UYQU VA GOMEOSTATIK SIRKADIYAN RITMLAR VA MIYANING METABOLIK BALANSINING O‘ZARO BOG‘LIQLIGI

Saydalixo'jaeva Sayyora Zamanovna
Xalilov Hikmatulla Dilshodovich
Toshkent Davlat tibbiyot Universiteti Normal va patologik fiziologiya kafedrasi
Abduvohidov Muhammad Mustafo Abdukabir o'g'li
Toshkent Davlat Tibbiyot Universiteti Pediatriya fakulteti 2-kurs talabalari

Annotatsiya: *Ushbu maqolada uyqu, gomeostatik va sirkadiyan ritmlar bilan miyaning metabolik balansi o‘rtasidagi murakkab fiziologik o‘zaro bog‘liqlik tahlii qilinadi. So‘nggi o‘n yil davomida olib borilgan tadqiqotlar shuni ko‘rsatdiki, uyqu buzilishlari miyaning energetik metabolizmi, glial hujayra faolligi va neyronlararo sintez jarayonlariga sezilarli ta'sir ko‘rsatadi. Maqolada uyquning gomeostatik jarayonlari bilan sirkadiyan tizimning miya metabolizmini qanday tartibga solishi, shuningdek, bu jarayonlarning buzilishi neyrodegenerativ kasalliklar, metabolik sindromlar va psixiatrik kasalliklar bilan bog‘liqligi o‘rganilgan. Tadqiqotlar uyquning miyada toksik metabolitlarni tozalash, energiya muvozanatini saqlash va neyroplastiklikni qo‘llab-quvvatlashdagi ahamiyatini ilmiy asoslaydi.*

Kalit so‘zlar: *uyqu, sirkadiyan ritm, gomeostaz, miya metabolizmi, glimfatik tizim, neyrodegeneratsiya, energetik balans, neyroplastiklik*

Tadqiqot maqsadi: Ushbu tadqiqotning asosiy maqsadi 2015-2025-yillar oralig‘ida o‘tkazilgan ilmiy tadqiqotlar asosida uyquning gomeostatik va sirkadiyan tartibga solinishi bilan miyaning metabolik balansi o‘rtasidagi fiziologik va molekulyar mexanizmlarni aniqlashtirishdan iborat. Tadqiqot quyidagi maqsadlarni amalga oshirishga qaratilgan:

Uyqu davomida miyada sodir bo‘ladigan metabolik o‘zgarishlarni tizimli tahlii qilish

Gomeostatik va sirkadiyan ritmlarning miya energetik metabolizmini tartibga solish mexanizmlarini aniqlash

Uyqu buzilishlarining miya metabolizmi va neyron funktsiyasiga ta'sirini baholash

Uyqu va miya metabolik balansi o‘rtasidagi bog‘liqlikning klinik ahamiyatini aniqlash

Tadqiqot uslublari: Tadqiqotda tizimli adabiyotlar sharhi usuli qo‘llangan bo‘lib, 2015-2025-yillar oralig‘ida chop etilgan ilmiy maqolalar, klinik tadqiqotlar va meta-tahliilar tahlil qilingan. Ma'lumotlarni yig‘ish va tahlii qilish quyidagi usullar asosida amalga oshirilgan:

PubMed, Scopus, Web of Science va Google Scholar kabi ilmiy ma'lumotlar bazalaridan foydalanish

Tizimli qidiruv strategiyasi: "uyqu", "sirkadiyan ritm", "miya metabolizmi", "glimfatik tizim", "uyqu metabolik funktsiyasi" kalit so‘zlaridan foydalanish

Tanlangan maqolalarning metodologik sifati va natijalarining ishonchliligini baholash

Eksperimental va klinik tadqiqotlardan olingan ma'lumotlarni qiyosiy tahlii qilish

Statistik ma'lumotlarni ikkinchi darajali tahlii usullari yordamida qayta ishlash

Kirish: Uyqu inson organizmi, xususan miya funktsiyasi uchun muhim fiziologik jarayon bo‘lib, u gomeostatik va sirkadiyan ritmlar tomonidan qat'iy tartibga solinadi. So‘nggi o‘n yil davomida olib borilgan tadqiqotlar shuni ko‘rsatdiki, uyqu nafaqat dam olish davri, balki miyaning metabolik faolligi va tozalanishi uchun ham juda muhim ahamiyatga ega [1]. Gomeostatik uyqu tartibi organizmning uyqu ehtiyojini boshqaradi va uyqu davomiyligi va chuqurligi bilan bog‘liq bo‘lsa, sirkadiyan ritm uyqu-uyg‘onish tsikllarining 24 soatlik davriyligini belgilaydi [2].

Miya inson tanasidagi eng ko‘p energiya sarflaydigan organ bo‘lib, uning funktsiyasi uchun energiya muvozanatini saqlash juda muhimdir. Uyqu davrida miyaning energetik metabolizmi sezilarli o‘zgarishlarga uchraydi, bu esa neyronlar va glial hujayralarning funktsional faolligiga ta'sir ko‘rsatadi [3]. 2012-yilda kashf etilgan glimfatik tizim konsepsiyasi uyquning miyada toksik metabolitlarni, jumladan, beta-amiloidni tozalashdagi ahamiyatini ochib berdi [4].

Ushbu maqolada so‘nggi o‘n yil davomida o‘tkazilgan tadqiqotlar asosida uyqu, gomeostatik va sirkadiyan ritmlar bilan miyaning metabolik balansi o‘rtasidagi bog‘liqlik tizimli tahlii qilinadi va bu o‘zaro bog‘liqlikning neyrodegenerativ kasalliklar, metabolik buzilishlar va psixiatrik kasalliklar patogenezidagi ahamiyati ko‘rib chiqiladi.

Natijalar

Uyqu va Miyaning Energetik Metabolizmi

Tadqiqotlar shuni ko‘rsatdiki, uyqu davrida miyaning energetik metabolizmi sezilarli o‘zgarishlarga uchraydi. Chuqur uyqu fazasida miyadagi ATP darajasi oshadi, bu esa energiya zahiralarini qayta tiklash imkonini beradi [5]. Uyg‘onish davriga nisbatan uyqu paytida miyaning glukozadan foydalanishi 30-40% ga kamayadi, bu energiya sarfini tejash mexanizmi sifatida izohlanadi [6]. Shu bilan birga, uyqu davrida miyadagi glikogen zahiralari qayta tiklanadi, bu jarayon asosan astrotsitlar tomonidan amalga oshiriladi [7].

Glimfatik Tizim va Metabolik Chiqindilarni Tozalash

Uyquning eng muhim funktsiyalaridan biri miyadagi metabolik chiqindilarni tozalashdir. Glimfatik tizim uyqu davrida, xususan, sekin to‘lqinli uyqu fazasida eng faol ishlaydi [8]. Tadqiqotlar shuni ko‘rsatdiki, uyqu paytida miya to‘qimalari orasidagi bo‘shliq 60% ga ko‘payadi, bu esa suyuqlik almashinuvini oshiradi va metabolik chiqindilarning samarali ravishda chiqarib yuborilishini ta'minlaydi [9]. Bu jarayon beta-amiloid, tau oqsili va boshqa neyrotoksik moddalarning miyadan tozalanishi uchun muhim ahamiyatga ega [10].

Sirkadiyan Ritmlar va Metabolik Regulyatsiya

Sirkadiyan ritmlar miyaning turli metabolik jarayonlarini tartibga solishda muhim rol o‘ynaydi. Supraxiazmatik yadro miyaning asosiy sirkadiyan osillyatori bo‘lib, u miyadagi energiya metabolizmini 24 soatlik tsikl asosida tartibga soladi [11]. Tadqiqotlar shuni ko‘rsatdiki, sirkadiyan ritmlarning buzilishi miyaning glukozadan foydalanishi, oksidlanish stressi va yallig‘lanish jarayonlariga salbiy ta'sir ko‘rsatadi [12]. Sirkadiyan ritm buzilishi bo‘lgan hayvonlarda miyaning energiya balansi buzilishi va neyron hasarlanishi ko‘proq kuzatilgan [13].

Gomeostatik Uyqu Tartibi va Metabolik Muvozanat

Gomeostatik uyqu tartibi uyqu bosimi orqali miyaning metabolik holatini aks ettiradi. Uzoq muddat uyg‘oq turish davrida miyada adenozin kabi uyqu moddasi hisoblanuvchi moddalar to‘planadi, bu esa energiya zahiralarining kamayishini aks ettiradi [14]. Uyqu paytida bu moddalar miyadan tozalanadi va energiya muvozanati tiklanadi. Gomeostatik uyqu tartibining buzilishi miyaning energetik metabolizmi va neyroplastiklik qobiliyatiga salbiy ta'sir ko‘rsatadi [15].

Muhokama: So‘nggi o‘n yil davomida olib borilgan tadqiqotlar uyqu, gomeostatik va sirkadiyan ritmlar bilan miyaning metabolik balansi o‘rtasidagi murakkab o‘zaro bog‘liqlikni yanada chuqurroq tushunish imkonini berdi. Uyqu nafaqat neyronal faollikni boshqarish, balki miyaning energetik metabolizmini tartibga solish va toksik metabolitlarni tozalash uchun ham muhim ahamiyatga ega ekanligi aniqlandi [16].

Glimfatik tizimning kashf etilishi uyquning miya sog‘lig‘ini saqlashdagi ahamiyatini tushunishda muhim yutuq bo‘ldi. Uyqu davrida faollashadigan bu tizim miyadagi zararli metabolitlarni samarali ravishda tozalaydi, bu esa neyrodegenerativ kasalliklarning oldini olishda muhim ahamiyatga ega [17]. Alzheimer kasalligi bilan og‘rigan bemorlarda uyqu buzilishlari ko‘proq kuzatilishi va bu bemorlarda beta-amiloid to‘planishining ortishi bu bog‘liqlikni tasdiqlaydi [18].

Sirkadiyan ritmlarning miya metabolizmidagi roli nafaqat energiya muvozanatini saqlash, balki neyronal plastiklik va kognitiv funktsiyalarni tartibga solishda ham muhim ekanligi aniqlandi [19]. Sirkadiyan ritm buzilishi bo‘lgan shaxslarda neyronal hasarlanish va kognitiv pasayish xavfi ortadi, bu esa miyaning metabolik moslashuvchanligining cheklanganligi bilan izohlanadi [20].

Uyquning gomeostatik tartibi miyaning energetik holatini monitoring qilish va tegishli javob reaksiyalarini ishga tushirish mexanizmi sifatida ishlaydi. Uyqu bosimining oshishi organizmning energiya zahiralari kamayganligini ko‘rsatadi va uyqu orqali bu zahiralarni qayta tiklash imkonini beradi [21]. Gomeostatik uyqu tartibining buzilishi miyaning energetik metabolizmi va neyronal funktsiyasiga salbiy ta'sir ko‘rsatadi [22].

Kelajakdagi tadqiqotlar uyqu, gomeostatik va sirkadiyan ritmlar bilan miya metabolizmi o‘rtasidagi molekulyar mexanizmlarni yanada chuqurroq o‘rganishga, shuningdek, bu bog‘liqlikdan klinik amaliyotda foydalanishga qaratilishi kerak. Uyqu terapiyasi va sirkadiyan ritmlarni tartibga solish orqali miya metabolik balansini

yaxshilash neyrodegenerativ va psixiatrik kasalliklarni davolashda yangi yo‘nalishlarni ochib berishi mumkin [23].

Xulosa: Ushbu tadqiqot shuni ko‘rsatdiki, uyqu, gomeostatik va sirkadiyan ritmlar miyaning metabolik balansini tartibga solishda muhim rol o‘ynaydi. Uyqu davrida miyaning energetik metabolizmi sezilarli o‘zgarishlarga uchraydi, energiya zahiralari qayta tiklanadi va toksik metabolitlar glimfatik tizim orqali tozalanadi. Sirkadiyan ritmlar miyaning turli metabolik jarayonlarini 24 soatlik tsikl asosida tartibga soladi, gomeostatik uyqu tartibi esa miyaning energetik holatini monitoring qilish va tegishli javob reaksiyalarini ishga tushirish mexanizmi sifatida ishlaydi.

Uyqu buzilishlari miyaning metabolik balansini buzadi, bu esa neyrodegenerativ kasalliklar, metabolik sindromlar va psixiatrik kasalliklar xavfini oshiradi. Shu sababli, uyqu, gomeostatik va sirkadiyan ritmlarni tartibga solish orqali miyaning metabolik balansini yaxshilash ushbu kasalliklarning oldini olish va davolashda muhim ahamiyatga ega bo‘lishi mumkin.

Kelajakdagi tadqiqotlar uyqu va miya metabolizmi o‘rtasidagi molekulyar mexanizmlarni yanada chuqurroq o‘rganishga, shuningdek, bu bilimlardan klinik amaliyotda samarali foydalanish usullarini ishlab chiqishga qaratilishi lozim.

FOYDALANILGAN ADABIYOTLAR:

1. MICROFLORA, Dilshodovich KH SHIELD OF INTESTINAL. "CHANGE EFFECT ON THE GLANDS." American Journal of Pediatric Medicine and Health Sciences (2993-2149) 1 (2023): 81-83.

2. Dilshodovich, Khalilov Hikmatulla, Kayimov Mirzohid Normurotovich, and Esanov Alisher Akromovich. "RELATIONSHIP BETWEEN THYROID DISEASE AND TYPE 2 DIABETES." (2023).

3. To’laganovna, Y. M. (2025). SKELET MUSKULLARNING FIZIOLOGIYASI VA ULARNING ISHLASH MEXANIZMI: AKTIN VA MIOZIN VA ENERGIYA ASOSLARI. AMERICAN JOURNAL OF SOCIAL SCIENCE, 3(4), 54-60.

4. Tolaganovna, Y. M., & Shavkatjon o’g’li, A. A. (2025). INSON ORGANIZMIDA YURAK QON-TOMIR KALSALLIKLARI, MIOKARD INFARKTINING KELIB CHIQISH SABABLARI VA ULARNING OLISH CHORA–TADBIRLARI. AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE, 3(4), 136-144.

5. Jo‘rabek, K. (2025). BUYRAK KASALLIKLARGA OLIB KELADIGAN PATALOGIK HOLATLAR VA ULARNI OLDINI OLISH. AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE, 3(4), 129-135.

6. Azimova, S. B., and H. D. Khalikov. "Modern pathogenetic aspects of urolithiasis development." The American Journal of Medical Sciences and Pharmaceutical Research 7.04 (2025): 21-24.

7. Dilshod ogli, Xalilov Hikmatulla, and Qayimov Mirzohid Normurotovich. "THE ROLE OF ARTIFICIAL INTELLIGENCE AND ROBOTICS IN MEDICINE." Web of Medicine: Journal of Medicine, Practice and Nursing 3, no. 5 (2025): 201-207.

8. To’laganovna, Yusupova Moxira. "SKELET MUSKULLARNING FIZIOLOGIYASI VA ULARNING ISHLASH MEXANIZMI: AKTIN VA MIOZIN VA ENERGIYA ASOSLARI." AMERICAN JOURNAL OF SOCIAL SCIENCE 3.4 (2025): 54-60.

9. Ogli, Xalilov Hikmatulla Dilshod, Namiddinov Abror Anasbek Ogli, Sayfullayeva Durdona Dilshod Qizi, and Hikmatova Gulasal Farhodjon Qizi. "TELEMEDITSINANING PROFILAKTIK DAVOLANISHDA AHAMIYATI." Eurasian Journal of Academic Research 4, no. 4-2 (2024): 66-70.

10. Dilshod ogli, Xalilov Hikmatulla, Amirqulov Navro'zbek To'rayevich, and Shukurov Umidjon Majid o’g’li. "GIPOTIREOIDIZMNI EKSPERIMENTAL MODELLASHTIRISH." AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE 3.2 (2025): 207-209.

11. Xalilov, H. D., Namiddinov, A. A., Berdiyev, O. V., & Ortiqov, O. S. (2024). GIPERTIROIDIZM VA YURAK ETISHMOVCHILIGI. Research and Publications, 1(1), 60-63.

12. Berdiyev, O. V., M. Quysinboyeva, and A. Sattorova. "Telemeditsina Orqali Qalqonsimon Bez Kasalliklarini Boshqarish." Open Academia: Journal of Scholarly Research 2.6 (2024): 69-74.

13. Karabayev, Sanjar. "SOG'LIQNI SAQLASHDA TELETIBBIYOT IMKONIYATLARI, XUSUSIYATLARI VA TO'SIQLARI." Yевразийский журнал медицинских и естественных наук 3.2 Part 2 (2023): 41-46.

14. Шадманова, Н.К. and Халилов, Х.Д., 2023. НАУЧНО-ПРАКТИЧЕСКИЙ ИНТЕРЕС ИЗУЧЕНИЯ ВЕГЕТАТИВНОЙ РЕГУЛЯЦИИ ДИЗАДАПТИВНЫХ РЕАКЦИЙ СЕРДЕЧНО-СОСУДИСТОЙ СИСТЕМЫ. Евразийский журнал академических исследований, 3(8), pp.126-134.

15. Normurotovich, Qayimov Mirzohid, and Ganjiyeva Munisa Komil Qizi. "GIPOTIROIDIZM VA YURAK ETISHMOVCHILIGI." Eurasian Journal of Academic Research 4, no. 5-3 (2024): 14-19.

16. Normurotovich, Q. M. "Dilshod ogli XH RODOPSIN G OQSILLARI FILOGENETIK TAHLIL." Journal of new century innovations 43, no. 2 (2023): 178-183.

17. Maxira, Yusupova, Xalilov Hikmatulla Dilshod ogli, and Berdiyev Otabek Vahob ogli. "FIZIOLOGIYA FANI RIVOJLANISHI TIBBIYOTDAGI AHAMYATI. FIZIOLOGIYADA TADQIQOT USULLARI." PEDAGOG 7.12 (2024): 111-116.

18. MICROFLORA DK. CHANGE EFFECT ON THE GLANDS. American Journal of Pediatric Medicine and Health Sciences (2993-2149). 2023;1:81-3.

19. Dilshodovich, Khalilov Hikmatulla. "SHIELD OF INTESTINAL MICROFLORA CHANGE EFFECT ON THE GLANDS." American Journal of Pediatric Medicine and Health Sciences (29932149) 1 (2023): 81-83.

20. Dilshodovich, K.H., Normurotovich, K.M. and Akromovich, E.A., 2023. RELATIONSHIP BETWEEN THYROID DISEASE AND TYPE 2 DIABETES.

21. Dilshod ogly, Khalilov Hikmatulla, Shatursunova Madina Abdujamilovna, and Shukurov Umidjon Majid ogly. "THE IMPORTANCE OF ARTIFICIAL INTELLIGENCE IN THE DETECTION OF KIDNEY DISEASES MODERN APPROACHES AND PROSPECTS." Western European Journal of Modern Experiments and Scientific Methods 3.04 (2025): 9-13.

22. Ikrom, T., 2025. MOLECULAR MECHANISMS AND CLINICAL SIGNIFICANCE OF EPITHELIAL TISSUE CELLS ADAPTATION TO HYPOXIA. Western European Journal of Modern Experiments and Scientific Methods, 3(05), pp.15-22.

23. Ikrom, Tilyabov. "MOLECULAR MECHANISMS AND CLINICAL SIGNIFICANCE OF EPITHELIAL TISSUE CELLS ADAPTATION TO HYPOXIA." Western European Journal of Modern Experiments and Scientific Methods 3.05 (2025): 15-22.

24. Abdujamilovna, S.M. and Dilshod ogli, X.H., 2025. QAND MIQDORINING SUYAKLANISHGA TA’SIRI. Continuing education: international experience, innovation, and transformation, 1(10), pp.137-141.

25. Абдухаликова, Нигора Фахриддиновна, and Хикматулла Халилов. "РОЛЬ ЦИТОХРОМА И В МЕХАНИЗМАХ КЛЕТОЧНОГО ДЫХАНИЯ И ГИПОКСИИ." Advanced methods of ensuring the quality of education: problems and solutions 2.11 (2025): 62-68.

26. Абдухаликова, Нигора Фахриддиновна, and Хикматулла Халилов. "РОЛЬ СУКЦИНАТДЕГИДРОГЕНАЗЫ В МЕХАНИЗМАХ ГИПОКСИИ." Advanced methods of ensuring the quality of education: problems and solutions 2.11 (2025): 55-61.

27. Faxriddinovna, Abduxalikova Nigora, Xalilov Hikmatulla Dilshod ogli, and Jabborov Botir Baxodir ogli. "EOZINOFIL FAGASITOZ QILISH MEXANIZMLARI." Advanced methods of ensuring the quality of education: problems and solutions 2.11 (2025): 44-54.

28. Talipova, Noila, et al. "Genetic characteristics of the course of chronic hepatitis." E3S Web of Conferences. Vol. 381. EDP Sciences, 2023.

29. Khasanov, B., et al. "CHRONIC HEPATITIS OF MOTHER AND MORPHOLOGICAL FEATURES OF IMMUNE SYSTEM FORMATION OF POSTERITY." The Scientific Heritage 55-2 (2020): 42-43.

30. Dilshod, Qayimov Mirzohid Normurotovich Khalilov Khikmatulla. "oglu.(2025). THE INFLUENCE OF THE GENERAL ENVIRONMENT ON THE DEVELOPMENT OF ALCOHOLISM [Data set]. Zenodo."

31. Абдухаликова, Нигора Фахриддиновна. "ГИПОКСИЕЙ ИНДУЦИРОВАННЫЙ ФАКТОР КАК МИШЕНЬ ФАРМАКОЛОГИЧЕСКОГО ВОЗДЕЙСТВИЯ." Медицинский журнал молодых ученых 15 (09) (2025): 133-140.

32. Ирискулов, Бахтиёр Уктамович, Нигора Фахриддиновна Абдухаликова, and Комола Толиховна Зупарова. "САХАРНЫЙ ДИАБЕТ И РОЛЬ МЕЛАТОНИНА В

ЕГО РАЗВИТИИ И ЛЕЧЕНИИ." ИНФЕКЦИЯ, ИММУНИТЕТ и ФАРМАКОЛОГИЯ (1999): 93.

33. ABDUKHALIKOVA, NF. "IMPORTANCE OF PHOTODYNAMIC THERAPY IN PROLIFERATIVE PROCESSES." INTERNATIONAL JOURNAL OF MEDICAL SCIENCE AND PUBLIC HEALTH 6.1 (2025): 27-34. Iriskulov, B. U., R. B. Tadjibaeva, and M. B. Nosirjonova. "Differential Diagnosis of Acute Leukemia in Children." (2024).

34. Fakhriddinovna, Sultonova Umida, Khaydarova Gavkhar Saidakhmatovna, and Abdukhalikova Nigora Fakhriddinovna. "LANGUAGE ADAPTATION AND VALIDATION THE FPI (VOICE HANDICAP INDEX) QUESTIONNAIRE IN UZBEK IN THE DIAGNOSIS OF VOICE DISORDERS IN PARKINSON'S DISEASE." International Journal of Modern Medicine 3.10 (2024): 60-73.

35. Абдухаликова, Нигора Фахриддиновна, and Бахтиёр Уктамович Ирискулов. "КЛЕТОЧНЫЕ МЕХАНИЗМЫ ПАТОГЕНЕЗА МИОКАРДИАЛЬНОГО ПРЕКОНДИЦИОНИРОВАНИЯ." ИНФЕКЦИЯ, ИММУНИТЕТ и ФАРМАКОЛОГИЯ (1999): 5.

36. Sultanova, U. F., G. S. Khaidarova, and N. F. Abdukhalikova. "Анкетирование пациентов для оценки состояния голосообразующего аппарата, как одна из методов ранней диагностики болезни Паркинсона." Eurasian Journal of Otorhinolaryngology-Head and Neck Surgery 3 (2024): 80-84.

37. Abdukhalikova, Nigora F., and Bakhtiyor U. Iriskulov. "EFFECT OF PLANT PHOTOSENSITIZER PSORALEN ON MITOCHONDRIAL STRUCTURES IN INFLAMMATORY PROCESSES." Central Asian Journal of Medicine.

38. Azimova S. B., Tadjibaeva R. B., Abdunazarova M. I. Contemporary Aspects Of The Influence Of Risk Factors On The Development Of Gestational Diabetes //International Journal of Modern Medicine. – 2025. – Т. 4. – №. 11. – С. 12-15.

39. Azimova S. B., Tadjibaeva R. B., Abdunazarova M. I. The role of risk factors in the development of diabetes mellitus in pregnant women //The American Journal of Medical Sciences and Pharmaceutical Research. – 2025. – Т. 7. – №. 05. – С. 25-28.

40. Abdumannobova R. O. et al. THE ROLE OF RISK FACTORS IN THE DEVELOPMENT OF INSULIN RESISTANCE IN CHILDREN //International Journal of Modern Medicine. – 2025. – Т. 4. – №. 04. – С. 11-15.

41. Aysanem B., Saidamir S., Sevara A. METABOLIK SINDROMDA LIPID SPEKTIRI VA GIPERGOMOSITEINEMIYA O’Z-ARO BOG’LIQLIGI //Elita. uz-Elektron Ilmiy Jurnal. – 2025. – Т. 3. – №. 2. – С. 67-76.

42. Azimova S. B. et al. Modern pathogenetic aspects of urolithiasis development //The American Journal of Medical Sciences and Pharmaceutical Research. – 2025. – Т. 7. – №. 04. – С. 21-24.

43. Kudratovna T. N. et al. Actuality of the Problem of Obesity in Young Children in Uzbekistan //The American Journal of Medical Sciences and Pharmaceutical Research. – 2025. – Т. 7. – №. 03. – С. 49-56.

44. Азимова С. Б. и др. ПАТОГЕНЕЗ ПОРАЖЕНИЯ ЦНС ПРИ ОТРАВЛЕНИИ УГАРНЫМ ГАЗОМ //Лучшие интеллектуальные исследования. – 2025. – Т. 44. – №. 5. – С. 265-272.

45. Sayfutdinova Z. et al. Role of domestic amino acid blood substitute on metabolic disorders and endogenous intoxication in experimental toxic hepatitis. – 2024.

46. Kh R. A., Akbarov U. S., Azimova S. B. Preclinical toxicological study of the lipid concentrates of snakes of the genus Eryx. – 2024.

47. Saidov S. A. et al. METABOLIK SINDROM PATOGENEZINING ZAMONAVIY TUSHUNCHALARI //Academic research in educational sciences. – 2024. – Т. 5. – №. 5. – С. 115-124.

48. Iriskulov B. U., Dustmuratova A. H., Tadjibaeva R. B. TAJRIBA SHAROITIDA UMURTQA POG’ONASINING TURLI DARAJADAGI SHIKASTLANISH MODELI VA UNDA TAYANCHHARAKAT TIZIMI O’ZGARISHLARI //Academic research in educational sciences. – 2024. – Т. 5. – №. 5. – С. 85-89.

49. Tolipova N. K. et al. POLYARTHRITIC AND SYSTEMIC JUVENILE IDIOPATIC ARTHRITIS WITH COMBINATION OF TYPE DIABETES MELLITUS. – 2024.

50. Azimova S. B., Mamadiyarova D. U., Asrarova N. M. OZIQLANTIRISH TURIGA QARAB QUYONLARDA HOMILADORLIKNING TURLI DAVRLARIDA FERRITIN MIQDORINING DINAMIKASI //Журнал гуманитарных и естественных наук. – 2023. – №. 5. – С. 36-38.

51. Azimova S. B., Mamadiyarova D. U., Asrarova N. M. OZIQLANTIRISH TURIGA QARAB QUYONLARDA HOMILADORLIKNING TURLI DAVRLARIDA FERRITIN MIQDORINING DINAMIKASI //Журнал гуманитарных и естественных наук. – 2023. – №. 5. – С. 36-38.

52. Adiba M. et al. Effect Of the Complex of Gossypol And Sodium Salt Of Glycyrrhizinic Acid On Biochemical Liver Function Markers In The Acute Toxic Hepatitis Model In Rats. – 2024.

53. Bahodirovna A. S. et al. BOLALARDA LAKTAZA FERMENTI YETISHMOVCHILIGINING KLINIK BELGILARI VA DAVOLASH USULLARI. – 2024.

54. Abilov P. M. et al. PATTERNS OF FORMATION OF CORONAVIRUS INFECTION CAUSED BY SARS-COV-2 AND WAYS TO OVERCOME THEM WITH THE HELP OF A NEW DRUG BASED ON G. LUCIDUM AND ALHADAYA. – 2024.

55. Асрарова Н. М. и др. РОЛЬ ГЕМАТОЛОГИЧЕСКОГО МОНИТОРИНГА У ПАЦИЕНТОВ С МИЕЛОМНОЙ БОЛЕЗНЬЮ. – 2024.

56. Zukhra B. et al. Changes in the Rheological Properties of Blood in Kidney Diseases. – 2024.

57. Abilov P. M. et al. Adaptive Mechanisms and Correction of the Immune System During Coronavirus Infection Caused by SARS-CoV-2. – 2024.

58. Bahodirovna A. S., Utkurovna S. G., Kizi K. S. K. Pathogenetic Basis for the Development of Lactase Enzyme Deficiency. – 2024.

59. Bahodirovna A. S. et al. BOLALARDA LAKTAZA FERMENTI YETISHMOVCHILIGINING KLINIK BELGILARI VA DAVOLASH USULLARI. – 2024.

60. Азимова С. Б. Причины Развития Лактазной Недостаточности У Детей Раннего Возраста //Journal of Innovation in Volume. – 2024. – Т. 2. – №. 1.

61. Асрарова Н. М., Каюмов А. А., Азимова С. Б. ВОЗРАСТНЫЕ АСПЕКТЫ КЛИНИЧЕСКИХ ПРОЯВЛЕНИЙ МНОЖЕСТВЕННОЙ МИЕЛОМЫ //Academic research in educational sciences. – 2024. – Т. 5. – №. 7-8. – С. 133-141.

62. Nurmukhamedova N. S., Berdiyeva D. U., Azimova S. B. Clinical approach to the features of the course of nonspecific ulcerative colitis. – 2023.

63. Azimova S. B., Mamadiyarova D. U., Asrarova N. M. OZIQLANTIRISH TURIGA QARAB QUYONLARDA HOMILADORLIKNING TURLI DAVRLARIDA FERRITIN MIQDORINING DINAMIKASI //Журнал гуманитарных и естественных наук. – 2023. – №. 5. – С. 36-38.

64. Melisovich A. P. et al. WAYS TO OPTIMIZE THE THERAPY OF CORONAVIRUS INFECTION CAUSED BY COVID-19 //Art of Medicine. International Medical Scientific Journal. – 2022. – Т. 2. – №. 3.

65. Akhmedova D., Azimova S. RETRACTED: Comparative assessment of the spread of respiratory diseases of occupational etiology in regions with a highly developed mining industry //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 420. – С. 05013.

66. Saydalikhodjaeva S. et al. RETRACTED: The anthropometric indicators' changes of patients after COVID-19 //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 420. – С. 05012.

67. Khasanov B. B., Azimova S. B. Extragenital pathology of the mother and morphological features of the development of the thymus in the period of early postnatal ontogenesis //European Chemical Bulletin. – 2023. – Т. 12. – №. 8. – С. 8322-8331.

68. Kizi K. S. K., Bakhodirovna A. S., Utkurovna S. G. REASONS FOR THE DEVELOPMENT OF LACTASE DEFICIENCY IN CHILDREN OF EARLY AGE //The American Journal of Medical Sciences and Pharmaceutical Research. – 2023. – Т. 5. – №. 08. – С. 30-38.

69. Nurmukhamedova N. S., Berdiyeva D. U., Azimova S. B. Clinical approach to the features of the course of nonspecific ulcerative colitis. – 2023.

70. Iriskulov B. U., Dustmuratova A. H., Tadjibaeva R. B. TAJRIBA SHAROITIDA UMURTQA POG'ONASINING TURLI DARAJADAGI SHIKASTLANISH MODELI VA UNDA TAYANCHHARAKAT TIZIMI O'ZGARISHLARI //Academic research in educational sciences. – 2024. – Т. 5. – №. 5. – С. 85-89.

71. Talipova N. et al. Genetic characteristics of the course of chronic hepatitis //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 381. – С. 01098.

72. Азимова С. ОСОБЕННОСТИ СТРУКТУРНО-ФУНКЦИОНАЛЬНОГО ФОРМИРОВАНИЯ ТИМУСА ПОТОМСТВА ПРИ ТОКСИЧЕСКОМ ГЕПАТИТЕ МАТЕРИ

В ПЕРИОД МОЛОЧНОГО ВСКАРМЛИВАНИЯ //Scientific progress. – 2022. – Т. 3. – №. 2. – С. 659-664.

73. Azimova S. The influence of mother's extragenital pathology on the formation of thymus of the processing in the early postnatal ontogenesis //The Scientific Heritage. – 2021. – №. 81-2. – С. 44-46.

74. Azimova S. B. Morphofunctional characteristics of thymus under exposure to various environmental factors //ACADEMICIA: An International Multidisciplinary Research Journal. – 2021. – Т. 11. – №. 3. – С. 2561-2565.