

hypopnea index (AHI) as follows: mild (AHI = 5–15), moderate (AHI = 15–30), and severe (AHI > 30). Sensitive immunoradiometric assays were used to measure plasma NT-proBNP and galectin-3. Multivariable regression analysis was used to estimate the relationships between cardiac biomarkers and indicators of OSAS, adjusting for age, sex, and body mass index.

**Results.** The elevated NT-proBNP level was found in 32 % of the participants from group 1; 92 % patients from group 2; 28 % participants from group 3 and 77 % patients from group 4. An increase in the severity of sleep apnea in all patients with OSAS has been accompanied by a rise in mean NT-proBNP (increasing from a mean value of 142 ng/mL in the group with AHI < 5 to 312 ng/mL in the group with an AHI ≥ 30). But NT-proBNP differs significantly only between patients with severe OSAS in comparison with patients without OSAS. Also, significant differences were detected between patients with severe OSAS from group 1 and group 2 ( $p < 0.05$ ). But no statistically significant relations between OSAS indices and NT-proBNP were observed in the adjusted final regression model. Mean galectin-3 level was significantly higher in patients with OSAS compared to subjects without OSAS ( $p < 0.05$ ) and in the severe OSAS group compared to the moderate and mild OSAS groups ( $p < 0.05$ ). There was a significant increase of the level of galectin-3 in patients from group 1 in comparison with patients from group 2 and in patients from group 3 in comparison from group 4 ( $p < 0.05$ ). Galectin-3 ( $p < 0.05$ ) was connected with AHI after adjusting for other factors in the final regression model.

**Conclusions.** The level of Galectin-3 is associated significantly with OSAS severity in comparison with NT-proBNP and can be used as a sensitive diagnostic and prognostic marker for cardiovascular abnormalities in patients with OSAS and HF with preserved as well as with reduced ejection fraction.

## The role of fungal sensitization in systolic function of the heart in arterial hypertension

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**Objective.** The aim of the work was to study the prevalence of mycogenic sensitization in arterial hypertension (AH) and its relationship with the disease severity, progression of chronic heart failure (CHF) and contractile function of myocardium.

**Material and methods.** 34 patients with II and III stages of AH and II - III functional classes of CHF by NYHA (mean age  $51.4 \pm 1.2$  years) were examined for the presence of mycogenic sensitization. The levels of serum specific IgE antibodies (sIgE) were measured to *Candida maltosa*, *Saccharomyces cerevisiae*, *Candida albicans*, *Candida crusei*, *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*, *Penicillium chrysogenum*, *Penicillium tardum*, *Penicillium expansum*, *Alternaria tenuis*, *Trichophyton rubrum*, *Fusarium oxysporum*, *Cladosporium herbarum*, *Rhizopus nigricans*, *Mucor pu-*

*sillus* by an ELISA. The presence of mycogenic sensitization was determined at the level of sIgE > 50 KU/l.

**Results.** IgE-mediated hypersensitivity to fungal antigens was revealed in 32.0 % of patients with AH. In patients with III stage of AH, in comparison to the patients with II stage of AH poly-sensitization to *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Candida maltosa*, *Candida albicans* and *Alternaria tenuis* were noted. Progression of CHF, as well as worsening of the contractility of myocardium, was associated with increased mycogenic sensitization to this spectrum of fungi. Patients with decreased systolic function of myocardium were characterized by a prevalence of increased sIgE to *Aspergillus*, *Candida* and *Alternaria* species (in particular to *Aspergillus niger* and *Alternaria tenuis*).

**Conclusions.** Mycogenic sensitization to *Aspergillus*, *Candida* and *Alternaria* species might be considered as a risk factor for cardiovascular complications in arterial hypertension.

## Serum chemerin and renal dysfunction in hypertensive patients with obesity

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**Background.** It is known that the presence of microalbuminuria is a reliable marker of kidney damage in patients with essential hypertension (EH). The presence of protein in the urine of patients with EH is a predictor of kidney disease progression and an independent factor of cardiovascular risk. Currently, there are few biomarkers that are used for diagnosis and monitoring of renal function. Recently, a novel adipocytokine, chemerin, is being widely studied. Analysis of chemerin role in the inflammatory process suggests its possible role in the development of kidney tissue inflammation and renal dysfunction in cardiovascular disease. The aim of our study was to examine the relationship between levels of serum chemerin, glomerular filtration rate (GFR) and the presence of proteinuria in patients with essential hypertension with different body mass index (BMI).

**Material and methods.** Chemerin serum levels were evaluated in 82 patients aged 60 (55; 66) years (including 26 overweight and 39 obese patients) by ELISA using a set of reagents Human Chemerin ELISA Kit (Kono Biotech Co., Ltd., China). All patients were examined according to the KDIGO CKD Work Group – 2013 recommendations. Serum creatinine levels and morning proteinuria were assessed. GFR calculation was performed by CKD-EPI formula for Caucasian people. Statistical analysis was performed using Statistica for Windows 6.1 software package (Statsoft Inc., USA). To compare independent groups, non-parametric statistics were used, including Mann-Whitney test and Spearman coefficient of rank correlation. Quantitative features are described as median (Me), upper (UQ) and lower (LQ) quartiles.

**Results.** Only 3.7 % (3) of the observed patients had GFR higher than 90 ml/min/1.73 m<sup>2</sup>. Other patients were divided into groups by level of GFR: 90–60 ml/

min/1.73 m<sup>2</sup> – 1st group (42 patients); 60–30 ml/min/1.73 m<sup>2</sup> – 2nd group (37 patients). When conducting inter-group analysis, serum chemerin was statistically higher in patients with lower GFR, 6.28 (5.55; 7.73) ng/ml compared to the 1st group: 4.7 (4.24; 5.86) ng/ml,  $p=0.03$ , while data on BMI groups was not significantly different. Correlation analysis showed the presence of a negative correlation between GFR and serum chemerin,  $r=-0.33$ ,  $p<0.05$  in both groups. Patients of the surveyed groups differed significantly in presence of proteinuria,  $p=0.04$ : the number of patients with proteinuria in group 1 was 8 (19 %), in group 2 – 18 (48 %), but the correlation between chemerin and proteinuria was absent.

**Conclusions.** The findings give reason to consider chemerin a potential marker of the renal parenchyma inflammation, which may be involved in the formation of renal dysfunction in patients with essential hypertension, regardless of BMI.

### Significance of central hemodynamics parameters in patients of different age with uncomplicated essential hypertension

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**Background:** due to cumulative data of scientific research of central blood pressure and its amplification, reference values were proposed for patients with different cardiovascular risk factors. Still, the possibility of its practical implementation in patients of different age groups has not been fully studied.

**Purpose:** the aim of our study was to determine the relationship of the parameters of central hemodynamics with cardiovascular remodeling in patients with essential hypertension according to age.

**Methods:** it were surveyed 132 untreated patients (23 females and 109 males) with essential uncomplicated hypertension, which were divided depending on age (WHO, 2012) into 3 groups: I group included 47 patients of the young age (mean age 38.00 (35.00; 41.00) years, II group – 50 middle-aged patients (mean age 53,00 (50.00; 57.00) years) and III group – 35 elderly patients (mean age 66.00 (62.00; 68.00) years). Measurements of central systolic blood pressure (cSBP), SBP amplification (SBP Amp), pulse wave velocity (PWV) were carried out using Arteriograph Tensioclinic (TensioMed, Hungary). Indices of target-organ damage included LVH which was determined by echocardiographic left ventricular mass index (LVMI), adjusted for body surface (g/m<sup>2</sup>) or height (LVMI<sup>2.7</sup>), aortic PWV.

**Results.** Using conventional standards of SBP Amp, in I group SBP Amp level was higher than in II and III groups ( $p<0.001$ ). SBP Amp reduction was found in 44.68 % of patients in I group, 78.00 % in II and 82.86 % in III group. However, when evaluating the SBP Amp by the reference values according to blood pressure categories, there was established the highest percentage of patients with a decrease in the SBP Amp (82.86 %) in I group. There were

74 % of patients with pathologically decreased SBP Amp in the II group and 46,81% in the III group.

It was determined that LVMI<sup>2.7</sup> significantly differed in I (44.11 (37.02; 54.15) g/m<sup>2</sup>) versus III (50.92 (46.41; 61.70) g/m<sup>2</sup>) group ( $p<0.05$ ), and I versus II (52.75 (47.48; 58.13) g/m<sup>2</sup>) group ( $p<0.05$ ). PWV level in I (10.00 (8.20; 10.50) m/s) and II (10.20 (9.30; 11.50) m/s) groups was significantly less than in III (11.10 (10.00; 12.10) m/s) ( $p<0.05$ ). Only in I group the multivariate correlation analysis revealed relationship of LVMI and LVMI<sup>2.7</sup> with, cSBP ( $r=0.45$  and  $r=0.42$ ;  $p<0.05$ ), SBP Amp ( $r=-0.39$  and  $r=-0.31$ ;  $p<0.05$ ). Relation of cSBP with PWV was established in I and III groups ( $r=0.33$  and  $r=0.37$ ;  $p<0.05$ ).

**Conclusion:** for early identification of persons at high risk of subclinical target organs damage in young age patients, reference values of SBP Amp and cSBP according to blood pressure categories should be used as standard.

### Results of the bode index for evaluating chronic obstructive pulmonary disease outcomes, depending on the presence or absence of hypertension

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**Actuality.** Hypertension (HT) affecting up to 50 % of the chronic obstructive pulmonary disease (COPD) patients (Divo M., Cote C., de Torres J.P. et al., 2012). The BODE index, for Body-mass index (BMI), airflow Obstruction, Dyspnea, and Exercise, is a multidimensional scoring system used to test patients who have been diagnosed with COPD and to predict long-term outcomes for them.

**Aim** of the investigation was to assess the result of the BODE index in COPD patients in combination with hypertension and isolated COPD patients.

**Material and methods.** In total, 100 COPD (GOLD 2, group B) patients in remission (79 males and 21 females) (54.42±6.23) years old were monitored. The COPD group in combination with HT stage II included 69 patients, the isolated COPD group – 31 patients. All patients underwent general clinical and laboratory examination, assessment of body mass index, dyspnea evaluation using the modified medical research council (mMRC) dyspnea scale, six-minute walking test, pulse oximetry, spirometry, electrocardiography, echocardiography and chest x-ray.

**Results.** BMI less 21 kg/m<sup>2</sup> had 3 patients (1 from the COPD group in combination with HT stage II and 2 from the isolated COPD group). The overall BMI results were 0.01±0.12 points vs. 0.06±0.25 points respectively. Forced expiratory volume in one second (FEV1) as criterion of airflow obstruction showed the following results: 1.00±0.00 points vs. 0.94±0.25 points respectively. Dyspnea evaluation using the mMRC scale demonstrat-