

ABSTRACT&REFERENCES

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COAGULATION, ANTICOAGULATION AND FIBRINOLYTIC SYSTEM OF BLOOD IN PATIENTS WITH ACUTE ISCHEMIC HEART DISEASE AND FEATURES OF CHANGES IN COMBINATION WITH DIABETES MELLITUS (cohort prospective study)

p. 4-8

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Aim. To evaluate the clotting, anticoagulant and fibrinolytic activity of blood in patients with acute coronary heart disease (ACHD) and to determine the peculiarities of changes when combined with ACHD and DM2.

Materials and methods. 60 persons were diagnosed MI with ST-segment elevation, MI without ST-segment elevation, unstable angina. Among them: 30 patients with ACHD (Group I), 30 patients with ACHD in combination with DM2 (Group II) and 15 practically healthy subjects (control group). The average age of the patients is 64.2±10.01 years, the number of men is 30 (50%), and women – 30 (50%). Patients were diagnosed with hemostatic parameters in venous blood.

Results. With a general similarity of changes in the anticoagulant system in both groups, attention was drawn to the significant exacerbation of antithrombin activity in patients in group II, which was accompanied by oppression of the PtC system. Thus, the content of ATIII in this group was lower than the control group by 27.8 % (65.5 [54.0; 76.0], $p < 0.001$), and PtC decreased by 37.2 % (0.66 [0, 6, 0, 7], $p < 0.001$), whereas in patients of group I anticoagulant activity decreased only at the expense of ATIII-78,0 [74,0; 82,0] versus 90,0 [80,0; 110,0], $p < 0,01$), while the level of PtC did not undergo significant changes. The indicated changes took place against the suppression of fibrinolytic activity in the two groups under study. At the same time, XIIa fibrinolysis appeared to be the most prolonged in group II, namely, 1.6 times in comparison with the same indicator in group I (20.4 [18.5; 23.7] vs. 13.05 [12.6; 13, 7], $p < 0.001$) and 2.6 times different from control (8.0 [7.0; 11.0]; $p < 0.001$).

Conclusions. Changes detected as a result of studying the coagulation linkage of hemostasis in the study groups indicate acceleration of blood coagulation at all stages of coagulation. The presence of DM2 is characterized by a number of changes from the system of hemostasis, which determine the increased risk of thrombotic complications

Keywords: diabetes mellitus, plasma hemostasis, acute ischemic heart disease, thrombotic formation

References

1. IDF Diabetes Atlas (2018). Available at: <https://www.diabetesatlas.org/>

2. King, R. J., Grant, P. J. (2016). Diabetes and cardiovascular disease: pathophysiology of a life-threatening epidemic. *Herz*, 41 (3), 184–192. doi: <http://doi.org/10.1007/s00059-016-4414-8>

3. Dedov, I. I., Sheštakova, M. V. (Eds.) (2016). *Sakharnyi diabet 2-go tipa: ot teorii k praktike*. Moscow: MIA, 571.

4. BirhanYilmaz, M., Guray, U., Guray, Y., Altay, H., Demirkan, B., Caldir, V. et. al. (2005). Metabolic syndrome is associated with extension of coronary artery disease in patients with non-ST segment elevation acute coronary syndromes. *Coronary Artery Disease*, 16 (5), 287–292. doi: <http://doi.org/10.1097/00019501-200508000-00005>

5. Maschirow, L., Khalaf, K., Al-Aubaidy, H. A., Jelinek, H. F. (2015). Inflammation, coagulation, endothelial dysfunction and oxidative stress in prediabetes – Biomarkers as a possible tool for early disease detection for rural screening. *Clinical Biochemistry*, 48 (9), 581–585. doi: <http://doi.org/10.1016/j.clinbiochem.2015.02.015>

6. Dedov, I. I., Sheštakova, M. V., Vikulova, O. K. (2015). National register of diabetes mellitus in Russian Federation. *Diabetes Mellitus*, 18 (3), 5–22. doi: <http://doi.org/10.14341/dm201535-22>

7. Buse, J. B., Ginsberg, H. N., Bakris, G. L., Clark, N. G., Cošta, F., Eckel, R. et. al. (2007). Primary prevention of cardiovascular diseases in people with diabetes mellitus: a scientific statement from the American Heart Association and the American Diabetes Association. *Circulation*, 115 (1), 114–126. doi: <http://doi.org/10.1161/circulationaha.106.179294>

8. Sheštakova, M. V., Chazova, I. E., Sheštakova, E. A. (2016). Russian multicentre type 2 diabetes screening program in patients with cardiovascular disease. *Diabetes Mellitus*, 19 (1), 24–29. doi: <http://doi.org/10.14341/dm7765>

9. Kondrateva, E. I., Sukhanova, G. A., Litvinova, L. S., Kirienkova, E. V., Kretova, E. I., Zatolokin, P. A. (2011). Vliianie vozrasta i pola na pokazateli koaguliatsionnogo i sosudisto-trombotsitarnogo gemoštaza u bolnykh sakharnogo diabetu 2 tipa. *Klinicheskaia laboratornaia diagnostika*, 8, 41–43.

10. Kuznik, B. I., Vitkovskiy, Y. A., Zakharova, M. Y., Klyuchereva, N. N., Rodnina, O. S., Solpov, A. V. (2012). Aggregation activity of blood formed elements in patients with type 1 and type 2 diabetes mellitus. *Diabetes Mellitus*, 15 (2), 49–53. doi: <http://doi.org/10.14341/2072-0351-5518>

11. Nelaeva, Iu. V. (2003). Gemošticheskie izmeneniia u bolnykh sakharnym diabetom 1 tipa s diabeticheskoi nefropatiiei. *Vozmozhnosti korrektsii alfa-lipoevoi kislotoi*. Tiumen.

12. Petina, M. M., Gorokhovskaia, G. N., Martynov, A. I. (2010). Osobennosti gemoštaza u bolnykh sakharnym diabetom 2 tipa v sochetanii s ishemicheskoi bolezniiu serdtsa. *Meditsinskaia nauka i obrazovanie Urala*, 11 (1), 30–36.

13. Severina, A. S., Sheštakova, M. V. (2004). Narushenie sistemy gemoštaza u bol'nykh sakharnym diabetom. *Diabetes Mellitus*, 7 (1), 62–67. doi: <http://doi.org/10.14341/2072-0351-5905>

14. Khasanova, Y. V., Nelaeva, A. A., Galkina, A. B., Medvedeva, I. V. (2012). The role of coagulation and inflammation in the development of diabetic nephropathy in patients

withdiabetes mellitus type 2. *Diabetes Mellitus*, 15 (1), 31–34. doi: <http://doi.org/10.14341/2072-0351-5976>

15. Jaffa, A. A., Durazo-Arvizu, R., Zheng, D., Lackland, D. T., Srikanth, S., Garvey, W. T., Schmaier, A. H. (2003). Plasma Prekallikrein: A Risk Marker for Hypertension and Nephropathy in Type 1 Diabetes. *Diabetes*, 52 (5), 1215–1221. doi: <http://doi.org/10.2337/diabetes.52.5.1215>

16. Heidar, A., Bassam, R., Satish, K., Cohen, M. (2003). Platelets and Antiplatelet Therapy in Patients with Diabetes Mellitus. *The Journal of invasive cardiology*, 15 (5), 264–269.

17. Xiangyu, C. H., Fang, L., Hongbo, L. (2017). The Relationship between Type 2 Diabetes and Platelet Indicators. *Iranian Journal of Public Health*, 46 (9), 1211–1216.

18. Santilli, F., Simeone, P., Liani, R., Davi, G. (2015). Platelets and diabetes mellitus. *Prostaglandins & Other Lipid Mediators*, 120, 28–39. doi: <http://doi.org/10.1016/j.prostaglandins.2015.05.002>

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COHORT PROSPECTIVE STUDY OF THE HEART AND VESSEL CONDITION IN PATIENTS WITH ISCHEMIC HEART DISEASE COMBINED WITH TYPE 2 DIABETES

p. 8-14

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The article is devoted to the evaluation of peculiarities of cardiac hemodynamics in patients with type 2 diabetes mellitus (type 2 diabetes) in combination with ischemic heart disease (IHD). The main parameters of the function of the heart and structural and functional changes of the common carotid artery (SCA), features of carbohydrate and lipid metabolism have been studied. Aim: To evaluate the peculiarities of cardiac hemodynamics in patients with type 2 diabetes in combination with IHD and to find correlations with other cardiovascular risk factors in these patients.

Materials and methods: 100 patients with IHD were included in the study: patients with type 2 diabetes in combination with coronary heart disease, stable angina pectoris (n=60) – 1 group, 2 groups – patients with coronary heart disease: stable angina pectoris II-III FC without violations of carbohydrate metabolism (n=40). In the study of patients, the analysis of complaints, car-

diological anamnesis, vascular risk factors, objective research, clinical and laboratory and clinical and instrumental research methods were performed, which included ECG, Holter monitoring of ECG, Echo-CG, and vegetative ECG tests.

Results: On the basis of the conducted studies we revealed more severe violations of the diastolic function of the left ventricle, increased volumetric parameters of the heart, thickening of the intima-media complex in patients with coronary heart disease on the background of type 2 diabetes. According to the results of vegetative tests, 71.7 % of patients in group 1 revealed signs of diabetic autonomic cardiac neuropathy (DANS). Episodes of painless myocardial ischemia (BBIM) in patients in group 1 were twice as likely to occur in group 2 patients (45% of the total number of patients with diabetes mellitus) than in patients without type 2 diabetes (20 % of the total number of patients without diabetes type 2).

Conclusions: Significant violations of lipid metabolism, significant violations of autonomic innervation, including the sympathetic nervous system, and longer duration of type 2 diabetes (13.2±6.23) years were characteristic for patients with DANS, in combination with BBIM. In patients with type 2 diabetes with DANS signs, an increase in the diameter of the CCA and the thickness of the intima-media complex was observed, indicating a more pronounced atherosclerotic vascular trauma in the central nervous system, and is an independent predictor of acute cardiovascular and cerebrovascular events. The presence of type 2 diabetes in patients with coronary heart disease accelerates the progression of LV remodelling and enhances myocardial dysfunction of the lungs, which is also one of the explanations for the higher risk of cardiac events in patients with coronary artery disease of the concomitant type 2 diabetes. It is advisable for all patients with type 2 diabetes to conduct an ultrasound examination of the heart with an estimate of intima-media thickness, as well as daily ECG monitoring for the early detection of atherosclerosis, episodes of BBIM, and timely treatment

Keywords: diabetes mellitus type 2, ischemic heart disease, intima-media thickness

References

1. Statsenko, M. E., Turkina, S. V., Shalaeva, S. S. et. al. (2013). Osobennosti narusheniia strukturno-funktsionalnykh parametrov serdtsa u patsientov s khronicheskoi serdechnoi nedostatochnosti i diabeticheskoi avtonomnoi kardialnoi nevroptaii. *Terapevticheskii arkhiv*, 10, 23–28.
2. Pro zatverdzhennia ta vprovadzhenia medyko-tekh-nolohichnykh dokumentiv zi standartyzatsii medychnoi dopomohy pry tsukrovomu diabeti 2 typu (2012). Nakaz MOZ Ukrainy No. 1118. 21.12.2012. Available at: http://old.moz.gov.ua/ua/portal/dn_20121221_1118.html
3. Serhyenko, O. O., Serhyenko, V. O. (2013). Kardiova-skuliarna avtonomna neiropatiia u khvorykh na tsukrovyy diabet. *Zdorovia Ukrainy*, 1, 38–41.
4. Kumar, R., Kerins, D. M., Walther, T. (2015). Cardiovascular safety of anti-diabetic drugs. *European Heart Journal – Cardiovascular Pharmacotherapy*, 2 (1), 32–43. doi: <http://doi.org/10.1093/ehjcvp/pvv035>
5. Baevskiy, R. M. (2004). The analysis of heart rate variability: history and philosophy, theory and practice. *Klinicheskaya informatika i telemeditsina*, 1, 54–64.

6. Franch-Nadal, J., Roura-Olmeda, P., Benito-Badorrey, B., Rodriguez-Poncelas, A., Coll-de-Tuero, G., Mata-Cases, M. (2014). Metabolic control and cardiovascular risk factors in type 2 diabetes mellitus patients according to diabetes duration. *Family Practice*, 32 (1), 27–34. doi: <http://doi.org/10.1093/fampra/cmu048>

7. Halter, J. B., Musi, N., McFarland Horne, F., Crandall, J. P., Goldberg, A., Harkless, L. et. al. (2014). Diabetes and Cardiovascular Disease in Older Adults: Current Status and Future Directions. *Diabetes*, 63 (8), 2578–2589. doi: <http://doi.org/10.2337/db14-0020>

8. Bondar, I. A., Demin, A. A., Shabelnikova, O. Yu. (2014). Morphological and functional parameters of the heart and vessels in patients with type 2 diabetes mellitus and cardiovascular autonomic neuropathy. *Sakharnyy diabet*, 2, 41–46.

9. Lunina, E. Y., Petrukhin, I. S. (2012). Diagnostic value of spectral analysis of heart rate variability in cardiac autonomic neuropathy and Type 2 diabetes mellitus. *Rossiiskii kardiologicheskii zhurnal*, 3 (95), 42–46.

10. Rodriguez-Poncelas, A., Coll-de-Tuero, G., Saez, M., Garrido-Martín, J. M., Millaruelo-Trillo, J. M. et. al. (2015). Comparison of different vascular risk engines in the identification of type 2 diabetes patients with high cardiovascular risk. *BMC Cardiovascular Disorders*, 15 (1). doi: <http://doi.org/10.1186/s12872-015-0120-3>

11. Pro zatverdzhennia ta vprovadzhenia medyko-tekhonolohichnykh dokumentiv zi standartyzatsii medychnoi dopomohy pry stablynii ishemichnii khvorobi sertsia (2016). Nakaz MOZ Ukrainy No. 152. 02.03.2016. Available at: http://old.moz.gov.ua/ua/portal/dn_20160302_0152.html

12. Mankovskii, B. N., Poltorak, V. V., Kravchun, N. A., Smirnov, I. I., Bilchenko, A. V., Zhuravleva, L. V. et. al. (2016). Mnogofaktornyi podkhod k terapii sakharnogo diabeta 2 tipa i novye gorizonty v kontrole zabolevaniia. *Zdorov'e Ukrainy*, 3, 28–29.

13. Pop-Busui, R. (2010). Cardiac Autonomic Neuropathy in Diabetes: A clinical perspective. *Diabetes Care*, 33 (2), 434–441. doi: <http://doi.org/10.2337/dc09-1294>

14. Mukhtarova, R. R. (2013). Early detection of cardiovascular type of diabetic autonomic neuropathy. *Prakticheskaya meditsina*, 1 (1 (69)), 75–79.

15. Tkachenko, V. I., Mankovskyi, B. M., Dolzhenko, M. M. (2014). Analiz medychnoho stanu patsientiv z tsukrovym diabetom 2-ho typu ta yoho vplyv na rozvytok uskladnen. *Mizhnarodnyi endokrynolohichnyi zhurnal*, 8, 18–24.

16. Standards of Medical Care in Diabetes--2014 (2013). *Diabetes Care*, 37 (Supplement_1), S14–S80. doi: <http://doi.org/10.2337/dc14-s014>

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SURVIVAL OF PATIENTS WITH THYROID PAPILLARY AND FOLLICULAR CARCINOMA: SIMILARITY AND DIFFERENCE OF PROGNOSTIC FACTORS (cohort retrospective study)

p. 15-23

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While analyzing the causes supposed to be important for disease prognosis and to impact on the patient's survival of malignant thyroid tumors, the researches examine many factors. The aim of the study was to determine the indices of cumulative patients survival with differentiated thyroid carcinoma that belong to different histological types depending on biological properties of neoplasm and some clinical factors.

Materials and methods: Retrospective study of the cohort of patients after surgical intervention. The information of patients (age and sex, histological type, size and categories of carcinomas (TNM), their invasive properties, the presence of multifocal growth), as well as the clinical characteristics of the disease (stage, volume of surgical intervention and radioiodine treatment, risk of relapse group, number of points in the system MACIS) was analysed.

Results: In cases of papillary or follicular thyroid carcinoma the analyzed factors are important for further prognosis. The most essential factor for papillary carcinoma is the tumor size, which associated with other ones – metastasizing, multifocal growth, intra- and extra-thyroid invasion, relapse development. In patients below 45, which were operated because of cancer, without extra-thyroid tumor spreading and metastases, the favorable disease prognosis does not depend on the neoplasm type. Under other circumstances the impact of carcinoma histological type (for follicular carcinoma versus papillary ones) is more important, and in some cases – for men, for patients above 60, patients with tumors above 40 mm, for multifocal neoplasm with intra- and especially extra-thyroid invasion, for cases of distant metastases, thyroidectomy with lymph nodes dissection, with relapses the histological tumor type, is extremely important.

Conclusion: The obtained results confirm the conclusion that histological subtype of differentiated thyroid carcinoma, tumor size, age and patient gender are the most important predictor of diseases persistence/disease relapse or patients mortality

Keywords: papillary thyroid carcinoma (PTC), follicular thyroid carcinoma (FTC), prognostic factors, MACIS

References

1. Glikson, E., Alon, E., Bedrin, L., Talmi, Y. (2017). Prognostic factors in differentiated thyroid cancer revisited. *Israel Medical Association Journal*, 19 (2), 114–118.

2. Konturek, A., Barczyński, M., Nowak, W., Richter, P. (2012). Prognostic factors in differentiated thyroid cancer – a 20-year surgical outcome study. *Langenbeck's Archives of Surgery*, 397 (5), 809–815. doi: <http://doi.org/10.1007/s00423-011-0899-z>

3. Passler, C., Scheuba, C., Prager, G., Kaczirek, K., Kaserer, K., Zettinig, G., Niederle, B. (2004). Prognostic factors of papillary and follicular thyroid cancer: differences in an iodine-replete endemic goiter region. *Endocrine-Related Cancer*, 11, 131–139. doi: <http://doi.org/10.1677/erc.0.0110131>

4. Gulcelik, M. A., Ozdemir, Y., Kadri Colakoglu, M., Camlibel, M., Alagol, H. (2012). Prognostic factors determin-

- ing survival in patients with node positive differentiated thyroid cancer: a retrospective cross-sectional study. *Clinical Otolaryngology*, 37 (6), 460–467. doi: <http://doi.org/10.1111/coa.12022>
5. Lorea, A. E., Bermejo, I. M., Esparza, N. E., Apinaniz, E. A., Arribas, J. P., Echarri, A. I. et. al. (2018). Clinical characteristics and prognostic factors in patients with follicular thyroid carcinoma. *Endocrine Abstracts*, 56, 1143. doi: <http://doi.org/10.1530/endoabs.56.p1146>
 6. Lang, B. H.-H., Lo, C.-Y., Chan, W.-F., Lam, K.-Y., Wan, K.-Y. (2006). Prognostic Factors in Papillary and Follicular Thyroid Carcinoma: Their Implications for Cancer Staging. *Annals of Surgical Oncology*, 14 (2), 730–738. doi: <http://doi.org/10.1245/s10434-006-9207-5>
 7. Sautter-Bihl, M.-L., Raub, J., Hetzel-Sesterheim, M., Heinze, H. G. (2001). Differentiated Thyroid Cancer: Prognostic Factors and Influence of Treatment on the Outcome in 441 Patients. *Strahlentherapie Und Onkologie*, 177 (3), 125–131. doi: <http://doi.org/10.1007/pl00002392>
 8. Nitipir, C., Alecu, L., Slavu, I., Tulin, R., Jecan, R., Orlov, C. et. al. (2018). Unmodifiable variables related to thyroid cancer incidence. *Journal of Mind and Medical Sciences*, 5 (1), 123–128. doi: <http://doi.org/10.22543/7674.51.p123128>
 9. Tang, J., Liu, H. B., Yu, L., Meng, X., Leng, S. X., Zhang, H. (2018). Clinical-pathological Characteristics and Prognostic Factors for Papillary Thyroid Microcarcinoma in the Elderly. *Journal of Cancer*, 9 (2), 256–262. doi: <http://doi.org/10.7150/jca.22700>
 10. Kauffmann, R. M., Hamner, J. B., Ituarte, P. H. G., Yim, J. H. (2018). Age greater than 60 years portends a worse prognosis in patients with papillary thyroid cancer: should there be three age categories for staging? *BMC Cancer*, 18 (1). doi: <http://doi.org/10.1186/s12885-018-4181-4>
 11. Santrac, N., Markovic, I., Goran, M., Buta, M., Djuricic, I., Dzodic, R. (2017). Prognostic factors for intrathyroidal papillary carcinomas – a multivariate analysis. *Endocrine Abstracts*, 49. doi: <http://doi.org/10.1530/endoabs.49.gp225>
 12. O'Neill, C. J., Vaughan, L., Learoyd, D. L., Sidhu, S. B., Delbridge, L. W., Sywak, M. S. (2011). Management of follicular thyroid carcinoma should be individualised based on degree of capsular and vascular invasion. *European Journal of Surgical Oncology*, 37 (2), 181–185. doi: <http://doi.org/10.1016/j.ejso.2010.11.005>
 13. Azhar, Y., Achmad, D., Lukman, K., Hilmanto, D. (2018). Pediatric differentiated thyroid carcinoma risk factor for analysis for disease free survival. *Indian Journal of Medical and Paediatric Oncology*, 39 (2), 153–158. doi: http://doi.org/10.4103/ijmpo.ijmpo_70_17
 14. Ito, Y., Miyauchi, A., Kihara, M., Fukushima, M., Higashiyama, T., Miya, A. (2018). Overall Survival of Papillary Thyroid Carcinoma Patients: A Single-Institution Long-Term Follow-Up of 5897 Patients. *World Journal of Surgery*, 42 (3), 615–622. doi: <http://doi.org/10.1007/s00268-018-4479-z>
 15. Barbaro, D., Simi, U., Meucci, G., Lapi, P., Orsini, P., Pasquini, C. (2005). Thyroid papillary cancers: microcarcinoma and carcinoma, incidental cancers and non-incidental cancers – are they different diseases? *Clinical Endocrinology*, 63 (5), 577–581. doi: <http://doi.org/10.1111/j.1365-2265.2005.02386.x>
 16. Gomez, N. R., Kouniavsky, G., Tsai, H.-L., Somervell, H., Pai, S. I., Tufano, R. P. et. al. (2011). Tumor size and presence of calcifications on ultrasonography are pre-operative predictors of lymph node metastases in patients with papillary thyroid cancer. *Journal of Surgical Oncology*, 104 (6), 613–616. doi: <http://doi.org/10.1002/jso.21891>
 17. Qu, N., Shi, R., Yang, S., Ma, B., Lu, Z., Wen, D. et. al. (2016). Tumor size interpretation for predicting cervical lymph node metastasis using a differentiated thyroid cancer risk model. *OncoTargets and Therapy*, 9, 5015–5022. doi: <http://doi.org/10.2147/ott.s107187>
 18. Gong, Y., Li, G., Lei, J., You, J., Jiang, K., Li, Z. et. al. (2018). A favorable tumor size to define papillary thyroid microcarcinoma: an analysis of 1176 consecutive cases. *Cancer Management and Research*, 10, 899–906. doi: <http://doi.org/10.2147/cmar.s154135>
 19. Gillanders, S. L., O'Neill, J. P. (2018). Prognostic markers in well differentiated papillary and follicular thyroid cancer (WDTC). *European Journal of Surgical Oncology*, 44 (3), 286–296. doi: <http://doi.org/10.1016/j.ejso.2017.07.013>
 20. Wu, M.-H., Shen, W. T., Gosnell, J., Duh, Q.-Y. (2014). Prognostic significance of extranodal extension of regional lymph node metastasis in papillary thyroid cancer. *Head & Neck*, 37 (9), 1336–1343. doi: <http://doi.org/10.1002/hed.23747>
 21. Lango, M., Flieder, D., Arrangoiz, R., Veloski, C., Yu, J. Q., Li, T. et. al. (2013). Extranodal Extension of Metastatic Papillary Thyroid Carcinoma: Correlation with Biochemical Endpoints, Nodal Persistence, and Systemic Disease Progression. *Thyroid*, 23 (9), 1099–1105. doi: <http://doi.org/10.1089/thy.2013.0027>
 22. Lamartina, L., Grani, G., Durante, C., Filetti, S. (2018). Recent advances in managing differentiated thyroid cancer. *F1000Research*, 7, 86. doi: <http://doi.org/10.12688/f1000research.12811.1>
 23. Wang, L. Y., Palmer, F. L., Nixon, I. J., Thomas, D., Patel, S. G., Shaha, A. R. et. al. (2014). Multi-Organ Distant Metastases Confer Worse Disease-Specific Survival in Differentiated Thyroid Cancer. *Thyroid*, 24 (11), 1594–1599. doi: <http://doi.org/10.1089/thy.2014.0173>
 24. Lee, J., Soh, E.-Y. (2010). Differentiated Thyroid Carcinoma Presenting With Distant Metastasis at Initial Diagnosis. *Annals of Surgery*, 251 (1), 114–119. doi: <http://doi.org/10.1097/sla.0b013e3181b7faf6>
 25. Sugitani, I., Fujimoto, Y., Yamamoto, N. (2008). Papillary thyroid carcinoma with distant metastases: Survival predictors and the importance of local control. *Surgery*, 143 (1), 35–42. doi: <http://doi.org/10.1016/j.surg.2007.06.011>
 26. Wreesmann, V. B., Nixon, I. J., Rivera, M., Katabi, N., Palmer, F., Ganly, I. et. al. (2015). Prognostic Value of Vascular Invasion in Well-Differentiated Papillary Thyroid Carcinoma. *Thyroid*, 25 (5), 503–508. doi: <http://doi.org/10.1089/thy.2015.0052>
 27. Hotomi, M., Sugitani, I., Toda, K., Kawabata, K., Fujimoto, Y. (2012). A Novel Definition of Extrathyroidal Invasion for Patients with Papillary Thyroid Carcinoma for Predicting Prognosis. *World Journal of Surgery*, 36 (6), 1231–1240. doi: <http://doi.org/10.1007/s00268-012-1518-z>
 28. Yu, X.-M., Lo, C.-Y., Lam, A. K.-Y., Leung, P., Luk, J. M. (2008). Serum Vascular Endothelial Growth Factor C Correlates With Lymph Node Metastases and High-Risk Tu-

mor Profiles in Papillary Thyroid Carcinoma. *Annals of Surgery*, 247 (3), 483–489. doi: <http://doi.org/10.1097/sla.0b013e31815fa447>

29. Tam, A. A., Özdemir, D., Çuhacı, N., Başer, H., Aydın, C., Yazgan, A. K. Et. al. (2016). Association of multifocality, tumor number, and total tumor diameter with clinicopathological features in papillary thyroid cancer. *Endocrine*, 53 (3), 774–783. doi: <http://doi.org/10.1007/s12020-016-0955-0>

30. Lang, B. H.-H., Wong, K. P., Cheung, C. Y., Wan, K. Y., Lo, C.-Y. (2012). Evaluating the Prognostic Factors Associated with Cancer-specific Survival of Differentiated Thyroid Carcinoma Presenting with Distant Metastasis. *Annals of Surgical Oncology*, 20 (4), 1329–1335. doi: <http://doi.org/10.1245/s10434-012-2711-x>

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THE COURSE OF SEIZURES IN PATIENT WITH SUPRATENTORIAL BRAIN MENINGIOMAS (cohort retrospective study)

p. 24-30

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Meningioma is the most common brain tumour with a favourable prognosis for a long life. Often epileptic seizures are the main clinical manifestation of meningiomas. However, surgical treatment does not always deprive patients of attacks, and vice versa, some attacks after surgery arise for the first time. Investigating the factors that influence the course of epileptic seizures will optimize treatment tactics

Aim: Identify the factors that affect the preservation or emergence of epileptic seizures in patients operated for supratentorial meningiomas of the brain with a view to further personalized correction of anticonvulsants therapies.

Materials and methods: A retrospective analysis of the course of the disease was performed in 242 patients with totally removed supratentorial meningioma of the brain. The remote results of the disease in 176 people were evaluated. The average duration of observation was 37.0 months (12–111).

Results: In 55 (75.3±5.0%) out of 73 patients who had a seizures before surgical treatment, they disappeared in the distant period. Of the 103 patients without trial before surgery, they subsequently arose in 9 people (8,7±2,8%). Seizures were preserved in 8 (32.0±9.5%) out of 25 men and 10 (20.8±5.9%) out of 48 women. In 6 (50.0±15.1%) of 12 patients with localization of meningiomas in the left parietal lobe epileptic seizures were preserved, this localization was significantly more frequent in the group of patients with persistent seizures after surgery, $p < 0.05$.

The average duration of the disease before surgery is significantly higher in patients who did not seizure free after intervention – 41.3 and 14.3 months respectively. Among those who had a history of seizures less than year, 40 (90.9±4.3%) of 44 patients were seizure free, and in those who were ill more than a year in 13 (56.5±10.6%) out of 23 cases. Among patients who had more than 10 attacks before intervention, after surgery they returned in 60.0±13.1% of cases, whereas among patients with less than 10 seizures before surgery, recidivism was only in 15.5±4.3% of patients. In the group of patients with persistent seizures after surgery, patients with more than 10 seizures in history were significantly more likely to suffer, $p < 0.01$.

Conclusions: Total removal of meningiomas can make about ¾ patients seizure free. Localization of the tumour in the left parietal region is associated with a greater likelihood of preservation of epilepsy after surgery. The longer patient has the illness and the more seizures he has, the greater the probability of convulsions after surgical treatment

Keywords: Meningioma, epilepsy, neuro-oncology, brain membranes, neurosurgery

References

- Ostrom, Q. T., Gittleman, H., Liao, P., Rouse, C., Chen, Y., Dowling, J. et. al. (2014). CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2007-2011. *Neuro-Oncology*, 16 (4), 1–63. doi: <http://doi.org/10.1093/neuonc/nou223>
- Studeniak, T. O. (2017). Riznomanitništ' nevrolohichnoi symptomatyky u patsientiv iz supratentorialnymy meninhiomamy holovnoho mozku [Neurological symptoms diversity in patients with brain supratentorial meningiomas]. *Scientific herald of UzhNU. Series: Medicine*, 1 (55), 117–119.
- Chen, D. Y., Chen, C. C., Crawford, J. R., Wang, S. G. (2018). Tumor-related epilepsy: epidemiology, pathogenesis and management. *Journal of Neuro-Oncology*, 139 (1), 13–21. doi: <http://doi.org/10.1007/s11060-018-2862-0>
- Polishchuk, M. Ye., Mekhrzi, M. K., Sirko, A. H. et. al. (2018). Neiroradiolohichna diahnoštyka meninhitom sered pervynnykh pukhlyn bichnykh shlunochkiv [Neuro-radiological diagnosis of meningiomas among the primary tumors of the lateral ventricles]. *Endovascular neurothosurgery*, 1 (23), 14–23.
- Rogers, L., Barani, I., Chamberlain, M., Kaley, T. J., McDermott, M., Raizer, J. et. al. (2015). Meningiomas: knowledge base, treatment outcomes, and uncertainties. A RANO review. *Journal of Neurosurgery*, 122 (1), 4–23. doi: <http://doi.org/10.3171/2014.7.jns131644>
- Tanti, M. J., Marson, A. G., Jenkinson, M. D. (2017). Epilepsy and adverse quality of life in surgically resected me-

ningioma. *Acta Neurologica Scandinavica*, 136 (3), 246–253. doi: <http://doi.org/10.1111/ane.12711>

7. Englot, D. J., Magill, S. T., Han, S. J., Chang, E. F., Berger, M. S., McDermott, M. W. (2016). Seizures in supratentorial meningioma: a systematic review and meta-analysis. *Journal of Neurosurgery*, 124 (6), 1552–1561. doi: <http://doi.org/10.3171/2015.4.jns.142742>

8. Studeniak, T. O. (2017). Prognostychni kryterii rozvytku symptomatychnoi epilepsii u patsiientiv z supratentorialnymy meninhiomamy holovnoho mozku [Prognostic criteria for the development of symptomatic epilepsy in patients with supratentorial meningiomas of the brain]. *Epileptology Bulletin*, 1 (47-48), 33–38.

9. Englot, D. J., Berger, M. S., Barbaro, N. M., Chang, E. F. (2011). Factors associated with seizure freedom in the surgical resection of glioneuronal tumors. *Epilepsia*, 53 (1), 51–57. doi: <http://doi.org/10.1111/j.1528-1167.2011.03269.x>

10. Chan, R. C., Thompson, G. B. (1984). Morbidity, mortality, and quality of life following surgery for intracranial meningiomas. A retrospective study in 257 cases. *Journal of Neurosurgery*, 60 (1), 52–60. doi: <http://doi.org/10.3171/jns.1984.60.1.0052>

11. Studeniak, T. O., Smolanka, V. I., Smolanka, A. V. (2018). Long-term results of meningiomas surgical treatment. Analysis of 110 cases. *ScienceRise: Medical Science*, 4 (24), 32–37. doi: <http://doi.org/10.15587/2519-4798.2018.132680>

12. Seyedi, J. F., Pedersen, C. B., Poulsen, F. R. (2018). Risk of seizures before and after neurosurgical treatment of intracranial meningiomas. *Clinical Neurology and Neurosurgery*, 165, 60–66. doi: <http://doi.org/10.1016/j.clineuro.2018.01.002>

13. Ali, A., Bagchi, A., Mills, S., Giraldi, D., Chavredakis, E., Brodbelt, A., Jenkinson, M. (2018). Risk factors for developing post-operative seizures following meningioma resection. *Neuro-Oncology*, 20 (1), 1. doi: <http://doi.org/10.1093/neuonc/nox237.001>

14. Xue, H., Sveinsson, O., Bartek, J., Förander, P., Skyrtman, S., Kihlström, L. et. al. (2018). Long-term control and predictors of seizures in intracranial meningioma surgery: a population-based study. *Acta Neurochirurgica*, 160 (3), 589–596. doi: <http://doi.org/10.1007/s00701-017-3434-3>

15. Hwang, K., Joo, J.-D., Kim, Y.-H., Han, J. H., Oh, C. W., Yun, C.-H. et. al. (2019). Risk factors for preoperative and late postoperative seizures in primary supratentorial meningiomas. *Clinical Neurology and Neurosurgery*, 180, 34–39. doi: <http://doi.org/10.1016/j.clineuro.2019.03.007>

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EFFECT OF EFFICIENCY IN TREATMENT SOCIAL AND PSYCHOLOGICAL FACTORS LIFE IN CHILDREN WITH EPILEPSY (cohort retrospective study)

p. 30-35

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An important task of modern pediatric neurology is to increase the effectiveness of treatment of epilepsy in children. Traditional criteria for assessing the effectiveness of treatment, based on the indicators of laboratory and instrumental studies, reflect only the biological component of the picture of the disease and it is necessary to apply a criterion for assessing the state of other basic functions of the child.

The purpose. To identify the most significant social and psychological problems and aspects of the lives of children and adolescents with epilepsy, depending on the effectiveness of treatment (children with controlled and uncontrolled attacks) from the point of view of patients, their parents and health care professionals, and raising awareness of the sub- the issues related to this state to improve the quality of care for this group of patients to lead a better life.

Materials and methods. Surveys on social, psycho-emotional factors of life of children with epilepsy with controlled and uncontrolled attacks were conducted during 1 year with the help of questionnaires for 3 groups of respondents: children and adolescents from 12 to 18 years old, patients with epilepsy, their parents and the medical staff who are in contact with children with epilepsy in their work, the statistical processing of the received data is carried out.

Results. The study showed the main factors influencing the lives of children with epilepsy from the point of view of patients themselves, their parents and health professionals. These are social (the opportunity to attend school, communicate with peers, get education and employment in the future) and psycho-emotional (fear of their illness, its concealment from others, difficulty in learning) factors.

Conclusions. Most children with uncontrolled attacks receive home-schooling, miss 25.37±2.17 days of schooling, have problems communicating with new people, friends, less self-confident. More than a third of the respondents were informed about problems with memory, concentration and difficulties with math. A common problem for children with epilepsy and their parents is the fear of the future: the opportunity to get education and employment. Parents are concerned about further independent life. For children with uncontrolled attacks, their parents and health workers, the top priority is the effectiveness of treatment – overcoming attacks and the ability to lead an active social life. The complication between patients, their parents and doctors is higher in a group of children with controlled attacks

Keywords: epilepsy, children, social and psychological factors, problems and aspects of life

References

1. Sukhonosova, O. Yu. (2017). Comparative analysis of incidence and prevalence of nervous system diseases and epilepsy in children residing in Ukraine and Kharkiv region. *International Medical Journal*, 23 (1), 65–69.

2. Fisher, R. S., Acevedo, C., Arzimanoglou, A., Bo-gacz, A., Cross, J. H., Elger, C. E. et. al. (2014). ILAE Official Report: A practical clinical definition of epilepsy. *Epilepsia*, 55 (4), 475–482. doi: <http://doi.org/10.1111/epi.12550>

3. Kirabira, J., Forry, J. B., Kinengyere, A. A., Adriko, W., Amir, A., Rukundo, G. Z., Akena, D. (2019). A systematic review

protocol of stigma among children and adolescents with epilepsy. *Systematic Reviews*, 8 (1), 21. doi: <http://doi.org/10.1186/s13643-019-0940-9>

4. Ferro, M. A. (2014). Risk factors for health-related quality of life in children with epilepsy: A meta-analysis. *Epilepsia*, 55 (11), 1722–1731. doi: <http://doi.org/10.1111/epi.12772>

5. Sadr, S. S., Javanbakht, J., Javidan, A. N., Ghaffarpour, M., Khamse, S., Naghshband, Z. (2016). Descriptive epidemiology: prevalence, incidence, sociodemographic factors, socioeconomic domains, and quality of life of epilepsy: an update and systematic review. *Archives of Medical Science*, 14 (4), 717–724. doi: <http://doi.org/10.5114/aoms.2016.60377>

6. Fayed, N., Davis, A. M., Streiner, L. D., Rosenbaum, P. L., Cunningham, C. E., Lach, L. M. et. al. (2015). Children's perspective of quality of life in epilepsy. *Neurology*, 84 (18), 1830–1837. doi: <http://doi.org/10.1212/wnl.0000000000001536>

7. Ramsey, R. R., Loiselle, K., Rausch, J. R., Harrison, J., Modi, A. C. (2016). Predictors of trajectories of epilepsy-specific quality of life among children newly diagnosed with epilepsy. *Epilepsy & Behavior*, 57, 202–210. doi: <http://doi.org/10.1016/j.yebeh.2016.02.002>

8. Rosenberg, E. C., Louik, J., Conway, E., Devinsky, O., Friedman, D. (2017). Quality of Life in Childhood Epilepsy in pediatric patients enrolled in a prospective, open-label clinical study with cannabidiol. *Epilepsia*, 58 (8), e96–e100. doi: <http://doi.org/10.1111/epi.13815>

9. Conway, L., Widjaja, E., Smith, M. L. (2017). Single-item measure for assessing quality of life in children with drug-resistant epilepsy. *Epilepsia Open*, 3 (1), 46–54. doi: <http://doi.org/10.1002/epi4.12088>

10. Kovtyuk, N. I. (2015). Regarding the Possibility of Improving the Quality of Life in Children with Epilepsy. *Actual problems of transport medicine*, 1 (3 (41-1)), 21–24. Available at: <http://dspace.bsmu.edu.ua:8080/xmlui/handle/123456789/9334>

11. Choi, H.-Y., Kim, S. E., Lee, H. W., Kim, E.-J. (2016). Social Behavioral Problems and the Health-Related Quality of Life in Children and Adolescents with Epilepsy. *Psychiatry Investigation*, 13 (5), 488–495. doi: <http://doi.org/10.4306/pi.2016.13.5.488>

12. Chan, C. J., Zou, G., Wiebe, S., Speechley, K. N. (2015). Global assessment of the severity of epilepsy (GASE) Scale in children: Validity, reliability, responsiveness. *Epilepsia*, 56 (12), 1950–1956. doi: <http://doi.org/10.1111/epi.13216>

13. Esetova, A. A., Tuleeva, T. I., Dikhanbayeva, G. A. (2017). Evaluation of quality of life of children with epilepsy by QOLCE questionnaire in South Kazakhstan Neurosurgery and Neurology of Kazakhstan, 2 (47), 20–25.

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ANALYSIS OF THE FUNCTIONAL STATE OF RED BLOOD CELLS IN PATIENTS WITH SURGICAL PATHOLOGY OF THE AORTA AFTER SURGICAL INTERVENTION USING CARDIOPULMONARY BYPASS (cogortant prospective research)

p. 35-39

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The aim is to analyse the functional state of red blood cells in patients with surgical pathology of the aorta after surgical intervention using cardiopulmonary bypass.

Materials and Methods. 118 patients with surgical aortic pathology (SAP) were examined. Patients were divided into 2 groups. Group I included 46 patients who were additionally prescribed a solution of meglumin sodium succinate (reamberin), group II included 46 patients who were additionally assigned a solution of D-fructose-1,6-diphosphate sodium hydrate (esophosphine). Erythrocyte indices were analyzed: MCV (mean erythrocyte volume), MCH (mean hemoglobin in erythrocyte), MCHC (mean hemoglobin concentration in erythrocyte mass) and RDW (erythrocyte mean volume ratio).

Result. When analyzing the dynamics of the indicator of the width of the distribution of erythrocytes by volume (coefficient of the average volume of the erythrocyte) in the blood of patients with groups K, I and II, no significant differences were found between the groups. Despite the absence of statistically significant differences in the RDW index between the groups on a daily basis and in comparison with the starting values, nevertheless, in patients of group II, the recovery of its numbers was faster compared to others. Considering that patients of group II differed in prescribing an additional substance to the main treatment protocol - D-fructose-1,6-diphosphate sodium hydrate salt - its pharmacodynamic effect can be considered positive for the erythrocyte membrane elasticity, their elasticity and hemolytic resistance.

Conclusions. It can be argued that the mere fact of anesthesia support using cardiopulmonary bypass negatively affects the state of erythrocyte indices: MCV, MCH, MCHC, RDW. The study provides a vector for the appointment during surgery additional pharmacological substances that would have a positive impact on these indicators

Keywords: functional state of erythrocytes, surgical aortic pathology, artificial blood circulation

References

1. Klimova, B., Valis, M., Kuca, K. (2017). Cognitive decline in normal aging and its prevention: a review on non-pharmacological lifestyle strategies. *Clinical Interventions in Aging*, 12, 903–910. doi: <http://doi.org/10.2147/cia.s132963>

2. Peracino, A., Pecorelli, S. (2016). The Epidemiology of Cognitive Impairment in the Aging Population: Implica-

tions for Hearing Loss. *Audiology and Neurotology*, 21 (1), 3–9. doi: <http://doi.org/10.1159/000448346>

3. Novak, V., Hajjar, I. (2010). The relationship between blood pressure and cognitive function. *Nature Reviews Cardiology*, 7 (12), 686–698. doi: <http://doi.org/10.1038/nrcardio.2010.161>

4. Rundshagen, I. (2014). Postoperative Cognitive Dysfunction. *Deutsches Ärzteblatt International*, 111 (8), 119–125. doi: <http://doi.org/10.3238/arztebl.2014.0119>

5. Jungwirth, B., Zieglgansberger, W., Kochs, E., Rammes, G. (2009). Anesthesia and Postoperative Cognitive Dysfunction (POCD). *Mini-Reviews in Medicinal Chemistry*, 9 (14), 1568–1579. doi: <http://doi.org/10.2174/138955709791012229>

6. Choi, H. A., Lee, M. J., Chung, C.-S. (2017). Cerebral endothelial dysfunction in reversible cerebral vasoconstriction syndrome: a case-control study. *The Journal of Headache and Pain*, 18 (1). doi: <http://doi.org/10.1186/s10194-017-0738-x>

7. Hudetz, J. A., Gandhi, S. D., Iqbal, Z., Patterson, K. M., Pagel, P. S. (2010). Elevated postoperative inflammatory biomarkers are associated with short- and medium-term cognitive dysfunction after coronary artery surgery. *Journal of Anesthesia*, 25 (1), 1–9. doi: <http://doi.org/10.1007/s00540-010-1042-y>

8. Shnaider, N. A. (2007). Rol i mešto farmakologicheskoi tserebroprotektzii v profilaktike i korrektsii kognitivnoi nedostatochnosti: gipotezy i dokazatelstva. *Zdorovia Ukraini*, 3 (160), 29–30.

9. Xu, D., Wang, B., Zhao, X., Zheng, Y., Du, J., Wang, Y. (2017). General anesthetics protects against cardiac arrest-induced brain injury by inhibiting calcium wave propagation in zebrafish. *Molecular Brain*, 10 (1). doi: <http://doi.org/10.1186/s13041-017-0323-x>

10. Abraham, M. (2014). Protecting the anaesthetised brain. *Journal of Neuroanaesthesiology and Critical Care*, 1 (1), 20–39. doi: <http://doi.org/10.4103/2348-0548.124841>

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VERTICAL MOVEMENT OF DYSTOPIC CANINES USING DEVICE WITH Nd-Fe-B MAGNETS (CLINICAL CASE)

p. 40-43

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The use of braces for the correction of single tooth position in some cases seems to be impractical, since it may cause a vio-

lation in the position of the adjacent teeth, which are used as a support for such correction. An alternative way to move of single tooth into the normal position is use of device with permanent Nd-Fe-B magnets. This allows to localize the force action and achieve the desired aesthetic and functional result with fewer side effects and also reduce the cost of treatment.

The aim of present work was development of methods and normalization of position of upper jaw canine by using the device with permanent Nd-Fe-B magnets.

Materials and methods. *To move the tooth, the permanent Nd-Fe-B magnets of size 5×5×2 mm were used. An anti-corrosion ZrO₂ coating was applied to the surface of the magnets. One of them was installed in a plastic devise, and the second one was fixed on the tooth using photopolymer material. The magnitude of acting force was determined using the experimentally derived dependence of the force of attraction or repulsion of magnets on the distance between them. Additional control of the interaction forces between the magnets, both at the beginning of treatment and at individual stages, was carried out using a teslameter and recalculation tables.*

Results. *The article provides a description of the technique and stages of manufacturing of device with magnets, as well as the procedure for attaching the magnet to the tooth surface. There was presented a clinical case of moving an abnormally located canine using a device with permanent Nd-Fe-B magnets. As a result of orthodontic treatment performed using a permanent magnet device, a vestibular displacement of the tooth 23 was performed in order to achieve normal overlap in the transverse plane. The proposed method of orthodontic treatment allowed in a short time to normalize the position of tooth 23 without side effects for the remaining teeth.*

Conclusions. *On the base of treatment it was proved the possibility of moving individual tooth using the device with Nd-Fe-B permanent magnets without the occurrence of side effects for supporting teeth, which allows expanding the range of traditional bite correction methods*

Keywords: *malocclusions, canine dystopia, teeth position correction, Nd-Fe-B magnets, devices with magnets*

References

1. Bariani, R. B., Guimarães, C., Moura, W., Ortolani, C. F., Henriques, J. C., Pereira-Bellini, S. (2018). Treatment of class II malocclusion and unerupted upper canines with self-ligating appliance. *Indian Journal of Dental Research*, 29 (3), 391–395. doi: http://doi.org/10.4103/ijdr.ijdr_231_15

2. Burstone, C. J., Koenig, H. A. (1974). Force systems from an ideal arch. *American Journal of Orthodontics*, 65 (3), 270–289. doi: [http://doi.org/10.1016/s0002-9416\(74\)90332-7](http://doi.org/10.1016/s0002-9416(74)90332-7)

3. Li, L. C. F., Wong, R. W. K., King, N. M. (2008). Orthodontic traction of impacted canine using magnet: a case report. *Cases Journal*, 1 (1), 382. doi: <http://doi.org/10.1186/1757-1626-1-382>

4. Tomizuka, R., Kanetaka, H., Shimizu, Y., Suzuki, A., Igarashi, K., Mitani, H. (2006). Effects of Gradually Increasing Force Generated by Permanent Rare Earth Magnets for Orthodontic Tooth Movement. *The Angle Orthodontist*, 76 (6), 1004–1009. doi: <http://doi.org/10.2319/071805-237>

5. Sharma, N. S., Kamble, R., Shrivastav, S., Sharma, P. (2015). The Use of Magnets in Orthodontics. *World Journal*

of Dentistry, 6 (1), 45–48. doi: <http://doi.org/10.5005/jp-journals-10015-1311>

6. Phelan, A., Tarraf, N. E., Taylor, P., Hönscheid, R., Drescher, D., Baccetti, T., Darendeliler, M. A. (2012). Skeletal and dental outcomes of a new magnetic functional appliance, the Sydney Magnoglide, in Class II correction. *American Journal of Orthodontics and Dentofacial Orthopedics*, 141 (6), 759–772. doi: <http://doi.org/10.1016/j.ajodo.2012.01.014>

7. Kutsevliak, V. Y., Starykov, V. V. (2018). Snyzhenye elektrohymycheskoi aktyvnošty poštoianikh mahnytov, prymaniaemikh v ortodontycheskykh apparatakh. *Visnyk štomatolohii*, 3, 32–35.

8. Kitsugi, A., Okuno, O., Nakano, T., Hamanaka, H., Kuroda, T. (1992). The Corrosion Behavior of Nd₂Fe₁₄B and SmCo₅ Magnets. *Dental Materials Journal*, 11 (2), 119–129. doi: <http://doi.org/10.4012/dmj.11.119>

9. Kutsevliak, V. Y., Starykov, V. V. (2018). Otsenka syli vzaymodeištvyia Nd-Fe-B poštoianikh mahnytov, prymaniaemikh v ortodontycheskykh apparatakh. *Ukrainskyi zhurnal medytsyny, biolohii ta sportu*, 7, 191–196.

10. Darendeliler, M. A., Darendeliler, A., Mandurino, M. (1997). Clinical application of magnets in orthodontics and biological implications: a review. *The European Journal of Orthodontics*, 19 (4), 431–442. doi: <http://doi.org/10.1093/ejo/19.4.431>