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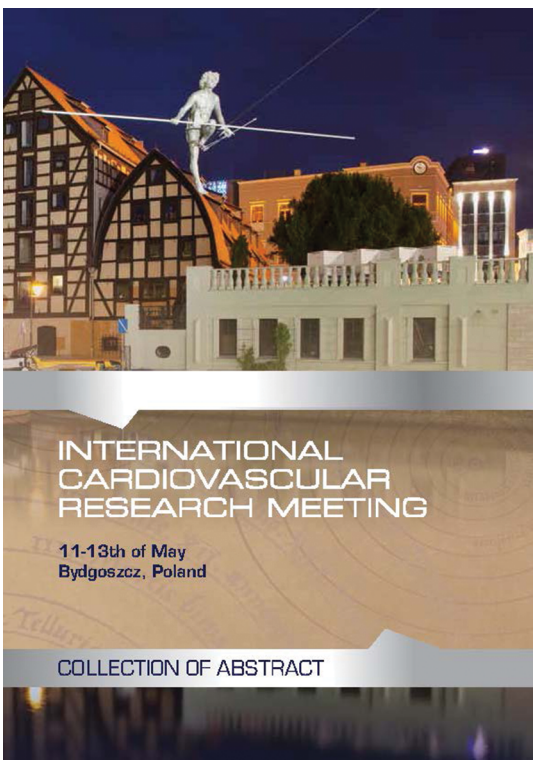
Abstracts



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1. Analysis of genomic DNA damage induced by oxidative stress in patients with acute coronary syndromes after percutaneous coronary interventions

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Background: Acute corona ry syndromes (ACS) are the most common cause of death worldwide. The available data suggest that reactive oxygen species (ROS) play a crucial role in the pathogenesis of ACS. ROS are the key molecules that contribute to the progression of myocardial damage and necrosis size in the setting of ACS. Restoration of coronary blood flow in ischaemic myocardium can result in reperfusion injury leading to increased release of free radicals, and subsequently augmented oxidative stress. Oxidative stress caused by excessive formation of ROS, combined with the impairment of natural antioxidative processes can lead to disproportionate degradation of biomolecules such as lipids, DNA or proteins.
Methods: The aim of this study was to analyze genomic DNA damage induced by ROS in patients with ACS treated with primary percutaneous coronary intervention (PCI). The study included 31 patients with ACS (STEMI [n = 8], NSTEMI [n = 12], UA [n = 11]) admitted to the Department of Cardiology and Internal Medicine, Dr A. Jurasz University Hospital, Bydgoszcz, Poland. All trial participants underwent a coronary angiography and coronary revascularization with PCI. Whole blood samples for genomic DNA damage assessment were collected directly before PCI, 24 hours after PCI and 4 days after PCI. Genomic DNA was isolated using paramagnetic particles, electrophoretically separated on 1.5% agarose gel and stained with ethidium bromide before evaluation.
Results: Significant differences in genomic DNA damage between all three ACS subgroups were present on visual inspection. Genomic DNA degradation in STEMI patients was demonstrated by steaks on agarose gel, while in patients with NSTEMI and UA it was imprinted as bands. Observed differences were most severe in STEMI patients indicating a wide range of genomic DNA damage in this group. Genomic DNA damage was most pronounced in samples obtained before PCI and 24 hours after PCI.
Conclusion: ROS generated during myocardial ischaemia and as the consequence of reperfusion injury after PCI cause genomic DNA damage. Electrophoretic separation enables the assessment of the genetic material damage in patients with ACS.

2. Mild therapeutic hypothermia after sudden cardiac arrest in STEMI and NSTEMI patients

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Mild therapeutic hypothermia is a recommended method after sudden cardiac arrest, which increase survival rate and demonstrate beneficial effects on neurological function. Early temperature management after cardiac arrest and short time to reach target temperature seem to be crucial for the effectiveness of this method. The purpose of this study is to demonstrate relationship between occurrence of ST elevation and non-ST-elevation myocardial infarction and time to target temperature (32–33ºC) in the process of mild therapeutic hypothermia.
The study included 64 STEMI, 13 NSTEMI and patients after out-of-hospital sudden cardiac arrest seen at the Antoni Jurasz University Hospital No. 1 in Bydgoszcz between 2012 and 2016 exposed to mild therapeutic hypothermia. The data taken into account was the time between sudden cardiac arrest and achieve the temperature of 33ºC. In ST-elevated myocardial infarction patients time to target temperature was 25% ($p < 0.05$) longer than non-ST-elevated myocardial infarction patients. We assume that this delay may be associated with pre-hospital delay. Further investigation is needed.

3. Ablation — highly effective method of treating different types of arrhythmia — retrospective single-centre experience

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Background: The percutaneous catheter ablation (Radiofrequency Ablation (RFA) and cryoablation) is the invasive, well-established technique for treating arrhythmias. According to the literature this procedure is characterized by high efficacy and low risk of complications. However, there is still remarkable percentage of patients with recurrence of arrhythmia after ablation, especially in patients with persistent atrial fibrillation (AF). The aim of this study was to evaluate the early effectiveness of ablation procedure.

Methods: Our retrospective single-centre study was conducted at Cardiology Department at University Hospital No 1 in Bydgoszcz between 01/2015 and 12/2016. Data of 416 patients (207 females [F], 209 males [M]), who underwent catheter ablation were collected. Analyzed arrhythmias were: atrio-ventricular nodal re-entrant tachycardia (AVNRT) — 131 (31.5%), pre-excitation syndrome — 71 (17.1%), atrioventricular re-entrant tachycardia (AVRT) — 24 (5.8%), atrial tachycardia (AT) — 8 (1.9%), atrial flutter (AFl) — 63 (15.1%), AF — 45 (10.8%), ventricular tachycardia (VT) — 27 (6.5%), ventricular extrasystole (PVC) — 46 (11.1%), supraventricular extrasystole (PSVC) — 1 (0.2%). Direct efficacy and recurrence of arrhythmia before the day of discharge were evaluated. Additionally, the effectiveness of ablation in patients, who have had the procedure before was focused on. Ablations were performed using two methods: RFA — 337 (81.0%) and cryoablation — 79 (19.0%). Collected data included: basic clinical characteristics, comorbidities, occurrence of complications and details of ablation procedure.
Results: The ablation procedure was successful in 385 patients, what translated into direct efficacy of ablation of 92.5%. According to the type of arrhythmia the rate of success was 97.7% for AVNRT, 93.0% for pre-excitation syndrome, 91.7% for AVRT, 100% for AT, 90.5% for AFl, 84.4% for AF, 85.2% for VT, 91.3% for PVC, 100% for PSVC. Partial efficacy was noted in 11 cases (2.6%). In 40 patients (10.1%) recurrence of arrhythmia occurred. There were 36 patients (8.7%), who have had previous ablation for the same arrhythmia before. In this subpopulation ablation was directly effective in 32 cases (88.9%), however arrhythmia returned in 4 patients (11.8%) before the day of discharge. The effectiveness of ablation according to the method was similar for both approaches, accounting 93.2% for RFA and 90.0% for cryoablation. Complications occurred in 17 patients (4.1%) and the most common complications were temporary phrenic nerve paralysis — 4 (1.0%), hematoma — 4 (1.0%) and atrioventricular block — 4 (1.0%).
Conclusion: Ablation is highly effective and safe method of treating different types of arrhythmia. Both RFA and cryoablation have similar rate of success. The risk of arrhythmia recurrence is low, accounting for 10%.

4. Analysis of ICD with subcutaneous electrode array implantation results, according to electrophysiological and clinical data

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Background: Cardiac arrest (CA) is one of the most common cause of mortality and hospitalizations in the world. About 4.25 millions of patients die each year due to sudden cardiac arrest. The incidence of CA predisposes to next episode. The most prominent risk factor of CA is a systolic heart failure. To prevent sudden death patients with risk factors are indicated to implant ICD, which early detect and interrupt malignant arrhythmias Ventricular Tachycardia (VT) and Ventricular Fibrillation (VF). In some cases such therapy can be insufficient due to high defibrillation threshold (DFT). Subcutaneous electrode array is a method to decrease high DFT. The aim of study was to prove an effective decreasing defibrillation threshold by subcutaneous electrode array and evaluation of its effectiveness during one year after intervention.
Methods: The retrospective single-center study was performed. We examined procedures of implantation sub-cutaneous electrode array Medtronic 6996/6996SQ — 58 cm in 17 patients (F = 3, M = 14; average age 56.42 ± 15.45) treated in Cardiology Department at University Hospital No 1 in Bydgoszcz, Poland between 01/2005 and 12/2016. Outpatient follow-up of these patients in Cardiac Arrhythmia Clinic was studied. All data required for this study was obtained using OPEN CARE system and electrophisiologic team database.
Results: Among from evaluated patients 47.06% got ICD with subcutaneous electrode array in primary prevention and 52.94% in secondary prevention (2/3 of them had implanted ICD before and it didn't stop arrhythmia). Average defibrillation threshold after implantation was 24.02 ± 7.22 Joules. In 94.11% patients defibrillation threshold was reduced by implantation of SQ, 5.89% electrode did not reduce it and was turned off. 23.53% procedures were complicated (50% episodes of atrial fibrillation, 50% asymptomatic pneumothorax). In 31.25% patients had episodes of VT/VF during one year after implantation, the total number of them were 28. This arrhythmias were significantly more often in the group of patients with CA in past (55% vs 0%; $p < 0.05$). 3.6% VT/VF didn't stop despite of implantation the electrode, 6.25% patients had unnecessary discharges. 25% of patients needed hospitalization caused by cardiac arrhythmia and 6.25 needed to delete ICD with the electrode. There was electric storm in 12.5% patients.
Conclusions: ICD with subcutaneous electrode array is a method that allows obtaining acceptable defibrillation threshold. In most cases it prevents CA during one year after implantation.

5. Tumor necrosis factor alpha induces changes in F-actin organization leading to increased cellular adhesion and breakdown of cell-cell junctions in primary human coronary artery endothelial cells

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Background: Endothelial activation is considered as a crucial step in the initiation and development of atherosclerosis. The aim of the study was to investigate the effect of tumor necrosis factor alpha (TNFα) on F-actin organization in coronary artery endothelial cells, in the context of changes in cellular adhesions.

Methods: The study was performed on primary human coronary artery endothelial cells (pHCAECs) obtained from 23-year-old white male killed by head trauma secondary to blunt injury. pHCAECs were incubated with 25, 50, and 100 ng/mL of TNFα, expressed in HEK 293 cells, for 24 hours and subjected to further experiments. The activation of endothelial cells by analysis of functional expression of E-selectin, VCAM-1 and ICAM-1 and co-culture with Jurkat cells. Migration of cells was assessed using both wound healing assay and modified Boyden chamber assay. Fluorescent localization of F-actin, junctional proteins (VE-cadherin, claudin-5, α-catenin, β-catenin, and ZO-1), and non-muscle myosins (IIa and IIb) was analyzed using a confocal micro-scope. Moreover, a real-time fluorescent localization of actin and talin was observed using live-cell imaging system after infection of cells with baculoviruses encoding fused proteins: actin-GFP and talin-RFP.
Results: The study showed that TNFα activated functional expression of E-selectin and VCAM-1, but not ICAM-1. Furthermore, this activation was associated with formation of actin stress fibers and generation of several consequent cellular properties: (1) changes in cell shape: from epithelial- to spindle-like, (3) reduction of AJs and TJs continuity (2) upregulation of talin expression and its localization along actin stress fibers, what correlated with increased cell-matrix adhesion and longer time of this adhesion, (3) changes in cell migratory potential, and (4) inhibition of stable cell-cell contact, through suppressed interactions of TJ proteins with hyperpolymerized F-actin. Moreover, TNFα induced expression of non-muscle myosin IIa, which localized in regions of cell-cell contact.
Conclusion: The performed study suggest that disruption of endothelial barrier is possible not only by biochemical disassembly of protein complexes at cell-cell junctions but also by a mechanical breakdown of AJs through elevated F-actin polymerization accomplished with increased cell-matrix adhesion.
This study was supported by grant no. 2015/17/D/NZ7/00809 to Dr. Gagat from National Science Center, Poland.

6. Angiographic assessment of slow flow/no-reflow using corrected TIMI Frame Count in patients undergoing rotational atherectomy

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Backgrounds: Rotational atherectomy (RA) has been proven to be efficient for the treatment of calcified and diffuse lesions. However, in some cases rare complication- no or slow blood flow occurs. This phenomenon has been observed more frequently during RA than in other revascularization methods. There are several underlying mechanisms such as microcirculatory vasospasm, platelet activation and aggregation, microvascular embolization of atherosclerotic debris that are believed to relate to slow flow/no-reflow during RA.
Aim of the study: Aim of our study was to compare the group of patients with angiographic slow flow/no-reflow with the group of patients without angiographic slow flow/no-reflow.
Methods: We conducted a retrospective, single-center study. At the Department of Cardiology and Internal Medicine in Bydgoszcz between January 2005 and February 2017, 128 RA were performed and 145 stenosis were treated. We enrolled 84 patients with stenosis treated by RA for which corrected TIMI Frame Count (cTFC) could be evaluated. As angiographic slow flow/ no-reflow we presupposed cTFC $>$ 40 (a cTFC of 40 has previously been identified as the cut point for distinguishing TIMI grade 3 versus 2 flow).
Results: In our study angiographic slow flow/no-reflow occurred in 5 of 84 (6.0%) interventions. Thus, we compared collected data of the group of patients with slow flow/no-reflow with data concerning the group of patients without slow flow/no-reflow. It turned out that patients with slow flow/no-reflow were younger, having in average 64.6 years, while patients without slow flow/no-reflow were at the average age of 72.5 ($p < 0.05$). Moreover, patients with slow flow/no-reflow had more frequently (however not statistically significantly) hypertension (100.0% vs 66.2 %; $p = 0.28$), diabetes (80.0% vs 52.7%; $p = 0.47$) and burr to artery ratio was also higher (0.57 vs 0.52; $p = 0.25$). Both groups were similar in terms of sex (male prevalence at the level of 60.0% vs 62.0%), and BMI (27.2 vs 27.6).
Conclusions: Slow flow/no-reflow phenomenon is an uncommon complication. Potential factors of its occurrence are age, hypertension, diabetes and burr to artery ratio. To claim this factors identified in this study can be used for prediction of slow flow/no-reflow phenomenon, multi-center studies should be conducted, and wider set of data compared.

7. Safety of cardiac resynchronization device implantation — retrospective analysis from high-volume center

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Background: Cardiac resynchronization therapy (CRT) is a treatment dedicated to patients suffering from heart failure. According to the literature CRT devices implantations are associated with a significant rate of complications: a meta-analysis of 9082 patients in 25 CRT trials showed that peri-implantation deaths occurred in 0.3% of trial participants, mechanical complications in 3.2%, lead problems in 6.2% and infections in 1.4%. The aim of this study is to analyse the safety of CRT device implantation in a large single-center group.
Methods: The retrospective analysis of electronic medical records of 198 patients (43 women and 155 men), hospitalized in Cardiology Department, University Hospital no 1 in Bydgoszcz, who underwent CRT device implantations in two consecutive years (2015–2016) have been

performed. Out of 198 patients, 136 underwent implantation of CRT de novo and 62 exchange of the device. Studied procedures included implantations of 121 (89%) CRT-defibrillators (CRT-D) and 15 (11%) CRT-pacemakers (CRT-P) *de novo*, as procedures of exchange were excluded from statistical analysis. Collected data included: reported complications, patient's basic clinical characterics, co-morbidities and details of implantation procedures.

Results: Development of complications was observed in 46 patients (33.8%), out of which 30 (22.1%) experienced one, 12 (8.8%) two and 4 (2.9%) three complications. Most of them were mi-nor complications, the most common ones included : pocket hematoma (13 patients, 9.6%), lead dislodgement (11 patients, 8.1%), diaphragmatic stimulation (8 patients, 5.9%), and damage of coronary sinus or cardiac venous system, without tamponade (7 patients, 5.1%). Serious complications which included pneumothorax, mediastinal hematoma, perforation of free wall of the heart and cardiac tamponade were observed in 9 cases (6.6%), there were no peri-operative deaths. The occurrence of complications was significantly associated with: prolonged procedure time (147.5 vs 110.0 min; $p < 0.001$), prolonged hospitalization time (8 vs 5 days; $p < 0.0001$), higher incidence of valvular disease (42.2 vs 22.7%; $p < 0.05$) and smaller interventricular septum diameter (11.0 vs 12.0 mm; $p < 0.05$).

Conclusions: Overall, implantations of CRT devices are burdened with substantial risk of complications, although majority of them are minor and do not require subsequent surgical intervention. The risk of developing serious complications is low, accounting for 6.62%.

8. Assessment of myocardial perfusion using dynamic dual source computed tomography in patients with anatomically intermediate coronary artery stenoses — initial results

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Background: 15–20% of patients who underwent computed tomography coronary angiography (CTCA) are diagnosed with ≥ 1 intermediate (50–70%) coronary artery stenosis. In these cases documentation (or exclusion) of the presence of myocardial ischemia is required prior to qualification for revascularisation. Utility of dynamic computed tomography perfusion (CTP) for myocardial ischemia detection in reference to the magnetic resonance myocardial perfusion imaging (MR-MPI) is unclear.

Methods: The study group comprised seventeen consecutive patients with detected ≥ 1 inter-mediate coronary artery stenosis in CTCA who underwent dynamic CTP (Somatom® Force) and MR-MPI (AvantoFIT). In both perfusion examinations we used innovative, selective vasodilatator — regadenoson. The distribution of myocardial contrast agent in dynamic CTP, which is a surrogate of myocardial blood flow, was represented as quantitative parameters for each myocardial segment (16-segment model): MBF (myocardial blood flow), MBV (myocardial blood volume), peak value, time to peak, PCBV (perfused capillary blood volume). The study is funded by the National Science Centre — grant No. 2015/19/B/NZ5/03502.

Results: Of the included patients, 6 were diagnosed with myocardial ischemia in the MRMPI. The average dose of radiation during CTP was 321.25 (± 67.83) mGy*cm. The area under the ROC curve for investigated parameters was: MBF (AUC = 0.738, $p < 0.001$), MBV (AUC = 0.765, $p < 0.001$), peak value (AUC = 0.658, $p = 0.003$), PCBV (AUC = 0.703, $p < 0.001$), time to peak (AUC = 0.521, $p = 0.737$). For parameters significantly correlated with the results of the MR-MPI, optimal cut-off points, sensitivity, specificity, NPV, PPV were determined based on the ROC curves. In the multivariate regression analysis, the only independent CTP-based parameter identifying ischemia was MBF ≤ 153.38 (OR = 9.89; 95% CI 2.79–35.05; $p = 0.0004$), there was a trend for peak value ≤ 119.09 (OR = 3.84; 95% CI 0.84–17.67; $p = 0.08$). We constructed an ischemia index based on both parameters: both positive — 2, only one positive — 1, both negative — 0. The sum allowed the development of the ROC curve and an optimal cut-off (≥ 1 positive parameter) achieving sensitivity 80%, specificity 73%; NPV = 97%; PPV = 26% and accuracy 73.8%, which was higher than for individual parameters (MBF: 67.5%, $p < 0.0001$; peak value: 45.4%, $p < 0.0001$; MBV: 65%, $p < 0.0001$).

Conclusions: 1. It is possible to evaluate myocardial ischemia with dynamic CTP in patients with anatomically intermediate coronary artery stenoses in reference to MR-MPI. 2. Quantitative parameters: MBF, MBV, peak value and PCBV can identify myocardial ischemia in reference to MR-MPI and it is possible to determine cut-off points for these parameters. 3. Multivariate model (MBF and peak value) predicts myocardial ischemia with better accuracy compared to individual parameters.

9. Collagen degradation products as a potential biomarker of the left ventricle remodeling after myocardial infarction

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Background: Coronary artery disease, including myocardial infarction, is one of the main causes of morbidity and mortality globally. Myocardial infarction causes complex structural and functional changes in myocardium of the left ventricle, phenomenon known as left ventricular

remodeling. Primary and secondary prevention of myocardial infarction are a priority for the health system and require multifactorial approach to increase its effectiveness. Biomarkers of cardiac remodeling can be useful in identifying high-risk patients, establishing faster diagnosis, determining prognosis and monitoring the left ventricle remodeling in patients after myocardial infarction.

Methods: The aim of this study was to evaluate the value of plasma collagen degradation products (CDPs) quantification as a biomarker of the left ventricle remodeling in patients with ST-elevation myocardial infarction (STEMI). The trial included 14 consecutive patients with STEMI admitted to the Department of Cardiology and Internal Medicine, Dr A. Jurasz University Hospital, Bydgoszcz, Poland. All the study participants underwent a primary percutaneous coronary intervention. The blood samples for CDPs assessment were collected on 1, 3, 5 and 7 days after STEMI. The CDPs plasma concentration were evaluated based on the free hydroxyproline plasma concentration and hydroxyproline concentration after plasma hydrolysis.

Results: The mean concentration of free hydroxyproline was numerically lower than the concentra-tion of hydroxyproline after plasma hydrolysis (1.23 ± 0.40 vs 10.29 ± 2.58 μg/mL). The CDPs concentration was the lowest in samples obtained 1 day after STEMI and remained higher in the later days (1 day: 61.39 ± 16.70 μg/mL; 3 day: 65.96 ± 16.40 μg/mL; 5 day: 70.50 ± 14.60 μg/mL; 7 day: 70.53 ± 23.33 μg/mL).

Conclusions: Evaluation of the CDPs plasma concentration in patients with STEMI is feasible and can become useful diagnostic and prognostic tool. Clinical significance of CDPs warrants further research.

10. The efficiency of management for patients with electrical storm

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Electrical storm (ES) is a life-threatening condition due to electrical instability. It is defined as the occurrence of at least 3 episodes of ventricular tachycardia (VT) or ventricular fibrillation (VF) within 24 hours. It affects mostly patients with implantable cardioverter-defibrillator (ICD), less frequently patients with a device for cardiac resynchronization therapy (CRT), but it also can be observed in patients without implanted electrical support devices. Presently, there is no detailed data on the frequency of ES occurrence in the general population, however, the actual frequency might be underestimated due to the efficiency of anti-tachycardia pacing (ATP) in stopping of the ventricular arrhythmias in ICD patients. Some general risk factors for ES occurrence are: organic heart disease, left ventricle systolic dysfunction, advanced heart failure, male gender, electrolyte disorders, chronic kidney disease, ion channels-related diseases, depression or psychological stress. ES requires urgent hospitalization within a cardiac intensive care unit. The treatment is focused on reduction of arrhythmia that results in hemodynamic instability. Electrical cardioversion and antiarrhythmic agent pharmacotherapy are used in the initial treatment. Simultaneously, a correction of reversible causes of ES is conducted with rescue treatment. Among the methods used are: percutaneous coronary interventions (PCI), more aggressive heart failure therapy, infection treatment, electrolyte imbalance or hyperthyroidism correction. In case of recurrent VT episodes, an efficient and relatively safe method of treatment is radiofrequency catheter ablation. The clinical population for the survey comprised patients hospitalized in the 2015–2016 period within the Department of Cardiology at the Antoni Jurasz University Hospital no. 1, who were diagnosed with ES. A retrospective study based on medical records was carried out and a group of 43 patients (40 men and 3 women) aged 24 to 89 was selected. Among this population the most common risk factor for ES were heart failure and coronary artery disease. The most commonly occurring tachyarrhythmia that was responsible for ES appearance, was VT. Nearly 50% of the patients had ES episodes and 72.1% had ICD implants. The shocks released by the device were recorded in 65.1% of them.

11. Influence of QRS duration and QRS axis on response to cardiac resynchronization therapy in patients with left bundle branch block: a single-centre study

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Background: Previous studies have recognized some electrocardiographic parameters as predictors of response to cardiac resynchronization therapy (CRT). The aim of this study was to evaluate potential usefulness of QRS duration and QRS axis deviation in predicting symptomatic (SR) and echocardiographic response (ER) to CRT in patients with left bundle branch block (LBBB).

Methods: We conducted a single-centre retrospective analysis of 42 patients with LBBB who were treated with CRT from July 2010 to April 2016. All data were extracted from discharge summaries, echo-cardiography and electrocardiography (standard 12-lead) examinations. SR was defined as improvement in New York Heart Association (NYHA) class (≥ 1) and ER as improvement in left ventricular ejection fraction (LVEF) of ≥ 10% absolute. Following parameters were analyzed as potential predictors of response: QRS duration and QRS axis (both evaluated before and after procedure), QRS reduction and axis change (both after the procedure).

Results: Mean age of the studied group was 66.4 ± 8.3 y with majority of men (54.8%). Mean follow-up period lasted 29 ± 18.6 months. ER was achieved in 19 patients (45.2%) who, compared to non-responders, had more negative mean axis degree before the procedure (–42.6 ± 44.6 vs

–13.1 ± 34.7, p = 0.021). Increase of baseline axis degree was associated with higher risk of negative echocardiographic response to CRT (OR 0.98, 95% CI: 0.96–0.998, p = 0.03) with cut-off point at -36° (sens.: 63.2%, spec.: 69.6%). SR was noticed in 16 patients (38.1%) who, compared to nonresponders, had wider QRS before and after the procedure (172.3 ± 17.9 vs 159.0 ± 18.3, p = 0.027 and 157.2 ± 24.1 vs 136.7 ± 23.2, p = 0.009 respectively), and more positive axis degree after CRT (–9.9 ± 97.0 vs –71.3 ± 76.8, p = 0.028). QRS duration < 150 ms before the procedure indicated poor SR (OR 0.04, 95% CI: 0.001–0.74, p = 0.033) whereas QRS > 160 ms after CRT was associated with better response (OR 7.2 95% CI: 1.24–41.94, p = 0.038). Wider QRS was positive predictor of SR both before (OR 1.04, 95% CI: 1.00–1.08, p = 0.04) and after the procedure (OR 1.04, 95% CI 1.01–1.07, p = 0.02 re-spectively) with cut-off points respectively: 178.5 ms (sens.: 31.3%, spec.: 84.6%) and 157 ms (sens.: 56.3%, spec.: 73.1%).

Conclusions: In our study we found that in LBBB patients undergoing CRT wider QRS before and after the procedure is related to better symptomatic response with cut-off points 178.5ms and 157ms, respectively. We also presented that preimplantation QRS axis affects the echocardiographic response. Negative deviation of the axis with the cutoff point –36° is a response predictor.

12. Daily weather conditions and the incidence of out-of-hospital cardiac arrest in Opole district during two-year observation

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Background: Previous studies have revealed an association between atmospheric conditions and cardiovascular diseases. The impact of weather on cardiac acute events was confirmed in different geographical regions. The aim of our study was to investigate the influence of daily weather conditions on the incidence of OHCA in moderate climate of Poland.

Methods: A retrospective analysis of OHCA cases based on dispatch cards from Emergency Medical Center in Opole covering 2 years (2006–2007). Total of 815 adults (> 18 y) with presumed cardiac etiology of OHCA were included. We examined relationship between OHCA incidence and following meteorological factors: temperature, precipitation, atmospheric pressure (AP), insolation, humidity, cloudiness, rainfall duration, snowfall and storm occurrence in the entire group as well as with respect to gender and age (≤ 65 y and > 65 y old).

Results: The studied population consisted mostly of men (63%), younger than women (66.1 ± 13.42 y vs 74 ± 14.07 y, p < 0.001). The mean age of the group was 69.2 ± 14.2 years. Asystole was diagnosed in 87.8% of cases, ventricular fibrillation/tachycardia (VF/VT) in 11%. Over the study period there were 249 days (34%) without any OHCA and 1 day with 6 events, resulting in the mean value of 1.12 ± 1.09 OHCA cases daily. There was no significant difference (p > 0.05) in a daily incidence of OHCA in relation to mean daily temperature (MDT), however an association was found between daily mean number of OHCA and the MDT change — the increase of MDT between consecutive days was related to higher mean number of OHCA compared to MDT decrease (1.2 vs 1.03 cases, p = 0.045). The highest mean daily number of OHCA (1.7 ± 0.52) was noticed on days with difference from the previous day of > 4°C (p = 0.03). The subgroup of ≤ 65 years old, compared to the older, included mostly men (74% vs 51%, p < 0.001) and more often had VF/VT (p = 0.008). In this group OHCA occurred more often (0.43 ± 0.61 per day) on days with increase of AP 0.1–5 hPa in comparison to the day before (p = 0.03).

Conclusions: In the moderate climate of Poland only a few meteorological variables may determine the incidence of OHCA, and the temperature change seems to be the most significant. In the younger population the incidence of OHCA is influenced by atmospheric pressure changes. This is the first study to evaluate the influence of weather conditions on the incidence of OHCA in Poland.

13. Temporal variability of out-of-hospital cardiac arrest in Opole district — a 2-year observation

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Background: Out-of-hospital cardiac (OHCA) is a significant medical condition because of its still low survival rate. Recent studies indicate chronological variations of OHCA incidence but to date, polish experience is scarce. Knowledge about trends in the occurrence of OHCA in a particular population may help to provide new strategies aimed at improving the survival. The aim of the study was to examine the epidemiology and the influence of chronological factors on the incidence of OHCA in population of Opole district.

Methods: A retrospective analysis of dispatch cards from Emergency Medical Center in Opole covering 2 years (2006–2007) was performed. A total of 815 adults with OHCA of presumed cardiac etiology were included. We examined the epidemiology, circadian, weekly and seasonal variations in OHCA occurrence — both in entire group and with respect to gender and age.

Results: The incidence of OHCA in studied population was 1.56 per 1000 inhabitants per year. Mean age of the group was 69.2 ± 14.2 years, with the majority of men (63%), younger than women (66.1 vs 74 y, p = 0.0001). Asystole was diagnosed in 87.8% of cases, ventricular fibrillation/tachycardia (VF/VT) in 11%. The occurrence of OHCA increased with age, more often in > 65 years old subgroup (62.4%), reaching

a peak in the range of 71–75 years. The incidence of OHCA stayed at stable low level between 22:00-4:59 and started to increase from 5:00, with bimodal peaks: 8:00–11:00 and 14:00–16:00. The lowest number of OHCA occurred from 00:00–5:59, the highest from 6:00–11:59 (13% vs 32.4%, $p < 0.001$). The day with the lowest occurrence of OHCA was Friday, the highest Saturday, Monday and Sunday (10.9% vs 16% $p = 0.02$; 15.7% $p = 0.01$ and 15.2% $p = 0.03$, respectively). Summer was the season of the lowest incidence of OHCA, while winter — the highest (22.6% vs 26%, $p = 0.048$). These seasons were the warmest and the coldest one, respectively (average temp. 18.5 vs 00C, $p < 0.001$). August was the month with the lowest average amount of OHCA, October and February — the highest (0.77 vs 1.26 cases, $p = 0.03$). The subgroup of ≤ 65 years of age, compared to the older, consisted mainly of men (74% vs 51%, $p < 0.001$) and more often had VF/VT ($p = 0.008$) Both age subgroups presented similar pattern of temporal variability in OHCA occurrence.

Conclusions: The studied population is characterized by circadian and weekly variability in OHCA occurrence. OHCA increases with patients age. We also observed seasonal differences in OHCA incidence, and this phenomenon may be affected by temperature. OHCA increases with patients' age, but temporal variations in OHCA occur independently on age. This is the first polish analysis of such a large group also including seasonal temperature data.

14. Protective effect of nitroxides against oxidative modification of fibrinogen

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Background: Fibrinogen (Fg) is a protein acting an extremely important role in primary and secondary hemostasis. Fg is involved in blood clotting, platelets and erythrocytes aggregation, and so on. This protein has a high susceptibility to oxidative attack of oxygen, nitrogen and chlorine reactive forms. Oxidative modifications of Fg lead to formation of pathological fibrin structure, and consequently increases risk of venous and arterial thrombosis. Therefore we are looking for various com-pounds that could counteract both nitrated and chlorinated tyrosine residues in this protein. In the studies we selected three nitroxides: TEMPO, 4-Hydroxy-TEMPO, 4-Acetamido-TEMPO. The aim is to evaluate the protective effect of nitroxides on fiobrynogen molecule against oxidative modifications induced by peroxynitrite and hypochlorous acid used in 100–300 μM concentration.

Methods: Fibrinogen isolated from human plasma by Doolittle method. TEMPO, 4-Hydroxy-TEMPO and 4-Acetamido-TEMPO used in 2.16––500 μM concentration; peroxynitrite and hypochlorous acid in 100 and 300 μM concentration. To analyze the structure of fibrinogen used in electrophoresis, to evaluate protective affect of nitroxides against the formation of 3-nitrotyrosine and carbonyl proteins in Fg used Western blot.

Results: TEMPO, 4-hydroxy-TEMPO and 4-Acetamido-TEMPO have a protective effect on fibrinogen against peroxynitrite used in 100–300 μM concentration. These compounds prevent the formation of high-molecular protein aggregates, protect against formation of 3-nitrotyrosine and carbonyl proteins in Fg molecule, even at low concentrations. In the case of fibrinogen incubated with hypochlorous acid, nitroxides showed no protective effects.

Conclusion: Nitroxides protect the protein from only peroxynitrite effect, so mechanisms of action of these two oxidants are different.

15. Anticoagulant therapy in hemodialysis patients with atrial fibrillation — between the hammer and the anvil

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Background: Atrial fibrillation (AF) is one of the most common supraventricular arrhythmias. The prevalence of AF in the population over 20 years is 3%. AF was found in about 3.5 to 27% of hemodialysis (HD) patients. The data on benefit and risk of anticoagulant therapy in HD patient with AF are ambiguous. The aim of the study was to assess the prevalence of AF in HD patients, to assess the risk of thromboembolic and hemorrhagic complications, and to analyze usage of anticoagulant therapy in HD patients.

Methods: All patients undergoing chronic HD treatment at Dialysis Unit University Hospital No 1 in Bydgoszcz were investigated in cross-sectional study. Data were obtained from medical records. The study population involved 121 patients, aged 22–90 years (64 ± 16). AF was diagnosed in 26 (21%) of HD patients (AF+). AF+ patient were compared with HD patients without history of AF (AF–). In AF+ patients the risk of thrombotic complication was assessed using CHA_2DS_2–VASc and ATRIA scale, while the risk of bleeding was assessed using HAS-BLED. Unstable INR was defined, if > 40% measurements of INR in 2016 were beyond target range 2–3.

Results: AF+ were older than AF– patients. There are no difference between AF+ and AF with regard to gender, history of stroke, and history of significant bleeding. In AF+ patients higher prevalence of heart failure (81% vs 48%; $p < 0.05$) and coronary artery disease (58% vs 32%; $p < 0.05$) was found. Mean (± SD) CHA_2DS_2–VASc score was 4.9 ± 1.6 (median 5, range 2–8). Twenty five of 26 (96%) AF+ patients had CHA_2DS_2–VASc score ≥ 2, and 15 (58%) patients had ATRIA score > 7. Mean HAS-BLED score was 3.9 ± 0.8 (median 4, range 3–5). In AF+

group 13 (50%) patients were treated with oral anticoagulant (OAC), and 6 (24%) patients received low molecular weight heparin. Among patients on OAC 10 (77%) had unstable INR. Mean INR was 2.41 ± 1.14.

Conclusions: HD patients with AF are at high risk of both: thrombotic and hemorrhagic complications. Despite the lack of recommendations for anticoagulant therapy in HD patients with AF, the most of these patients were treated with anticoagulant therapy. OAC therapy in HD patients is associated with unstable INR results. To identify HD patients with AF, who will benefit from anticoagulant therapy it is necessary to create a new risk scale dedicated for these patients.

16. The influence of cardiac rehabilitation on exercise tolerance and fatigue evaluation in patients after myocardial infarction

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Background: Comprehensive cardiac rehabilitation is now the standard of treatment in patients after myocardial infarction . Poland has proposed the Askanas and Rudnicki three consecutive cardiac rehabilitation program. One of them is outpatient rehabilitation for patients after the completion of stage rehabilitation hospital. The aim of the study was to evaluate the impact of cardiac rehabilitation outpatient change in exercise tolerance and fatigue evaluation of patients after myocardial infarction.

Methods: The examination group of 27 patients aged 45–85 years (average 63.8 ± 8.7), aimed at cardiac rehabilitation outpatient. Before rehabilitation and after the (threemonth training includes 24 training sessions) conducted an exercise test on a bicycle cycloergometer, according to the protocol 25 Wat. The analysis parameters were: resting heart rate and maximum, systolic blood pressure at rest and maximum, diastolic blood pressure at rest and maximum duration of the test, metabolic equivalent [MET] and the cause of the interruption sample and the degree of sense of fatigue according to the Borg scale. In addition, the patient after rehabilitation fill a questionnaire on the state of before and after rehabilitation.

Results: After a series of cardiac rehabilitation was a significant improvement in exercise capacity ($p < 0.001$), the extension of the duration of the tests ($p < 0.05$), reduction in resting systolic blood pressure and a reduction in the average number of points on the Borg scale (against 15.9 after 13.9). Decreased levels of perceived fear of taking exercise (down by 15%).

Conclusion: Well programmed prior myocardial infarction cardiac rehabilitation in an outpatient setting a positive impact on the parameters of exercise tolerance and fatigue evaluation of patients after myocardial infarction. It should be widely used form of rehabilitation.

17. Does the phenomenon of coronary artery disease "undertreatment" still exist in hemodialysis patients?

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Background: Cardiovascular disease is the leading cause of death in hemodialysis (HD) patients. At the beginning of XXI century the phenomenon of coronary artery disease (CAD) „undertreatment" among HD patients was first described. Coronary revascularization in HD patients is challenging due to high risk of mortality and morbidity. The aim of the study was to analyze the interventional and conservative treatment of coronary artery disease in HD patients.

Methods: The cross-sectional study was performed in all HD patients of Dialysis Unit of Antoni Jurasz University Hospital No. 1 in Bydgoszcz. Data were obtained from medical records. The analysis included 121 patients (47 female and 74 male), aged 22–90 (64 ± 16 years). CAD was diagnosed in 45 (37%) of HD patients (CAD+ group). CAD+ group was compared with HD patients without CAD (CAD– group). Conservative and interventional treatment of CAD was analyzed in CAD+ group.

Results: Clinical forms of CAD in the study group were: stable angina in 15 (33%), unstable angina in 4 (9%), NSTEMI in 21 (47%), STEMI in 8 (18%), history of myocardial infarction of unknown type in 3 (7%). Several forms of CAD were found in 6 (13%) patients. CAD+ patients were older (69 ± 13 vs 61 ± 17; $p < 0.003$) when compared to CAD–. The study groups did not differ with respect to gender (male 64% vs 59%; NS) and duration of HD therapy (median 55 vs 30 months; $p = 0.06$). CAD+ patients were more likely to have coexisting heart failure (87% vs 37%; $p < 0.05$) and atrial fibrillation (33% vs 15%; $p < 0.05$). Diabetic nephropathy was underlying renal disease in 47% of CAD+ and 21% of CAD– patients ($p < 0.05$). In CAD+ group 34(75%) patients underwent coronary revascularization: PCI in 24 (53%), CABG in 5 (11%), and

both PCI and CABG in 5 (11%). Antiplatelet therapy was used in 39 (87%) of CAD+ patients: ASA in 34 (75%), clopidogrel in 3 (7%), both ASA and clopidogrel in 6 (13%) patients. Statin was used in 37 (82%), angiotensin-converting-enzyme inhibitors or angiotensin receptor blockers in 29 (65%) and β-blockers in 37 (82%) HD patients with CAD.

Conclusion: The results of the study does not confirm the phenomenon of coronary artery disease "undertreatment" in hemodialysis patients.

18. Sodium renal transport under tiocetam influence in acute renal insufficiency

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The clinical usage of new medicines must take into consideration the possible renal effects. Tiocetam is a newly created Ukrainian drug which consistis of piracetam (not proven nephrotic influence) and tiotriasolin (statistically sinificant renal effects). Tiocetam is influenced not only on nervous, cardiovascular system or metabolism as its components but on the kidneys and water-salts metabolism. Therefore, the aim of our study was the assessment of tiocetam influence in renal functions during acute renal insufficiency after mercury chloride nephtopathy. The 12 male rats were examined and divided into 2 groups: with 250 mg/kg tiocetam and without (control group). The experimental and case-control design was used. Biochemical methods were used with blood and urine examination. Renal sodium transport was calculated into 2 hours and body mass. The kidney functions were estimated in 5% body mass water loading. On our results, the positive tiocetam impact on sodium renal transport was determined. Sodium excretion was not significantly changed but potassium excretion was decreased in 1.4 times ($p < 0.05$). The blood/ urine sodium ration was de-creased in 1.7 times. The distal and proximal sodium transport was increased in 2.1 and 3.3 times accordingly ($p < 0.001$). Sodium clearance was nott significantly changes but water unsodium clearance was increased in 2.1 times ($p < 0.001$). Thus based of our results the tiocetam is statistically significant influenced on sodium renal transport in acute renal insufficiency.

19. Effect of extremely low frequency electromagnetic field on brain plasticity in post-stroke patients

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Background: Cardiovascular diseases, including ischaemic stroke are a serious problem of the mod-ern medicine. The most important part of therapy is immediate and long-term rehabilitation, considering the brain plasticity. Although extremely low-frequency electromagnetic field (ELF-EMF) therapy is not a standard treatment of post-stroke patients, some authors suggest its positive impact. Neurotrophic factors affect neurogenesis through the conditionality of the growth of new neurons and the survival of existing ones. The survival, maturation and functioning of the nervous system are influenced by the cytokines do not belong to neurotrophins, for example: Hepatocyte Growth Factor (HGF), Vascular Endothelial growth factor (VEGF), Leukemia Inhibitory Factor (LIF), Stem Cell Factor (SCF) and Stromal Cell-Derived Factor (SDF-1α).

Methods: This study aims at investigating the effect of ELF-EMF on the concentration of growth factors, which are associated with brain plasticity, in post-stroke patients. 35 patients were divided into two groups: ELF-EMF and non-ELF-EMF. Both groups underwent the same rehabilitation program, but additionally, the ELF-EMF group was exposed to ELF-EMF of 40 Hz, 7 mT, 15 min/day. The VEGF concentration was determined in plasma by ELISA method. HGF, βNGF, LIF, SCF and SDF-1α were estimated using a Biorad 5-plex kit on a Luminex platform.

Results: We showed that ELF-EMF therapy causes an increase of VEGF and HGF level about 29% and 17%, respectively ($p < 0.05$). In non-ELF-EMF group the VEGF concentration before and after treatment has not changed ($p > 0.05$) and the increase of HGF level was about 9% ($p > 0.05$). In contrast, the level of VEGF was about 34% higher in the ELF-EMF than in non-ELF-EMF and HGF level was higher about 15%. βNGF and LIF level was under detection (< 2.57 pg/mL and 1.92 pg/mL, respectively). There were no differences between the groups at a concentration of SCF and SDF-1α.

Conclusion: ELF-EMF therapy meaningfully improves the overall condition of patients and significantly affects the psychophysical abilities of patients after stroke. ELF-EMF effects on brain plasticity and angiogenesis. ELF-EMF therapy is a noninvasive and safe treatment with the potential for promoting recovery in stroke patients.

20. Analysis of different parameters for prediction of AF presence

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Background: Atrial fibrillation (AF) is the most common arrhythmia encountered in clinical practice. However, its pathogenesis remains incompletely understood. Alterations in left atrial (LA) geometry and tissue composition may play a critical role in arrhythmia induction. It is postulated

a possible role of anomalies in the number and insertion of pulmonary veins (PVs) in initiating AF. Therefore, the aim of our study was to compare anatomy of the LA wall thickness, density and PVs anatomy analysed by computed tomography in patients with AF and control subjects.
Methods: The study population of 124 patients were evaluated with multi-slice computed tomography (MSCT). Patients were assigned into 2 groups: AF and control groups. 31 consecutive patients had history of AF and were prepared to undergo PV isolation at University Hospital. All patients underwent cardiac CT scans prior to the procedure to define the anatomy of the LA and PVs. In control group were 93 consecutive patients without history of AF who underwent chest CT imaging to evaluate the suspected coronary heart disease at the same institution served as the AF group. The scans were analysed and measurements were made by consensus under supervision of the highly-experienced radiologist and well-trained student.
Results: A total of 124 patients were included. Patients in the AF group had an increased LA wall thickness and larger atrial volume comparing to the patients in the control group. In control group, patients were more like to have typical PVs anatomy, while patients of AF. Positive correlation was found between anterior wall thickness of LA and sex ($r = 0.344$, $p = 0.001$), AF ($r = 0.575$, $p = 0.001$) and LA volume ($r = 0.288$, $p = 0.001$). As the anterior and posterior wall thickness of LA increases, increases and the LA volume. In AF cohort, perimeter of right and left superior PV (RSPV and LSPV) and left common trunk (LCT) were significantly larger comparing to the patients in control group. Additional right PV1 (additional RPV1) and left inferior PV (LIPV) were found to be more oval among the patients in control group than in the patients with AF (they were linked to be more round). Our study demonstrated that the LA posterior wall was thicker to the patients of typical PVs anatomy than to the patients of atypical PVs anatomy. Using ROC curve analysis, we found that the thickness of LA anterior and posterior wall, LA volume, age, location of connection region of left pulmonary veins (CRLPV) and left inferior pulmonary vein ovality index can be the predictors for AF.

Prognostic models for AF prediction:

Model 1

Constant –3.645	OR		95% CI	P value
LA volume [m^3]	> 105.4	7.78	1.138–53.230	0.036
LA anterior wall thickness [mm]	> 1.42	47.88	9.911–231.327	< 0.001
LA posterior wall thickness [mm]	> 2.32	14.69	2.218–97.272	0.004

Model 2

Constant –4.621	OR		95% CI	P value
Age (years)	< 68.5	17.428	2.105–144.307	0.008
CRLPV lower location density (HU)	< 108.5	2.902	1.068–7.890	0.037
Left inferior pulmonary vein ovality index	< 1.1396	3.224	1.181–8.804	0.022

Conclusion: Patients in the AF group had an increased LA wall thickness and larger atrial volume comparing to the patients in the control group. In control group, patients were more like to have typical PVs anatomy, while patients of AF.

21. No malonic dialdehyde and endothelium dysfunction in patients with coronary artery bypass grafting performed with pump on

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Background: It is known that the NO molecule has both pro- and anti-oxidant properties. Since the nitric oxide (NO) is a vascular endothelial anti-thrombotic factor, that can convert in the highly toxic peroxynitrite (ONOO–) it is obvious need to study the changes in nitric oxide level in patients during perioperative period of Coronary Artery Bypass Graft surgery (CABG). The aim of our study was to investigate the role of NOx and Malonic dialdehyde (MD) change in blood serum and the condition of endothelium in of patients with coronary artery disease in the perioperative period of coronary bypass surgery performed with pump on.
Methods: It was investigated the content of nitrites and nitrates, MD in the blood plasma and endothelium dysfunction of 26 patients with coronary artery disease and cardiac ischemia (CI) in condition grafting performed with pump on.
Results: The studies revealed a decrease in [NOx], increase of malonic dialdehyde level as an indicator of oxidative stress in blood plasma of the patients after coronary bypass surgery in period of coronary blood flow restoration in comparison with the period before pump on device was connected. The patients levels of nitrite and nitrate in the recovery period cardiac activity (pump on) was lower (74%, $p < 0.05$), as compared with their concentration in the initial period of operation (before pump on). Decrease of NOx indicates either a low production of NO by vascular endothelium or an increase in its utilization in reaction with superoxide anion and its conversion to peroxynitrite. Increase in the levels of malonic dialdehyde is the result of the oxidative processes due to increased hemolysis. In the patients with coronary artery bypass grafting

we noticed decrease of endothelium dependent vasodilation in post-surgical period in comparison with the presurgical period. This creates conditions for the occurrence of coronary vascular endothelial dysfunction in patients with CABG, thereby predisposing to the development of thrombosis due to a decrease of antithrombotic proper-ties of vascular endothelium generated NO.

Conclusion: Decrease of NO levels, appearance of oxidative stress and endothelial dysfunctions are pathogenetic factors of perioperative Myocardial Infarction as the most frequent and dangerous fatal complications in patients with decreased antithrombotic properties of coronary arteries and implanted bypass.