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Physiological Features of Male Gonads in the Postnatal Period

Saidov Akmal Abdullaevich
Bukhara State Medical Institute

Abstract: A feature of spermatogenesis in multicellular animals is the presence of cytoplasmic bridges between dividing spermatogenic cells, due to which synchronous development of germ cells is achieved [11]. Spermatogenesis, by analogy with oogenesis, can be divided into four periods: the reproductive period; the growth period during which there is a noticeable increase in the size of the germ cells; the maturation period including meiosis; the period of formation that ends with the appearance of sperm [12]. However, in modern literature it is more common to divide spermatogenesis into three stages, since the growth of male germ cells during spermatogenesis is poorly expressed [13].

Keywords: spermatogenesis, testis, germ cells, Leydig cells.

After the birth of a mammal, the testis is an immature organ that gains the ability to fully perform its functions only during puberty. The acquisition of maturity by the testes is expressed in a number of morphological changes at the tissue, cellular and ultrastructural levels [1]. The testis of a newborn differs little in structure from the testis of a fetus in the last months of development. By the time of birth, the weight of the testicle reaches 0.8 g. The testicle of a newborn child is characterized by a lobed structure, a loose arrangement of interstitial tissue, which strongly resembles mesenchyme. The interstitial tissue contains a small number of small Leydig cells. However, during the first weeks and months after birth, the processes of programmed death of endocrinocytes are most active, followed by a period of "rest", when there are practically no mature Leydig cells in the population and the proliferative activity of their precursors is not expressed [2]. In human seminiferous convoluted tubules there is no lumen until the age of 4 years. The first type A spermatogonia appear at 5-6 years of age. At 7 years of age, the first spermatocytes are formed, and the lumens of the seminiferous convoluted tubules increase [3]. Significant changes in the structure of the testis occur during puberty. According to modern ideas, this process is triggered by leptin, a hormone synthesized by white adipose tissue cells. Animal experiments have shown that leptin injections promote puberty by stimulating the production of estrogen [4]. In humans, leptin levels also increase before the onset of puberty [5]. During this period, the formation of the blood-testis barrier (BTB) is completed, when sustentocytes (its main structural elements) stop dividing and form closing connections [6]. In this case, the barrier acquires a classical structure and includes such structures as a continuous basement membrane of the endothelium, capillary endothelium, which has pronounced phagacytic activity of pericytes, layers of interstitial connective tissue with macrophages capable of destroying toxic substances and xenobiotics, as well as the membranes of the convoluted seminiferous tubule and its basement membrane [7].

Other researchers argue that the barrier is formed already in the early stages of embryogenesis, separating blood cells from the cells of the reproductive system, thereby preventing the development of autoimmune reactions [8]. Puberty marks the peak of proliferation and differentiation of Leydig cells in all mammals [9]. Also at this stage, proliferation processes begin, but full spermatogenesis is established only by 20-22 years of age [10]. The result of the processes occurring during puberty is the formation of mature testes, in which the processes of spermatogenesis and steroidogenesis fully occur. A feature of spermatogenesis in multicellular animals is the presence of cytoplasmic bridges between dividing spermatogenic cells, due to which synchronous development of germ cells is achieved [11]. Spermatogenesis, by analogy with oogenesis, can be divided into four periods: the reproductive period; the growth period during which there is a noticeable increase in the size of the germ cells; the maturation period including meiosis; the period of formation that ends with the appearance of sperm [12]. However, in modern literature it is more common to divide spermatogenesis into three stages, since the growth of male germ cells during spermatogenesis is poorly expressed [13]. According to this

concept [14], the first stage of spermatogenesis is spermatocytogenesis. At this stage, spermatogonia multiply. The proliferation of spermatogonia is accompanied by the formation of a number of generations, with each subsequent generation becoming more differentiated than the previous one. These cells are located on the basement membrane of the seminiferous convoluted tubules. Their total number in the human testis is about 1 billion [15]. From a morphological point of view, spermatogonia are round or oval-shaped cells with ER, Golgi apparatus, as well as a large number of ribosomes and polysomes [16].

A characteristic feature of spermatogonia is the presence of sexual determinants (germ plasm). A number of studies indicate that the mitochondrial matrix takes part in the formation of this substance [17]. For mammals, there is a clear classification of spermatogonia depending on the morphology of the nuclei [18], however, in different groups of mammals, the number of groups into which the entire population of spermatogonia can be divided will differ. Thus, in rodents, spermatogonia are divided into 3 populations: A - immature, B-mature and intermediate type spermatogonia (In). In addition, immature spermatogonia form 4 subpopulations (A1–4) [19]. In addition to spermatogonia, stem spermatogenic cells (A0) are in contact with the basal membrane of the seminiferous convoluted tubules in rodents, which are morphologically indistinguishable from spermatogonia A, and the only feature by which they can be identified is the absence of neighboring cells within a radius of 25 μm [20]. An important feature of cells that have embarked on the path of differentiation is the presence of cytoplasmic bridges between them due to incomplete cytotomy. Such cells are designated as Apr (paired) if a bridge connects 2 cells, or Aal (grouped) if a clone of 4-8 or 16 cells is formed. These cells, despite being committed, proliferate but do not differentiate, being virtually no different from stem cells, except that they are part of a syncytial structure. It is due to cell divisions of Apr and Aal that the population of spermatogenic cells in rodents is maintained at a normal level [22]. In primates, including humans, the population of spermatogonia looks different: morphologically, the cells are divided into 2 populations: A and B, and type A spermatogonia, in turn, are divided according to the degree of chromatin condensation into dark and light cells (Apale and Adark). In this case, Apale spermatogonia differentiate into type B spermatogonia without intermediate stages. In addition, they are able to maintain their population through mitosis, and Adark spermatogonia are reserve cells and, like A0 stem cells, divide only under conditions of depletion of the spermatogonia cell pool [23].

The division of type B spermatogonia in all mammals leads to the formation of primary spermatocytes [24]. The next stage of spermatogonesis is meiosis. This process includes chromosome pairing, crossing over, as well as two successive divisions of spermatocytes, resulting in the formation of spermatids with a haploid set of chromosomes. Primary spermatocytes have the same set of organelles as spermatogonia and are also similar in size, but in their cytoplasm the material of sex determinants is present only in residual quantities [13]. The processes of sustentocytes penetrate between the basement membrane and spermatocytes and displace the cells, as a result of which the spermatocytes begin to move towards the lumen. By the end of interphase, the amount of DNA in first-order spermatocytes doubles [8]. The prophase of meiotic division consists of four phases: leptotene, zygotene, pachytene and diplotene. Leptotene spermatocytes no longer come into contact with their own membrane of the seminiferous convoluted tubules and have a nucleus that contains chromosomes, which look like thin filaments. The mitochondria of these cells also undergo changes: the cristae look swollen and lose their parallel arrangement. The mitochondria themselves begin to branch, which indicates their division [10]. Small vesicles of smooth ER are found in the cytoplasm. Spermatocytes at the zygotene stage are characterized by an increase in the size of the nuclei; thread-like chromosomes in them are collected in pairs. In this case, synaptonemal complexes are formed, located between the conjugating chromosomes, holding them near each other and facilitating the crossing over process [6]. The presence of synaptinemal complexes in the cytoplasm is the main feature that allows the identification of primary spermatocytes [11]. The volume of the nuclei of pachytene spermatocytes increases, a large spherical nucleolus appears in them, and the chromosomes become thick and short. During diplotene and diakinesis, chromosomes become as short as possible and synaptonemal complexes disappear, and by the end of meiotic prophase the nuclear membrane disappears. During the metaphase of the first

division of maturation, tetrads of chromatids are located in the region of the equatorial plate. In the anaphase of the first division of maturation, the centromeres of each pair of homologous chromosomes begin to move to opposite poles of the cell, carrying dyads of chromatids with them. Anaphase I and telophase I quickly complete, resulting in the formation of secondary spermatocytes. They quickly go through the second division of maturation, resulting in the formation of spermatids. The morphological transformation during which spermatids turn into spermatozoa is called spermiogenesis. This process has been studied in detail in rats [13].

Literature

1. Хайдарова Н. А. Морфологическая И Морфометрическая Характеристика Щитовидной Железы При Полипрагмазии Противовоспалительными Препаратами //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2022. – Т. 1. – №. 7. – С. 151-155.
2. Akhtamovna K. N., Muyitdinovna K. S. Ischemic Heart Disease in Path Anatomic Practice: Cardio Sclerosis //European Multidisciplinary Journal of Modern Science. – 2022. – Т. 5. – С. 402-406.
3. Muyitdinovna X. S. The role of hyperhomocyteinemia in the development of cognitive disorders in chronic brain ischemia //Web of scientist: international scientific research journal. – 2022. – Т. 3. – №. 8. – С. 442-453.
4. Muyitdinovna X. S. The role of hyperhomocysteinemia in the development of cognitive impairment in chronic cerebral ischemia //Web Sci. Int. Sci. Res. J. – 2022. – Т. 3. – С. 421-428.
5. Muyitdinovna X. S. Analysis of maternal mortality in the practice of pathological anatomy //Web of scientist: international scientific research journal. – 2022. – Т. 3. – №. 8.
6. Kadirovna K. D., Muyitdinovna X. S. ELEVATED HOMOCYSTEIN LEVELS AS A RISK FACTOR FOR THE DISEASE IN CEREBRAL ISCHEMIA //World Bulletin of Public Health. – 2023. – Т. 21. – С. 117-120.
7. Муйитдиновна Х. С. СУД ТИББИЙ АМАЛИЁТИДА ЖИГАР ЦИРРОЗИ УЧРАШИ ВА СТАТИСТИК ТАҲЛИЛИ //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2023. – Т. 2. – №. 5. – С. 355-361.
8. Muyitdinovna K. S. Ovarian Cysts in Women of Reproductive Age //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2022. – Т. 1. – №. 7. – С. 225-228.
9. Muyitdinovna K. S. Pathogenetic Types and Principles of Treatment of Dyscirculatory Encephalopathy //Research Journal of Trauma and Disability Studies. – 2023. – Т. 2. – №. 9. – С. 72-79.
10. Muyitdinovna, X. S. (2023). Modern Aspects of the Etiology of Acute Intestinal Infections. American Journal of Pediatric Medicine and Health Sciences (2993-2149), 1(3), 102–105. Retrieved from https://grnjournal.us/index.php/AJPMHS/article/view/197
11. Muyitdinovna K. S. Prevalence and Epidemiology of Brain Cancer in Bukhara Region //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2022. – Т. 1. – №. 7. – С. 220-224.
12. Kadirovna K. D., Muyitdinovna X. S. The role of hypergomocysteinemia in chronic ischemic stroke : дис. – Antalya, Turkey, 2022.
13. Akhtamovna K. N. Modern View on the Influence of Antitumor Therapy on the Activity of the Thyroid Gland //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 5. – С. 50-54.
14. Muyitdinovna K. S. Prevalence and Epidemiology of Brain Cancer in Bukhara Region //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2022. – Т. 1. – №. 7. – С. 220-224.
15. Axtamovna H. N. Study of the Influence of Stress Factors on Animals //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 3. – С. 106-111.

16. Хайдарова Н. А. Морфологические Изменения Сердца У 6-Месячных Белых Беспородных Крыс Под Влиянием Энергетического Напитка //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2022. – Т. 1. – №. 7. – С. 142-146.

17. Khaidarova N. MODULAR TECHNOLOGY FOR TEACHING STUDENTS IN THE SCIENCE OF FORENSIC MEDICINE //Естественные науки в современном мире: теоретические и практические исследования. – 2022. – Т. 1. – №. 24. – С. 103-106.

18. Khaidarova N. ATHEROSCLEROSIS OF CORONARY VESSELS WITH NORMAL MACRO AND MICROSTRUCTURE OF THE THYROID GLAND IN PRACTICALLY HEALTHY PERSONS //Инновационные исследования в современном мире: теория и практика. – 2022. – Т. 1. – №. 24. – С. 606-608.

19. Mustafoevich S. O., Akhtamovana K. N. MEETING OF KIDNEY CYSTERS IN COURT MEDICAL AUTOPSY PRACTICE //Web of Scientist: International Scientific research Journal. – 2022. – №. 3. – С. 6.

20. Mustafoevich S. O., Akhtamovana K. N. Epitelial safe tumors of bladder rate, types and causes //Web of Scientist: International Scientific research Journal. – 2022. – №. 3. – С. 6.

21. Muitdinovna, K. S., & Rakhimovich, O. K. (2023). Forensic Medical Assessment and Statistical Analysis of Mechanical Asphixia. International Journal of Integrative and Modern Medicine, 1(3), 21–24.

22. Khaidarova Nargiza Akhtamovna. (2023). Modern Aspects of Morphological Features of the Thyroid Gland in Autoimmune Thyroiditis. International Journal of Integrative and Modern Medicine, 1(3), 47–51. Retrieved from https://medicaljournals.eu/index.php/IJIMM/article/view/95

23. Xaydarova Nargiza Axtamovna. (2023). HASHIMOTO TIREOIDITIDA QALQONSIMON BEZNING MORFOLOGIK XUSUSIYATLARI. AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI, 2(11), 247–252.
Retrieved from https://sciencebox.uz/index.php/amaltibbiyot/article/view/8514

24. Kadirovna K. D., Muyitdinovna X. S. ELEVATED HOMOCYSTEIN LEVELS AS A RISK FACTOR FOR THE DISEASE IN CEREBRAL ISCHEMIA //World Bulletin of Public Health. – 2023. – Т. 21. – С. 117-120.

25. Axtamovna H. N. Effect of Hemodialysis Therapy on Heart Rhythm //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 5. – С. 326-331.

26. Axtamovna H. N. Effect of Hemodialysis Therapy on Heart Rhythm //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 5. – С. 326-331.

27. Kadirovna K. D., Muyitdinovna X. S. The role of hypergomocysteinemia in chronic ischemic stroke : дис. – Antalya, Turkey, 2022.

28. Muyitdinovna X. S. Modern Concepts on the Effect of Alcohol Intoxication on the Activity of the Heart //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 5. – С. 332-338.

29. Муйитдиновна Х. С. Суд Тиббий Амалиётида Механик Асфиксиялардан Чўкишнинг Учраши Ва Статистик Таҳлили //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2023. – Т. 2. – №. 11. – С. 403-406.

30. Rakhimovich O. K. CHARACTERISTICS OF MORPHOMETRIC AND ULTRASTRUCTURAL STRUCTURE OF LIVER HEPATOCYTES. – 2023.

31. Очилов К.Р., Каюмов Ж.Т. Ультраструктурные изменения печени крыс при пероральном введении солей тяжёлых металлов. “Пути совершенствования судебной экспертизы. Зарубежный опыт” Материалы научно-практической конференции 15-16 ноября 2017 г. Ташкент. С. 175.

32. Очилов К. Р. Влияние ионов кадмия и кобальта на дыхание митохондрий печени крыс //Новый день в медицине. – 2020. – №. 2. – С. 710-712.

33. Очилов К. Р. Изучение Влияние Солей Тяжелых Металлов На Биохимические Процессы Митохондрий Печени Крыс //Central Asian Journal of Medical and Natural Science. – 2021. – С. 383-387.

34. Очилов К. Р. СТРУКТУРНОЕ СТРОЕНИЕ КЛЕТОК ТКАНИ ПЕЧЕНИ ПРИ ВОЗДЕЙСТВИИ КАДМИЯ //Новости образования: исследование в XXI веке. – 2023. – Т. 1. – №. 7. – С. 372-377.

35. Очилов К. Р. ВЛИЯНИЕ СВИНЦА НА ОРГАНИЗМ ЧЕЛОВЕКА И ЖИВОТНЫХ //ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ. – 2023. – Т. 18. – №. 7. – С. 89-93.

36. ОЧИЛОВ К. Р. и др. ДЕЙСТВИЕ БУТИФОСА НА ТРАНСПОРТ Ca2+ В МИТОХОНДРИЯХ ПЕЧЕНИ КРЫС //Доклады Академии наук УзССР. – 1985. – Т. 45.

37. Наврузов Р. Р., Очилов К. Р. МОРФОФУНКЦИОНАЛЬНЫЕ ОСОБЕННОСТИ ЛИМФОИДНЫХ СТРУКТУР ТОЛСТОЙ КИШКИ ПРИ ЛУЧЕВОЙ БОЛЕЗНИ //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 728-733.

38. Тешаев Ш. Ж., Очилов К. Р. МОРФОФУНКЦИОНАЛЬНЫЕ ОСОБЕННОСТИ МИТОХОНДРИЙ ПЕЧЕНИ КРЫС ПРИ ОТРАВЛЕНИИ БУТИЛКАПТАКСОМ //Новый день в медицине. – 2020. – №. 2. – С. 715-717.

39. Ochilov Kamil Rakhimovich Issues of Physical Health of Young People

40. Intersections of Faith and Culture: AMERICAN Journal of Religious and Cultural Studies Volume 01, Issue 02, 2023 ISSN (E): XXX-XXX

41. Ochilov Komil Rahimovich Khaidarova Nargiza Akhtamovna Morphological and Morphometric Characteristics of the Thyroid Gland Polypharmacy Anti-inflammatory Sensors SCHOLASTIC: Journal of Natural and Medical Education Volume 2, Issue 5, Year 2023 ISSN: 2835-303X https://univerpubl.com/index.php/scholastic

42. Ochilov Komil Rakhimovich Khatamova Sarvinoz Muitdinovna, Forensic Medical Assessment and Statistical Analysis of Mechanical Asphixia IJIMM, Volume 1, Issue 3, 2023 ISSN: XXXX-XXXX http://medicaljournals.eu/index.php/IJIMM/issue/view/3 Kamil Rakhimovich Ochilov Studying The Effect Of Heavy Metal Salts On Biochemical Processes Of Rat Liver Mitochondria DOI: 10.47750/pnr.2022.13.S07.230

43. Ochilov Kamil Rakhimovich Effects of Heavy Metal Salts in Biochemical Processes, Rat Liver Mitochondria .American Journal of Science and Learning for Development ISSN 2835-2157 Volume 2 | No 1 | January -2023 Published by inter-publishing.com | All rights reserved. © 2023 Journal Homepage: https://inter-publishing.com/index.php/ AJSLD Page 109

44. Олимова А. З., Шодиев У. М. Репродуктив Ёшдаги эркакларда бепуштлик сабаблари: Бухоро тумани эпидемиологияси //Scientific progress. – 2021. – Т. 2. – №. 7. – С. 499-502.

45. Zokirovna O. A., Abdurasulovich S. B. Ovarian Diseases in Age of Reproductive Women: Dermoid Cyst //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 154-161.

46. Olimova A. Z. ECHINOCOCCOSIS OF LIVER OF THREE MONTHLY WHITE RAT //Scientific progress. – 2022. – Т. 3. – №. 3. – С. 462-466.

47. Олимова А. З. Морфологические и морфометрические особенности печени белых беспородных трех месячных крыс после тяжёлой черепно-мозговой травмы вызванной экспериментальным путём //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 557-563.

48. Oglu M. Z. M., Zokirovna O. A. МОРФОЛОГИЧЕСКИЕ И МОРФОМЕТРИЧЕСКИЕ ПАРАМЕТРЫ ПЕЧЕНИ БЕЛЫХ БЕСПОРОДНЫХ КРЫС, ПЕРЕНЕСШИХ ЭКСПЕРИМЕНТАЛЬНУЮ ЧЕРЕПНО-МОЗГОВУЮ ТРАВМУ ПОСЛЕ МЕДИКАМЕНТОЗНОЙ КОРРЕКЦИИ //JOURNAL OF BIOMEDICINE AND PRACTICE. – 2023. – Т. 8. – №. 1.
49. Олимова А. З., Турдиев М. Р. БУХОРО ШАҲРИДА МЕЪДА ВА ЎН ИККИ БАРМОҚЛИ ИЧАК ЯРАСИ УЧРАШ ЭПИДЕМИОЛОГИЯСИ //Oriental renaissance: Innovative, educational, natural and social sciences. – 2022. – Т. 2. – №. 4. – С. 642-647.
50. Zokirovna O. A. Modern Concepts of Idiopathic Pulmonary Fibrosis //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 3. – С. 97-101.
51. Zokirovna O. A. Pathology of Precancerous Conditions of the Ovaries //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 3. – С. 93-96.
52. Зокировна, Олимова Азиза и Тешаев Шухрат Джумаевич. «Морфологические аспекты печени белых беспородных крыс после тяжелой черепно-мозговой травмы, вызванной экспериментально в виде дорожно-транспортного происшествия». *Scholastic: Journal of Natural and Medical Education* 2.2 (2023): 59-62.
53. Zokirovna O. A. Comparative characteristics of the morphological parameters of the liver at different periods of traumatic brain injury //Euro-Asia Conferences. – 2021. – С. 139-142.
54. Zokirovna O. A. Macroand microscopic structure of the liver of threemonthly white rats //Academic research in educational sciences. – 2021. – Т. 2. – №. 9. – С. 309-312.
55. Олимова А. З. Частота Встречаемости Миомы Матки У Женщин В Репродуктивном Возрасте //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 551-556.
56. Zokirovna O. A., Abdurasulovich S. B. Ovarian Diseases in Age of Reproductive Women: Dermoid Cyst //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 154-161.
57. Zokirovna O. A. Cytological screening of cervical diseases: pap test research in the bukhara regional diagnostic center for the period 2015-2019. – 2022.
58. Zokirovna O. A., PREVALENCE R. M. M. EPIDEMIOLOGY OF CANCER OF THE ORAL CAVITY AND THROAT IN THE BUKHARA REGION //Web of Scientist: International Scientific Research Journal. – 2022. – Т. 3. – №. 11. – С. 545-550.
59. Olimova A. Z. The frequency of occurrence of my uterus In women of reproductive age //JOURNAL OF ADVANCED RESEARCH AND STABILITY (JARS). – 2021. – Т. 1. – №. 06. – С. 551-556.
60. Olimova Aziza Zokirovna. (2023). MODERN PRINCIPLES OF THE EFFECT OF HEMODIALYSIS THERAPY ON HEART RATE. *International Journal of Integrative and Modern Medicine*, *1*(1), 80–85.
Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/28
61. Olimova Aziza Zokirovna. (2023). PATHOMORPHOLOGICAL CHARACTERISTICS OF THE EPIDIDYMIS UNDER IRRADIATION. *International Journal of Integrative and Modern Medicine*, *1*(1), 96–100. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/31
62. Olimova Aziza Zokirovna. (2023). THE INCIDENCE OF CANCER OF THE ORAL CAVITY AND PHARYNX IN THE BUKHARA REGION. *International Journal of Integrative and Modern Medicine*, *1*(1), 86–89. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/29

63. Olimova Aziza Zokirovna. (2023). INFLUENCE OF ALCOHOL INTOXICATION ON THE HEART TISSUE OF RATS IN THE EXPERIMENT. *International Journal of Integrative and Modern Medicine*, *1*(1), 90–95. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/30

64. Olimova Aziza Zokirovna. (2023). Modern Aspects of the Etiology of Gastric Ulcer and Its Complications. *American Journal of Pediatric Medicine and Health Sciences (2993-2149)*, *1*(3), 163–166. Retrieved from http://grnjournal.us/index.php/AJPMHS/article/view/208

65. Zokirovna O. A., Jumaevich T. S. Morphological Aspects of the Liver of White Outbred Rats After Severe Traumatic Brain Injury Caused Experimentally in the Form of a Road Accident //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 2. – С. 59-62.

66. Aziza Zokirovna Olimova GASTRIC ULCER AND ITS COMPLICATIONS // Scientific progress. 2022. №3. URL: https://cyberleninka.ru/article/n/gastric-ulcer-and-its-complications (дата обращения: 28.09.2023).

67. Olimova Aziza Zokirovna. (2022). TECHNIQUE FOR CUTTING BIOPSY AND SURGICAL MATERIAL IN THE PRACTICE OF PATHOLOGICAL ANATOMY AND FORENSIC MEDICINE. *Web of Scientist: International Scientific Research Journal*, *3*(7), 116–120. https://doi.org/10.17605/OSF.IO/PSQ59

68. Zhumayevich N. F., Zokirovna O. A. PATHOMORPHOLOGY OF GASTRIC CANCER //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2022. – С. 330-333.

69. Zokirovna O. A. Epidemiological and Etiological Data of Morphogenesis and Pathomorphology of Congenital Heart Diseases in Children //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 4. – С. 88-91.