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PREDICTION OF THE RESULTS OF TREATMENT OF DIABETIC RETINOPATHY IN TYPE 2 DIABETES MELLITUS USING INDICATORS OF ENDOTHELIAL DYSFUNCTION

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Modern treatment of diabetes mellitus is based on strict glycemic control with the use of insulin therapy, as well as individually-oriented selection of drugs to lower glucose levels [1, p. 181]. The treatment of diabetic retinopathy (DR) is no exception, which has changed significantly over the past two decades due to the introduction of new technologies, including intravitreal injections of anti-VEGF drugs and steroids, as well as laser therapy [2, p. 1941].

Since the needs of patients in certain groups may differ, the treatment of DR should be personalized. Glycemic and blood pressure control can slow the progression of DR in the early stages, and in the late stages, laser treatment and/or anti-VEGF therapy can reduce vision loss [3, p. 67]. The modern strategy for treating DR is based on a combination of anti-VEGF therapy, laser coagulation, and surgical interventions depending on the clinical case, provided that systemic risk factors are optimally controlled. On the other hand, despite the widespread introduction of modern technologies, complications and relapses are possible after these interventions in the short and long term.

It is quite reasonable to believe that one of the leading mechanisms for the onset and further progression of DR is endothelial dysfunction with damage to the vascular wall and a decrease in the protective effects of nitric oxide (NO) [4, p. 591]. Metabolic disorders and accumulation of reactive oxygen species (ROS) inhibit endothelial NO synthase, which inhibits endothelium-mediated vasodilation. Another consequence is the initiation of sluggish metabolic inflammation, the markers of which are C-reactive protein and pro-inflammatory cytokines, which have a positive correlation with the severity of DR. Endothelial damage in DR reflects an increase in the formation of endothelin-1 in the vascular wall [5, p. 986]. Another marker of endothelial dysfunction is endothelial monocyte-activating polypeptide-II, which has pro-inflammatory and antiangiogenic activity.

The **aim** of the study is to develop a prognostic model for assessing the effectiveness of treatment of diabetic retinopathy in type 2 diabetes mellitus based on the determination of endothelial dysfunction indicators.

Materials and methods. 136 patients (136 eyes) with type 2 diabetes and DR were examined, who were divided into groups: 1st – with non-proliferative DR (60 eyes), 2nd – with preproliferative DR (PPDR; 42 eyes) and 3rd – with proliferative DR (PDR; 34 eyes). Patients were examined using ophthalmological methods; high-sensitivity C-reactive protein (hs-CRP), endothelin-1, endothelial monocyte-activating polypeptide-II (EMAP-II), endothelial NO synthase (eNOS), interleukins (IL-1β and IL-6) were determined in serum by enzyme immunoassay. The content of nitric oxide metabolites (NOx) in the blood was determined by biochemical method. Repeated ophthalmological examination was performed after 2 years of treatment, which included conservative, laser photocoagulation, anti-VEGF, surgical (vitrectomy) and their combination. Analysis of the study results was performed in the EZR v.1.54 package (Austria).

Results. In patients with type 2 diabetes and different stages of DR, a gradual increase in the blood content of all markers of endothelial dysfunction was found compared to controls (by 1.9-16.4 times; $p<0.001$). The exception was eNOS, the content of which gradually decreased (by 1.5–3.7 times; $p<0.001$). All indicators (except NOx) were associated with the risk of rapid progression of DR (AUC=0.77-0.88). The maximum AUC values (>0.8) were observed in models with EMAP-II, hc-CRP and IL-6. The specificity of the models with hs-CRP, EMAP-II, eNOS and IL-6 exceeded 85%, but their sensitivity was quite low (from 51.9% to 81.0%), which limited their use in practical studies. The multivariate model for predicting the risk of rapid progression of DR included EMAP-II and eNOS, which indicated the key importance of these markers for determining the effectiveness of DR treatment. The model had excellent quality indicators AUC = 0.92 (95% CI 0.86–0.96; sensitivity – 81.0%, specificity – 91.2%) and excellent quality for all treatments (AUC was from 0.85 to 1.0).

Conclusions. Thus, markers of endothelial dysfunction were associated with the results of DR treatment. For the first time, a model for predicting the effectiveness of DR treatment has been built for the Ukrainian population, highlighting the most significant markers of endothelial dysfunction – EMAP-II and eNOS.

Bibliography:

1. American Diabetes Association Professional Practice Committee. 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes-2025. *Diabetes Care*. 2025 Jan 1;48(Suppl 1):S181-S206.

2. Amoaku W.M., Ghanchi F., Bailey C., Banerjee S., Banerjee S., Downey L., Gale R., Hamilton R., Khunti K., Posner E., Quhill F., Robinson S., Setty R., Sim D., Varma D., Mehta H. Diabetic retinopathy and diabetic macular oedema pathways and management: UK Consensus Working Group. *Eye (Lond).* 2020 Jun;34(Suppl 1):1-51. doi: 10.1038/s41433-020-0961-6. Erratum in: Eye (Lond). 2020. 34(10). P. 1941–1942.

3. Flaxel C. J., Adelman R. A., Bailey S. T., Fawzi A., Lim J. I., Vemulakonda G. A., Ying G. S. Diabetic Retinopathy Preferred Practice Pattern®. *Ophthalmology*. 2020. 127(1). P. P66–P145.

4. Gui F., You Z., Fu S., Wu H., Zhang Y. Endothelial Dysfunction in Diabetic Retinopathy. *Front Endocrinol (Lausanne).* 2020. 4;11. P. 591.

5. Kostov K. The Causal Relationship between Endothelin-1 and Hypertension: Focusing on Endothelial Dysfunction, Arterial Stiffness, Vascular Remodeling, and Blood Pressure Regulation. *Life (Basel).* 2021. 11(9). P. 986.

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ТАКТИЧНА МЕДИЦИНА ЯК СКЛАДОВА СИСТЕМИ МЕДИЧНОГО ЗАБЕЗПЕЧЕННЯ В УМОВАХ БОЙОВИХ ДІЙ

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Тактична медицина є невід'ємною складовою системи медичного забезпечення в умовах бойових дій. Вона поєднує елементи військової, невідкладної та екстреної медицини, утворюючи цілісну систему дій, спрямовану на збереження життя військовослужбовців безпосередньо на полі бою. Її головна мета полягає у своєчасному наданні допомоги пораненим, стабілізації їхнього стану та подальшій евакуації до етапів кваліфікованої медичної допомоги. В умовах сучасних війн, де більшість уражень спричинені вогнепальною, мінно-вибуховою чи термічною дією, тактична медицина стає ключовим чинником зниження бойових втрат і підтримання боєздатності армії.

Розвиток тактичної медицини є наслідком осмислення досвіду минулих воєн і збройних конфліктів. Досвід Кореї, В'єтнаму, Афганістану, Іраку