq 0.05$), but there was no difference between the mesenteric and femoral artery (log EC50 SNP: Me vs. Fe: -9.909±0.192 vs. -10.08±0.078, $p \leq 0.05$).

Conclusion: The level of oxidative stress seems to be different along the arterial vascular tree, which could affect their vasomotor functions, such as the response to insulin.

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Malignant Hypertension in Patients with Renal Diseases: Single Centre Experience

Tišljar M., Katić T., Horvatić I., Durlen I., Božić B., Galešić-Ljubanović D., Galešić K.

Miroslav **Tišljar**, miroslavtislar@yahoo.com, Department of Nephrology, University Hospital Dubrava, Croatia
Tina **Katić**, tkatic@kdb.hr, Department of Nephrology, University Hospital Dubrava, Croatia
Ivica **Horvatić**, ivica.horvatic@yahoo.com, Department of Nephrology, University Hospital Dubrava, Croatia
Ivan **Durlen**, Department of Nephrology, University Hospital Dubrava, Croatia
Borka **Božić**, Department of Nephrology, University Hospital Dubrava, Croatia
Danica **Galešić-Ljubanović**, Department of Pathology, University Hospital Dubrava, Croatia
Krešimir **Galešić**, Department of Nephrology, University Hospital Dubrava, Croatia

Introduction: Malignant hypertension (MH) is defined by severe hypertension (often ≥ 120 mmHg diastolic) occurring with retinopathy of grade III (flame haemorrhages) to grade IV (papilloedema). MH patients demand urgent referral for assessment and treatment in order to minimize end-organ damage and reduce the risk of life threatening events. In University hospital "Dubrava" we have identified 10 patients with MH and overt renal disease in the period from 2003. to 2010.

Methods: After medical history and physical examination had been taken, routine blood biochemistry and urinalysis with 24-hour proteinuria were collected. Clinical and laboratory workup was expanded by 24-hour continuous blood pressure measurement, cardiac echosonography and retinal fundoscopic examination. In order to determine the type of renal lesion, 16-gauge needle ultrasound guided kidney biopsy was performed.

Results: Average age of included patients (6 male, 4 female) was 42.4 years (range 26 to 68). Renal disorder was presented as nephrotic syndrome with azotaemia (3 patients), acute nephritic syndrome (5 patients) and chronic nephritic syndrome (2 patients), respectively. All patients had severe renal insufficiency with average serum creatinine level of 633.8 $\mu\text{mol/L}$ (range 200 to 1870 $\mu\text{mol/L}$). Pathological proteinuria was found in all patients (2.63 g/day in average) and 5 patients had erythrocyturia. In 7 patients retinal exudates and in 3 patients papilloedema were detected. In 2/3 of patients left ventricular hypertrophy was present. The most frequent pathohisto-

logical renal finding was thrombotic microangiopathy (5 patients) followed by chronic sclerosing glomerulonephritis (2 patients) and IgA glomerulonephritis, hypertensive nephropathy and an acute interstitial nephritis (each in 1 patient).

Conclusion: In presented study, in vast majority of patients, end-organ damage was already evolved with thrombotic microangiopathy as the most common kidney histological finding. In patients with MH and signs of renal disorder, kidney biopsy is a valuable diagnostic tool which could significantly help clinician to make accurate diagnosis and apply adequate therapy.

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Association of Hypertension with Overweight Status and Weight Gain – Croatian Adult Health Survey 2003–2008

Ivičević Uhernik A., Erceg M., Vuletić S.

Ana **Ivičević Uhernik**, ana.ivicovic@hzjz.hr, Croatian National Institute of Public Health, Zagreb, Croatia
Marijan **Erceg**, marijan.erceg@hzjz.hr, Croatian National Institute of Public Health, Zagreb, Croatia
Silvije **Vuletić**, svuletic@snz.hr, University of Zagreb, School of Medicine, Andrija Štampar School of Public Health, Croatia

Introduction: Objective of this study was to investigate association of long-term overweight status as well as of becoming overweight with hypertension.

Aim: Prevalence of hypertension in 2008 was calculated for 1,383 respondents which had normal blood pressure in 2003.

Results: Among men, 30.3% of respondents with normal BMI both in 2003 and 2008 developed hypertension by 2008, the same applies for 44.5% of respondents who were overweight both in 2003 and 2008 and for 26.0% of respondents who had normal BMI in 2003, but were overweight in 2008. Among women, 15.1% of respondents with normal BMI both in 2003 and 2008 developed hypertension by 2008, the same applies for 43.0% of respondents who were overweight both in 2003 and 2008 and for 37.5% of respondents who had normal BMI in 2003, but were overweight in 2008. Men being overweight both in 2003 and 2008 were associated with Odds Ratio (OR) 1.70 for hypertension in 2008 (95% CI: 1.02–2.82) compared to men that maintained normal weight both in 2003 and 2008. Having normal weight in 2003 and being overweight in 2008 was not associated with increased OR for hypertension among men. Women being overweight both in 2003 and 2008 were associated with OR 3.39 for hypertension in 2008 (95% CI: 2.33–4.93), while having normal weight in 2003 and being overweight in 2008 was associated with OR 3.79 for hypertension in 2008 (95% CI: 2.45–5.87) compared to women that maintained normal weight both in 2003 and 2008.

Conclusion: For women both long-term overweight status and becoming overweight were significantly associated with development of hypertension, while for men this was true only for long-term overweight. Even recently becoming overweight (in last 5 years or even shorter period) can increase risk for hypertension among women. Long-term overweight status increases risk of hypertension among both sexes.

Aging Dependent Changes in Angiotensin II-Induced Contractions of Isolated Rat Carotid Arteries

Vamos Z., Cseple P., Koller A., Toth P., Degrell P., Hamar J.

Zoltan **Vamos**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary

Peter **Cseple**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary
Akos **Koller**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary
Peter **Toth**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary - Department of Physiology, New York Medical College, Valhalla, N.Y., USA

Peter **Degrell**, 2nd Department of Internal Medicine, University of Pécs, Pécs, Hungary

Janos **Hamar**, Department of Pathophysiology and Gerontology, University of Pécs, Pécs, Hungary

Introduction: Angiotensin II (Ang II) is a potent vasoconstrictor and plays a crucial role in the regulation of blood pressure. In addition, Ang II has been shown to exhibit tachyphylaxis.

Aim: The potential aging-induced changes in Ang II and norepinephrine (NE)-induced vasomotor responses have not yet been explored. We hypothesized that aging induces changes in the magnitude of vasomotor responses to Ang II and NE.

Methods: Thus carotid arteries from newborn (8 days: 8d), young (2 month: 2m), adult (6m) and aged (12m and 24m) rats were isolated and placed in a wire myograph to measure changes in their isometric tension. Two dose response curves to Ang II and NE were obtained in a sequential manner (1.-, and 2.-administration (Adm)).

Results: Contractions of vessels to 1.-Adm of Ang II in 8d vessels were significantly smaller compared to those of 2m, 6m, 12m and 24m, which were similar in magnitude (1.4 ± 0.2 and 5.2 ± 0.6 , 5.6 ± 0.4 , 5.2 ± 0.5 , 5.7 ± 0.4 mN, respectively). Contractions of vessels to 2.-Adm of Ang II were significantly reduced in 2m, 6m, 12m and 24m vessels (4.4 ± 0.5 ; 3.6 ± 0.4 ; 1.9 ± 0.4 , 0.5 ± 0.2 mN), whereas it didn't change in vessels of 8d rats (1.28 ± 0.2 mN). Contractions to 1.-Adm of NE increased until the age of 2m (8d: 0.7 ± 0.3 and 2m: 6.9 ± 0.7 mN), then it did not change (6m: 5.9 ± 0.5 , 12m: 5.7 ± 0.9 , 24m: 6.0 ± 0.8 mN). Compared to the 1.-Adm, contractions to 2.-Adm of NE did not change significantly (8d: 0.3 ± 0.2 mN, 2m: 6.4 ± 0.8 ; 6m: 5.4 ± 1.2 , 12m: 5.0 ± 1.7 , 24m: 6.3 ± 0.4 mN). In summary, we have found that: 1) Ang II-induced contraction increases with age, 2) repeated administration of Ang II elicits tachyphylaxis, which increases with age.

Conclusion: The data suggest that aging may induce specific changes in the functional availability of AT1-receptor, which could be due to altered internalization of its receptors, a finding that can have important clinical relevance. (Supported by OTKA K71591, K67984 és Am. Heart Assoc. Founders Aff. 0855910D)

Mediterranean Diet – Does it Work? Does it Exist?

Verbanac D.

Donatella **Verbanac**, University of Zagreb School of Medicine, Center for Translational and Clinical Research, Zagreb, Croatia

Introduction: We are witnessing a breakthrough of new dietary products, changing our dietary habits gradually, yet these are not always healthy. Lack of time, combined with a principle of saving money, accounts for the enormous popularity of fast food, prepared instantly and full of rich flavours, but very imbalanced concerning nutritional value. There is too much use of protein of animal origin, which are often a source of so called “bad” fats. Also, the vegetables consumed are often frozen or acidified, which does not compare with fresh food. All of these inevitably lead to negative consequences on people's health, often resulting in metabolic disorders.

Methods: We are searching for “a salvage pathway” such as to follow a “Mediterranean diet”, which was first described in nutrition-related literature in the 1960s. There are several variants of the Mediterranean diet, but some common components can be identified: high consumption of olive oil; moderate wine consumption, especially red wine; high consumption of vegetables, fruits, legumes, and grains; high consumption of fish, particularly pilchard; moderate consumption of milk and dairy products, mostly in the form of cheese; and low consumption of meat and meat products.

Results: Growing evidence demonstrates that the Mediterranean diet is beneficial to health. This evidence is strongest for coronary heart disease, but it also applies to some forms of cancer and for the majority of chronic inflammatory diseases.

Should we approach the Mediterranean diet by examining the impact of a whole dietary culture rather than isolating single nutrients? Presumably the answer would be affirmative since the examination of single nutrients ignores the important and complex interactions between components of a diet.

Conclusion: Therefore, dietary recommendations to the population regarding the Mediterranean diet should include a whole-diet approach along with general life-style changes.

Urinary Protein/Creatinine Ratio in Patients with Regulated and Unregulated Arterial Hypertension

Buljubašić D., Vizjak V., Ištvančić T., Pešić S.

Dunja **Buljubašić**, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Vedrana **Vizjak**, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Tomislav **Ištvančić**, Clinic for Surgery, Clinical Hospital Centre Osijek, Croatia

Siniša **Pešić**, Department for Radiology, Clinical Hospital Centre Osijek, Croatia

Introduction: Assessing target organ damage is crucial when treating patients with hypertension. One of the first signs of target organ damage is albuminuria and it is an indicator of kidney damage as well as an independent risk factor for development of chronic kidney disease and cardiovascular diseases. Instead of collecting 24 hour urine to quantify albuminuria, a urinary protein/creatinine ratio has been proved to be equally good in predicting cardiovascular risk.

Aim: The objective of this study was to show whether regulation of hypertension has any impact on urinary protein/creatinine ratio.

Methods: The research included 48 patients between the ages of 30 and 70 with pharmacologically treated arterial hypertension. They were divided into two groups, in the first one the patients whose blood pressure was lower than 140/90 mmHg (RH) were assigned and in the second patients whose blood pressure was equal or higher than 140/90 mmHg (NRH) measured during patients' regular check-ups were chosen. Exclusion criteria were glucose intolerance and kidney disease. Data on number and type of antihypertensive medications that patients were taking on everyday basis were obtained as well as data on basic blood and urine analysis.

Results: There were 26 patients in RH group (18 women, 8 men) and 22 patients in NRH group (13 women, 9 men). There was no difference in duration of hypertension between the groups. Average protein/creatinine ratio was 79.55 mg/g creatinine in RH group and 71.46 mg/g creatinine in NRH group ($p=0.481$). A significant difference was found in type of antihypertensive medication between the groups – patients in RH group used more ACEIs and ARBs than those in NRH group ($p<0.001$).

Conclusion: These results indicate that target organ damage measured by urinary protein/creatinine ratio is not dependent on regulation of hypertension, but the regulation of hypertension is most likely to be achieved when ACE inhibitors or ARBs are used as monotherapy or combined antihypertensive therapy.

Correlation Between Adipose Tissue Distribution and Sympathetic Nervous System Activation in Hypertensive Patients

Vizjak V., Buljubašić D., Radić R., Selthofer-Relatić K., Šimundić T., Bošnjak I., Jelaković B.

Vedrana **Vizjak**, vizjak.vedrana@kbo.hr, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Dunja **Buljubašić**, buljubasic.dunja@kbo.hr, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Radivoje **Radić**, rradic@mefos.hr, School of Medicine, University J.J. Strossmayer in Osijek, Croatia

Kristina **Selthofer-Relatić**, selthofer.relatic@gmail.com, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Ivica **Bošnjak**, Internal Clinic, Clinical Hospital Centre Osijek, Croatia

Bojan **Jelaković**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Introduction: It has not yet been clarified whether visceral or subcutaneous adipose tissue is responsible for excessive adipokine production which leads to hypertension and other metabolic disorders. We aimed to determine the correlation of each type of obesity (abdominal and peripheral) to sympathetic activation and its effect on blood pressure values and its variability.

Methods: The study included 18 patients with recently diagnosed essential arterial hypertension stage I. They were divided into groups regarding their body mass index (BMI). The following procedures were performed: sonographic visceral and subcutaneous adipose tissue measurement, 24 - hour ambulatory blood pressure monitoring and determination of catecholamines in plasma.

Results: 8 patients were lean ($BMI < 25 \text{ kg/m}^2$) and 10 were obese ($BMI > 25 \text{ kg/m}^2$). Mean waist/hip ratio was 0.91, and mean subcutaneous/visceral adipose tissue ratio was 0.94 and there were no significant differences between the groups regarding these ratios. Mean waist/hip ratio negatively correlated to mean subcutaneous/visceral adipose tissue ratio in both groups. Lean patients had significantly thinner subcutaneous adipose tissue compared to obese (16.33 and 23.08 respectively, $p=0.023$). There was a significant difference in adrenalin level between lean and obese patients (0.36 and 0.18 respectively, $p=0.001$). Plasma noradrenalin correlated positively to systolic blood pressure variability during 24 hours. Thickness of visceral adipose tissue correlated positively to diastolic blood pressure variability during the night. Subcutaneous/visceral adipose tissue ratio correlated positively to percentage of time that systolic blood pressure was above limits, and it negatively correlated to systolic blood pressure variability during the night.

Conclusion: This study indicates that there is a correlation between blood pressure values and adipose tissue thickness. Blood pressure variability is primarily related to visceral adipose tissue thickness but obviously subcutaneous/visceral adipose tissue ratio plays an important role in development of hypertension and that elevated level of catecholamines is not an inevitable determinant of stage I hypertension in overweight and obese patients.

Impact of Angiotensin-Converting Enzyme Gene Polymorphism on Proteinuria and Arterial Hypertension

Živko M., Galešić K., Kušec R.

Marijana **Živko**, General Hospital Virovitica, Croatia
Krešimir **Galešić**, University Hospital Dubrava, Zagreb, Croatia
Rajko **Kušec**, University Hospital Dubrava, Zagreb, Croatia

Introduction: Proteinuria is the hallmark of renal disease. Proteinuria has been shown to be tubulotoxic and directly contributes to renal deterioration. In essential hypertension the onset of de novo proteinuria is associated with faster rate of progression.

Aim: To investigate the relationship between ACE gene polymorphism and antiproteinuric effect of ACE inhibitors (ramipril) and to evaluate the possible association between I/D polymorphism and hypertension.

Methods: We recruited 66 patients (male 42, female 24) with overt proteinuria (urinary protein excretion over 500 mg/day). Before entry, previously used ACE inhibitors were withdrawn for at least one month and baseline proteinuria was measured. Patients were classified into three groups in accordance with ACE genotypes (17 DD; 35 ID; 14 II). They were treated with ramipril and prospectively followed up for one year. Various clinical parameters including age, body mass index (BMI), 24-h urine protein, creatinine, creatinine clearance (Ccr), systolic and diastolic blood pressure (SBP and DBP), mean arterial pressure (MAP) were measured in the pre- and post-treatment periods. The ACE gene insertion/deletion (I/D) polymorphisms in intron 16 were determined by PCR.

Results: There were no significant differences in the clinical parameters such as age, gender, serum creatinine, Ccr, SBP, DBP, MAP, and daily urinary excretion of protein among three groups ($p > 0.05$). ID genotype patients were found to have lower BMI ($p = 0.031$). ACE inhibition significantly reduced proteinuria in all genotype groups ($p < 0.05$). The percentage reductions of 24-h urinary excretion of protein were significantly different between the genotype groups ($p = 0.042$) and for DD genotype were significantly greater than in ID ($79.2 \pm 28.9\%$ vs $49.2 \pm 64.8\%$, $p = 0.015$). There was significant negative correlation between systolic blood pressure and percentage reductions of proteinuria ($r_s = -0.382$; $p = 0.002$).

Conclusion: ACE gene polymorphism might be a useful genetic marker for predicting the antiproteinuric effect of ACEI.

Pulse Pressure or Ambulatory Arterial Stiffness Index- Which Method is Better in Predicting Target Organ Damage?

Željko Vrkčić T., Laganović M., Pećin I., Kuzmanić D., Karanović S., Vuković Lela I., Premužić V., Rončević T., Fodor L., Fištrek M., Jelaković B.

Tajana **Željko Vrkčić**, Department of Nephrology and Arterial Hypertension, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia
Mario **Laganović**, Department of Nephrology and Arterial Hypertension, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia
Ivan **Pećin**, Department of Metabolic Diseases, University Hospital Centre Zagreb, School of Medicine University of Zagreb, Croatia

Duško **Kuzmanić**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Sandra **Karanović**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Croatia

Ivana **Vuković Lela**, Department of Nephrology, Arterial Hypertension and Dialysis UHC Zagreb, School of Medicine University of Zagreb, Zagreb, Croatia

Vedran **Premužić**, Department of Nephrology and Arterial Hypertension UHC Zagreb, School of Medicine University of Zagreb, Croatia

Tomislav **Rončević**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Ljiljana **Fodor**, Department of Internal Medicine, Division for Nephrology and Arterial Hypertension, University Hospital Center Zagreb, University of Zagreb School of Medicine, Croatia

Margareta **Fištrek**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Bojan **Jelaković**, University Hospital Center Zagreb, Department of Nephrology and Arterial Hypertension, Zagreb, Croatia

Background: Hypertension is the most important cardiovascular risk factor which causes target organ damage (TOD). Microalbuminuria (MA) and arterial stiffness (AS) are indicators of organ damage. In clinical practice there have often been used indirect methods for determining arterial stiffness. The older method is determination of pulse pressure (PP), and the novel is ambulatory arterial stiffness index (AASI) based on blood pressure (BP) values obtained during 24-h ambulatory blood pressure measurement (ABPM).

Aim: To determine the presence of TOD in our group of patients at the time of diagnosis. PP and AASI have been compared as assessment methods of organ damage.

Methods: We have included 103 subjects (60 men, 43 women, average age 37 ± 9.1 years) with newly diagnosed primary hypertension. Subjects were clinically examined. BP was measured using mercury sphygmomanometer and ABPM Spacelabs 90207. AASI was defined as 1 minus the regression slope of diastolic over systolic BP

values obtained from ABPM. MA is defined as 30–300 mg 24h urine albumin excretion.

Results: There were no differences in age between men and women but significant difference was observed in BMI ($p=0.032$). Also, significantly higher values of uric acid, triglycerides, homocysteine and 24-h natriuria were detected in men. AASI values were 0.373 ± 0.05 and were below the proposed cut-off values of 0.5 for younger subjects, respectively. The highest AASI values were observed in men and in subjects with highest body height, weight,

heart rate and 24-h PP. Significant correlation was found between 24-h PP and MA ($r=0.41$, $p=0.002$). We failed to find association between AASI and MA.

Conclusion: PP and AASI can be a marker of AS but pulse pressure is more reliable marker of organ damage in the earliest phase of arterial hypertension. Definitive validation should await further studies with direct measurements of AS.

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