DISTRIBUTION OF PHOSPHOLIPID MEMBRANES AND ACTIVITY OF APOPTOTIC ENZYMES IN TYPE 2 DM

Negmatova Gulzoda Shukhratovna
Scientific adviser: PhD.
Head of the Department of Endocrinology, Samarkand State Medical University

Mansurova Gulsum Zaydinovna
Assistant of the Department of Endocrinology, Samarkand State Medical University

Rustamova Malika Sirojiddin qizi, **Abdiyev Lazizbek Sobir o‘g‘li**
Clinical Resident of the Department of Endocrinology,
Samarkand State Medical University

ABSTRACT

Chronic hyperglycemia changes the composition of erythrocyte membranes, but the mechanisms of damage and activation of apoptosis are not well understood. A common feature of membranes in all eukaryotic cells is the non-random distribution of lipids across the bilayer. Lipid asymmetry in membranes is a consequence of multiple factors, including the biophysical properties of lipids that dictate their ability to spontaneously “flip” their polar headgroups through the hydrophobic membrane interior, and the presence of transporters (enzymes) that assist in active lipid translocation across the bilayer.

Keywords: hyperglycemia, apoptosis, phospholipid, inflammation.

INTRODUCTION

Chronic hyperglycemia changes the composition of erythrocyte membranes, but the mechanisms of damage and activation of apoptosis are not well understood. A common feature of membranes in all eukaryotic cells is the non-random distribution of lipids across the bilayer. Lipid asymmetry in membranes is a consequence of multiple factors, including the biophysical properties of lipids that dictate their ability to spontaneously “flip” their polar headgroups through the hydrophobic membrane interior, and the presence of transporters (enzymes) that assist in active lipid translocation across the bilayer. Moreover, this asymmetrical distribution of lipids has important functional consequences. For instance, the anionic phospholipid, phosphatidylserine (PS), is exclusively located at the cytoplasmic side of the plasma membrane in quiescent cells and is an essential co-factor for a number of membrane-

bound enzymes, such as protein kinase C and Na+/K+-ATPase. However, when exposed on the cell surface, PS acts as a conserved recognition signal for phagocytes and promotes the blood coagulation cascade. The present review aims to discuss the origin and maintenance of phospholipid asymmetry as well as the mechanism and functional significance of its disruption in health and disease.

Objective: to study the phospholipid composition of erythrocyte membranes and the activity of apoptotic enzymes in patients with type 2 diabetes.

MATERIALS AND METHODS

The study included patients with type 2 diabetes with a disease duration of 3-5 years without clinical manifestations of vascular complications. The first group consisted of 3 patients with low fasting hyperglycemia 6.67 +0.26 mmol/l (HbA1c 7.2 + 0.3%), the second group consisted of 3 patients with fasting hyperglycemia 9.81 + 0.19 mmol/l (HbA1c 11.1 + 0.2%). The control group included 10 healthy donors without impaired carbohydrate metabolism. Erythrocytes obtained from venous blood were studied. Membrane phospholipids were analyzed by one-dimensional chromatography (Evans WS, 1990). μ-calpain activity was determined by the method (Sorimachi H. 1977, Elce JS, 2000). The active concentration of the caspase 3 enzyme was recorded by ELISA using Biosciences (USA) kits.

RESULTS

With low glycemia in group 1, there was an increase in the concentration of phosphatidylethanolamine in group 1 68.01 + 0.74 mmol/l, diacylglycerol to 77.35 + 1.24 mm/l compared to the control 65.32 + 0.14 ($p < 0.05$) and 70.43+0.55 mmol/l ($p<0.05$), respectively. An increase in glycemia leads to more significant changes in the concentration of phosphatidylethanols by 68.62+0.84 mmol/l, diacylglycerol 84.18+2.06 mmol/l. There is also a significant increase in FFA to 100.51 + 0.48 mmol/l compared to group 1 94.66 + 1.94 mmol/l and control 94.33 + 0.21 mmol/l ($p < 0.05$). tration of phosphatidylcholine in group 2 to 217.92+2.24 mmol/l compared to the control 225.34+0.51 mmol/l ($p <0.05$). High hyperglycemia increases the activity of μ-calpain in group 2 to 36.35 + 3.84 μg/min, which was significantly different from group 1 8.89 + 1.36 μg/min and in the control 11.71 + 2.03 μg/min ($p <0.01$). The activity of caspase 3 was maximum in group 1, 0.949+0.135 ng/ml ($p<0.05$), with a further increase in glycemia it decreased and did not differ significantly from the control (0.621+0.051 ng/ml)

CONCLUSIONS

The scientific results indicate destructive processes in the membrane with activation of phospholipases and an increase in the proportion of damaged cells. High hyperglycemia leads to an increase in the activity of μ-calpain in erythrocytes, which indicates an increase in the pool of damaged cells that are not ready for apoptotic death

(caspase 3 activity is low); such cells are destroyed in the bloodstream by the mechanism of necrosis and increase inflammation. In patients with low hyperglycemia, the number of red blood cells ready for apoptotic death increases, which is a more favorable scenario, since it does not lead to activation of inflammation.

REFERENCES:

1. Salimova DE, Daminnov AT. A CLINICAL CASE BASED ON THE EXPERIENCE OF TREATING HYPERTENSION IN A PATIENT WITH TYPE 2 DIABETES MELLITUS, OBESITY AND VITAMIN D DEFICIENCY. Educ Res Univers Sci. 2023;2(12):150-154.
2. Sh, N. G., Salimova, D. E., Oybekovma, X. S., Qamariddinovna, X. A., & Amin o‘g‘li, B. J. (2022). ENDOCRINE GLANDS, STRUCTURE, AGE FEATURES, FUNCTIONS. PEDAGOG, 5(5), 341-345.
3. Shukhratovna, N. G., & Erkinovna, S. D. (2023). Features of the Course of Type 2 Diabetes Mellitus in Combination with Arterial Hypertension and Ways to Correct Them. Eurasian Medical Research Periodical, 17, 39-41.
4. Shukhratovna, N. G., & Erkinovna, S. D. (2022). THE ROLE OF GASTROINTESTINAL HORMONES IN THE PATHOLOGY OF THE DIGESTIVE SYSTEM. PEDAGOG, 5(6), 408-412.
5. Негматова, Г. Ш., & Салимова, Д. Э. (2023). Особенности течения сахарного диабета 2 типа в сочетании с артериальной гипертонией и пути их коррекции. Ta’lim fidoyilari, 2(1), 82-86.
6. Sobirjonovna K. N. Factors determining the clinical significance of depiptidyl peptidase 4 inhibitors in the treatment of patients with type 2 diabetes mellitus //World Bulletin of Public Health. 2022. Т. 8. – С. 67-72.
7. Курбонова Н.С. Негматова Г.Ш. “Ортиқча вазнли қизларда хайз даврининг бузулиши”// Тиббиѐтда янги кун. 9(47) 287-291 бет. 2022
8. Курбонова Н.С. Негматова Г.Ш. "Эриктильная дисфункция у больных сахарным диабетом и ее клинический анализ"//Биомедицина ва амалиѐт 5.1 сон. 160-165 бет. 2022 йил.
9. Курбонова Н.С. "Clinical manifestations and classification of lesions of the macular area in diabetes." Eurasian scientific herald. Vol13/2022/ 97-101стр.
10. Курбанова Нозима Сабиржановна “FACTORS DETERMINING THE CLINICAL SIGNIFICANCE OF DEPIPTIDYL PEPTIDASE 4 INHIBITORS IN THE TREATMENT OF PATIENTS WITH TYPE 2 DIABETES MELLITUS” World Bulletin of Public Health (WBPH)Volume-8, March 2022 67-72
11. Nazira K., Siddikovna T.G., Davranovna D.A., Takhirovich D.A., Tulkinovich O.S. (2021). Cardiovascular complications in patients with covid and diabetes mellitus 2. Central Asian Medical and Natural Science Journal, 2(3), 37-41.
12. GROWTH HORMONE FOR THE TREATMENT OF HEREDITARY DISEASES IN CHILDREN Ortikov Shahzod Tulkinovich. Karimova Nazira Alimovna, Kurbanova Nozima Sobirjanovna, Daminov Abdurasul Takhirovich /

International Journal of Innovative Engineering and Management Research. 2021 281-284.
13. Features of the course of type 2 diabetes mellitus with arterial hypertension and ways of their correction Negmatova Gulzoda Shukhratovna, Salimova Dildora Erkinovna Eurasian Medical Research Journal 17, 39-41, 2023.
14. FEATURES OF THE TECHNIQUE OF TYPE 2 DIABETES MELLITUS IN COMBINATION WITH ARTERIAL HYPERTENSION AND WAYS OF CORRECTION IX G.Sh. Negmatova, D.E. Salimova LLC "Research and publications", Enlightener, 2023.
15. Features of the coexistence of type 2 diabetes mellitus with arterial hypertension and their treatment Gulzoda Shukhratovna Negmatova, Dildora Erkinovna Salimova LLC "Ochik fan", Science and education, 2023.
16. Khalimova Z.Yu. and G.Sh. Negmatova. Autoimmune polyglandular syndromes. Literature review". Central Asian Journal of Medical and Natural S
17. Даминов А., Хайдаров О., Хасанова М. и Абдукахорова Р. (2023). ОСЛОЖНЕНИЯ ГЛЮКОКОРТИКОИДНОЙ ТЕРАПИИ У ПАЦИЕНТОВ С ДИАБЕТОМ, ПЕРЕЖИВШИХ КОВИД-19. Евразийский журнал медицинских и медицинских наук , 3 (4), 197-200.ciences 2.4 (2021): 166-175.
18. Khamidova M.N., Ismatova I.F., Zh.Sh. Berdirov, G.Sh. Negmatova and A.T. Daminov. "DIABETES AND COVID-19". Eurasian Journal of Medicine and Natural Sciences 2, no. 13 (2022): 190-204.
19. Takhirovich D.A., Burchaklar S.J.A., Shukhratovna N.G., Shukhratovna S.G., Zainuddinovna M.G. (2022). COURSE OF COVID-19 IN PATIENTS WITH DIABETES. Web of Scientist: International Journal of Scientific Research, 3(02), 73–76.
20. Takhirovich D.A., Korners S.J.A., Shukhratovna N.G., Shukhratovna S.G., Zainuddinovna M.G. (2022). COURSE OF COVID-19 IN PATIENTS WITH DIABETES. Web of Scientist: International Journal of Scientific Research, 3(02), 73–76.
21. Abduvali, X., Otabek, S., Asilbek, E., & Daminov, A. T. (2023). TYPE 2 DIABETES: TIME TO CHANGE THE CONCEPT. Science and innovation, 2(D4), 165-167.
22. Togaeva G.S. «Ўз-узини назорат қилиш мактабида ўқиган қандли диабет 2 тип билан касалланган беморларнинг клиник ва биохимиявий курсаткичлари». Journal of Biomedicine and Practice 2 Special Issue. Tashkent in 2020. Pages 132-135.
23. Togaeva Gulnora Siddikovna., Oripov Firdavs Suratovich., Davranova Aziza Davranovna.: "Structural features of cells of the islets of Langerhans in offspring with alloxonic diabetes" (Review article). Annals of the Romanian Society for Cell Biology 2021; P.158-162
24. Negmatova G.Sh, Togayeva G.S., Davranova A.D., Azimbegova S.N. “Assessment of the effectiveness of cardioprotectiva drugs in treatment of childeren with diabetic cardiomyopathy”/ The American juornal of medical sciences and pharmaceutical research//4.01. 79-83.

25. Negmatova G.Sh., Togayeva G.S., Davranova A.D., Azimbegova S.N. Uzbek medical journal. // Criteria for physical and sexual devolopent in with thyroid diseases. 4. 32.
26. Negmatova G.Sh, Togayeva G.S., Davranova A.D., Azimbegova S.N. “Assessment of the effectiveness of cardioprotectiva drugs in treatment of childeren with diabetic cardiomyopathy”/ The American juornal of medical sciences and pharmaceutical research//4.01. 79-83.
27. Dzhuraeva Z.A. Negmatova G.Sh. The state of the cardiovascular system in patients with hypothyroidism. Use of highly innovative technologies in preventive medicine. Republican scientific-practical conference. Andijon 2020.
28. Z.Y Xalimova G.Sh. Negmatova - "Аутоиммунные Полигландулярные Синдромы. Обзор Литературы”. Central Asian Journal of Medical and Natural Science, 2021
29. Endocrinology: national guidelines. Ed. Dedova I.I., Melnichenko G.A. M.: GEOTAR-Media; 2016.
29. Aramovna D. Z., Azamatovna H. D. Features of the Pathology of the Reproductive System in Pubertal Patients with Hypothalamic-Pituitary Dysfunction //EUROPEAN JOURNAL OF BUSINESS STARTUPS AND OPEN SOCIETY. – 2023. – Т. 3. – №. 2. – С. 74-77.
30. Qodirov, E. A., Ismoilov, S. I., Valiyev, J. J., & Daminov, A. T. (2023). Qandli diabet bilan og‘rigan bemorlarda COVID-19 xavfining ortishi patofiziologiya, davolash va oldini olishdagi dolzarb muammolar. Science and Education, 4(3), 91-101.
31. Daminov, A., Khaydarov, O., Hasanova, M., & Abdukakhorova, R. (2023). COMPLICATIONS OF GLUCOCORTICOID THERAPY IN PATIENTS DIABETES SURVIVED COVID-19. Евразийский журнал медицинских и естественных наук, 3(4), 197-200.
32. Урунова, Ф. З., Амирова, Ш. А., Базарова, В. Р., Бахронова, М. Б., & Даминов, А. Т. (2023). Осложнения глюкокортикоидной терапии при COVID-19 на фоне сахарного диабета 2-типа. Science and Education, 4(2), 520-529.