

group with a dosage of atorvastatin 10 mg/day, the changes in EDVD were statistically insignificant with changes up to 5.8 (4.9; 7.3) %. In the active treatment group with atorvastatin 40 mg/day after 4 weeks, EDVD resulted in 6.1 (4.7; 8.4) %, that was statistically significant improvement of endothelial function in such cohort of patients, and in the control group, after 4 weeks in EDVD up to 5.9 (4.3; 6.7) %.

**Conclusions.** Treatment regimen with additional atorvastatin 40 mg/day significantly improves the function of the endothelium in patients with essential hypertension combined with obesity.

### **The latent changes in insulin sensitivity in low risk arterial hypertensive patients with poor blood pressure control**

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The presence of metabolic syndrome influences on the choice of targeted medication treatment of arterial hypertension (AH) and includes clear recommendations for use of ACE-inhibitors or angiotensin receptor blockers in combination with calcium channel blockers. Diuretics and beta-blockers may be also efficient but they have unsafe metabolic profiles. The correct start of AH therapy is based on the choice of suitable drug combination, but, indeed, some patients may have the latent features of metabolic syndrome without clear clinical manifestations (absence of diabetes, unchanged tolerance to glucose, the unreliable changes of body mass index (BMI) etc.).

**The aim of the investigation** was to analyze the prevalence of the insulin resistance (IR) and the changes of tissue sensitivity to insulin (%S) in cohort of patients with AH who has characterized by previous non-regular use of antihypertensive medication and have uncontrolled levels of blood pressure (BP).

**Methods.** We have analyzed the specific cohort of 173 patients with isolated AH with the different durations of the disease course, non-regular use of the medication, with mean blood pressure (BP) 154 mmHg systolic and 98 mmHg diastolic. The exclusion criteria were the concomitant IHD, HF, PAD, diabetes mellitus, use of beta-blockers and diuretics to control the BP, BMI >25,5 and <21, other concomitant diseases. Both with the control group (69 practically healthy people) we have measured the levels of fasting glucose, plasma insulin, and calculated the index of insulin resistance (IR) and insulin tissue sensitivity (%S) using nonlinear homeostasis model assessment (HOMA2).

**Results.** We have set that both groups has no difference in the fasting glucose level ( $4.52 \pm 0.54$  mmol/l in AH group and  $4.48 \pm 0.62$  mmol/l in

healthy group,  $p > 0.05$ , but there were the reliable tendency of the increase of the free insulin concentration in patients with AH ( $66.1 \pm 21.4$  pmol/l against  $34.4 \pm 29.4$  pmol/l,  $p < 0.05$ ). The calculation of the IR in both groups showed the mean level  $1.55 \pm 0.44$ , with the 75%-percentile meaning in 1.87 and this level was set as a real lower limit of the insulin resistance in our investigation. Due to this limit we have found that the prevalence of higher level of IR was set at 46 from 173 AH patients (26.59 %), that testified about the state of insulin resistance and lower tissue insulin sensitivity (%S) ( $66.11 \pm 19.58$  against  $113.20 \pm 24.95$ ;  $p < 0.05$ ). Using analyses of variances (ANOVA) for setting the dependency of IR and %S changes due to the different levels of BMI and age periods we have not set the reliable results ( $p > 0.05$ ). There wasn't also found any reliable correlation between these indexes and total cholesterol and LDL-cholesterol levels. However, using LSD-procedures in ANOVA we have set the reliable increase of IR and decrease of %S depending on duration of AH in patients ( $F = 2.94$ ;  $p = 0.035$ ), especially in groups with more than 5 and more than 10 years of AH duration in comparison to 1 year and 3 year periods ( $p < 0.05$  in both cases).

**Conclusions.** According to the results of investigation, we may expect the ability of the insulin resistance presence in a part of AH patients despite of normal reference levels of recommended metabolic risk factors. The appurtenance to such «risk» group depends on the duration of uncontrolled blood pressure independently of other risk factors.

### **The link between glucometabolic status and nesfatinemia in hypertensive obese patients**

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Nowadays hypertension as well as obesity are worldwide medical epidemiological problems. Dysglycemia is one of the most common risk factors of cardiovascular diseases, which often occurs in patients with hypertension and obesity. It is well-known that such pathological conditions have an association between their pathogenetic ways of development, so that it has led to discovering of involved metabolically active substances last decades. Nesfatin-1 is currently being researched as a mediator participating in regulation of the above metabolic disorders.

**Purpose.** To investigate the relationship between nesfatin-1 activity and carbohydrate metabolism state in hypertensive obese patients.

**Methods.** 106 hypertensive patients were divided into groups A (with abdominal obesity, n=68) and B (normal anthropometrical findings, n=38). The control group C consisted of 12 healthy volunteers. The verification of hypertension and abdominal obesity was based on the recommendations of World Health Organization with standard clinical examination and anthropometric measurements. Carbohydrate metabolism in all patients was assessed by such parameters as fasting (mmol/l) and postprandial glucose (mmol/l), insulin (mkIE/ml), insulin resistance index HOMA-IR and index of pancreatic  $\beta$ -cell activity HOMA- $\beta$ -cell. Nesfatin-1 level was determined by ELISA method. The data obtained were analyzed by Statistica 12.0 software.

**Results.** All the hypertensive patients were characterized by significant hypernesfatinemia. Thus, nesfatin-1 levels in groups A and B were 7.51 [6.76; 8.17] and 8.27 [7.75; 9.51] ng/ml, respectively ( $p<0.001$ ), that was considerably higher than those of the group C (4.53 [4.23; 4.87],  $p<0.001$ ). The substantial difference between the main groups shows the result of anorexigenic feature of nesfatin-1.

Comparison of the main groups of patients confirmed that accompanied obesity, and its abdominal type especially, more often causes disturbances in glucometabolic status. Patients of the group A were characterized by higher levels of postprandial glycemia ( $p=0.05$ ), insulin ( $p<0.001$ ) and index of insulin resistance HOMA-IR ( $p<0.01$ ) compared with the data of the group B. So that patients with comorbidity tend to have impaired glucose tolerance, hyperinsulinemia and insulin resistance.

Nesfatin-1 showed negative correlation with postprandial glucose ( $r=-0.193$ ;  $p<0.05$ ) in the whole sample as well as positively correlated with insulin in groups A ( $r=0.146$ ;  $p<0.05$ ) and B ( $r=0.455$ ;  $p<0.01$ ). Such findings could be explained by insulinotropic action of peptide in pancreatic cells. But more pronounced relationship in the group B and association with index of  $\beta$ -cell activity HOMA- $\beta$  in the group B only ( $r=0.310$ ;  $p<0.05$ ) testify to more intense effect on the insulin production in hypertensive patients without obesity.

**Conclusions.** Nesfatin-1 may have an important role in metabolic disturbances of patients with hypertension showing protective features against obesity and dysglycemia, such as anorexigenic, insulinotropic, hypoglycemic, that could be crucial in further diagnostic and therapeutic approaches.

## The contribution of proinflammatory markers into the formation of cardiomyopathy in patients with type 2 diabetes mellitus and overweight

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**Purpose** – to evaluate the contribution of proinflammatory cytokines interleukin (IL)-1 $\beta$  and IL-6 to the formation of cardiomyopathy (CMP) in patients with type 2 diabetes.

**Methods.** A total of 102 patients with type 2 diabetes mellitus (T2DM) of moderate severity were examined, duration of diabetes history – 1 to 9 years. Patients were divided into the following groups depending on CMP severity: group 1 (n=35) – patients with moderate CMP and body mass index (BMI)  $<28.5$  kg/m<sup>2</sup>, group 2 (n=67) patients with severe CMP and BMI  $>28.5$  kg/m<sup>2</sup>. Control group included 20 healthy volunteers. IL-1 $\beta$  and IL-6 levels were determined by the immune enzyme method. Echocardiography was used to determine the peak velocity of early filling of left ventricle (LV) E, peak velocity of late filling of LV A, E/A ratio, deceleration time DT of early diastolic filling.

**Results.** The level of IL-1 $\beta$  (pg/ml) significantly differed in studied groups: control group –  $8.12\pm 0.24$ , group 1 –  $11.37\pm 0.26$ , group 2 –  $14.79\pm 0.27$ . The analysis of IL-6 (pg/ml) levels in studied groups also showed significant difference:  $8.83\pm 0.22$ ,  $11.3\pm 0.28$ ,  $14.21\pm 0.29$ , respectively. E/A ratio significantly differed in all groups: control group –  $1.4\pm 0.075$ , group 1 –  $0.92\pm 0.005$ , group 2 –  $0.81\pm 0.021$ . The following significant correlations were found in group 2: E/A ratio and IL-1 $\beta$  ( $R=-0.32$  ( $p<0.05$ )), E/A ratio and IL-6 ( $R=-0.28$  ( $p<0.05$ )); DT and IL-1 $\beta$  ( $R=0.30$  ( $p<0.05$ )). No significant correlations between proinflammatory cytokines and markers of diastolic function were found in group 1.

**Conclusions.** The disorders of the proinflammatory cytokines activity, namely increase of IL-1 $\beta$  and IL-6 levels, along with other factors contributes to the formation of diabetic cardiomyopathy in patients with T2DM and overweight. Therefore, the elaboration of appropriate anti-inflammatory therapies to prevent the development and progression of cardiomyopathy and heart failure in this category of patients is highly topical.