

VOLUME LXXV, ISSUE 2, FEBRUARY 2022

ISSN 0043-5147  
E-ISSN 2719-342X

# Wiadomości Lekarskie



Official journal of the Polish Medical Association

Since 1928



INDEXED IN PUBMED/MEDLINE, SCOPUS, EMBASE, EBSCO, INDEX COPERNICUS,  
POLISH MINISTRY OF EDUCATION AND SCIENCE, POLISH MEDICAL BIBLIOGRAPHY

Wiadomości Lekarskie is abstracted and indexed in: PUBMED/MEDLINE, SCOPUS, EMBASE, INDEX COPERNICUS,  
POLISH MINISTRY OF EDUCATION AND SCIENCE, POLISH MEDICAL BIBLIOGRAPHY

Copyright: © ALUNA Publishing House.

Articles published on-line and available in open access are published under Creative Commons Attribution-Non Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially.

## **Wiadomości Lekarskie monthly journal**

**You can order the subscription for the journal from Wydawnictwo Aluna by:**

prenumerata@wydawnictwo-aluna.pl  
Wydawnictwo Aluna  
Z.M. Przesmyckiego 29  
05-510 Konstancin-Jeziorna  
Poland

Place a written order first.

If you need, ask for an invoice.

Payment should be done to the following account of the Publisher:

**account number for Polish customers (PLN):**

82 1940 1076 3010 7407 0000 0000

Credit Agricole Bank Polska S. A., SWIFT: AGRIPPLR

**account number for foreign customers (EURO):**

57 2490 0005 0000 4600 7604 3035

Alior Bank S. A.: SWIFT: ALBPPLPW

Subscription of twelve consecutive issues (1-12):

Customers in Poland: 480 PLN/year

Customers from other countries: 360 EURO/year



# Wiadomości Lekarskie

**Editor in-Chief:**

Prof. Władysław Pierzchała

**Deputy Editor in-Chief:**

Prof. Aleksander Sieroń

**Statistical Editor:**

Dr Lesia Rudenko

**Managing Editor:**

Agnieszka Rosa – amarosa@wp.pl

**International Editorial Office:**

Nina Radchenko (editor)

– n.radchenko@wydawnictwo-aluna.pl

**Polish Medical Association (Polskie Towarzystwo Lekarskie):**

Prof. Waldemar Kostewicz – President PTL

Prof. Jerzy Woy-Wojciechowski – Honorary President PTL

---

**International Editorial Board – in-Chief:**

Marek Rudnicki

Chicago, USA

**International Editorial Board – Members:**

Kris Bankiewicz	San Francisco, USA	George Krol	New York, USA
Christopher Bara	Hannover, Germany	Krzysztof Łabuzek	Katowice, Poland
Krzysztof Bielecki	Warsaw, Poland	Henryk Majchrzak	Katowice, Poland
Zana Bumbuliene	Vilnius, Lithuania	Ewa Małecka-Tendera	Katowice, Poland
Ryszarda Chazan	Warsaw, Poland	Stella Nowicki	Memphis, USA
Stanislav Czudek	Ostrava, Czech Republic	Alfred Patyk	Gottingen, Germany
Jacek Dubiel	Cracow, Poland	Palmira Petrova	Yakutsk, Russia
Zbigniew Gasior	Katowice, Poland	Krystyna Pierzchała	Katowice, Poland
Andrzej Gładysz	Wroclaw, Poland	Tadeusz Płusa	Warsaw, Poland
Nataliya Gutorova	Kharkiv, Ukraine	Waldemar Priebe	Houston, USA
Marek Hartleb	Katowice, Poland	Maria Siemionow	Chicago, USA
Roman Jaeschke	Hamilton, Canada	Vladyslav Smiiianov	Sumy, Ukraine
Andrzej Jakubowiak	Chicago, USA	Tomasz Szczepański	Katowice, Poland
Oleksandr Katrushov	Poltava, Ukraine	Andrzej Witek	Katowice, Poland
Peter Konturek	Saalfeld, Germany	Zbigniew Wszolek	Jacksonville, USA
Jerzy Korewicki	Warsaw, Poland	Vyacheslav Zhdan	Poltava, Ukraine
Jan Kotarski	Lublin, Poland	Jan Zejda	Katowice, Poland

---

**Distribution and Subscriptions:**

Bartosz Guterman prenumerata@wydawnictwo-aluna.pl

**Graphic design / production:**

Grzegorz Sztank

www.red-studio.eu

**Publisher:**

ALUNA Publishing House

ul. Przesmyckiego 29,

05-510 Konstancin – Jeziorna

www.wydawnictwo-aluna.pl

www.wiadomoscilekarskie.pl

www.wiadlek.pl

## CONTENTS

### ORIGINAL ARTICLES

- Valentyna Voloshyna, Olena Denysiuk, Hanna Varina, Anatolii M. Hrynovskyi, Olena O. Lutsak, Olha T. Pletka, Giuseppina Ancona  
PSYCHOLOGICAL FEATURES OF MODERN ELDERLY PEOPLE'S ACTIVE LIFE POSITION 333
- Tetiana Zaikina, Diana Minukhina, Ganna Titova, Petro Rynchak, Natalia Lantukhova  
IMPACT OF PERCUTANEOUS CORONARY INTERVENTION ON PROTHROMBOGENIC POTENTIAL IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AND DIABETES MELLITUS TYPE 2 339
- Iryna B. Romash, Vasyl. H. Mishchuk, Ivan R. Romash, Iryna O. Krasilych, Nadiya I. Romash, Viktor I. Vus, Yaroslav Kolinko  
MANIFESTATIONS OF EXCESSIVE DAYTIME SLEEPINESS AND GHRELIN LEVEL IN CASE OF GASTROESOPHAGEAL REFLUX DISEASE IN PATIENTS WITH UNDIFFERENTIATED CONNECTIVE TISSUE DISEASE 344
- Tetiana Formanchuk, Mariya Pokidko, Andrii Formanchuk, Andrii Zhmur, Vitaliy Katsal  
ASSOCIATION OF CLINICAL AND EARLY ROUTINE LABORATORY FINDINGS WITH SEVERITY OF ACUTE PANCREATITIS 351
- Liudmyla F. Kaskova, Marina O. Sadovski  
AGE FEATURES OF DECIDUOUS TEETH CARIES PARAMETERS IN 3-6 YEARS OLD AGED CHILDREN 357
- Maryna Filonenko, Larysa Zhuravlyova, Nelya Sokolnikova  
CORRELATION OF CARDIAC BIOMARKERS WITH THE LEVELS OF SELENIUM AND ANTIOXIDANT ENZYMES IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AND A HISTORY OF HYPERTENSION 362
- Kateryna Mulyk, Aleksander Skaliy, Larysa Ruban, Liana Duhina, Tetiana Skaliy, Tomasz Nowikiewicz, Witold Kowalski  
IMPLEMENTATION OF THE POLISH-UKRAINIAN PROJECT "SELF-DIAGNOSIS OF BREAST CANCER IN YOUNG UKRAINIAN WOMEN" WITHIN THE FRAMEWORK OF THE RITA PROGRAM – CHANGES IN THE REGION AT THE KHARKIV STATE ACADEMY OF PHYSICAL CULTURE 366
- Ihor V. Kolosovych, Ihor V. Hanol, Ihor V. Cherepenko, Kateryna O. Lebedieva, Khrystyna O. Korolova  
INTRABDOMINAL PRESSURE AND ITS CORRECTION IN ACUTE SURGICAL PATHOLOGY 372
- Olga V. Denefil, Yaroslav O. Bilyk, Sofia V. Chorniy, Larysa Ya. Fedoniuk, Natalia V. Chornii  
THE PECULIARITIES OF MORFOLOGICAL CHANGES OF RATS' OVARY AND BIOCHEMICAL STATE UNDER THE DAMAGE WITH DIFFERENT DOSES OF LEAD ACETATE 377
- Yevhen Shaprynskyi, Volodymyr O. Shaprynskyi, Mustafa Bassam Hussein, Oleg O. Vorovskyi, Yaroslav V. Karyi  
RESULTS OF PREVENTIVE METHODS OF OCCURRENCE CERVICAL ANASTOMOTIC COMPLICATIONS IN ESOPHAGOPLASTY 383
- Ekateryna Biliaieva, Maryna Vlasenko  
DIABETES MELLITUS TYPE 1 IN ADOLESCENTS: IMPACT OF VITAMIN D STATUS 387
- Oleksandr O. Belov, Volodymyr G. Dronenko, Valeriia A. Rybinska, Andrii A. Tkach, Taras V. Shevchuk  
GENDER FEATURES OF DEPRESSIVE AND ANXIOUS MANIFESTATIONS OF THE LUNG CANCER PATIENTS 393
- Maryna I. Kyrychenko, Andriy V. Biliaiev, Andriy P. Mazur  
REMOTE DONOR PRECONDITIONING FOR INCREASING TRANSPLANT SURVIVAL IN THE RECIPIENT'S BODY DURING THE KIDNEY TRANSPLANTATION FROM THE LIVING-RELATED DONOR 397
- L.Ya. Vasyliiev, Yev.B. Radzishavska, A.S. Savchenko, L.A. Vygivska, Ya.K. Radzishavska, O.M. Boiko  
RESULTS OF THE ANALYSIS OF ONCOLOGICAL COMPLICATIONS OF ANTI-TUMOR TREATMENT IN PATIENTS WITH THYROID CANCER ON THE BASIS OF MATHEMATICAL ANALYSIS OF THE CATAMNESTIC DATA 404
- Inessa I. Yakubova, Victor Dosenko, Lesya Tumanovska, Volodymyr Ostriancko, Sergii Tsypan, Yurii Skrypnyk  
THE EFFECT OF DIET ENRICHED WITH PYROPHOSPHATE (E450) ON MORPHOLOGICAL CHANGES OF TOOTH GERMS OF MOUSE EMBRYOS 410
- Yanina Kutasevych, Aliya Abdalla, Iryna Oliinyk, Iryna Mashtakova, Yuliia Shcherbakova  
RETROSPECTIVE CHART ANALYSIS OF PATIENTS DIGNOSED WITH ACANTHOLYTIC PEMPHIGUS FOR THE PERIOD 2008-2018 416
- Marianna Dashko, Orysya Syzon, Iryna Voznyak, Iryna Chaplyk-Chyzho  
STUDY OF IMMUNO-PATHOGENETIC FEATURES OF PSORIASIS AND ACNE'S COURSE 422
- Iryna Tepla, Andrii Tkachenko, Valerii Teplyi  
ASSOCIATION BETWEEN PLACENTAL MORPHOMETRIC PARAMETERS AND BIRTH WEIGHT IN DICHORIONIC DIAMNIOTIC TWINS 427
- Anna Chernenko, Olga Dubenko, Liudmyla Kovalenko, Tetyana Nessonova  
CO-OCCURRING NECK-PAIN WITH MYOFASCIAL DYSFUNCTION IN PATIENTS WITH EPISODIC MIGRAINE 433

# IMPACT OF PERCUTANEOUS CORONARY INTERVENTION ON PROTHROMBOGENIC POTENTIAL IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AND DIABETES MELLITUS TYPE 2

DOI: 10.36740/WLek202202102

**Tetiana Zaikina, Diana Minukhina, Ganna Titova, Petro Rynchak, Natalia Lantukhova**

KHARKIV NATIONAL MEDICAL UNIVERSITY, KHARKIV, UKRAINE

## ABSTRACT

**The aim:** Aim of study is to assess the influence of urgent reperfusion strategy on the levels of vWf, PAI-1 and sCD40L in patients with acute myocardial infarction (AMI) and concomitant diabetes mellitus type 2 (DM2).

**Materials and methods:** 255 patients with acute myocardial infarction took part in the study, they were divided into four groups depending on the presence of concomitant diabetes mellitus type 2 and performed treatment: I group – 83 diabetic patients who were underwent urgent reperfusion therapy; II group – 60 diabetic patients who received standard anticoagulant therapy; III group – 65 non-diabetic patients who were underwent urgent reperfusion therapy; IV group – 47 non-diabetic patients who received standard anticoagulant therapy. The levels of von Willebrand factor, PAI-1 and sCD40L were determined by enzyme-linked immunosorbent assay. Statistical data were processed using the Mann–Whitney U-test, the Kruskal–Wallis H-test, quantitative variables were described by the following parameters: median (Me), 25th and 75th percentiles (Q1; Q3).

**Results:** According to obtained data, we can conclude that patients with acute myocardial infarction and concomitant type 2 diabetes mellitus have higher levels of von Willebrand factor, PAI-1 and sCD40L compared to non-diabetic patients with AMI, which leads to the increasing of the platelets adhesion and aggregation and decreasing of fibrinolysis.

**Conclusions:** Urgent restoration of blood supply in occluded artery contributed to a statistically significant reduction in levels of von Willebrand factor, PAI-1 and sCD40L levels in both diabetics and non-diabetic patients, reducing the risk of thromboembolic complications and thus improving the prognosis.

**KEY WORDS:** acute myocardial infarction, diabetes mellitus, reperfusion therapy, prothrombotic potential

Wiad Lek. 2022;75(2):339-343

## INTRODUCTION

Acute myocardial infarction is one of the leading medical problems currently. Its association with diabetes mellitus type 2 (DM2) is accompanied by higher risk of complications, including thromboembolic ones [1].

It is well known that the main cause of coronary artery occlusion is thrombosis at the site of a ruptured atherosclerotic plaque. The main components of the formed thrombus are blood cells and fibrin. It was found that at the beginning of thrombus formation its main cellular components presented by activated platelets, which are rapidly stabilized by fibrin fibers [2].

The formation of initial thrombi depends mainly on the adhesive and aggregating properties of platelets. Adhesion of activated platelets is initiated by von Willebrand factor (vWF), released from the damaged endothelial cells [3]. Activated platelets express CD40L that being a ligand of glycoprotein IIb/IIIa enhances platelets aggregation [4]. Recent studies showed its association with insulin resistance [5] and complicated course of acute coronary syndrome [6].

Under the normal circumstances, in response to thrombus formation, fibrinolysis is activated due to the synthesis

of tPA, aimed at its dissolution. But in patients with type 2 diabetes the balance of these processes is usually disturbed and fibrinolysis inhibitors predominate over its activators [7]. PAI-1 is a major fibrinolysis inhibitor that suppresses the dissolution of fibrin filaments [8]. Increased levels of PAI-1 correlate with degree of insulin resistance [9].

Considering all mentioned above it becomes obvious that presence of diabetes mellitus type 2 (DM2) contributes to the formation of the prothrombotic status [10] due to enhanced adhesive-aggregation properties of platelets and imbalance between coagulation and fibrinolytic substances.

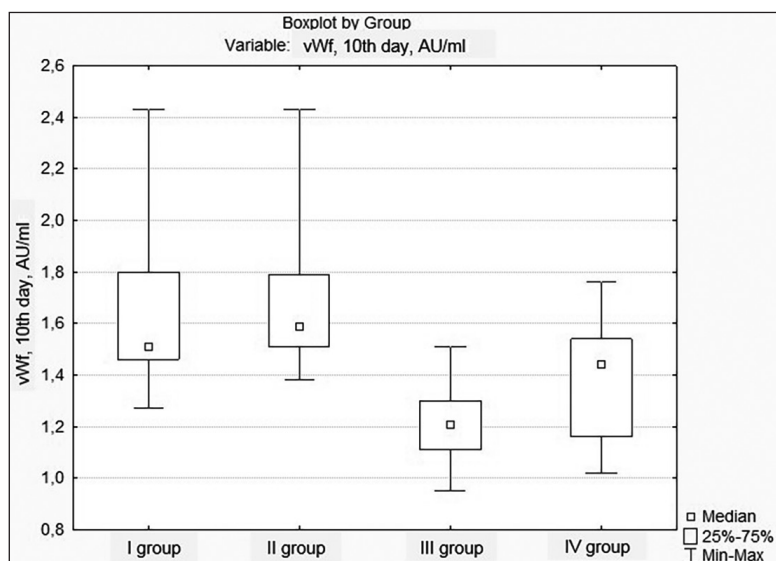
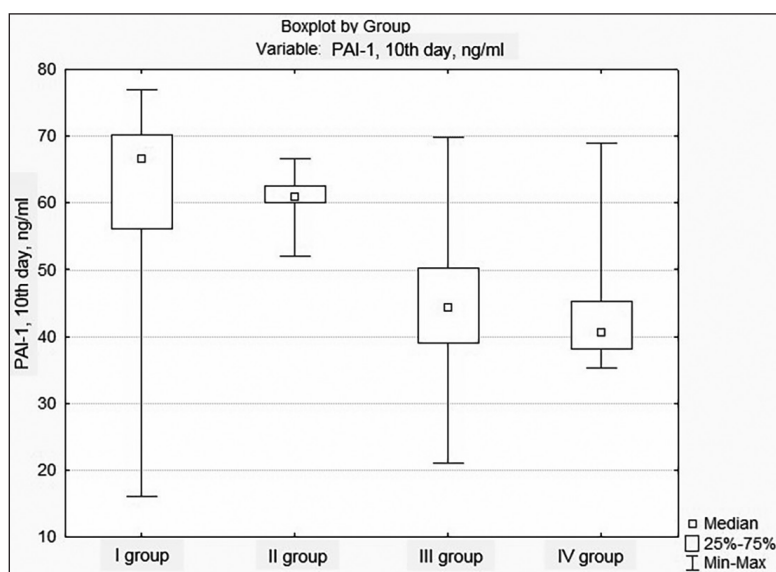
Given the absolute priority of urgent reperfusion strategy in patients with AMI due to its proven positive effect on short and long-term prognosis [11], we also decided to evaluate its effect on the prothrombotic potential associated with type 2 diabetes.

## THE AIM

Aim of study is to evaluate the influence of urgent reperfusion on the levels of vWf, PAI-1 and sCD40L in patients with acute myocardial infarction (AMI) and concomitant diabetes mellitus type 2 (DM2).

**Table I.** Levels of vWf, PAI-1, sCD40L measured on the 1st day of AMI depending on the presence of concomitant DM2 (Me [Q1; Q3])

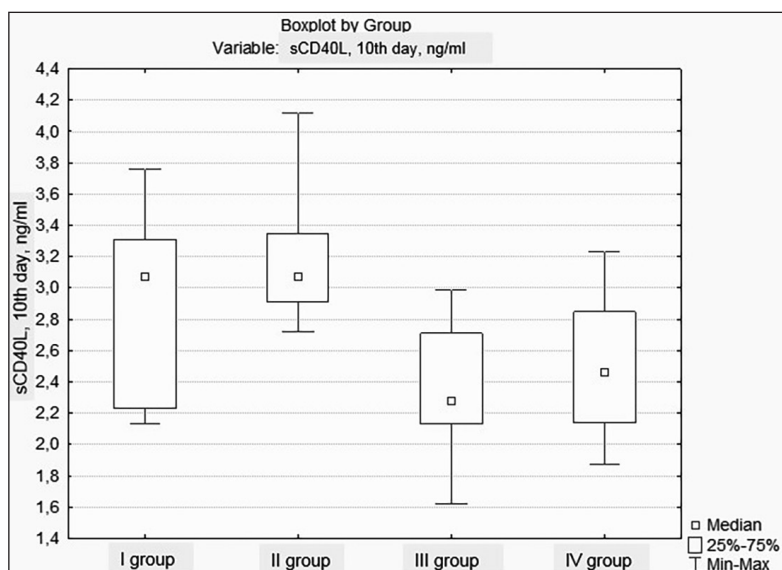
Parameter	Patients with AMI+DM2 (n=73)	Patients with AMI (n=57)	Significance of differences
vWf, AU/ml	1,97 [1,82; 2,18]	1,54 [1,36; 1,72]	U=151,5; p<0,01
PAI-1, ng/ml	68,85 [60,95; 71,1]	53,1 [43,38; 59,6]	U=800,5; p<0,01
sCD40L, ng/ml	3,78 [3,67; 3,9]	3,35 [2,88; 3,63]	U=403; p<0,01

**Fig 1.** Box graphs of vWf values measured on the 10th day of AMI depending on the presence of concomitant DM2 and performed treatment**Fig 2.** Box graphs of PAI-1 values measured on the 10th day of AMI depending on the presence of concomitant DM2 and performed treatment

## MATERIALS AND METHODS

255 patients with acute myocardial infarction were enrolled in the study. They were divided into 4 groups depending on the presence of concomitant diabetes mellitus type 2 and performed treatment: I group – 83 diabetic patients who were underwent urgent reperfusion; II group – 60 diabetic patients who received standard anticoagulant therapy; III group – 65 non-diabetic patients who were underwent urgent reperfusion; IV group – 47 non-diabetic patients who received standard anticoagulant therapy.

This research was carried out in compliance with all relevant diagnostic and treatment standards of the requirements for the ethical component of clinical trials (GCP, 1997). Before the study, patients were informed about the essence of the study, its purpose and possible results. All participants signed up the informed agreement. This study was approved by the local ethics committee in accordance to the recommendations of the ethical committees for biomedical research, Ukrainian legislation on health protection, the 2000 Helsinki Declaration and the directives



**Fig 3.** Box graphs of sCD40L values measured on the 10th day of AMI depending on the presence of concomitant DM2 and performed treatment

of the European Partnership 86/609 on the participation of people in biomedical research.

Acute myocardial infarction was diagnosed according to the Order of the Ministry of Health of Ukraine №455 dated 02.07.2014 «Unified clinical protocol of emergent, primary, secondary (specialized) and tertiary (highly specialized) medical aid and medical rehabilitation of the patients with acute coronary syndrome with elevated ST segment» on the basis of clinical, echocardiographic and biochemical criteria. Type 2 DM was diagnosed according to the Order of the Ministry of Health of Ukraine № 1118 dated 21.12.2012 «Standardized Clinical Protocol «Diabetes Mellitus Type 2».

Blood samples were obtained on the 1<sup>st</sup> and 10<sup>th</sup> days of AMI under the basal conditions, vWf blood serum levels were determined with commercial enzyme linked immunosorbent assay ELISA kit (Technoclone GmbH, Austria), PAI-1 blood serum levels were determined with commercial enzyme linked immunosorbent assay ELISA kit (Technoclone GmbH, Austria), sCD40-ligand blood serum levels were determined with commercial enzyme linked immunosorbent assay ELISA kit (YH Biosearch Laboratory, China) on the Automated EIA Analyzer «LabLine-90» (Austria). Statistical processing of results was performed using IBM SPSS Statistics software: quantitative variables were described by the following parameters: median (Me), 25<sup>th</sup> and 75<sup>th</sup> percentiles (Q1; Q3), the Mann-Whitney U-test was used for the assessment of the differences between two independent groups, the Kruskal-Wallis H-test was used for the assessment of the differences between four independent groups, p-statistical significance ( $p < 0,05$  is considered statistically significant).

## RESULTS

Analyzing the levels of vWf on the first day of myocardial infarction (table I), we detected that in the group of diabetic patients the median vWf was considerably

higher than in the group of non-diabetic – 1,97 AU/ml and 1,54 AU/ml respectively ( $U=151,5$ ;  $p < 0,01$ ), that indicates significantly more intense processes of platelets adhesion under conditions of concomitant disorders of carbohydrate metabolism.

Similar statistically significant differences between the study groups were found for the level of PAI-1: the median PAI-1 in diabetic patients was 68,85 ng/ml while in non-diabetic patients – 53,1 ng/ml respectively ( $U=800,5$ ;  $p < 0,01$ ) which can contribute to inhibition of lysis of blood clots.

A similar trend was found for sCD40L, the median of which was significantly higher in the group of patients with concomitant type 2 diabetes compared to patients without concomitant type 2 diabetes – 3,78 ng/ml and 3,35 ng/ml respectively ( $U=403$ ;  $p < 0,01$ ), indicating a high platelet aggregation potential.

Taking into account these results, it can be established that patients with acute myocardial infarction and concomitant type 2 diabetes mellitus experience prothrombotic status due to increased adhesion and aggregation properties of platelets on the background of inhibited fibrinolysis.

Urgent reperfusion strategy helps to improve outcomes for patients due to its positive impact on short and long-term prognosis [11]. However, it is interesting to note that in patients with AMI with concomitant DM2, urgent endovascular intervention is performed significantly less often than in patients without diabetes, although, according to modern guidelines for high-risk patients, tactics require greater determination aimed at reduction of the incidence of complications, including thromboembolic complications, to which these patients are prone [12]. We decided to analyze how PCI affects the mediators of thrombosis studied by us and whether there are differences depending on the co-existing DM2.

According to obtained data, we can conclude that urgent reperfusion had a positive impact on the dynamics of the studied indicators, determined on the 10th day of

AMI: reperfusion therapy contributed to a statistically significant reduction in the levels of vWf (H=60,421;  $p<0,01$ ) (fig.1), PAI-1 (H=48,434;  $p<0,01$ ) (fig.2), sCD40L (H=47,614;  $p<0,01$ ) (fig.3) in the groups of diabetic and non-diabetic patients.

## DISCUSSION

Obtained results correlate with recent studies that showed positive impact of PCI on the vWF dynamics and significantly higher risk of development of major adverse cardiovascular events in patients with increased residual levels of vWF after performed PCI due to myocardial infarction. The authors confidently call the Willebrand factor an essential risk marker in patients with acute coronary syndrome and offer to use it for the assessment of long-term prognosis after acute coronary events [13].

The positive effect of percutaneous coronary intervention on the marker of platelet aggregation activity-sCD40L was demonstrated in several recent investigations where invasive approach to the treatment of acute coronary syndrome also contributed to a more significant reduction in sCD40L compared with conservative therapy in diabetic [12] and non-diabetic patients [14].

PCI was also accompanied by a decrease in the level of PAI-1 in the dynamics of patients with and without disorders of carbohydrate metabolism, but still in the literature there are conflicting data on its prognostic value in predicting of adverse cardiovascular events [15].

Given the results, it can be argued that urgent reperfusion strategy reduces the prothrombotic potential in patients with acute myocardial infarction, regardless of concomitant insulin resistance by reducing the adhesive-aggregation properties of platelets and inhibition of antifibrinolytic effects.

## CONCLUSIONS

Patients with acute myocardial infarction and concomitant type 2 diabetes mellitus have higher levels of von Willebrand factor, PAI-1 and sCD40L compared to non-diabetic patients with AMI, which contributes to the formation of prothrombotic potential.

Reperfusion therapy has significantly reduced levels of von Willebrand factor, PAI-1 and sCD40L levels in both diabetics and non-diabetic patients with acute myocardial infarction, reducing the risk of thromboembolic complications and thus improving the prognosis.

## REFERENCES

1. Rawshani A., Rawshani A., Franzén S. et al. Risk Factors, Mortality, and Cardiovascular Outcomes in Patients with Type 2 Diabetes. *N Engl J Med.* 2018; 379: 633. doi: 10.1056/NEJMoa1800256
2. Gabbasov Z.A., Ryzhkova Y.V. [Platelet phenotype and myocardial infarction]. *Kreativnaya kardiologiya.* 2014; 2: 48-59. (in Russian).
3. Schneider M.F., Fallah M.A., Mess C. et al. Platelet adhesion and aggregate formation controlled by immobilised and soluble VWF. *BMC Mol and Cell Biol.* 2020; 21: 64. doi: 10.1186/s12860-020-00309-7.
4. Eskafi S., Raaz D. Patients with acute coronary syndrome express enhanced CD40 ligand/CD154 on platelets CD. *Heart.* 2001; 86(6): 649-5. doi: 10.1136/heart.86.6.649.
5. Zaikina T.S. [Relationships between sCD40-ligand levels, severity of insulin resistance and blood lipid profile in patients with acute myocardial infarction with concomitant type 2 diabetes]. *Visnik problem biologii i meditsini.* 2015; 3 (120): 118–122. (in Ukrainian).
6. Napoleão P., Carmo M., Pinheiro T. Prognostic evaluation of soluble CD40L in acute myocardial infarction: is not fancy, is science! *Ann Transl Med.* 2017; 5(4): 90. doi: 10.21037/atm.2017.01.58.
7. Zolotukhina Y.A. Features of changes in coagulation and fibrinolytic activity in patients with ischemic heart disease and concomitant type 2 diabetes mellitus, depending on the presence of diabetic vascular complications. *Mizhnarodnyi Endokrynolohichnyi Zhurnal.* 2018; 14(8): 734-739. (in Ukrainian). doi: 10.22141/2224-0721.14.8.2018.154852.
8. Song C., Burgess S., Eicher J.D. et al. Causal Effect of Plasminogen Activator Inhibitor Type 1 on Coronary Heart Disease. *J Am Heart Assoc.* 2017; 6(6): e004918. doi: 10.1161/JAHA.116.004918.
9. Yarmolinsky J., Bordin Barbieri N., Weinmann T. et al. Plasminogen activator inhibitor-1 and type 2 diabetes: a systematic review and meta-analysis of observational studies. *Sci Rep.* 2016; 6: 17714. doi: 10.1038/srep17714.
10. Picard F., Adjedj J., Varenne O. Diabetes Mellitus, a prothrombotic disease. *Ann Cardiol Angeiol (Paris).* 2017; 66(6): 385-2. doi: 10.1016/j.ancard.2017.10.011.
11. Kytö V., Prami T., Khanfir H. et al. Usage of PCI and long-term cardiovascular risk in post-myocardial infarction patients: a nationwide registry cohort study from Finland. *BMC Cardiovasc Disord.* 2019; 19: 123. doi: 10.1186/s12872-019-1101-8.
12. Belen'kova Y.A., Karetnikova V.N., Dyachenko A.O. [Efficacy of percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction in the presence of impaired glucose tolerance and diabetes mellitus]. *Kardiologiya.* 2014; 11: 4-10. doi: 10.18565/cardio.2014.11.4-10
13. Tscharré M., Tentzeris I., Vogel B. et al. Von Willebrand factor and ADAMTS13 and long-term outcomes in patients undergoing percutaneous coronary intervention. *Thromb Res.* 2020; 196: 31. doi: 10.1016/j.thromres.2020.08.018.
14. Qing-Bo C., Zeng-Lei H., Xue-Yu S. et al. Primary versus delayed percutaneous coronary intervention in terms of autonomic nervous function, inflammatory responses and cardiac function. *Int J Clin Exp Med.* 2016; 9(7): 14604.
15. Jung R., Motazedian P., Ramirez D. et al. Association between plasminogen activator inhibitor-1 and cardiovascular events: a systematic review and meta-analysis. *Thromb J.* 2018; 16:12. doi: 10.1186/s12959-018-0166-4.

## ORCID and contributionship:

Tetiana Zaikina: 0000-0003-1587-2146<sup>B-D,F</sup>  
 Diana Minukhina: 0000-0003-4091-5849<sup>B,C</sup>  
 Ganna Titova: 0000-0001-6876-083X<sup>A,E</sup>  
 Petro Rynchak: 0000-0002-7413-0970<sup>A,E</sup>  
 Natalia Lantukhova: 0000-0003-4713-7971<sup>A,E</sup>

## Conflict of interest:

The Authors declare no conflict of interest.



---

**CORRESPONDING AUTHOR**

**Tetiana Zaikina**

Kharkiv National Medical University

4 Nauki Avenue, 61000 Kharkiv, Ukraine

tel: 0508127688

e-mail: zaikina\_tatyana@ukr.net

**Received:** 19.02.2021

**Accepted:** 27.10.2021

---

**A** - Work concept and design, **B** - Data collection and analysis, **C** - Responsibility for statistical analysis,

**D** - Writing the article, **E** - Critical review, **F** - Final approval of the article