sy Research Priorities in Europe.On Behalf of Epilepsy Advocacy Europe. *Epilepsia*. 2015; 11: 1687–1695. DOI:10.1111/epi.13201

22. Pitkänen A, EkolleNdode-Ekane X, Lapinlampi N. Epilepsy biomarkers – Toward etiology and pathology specificity. *Neurobiol Dis*. 2019; 123: 42-58. DOI: 10.1016/j.nbd.2018.05.007.

23. Pitkänen A, Löscher W, Vezzani A. Advances in the development of biomarkers for epilepsy. *Lancet Neurol*. 2016; 8: 843-856. DOI: 10.1016/S1474-4422(16)00112-5.

24. Rizzo A, Donzelli S, Girgenti V. In vitro antineoplastic effects of brivaracetam and lacosamide on human glioma cells. *J ExpClin Cancer Res*. 2017; 36: 76. DOI:10.1186/s13046-017-0546-9.

25. Shah SZA, Zhao D, Hussain T. Regulation of MicroRNAs-Mediated Autophagic Flux: A New Regulatory Avenue for Neurodegenerative Diseases With Focus on Prion Diseases. *Front Aging Neurosci.* 2018; 10: 139. DOI: 10.3389/fnagi.2018.00139.

26. Dijkman SC, Voskuyl RA, Lange EC. Biomarkers in epilepsy–A modelling perspective. *Eur J Pharm Sci.* 2017; 109: 47-52. DOI: 10.1016/j.ejps.2017.05.035.

27. Walker LE, Frigerio F., Ravizza T. Molecular isoforms of high-mobility group box 1 are mechanistic biomarkers for epilepsy. *J Clin Invest*. 2019; 5:2166. DOI: 10.1172/JCI129285.

28. Wang L, Tan L, Tan J. Circulating microRNAs are promising novel biomarkers for drug-resistant epilepsy. *Sci Rep.* 2015; 5:10201. DOI: 10.1038/srep10201.

29. Wang AJ, Yu JT, Tan L. Genome-wide circulating microRNA expression profiling indicates biomarkers for epilepsy. *Sci Rep.* 2015; 5:9522. DOI: 10.1038/srep09522.

30. Won D., Kim W., Chaovalitwongse W.A. Altered visual contrast gain control is sensitive for idiopathic generalized epilepsies. *Clin. Neurophysiol.* 2017; 128: 340–348. DOI:10.1016/j.clinph.2016.12.008.

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КЛИНИЧЕСКАЯ ХАРАКТЕРИСТИКА СПОСОБОВ БЛОКАДЫ НИЖНЕГО ЛУНОЧКОВОГО НЕРВА

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Nowadays the improvement of health care system in long-term state policy is of great importance which is based on the development and adaptation of innovative technologies. At the same time dental help to the population is the most massive that is connected with the prevalence of pathological processes of organs and tissues of the oral cavity where methods of inferior alveolar nerve block are widely applied.

There is a set of anesthesia methods that have various technological and methodological features for inferior alveolar nerve block. At the same time, the general point for all types of anesthesia is anesthetic injection into the mandibular foramen area and the upper back quadrant of the branch of the lower jaw where a set of anatomical-topographical markers, which the dentist when performing local anesthesia, has to present accurately for himself, is used. Anatomical-topographical features of the inferior alveolar nerve allow carrying out this block by extra- and intraoral access. The extra access is submalar method through the lower jaw incisure, a submaxillary method – from bottom edge of the lower jaw and from the edge of the lower jaw branch.

Palpation, portiligature methods of mandibular anesthesia and also torus anesthesia are often used in clinical dentistry among intraoral methods of anesthesia. Vazirani-Akinosi, Laguardia and Egorov-Lapis' methods are applied for inferior alveolar nerve block in clinical situations connected with restriction opening of the mouth. Besides, the stem anesthesia at oval foramen by S.N.Waisblat's method is used for the mandibular nerve block. This technique is used when carrying out the traumatic operations demanding anesthesia in the field of tissues of the whole lower jaw. Gow-Gates's method has its peculiarity which characterizes its efficiency of anesthesia in the conditions of tissues inflammation of the lower jaw. The submalar method is used by Bershe (1922) and P.M. Egorov (1985) methods, where there is a relaxation of chewing group of muscles due to deactivating of motion branches of the mandibular nerve. It should be noted that the modified intraoral mental anesthesia, recommended by S. Malamed, is applied.

In general, methods of inferior alveolar nerve block are widely used in clinical dentistry for treatment-and-prevention. A set of anatomical-topographic points is used that demand certain experience and skills of the doctor causing some difficulties. This situation needs the improvement of mandibular anesthesia methods for maximum anesthesia technology simplification with complex clinical, laboratory and functional researches that will promote further safety and analgesic effect.

Keywords: lower jaw, anatomy and topography, inferior alveolar nerve, mandibular anesthesia, extra - and intra oral methods, maxillary artery, efficiency and safety of anesthesia.

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Nowadays the priority tasks of health care development are quality improvement of the provided medical care by introducing of the innovation technologies, having positive impact on strengthening and maintaining health of the population [2, 15, 26, 32]. In clinical dentistry, one of the key factors is adequate anesthesia which is constantly improving and searching of effective methods [1, 25].

It should be mentioned that there is a set of anesthesia methods which have various technology and methodological features for inferior alveolar nerve block [3, 4, 6, 18, 28, 29]. The general reference point for all types of anesthesia is anesthetic administration to the area of mandibular foramen and upper back quadrant of the mandible branch [3, 4]. At the same time the dentist uses a set of anatomical-topographical reference points when performing a local anesthesia. So, 11 approximate points of a needle, 6 directions of needle advance in horizontal position and 5 – in vertical position, 9 "targets-points" directly in the field of mandibular foramen and 12 – on mandible branches where the needle contacts with an internal surface of a mandible branch are applied for orientation. Such situation

causes certain difficulties in memorizing anatomy and topography of organs and tissues of the oral cavity, maxillofacial area and performance of the existing methods of inferior alveolar nerve block [3, 4, 21, 29].

It is necessary to emphasize that anatomical-topographical features of the inferior alveolar nerve allow carrying out its block with extra and intraoral accesses [3, 4]. At the same time, subjugal method refers through mandible incisure, a submaxillary method -extraoral access – from bottom edge of a mandible and from the rear edge of a mandible branch. The subjugal way is used at Bershe's (1922) and P.M. Egorov's (1985) methods where there is a relaxation of chewing group of muscles due to deactivating of motion branches of a mandibular nerve [17]. At the same time there is a relaxation of the muscles lifting a mandible, and these methods of anesthesia are used at inflammatory contracture of a mandible. Also there is Bershe-Dubov's method differing in depth of 1 cm needle injection deeper further when lower alveolar and lingual nerves are blocked as well as masticator nerve. At the same time there are difficulties with depth of needle immersion and a possibility of salpinx large vessels trauma. The submaxillary method is used at the complicated opening of the mouth and has difficulties of a needle depth injection. Access from the rear edge of a mandible branch is accompanied by passing of a needle through a parotid salivary gland where external carotid artery and branches of a facial nerve are located that causes the probability of development of complications of traumatic character [3, 4, 18].

Today mandibular anesthesia is widely applied at dental out-patient, polyclinic and in-patient departments [5, 9]. Palpation, portiligature methods of mandibular anesthesia and also torus anesthesia are often used in clinical dentistry among intraoral methods of anesthesia.

Gow-Gates method has its pecularity which characterizes its efficiency in the conditions of inflammation of mandible tissues [23, 29]. It is connected with simultaneous block of inferior alveolar, lingual, maxillary and hypoglossal, ear-temporal and buccal nerves [18, 30]. According to S.A. Rabinovich et al. (1999) adequate anesthesia when using this method is reached in 90–97% of cases, the positive aspiration sample is nearly 10 times less, than at other methods of anesthesia, and local post-injection complications arise extremely seldom [11]. It can be explained by the fact that there are no muscle and large neurovascular bunches on its way of a needle injection and the internal maxillary artery remains below needle advance at the level of mandible incisure. But, at the same time there is a probability of trauma of maxillary artery and pterygoid veniplex [10].

Despite its advantages, the greatest difficulty when performing anesthesia is caused by definition of the direction of a needle immersion into the tissue that is connected with individual intra and extraoral reference points. For elimination of this disadvantage, S.A. Rabinovich and O.N. Moskovits (1999) suggested the manual method simplifying its practical application where only specialists having certain skills and experience can perform it.

According to P.M. Egorov, it is not obligatory to find inferior alveolar nerve by a needle tip in the depth of tissues for effective blockade. High concentration of local anesthetic around the site of this nerve can be created with anesthetic injection in pterygoid and maxillary tissue plane where the nerve passes [18]. At the same time the author of the method conditionally divides an internal surface of a mandible branch into 4 quadrants with two crossed lines. The internal surface of a back upper quadrant of a mandible branch limits pterygoid and maxillary tissue plane. And also the mandibular foramen is defined in the same quadrant. Its upper edge is located in the front bottom corner of a quadrant. The least traumatic and effective for block of the lower alveolar nerve is the middle of the upper back quadrant. It should be noted that the back border of this quadrant is especially dangerous to emergence of post-injection complications. There is the end of pterygoid and maxillary tissue plane and the beginning of parotid salivary gland in which facial nerve branches are located [42]. P.M. Egorov and S.A. Rabinovich (1990) suggest the doctor to carry out orientation by finger-tips. At the same time the long fingertip is placed in the imagined upper back quadrant that will indicate a projection of pterygoid and maxillary tissue plane and a mandibular foramen which will promote adequate anesthesia [3, 4, 23, 31].

The methods of Vazirani-Akinosi, Laguardia and Egorov-Lapis are applied to block of the inferior alveolar nerve in clinical situations connected with restriction opening of the mouth [22, 27]. The efficiency of anesthesia is 80-85%. It is important to emphasize that, despite positive sides, there are certain disadvantages connected with complexity of definition of individual reference points, especially depths of needle immersion, and a high probability of post-injection complications [10, 22].

It is important to emphasize that one more type of conductive anesthesia is torus anesthesia according to M.M. Weisbrem. The anesthetizing solution is entered into the area of the mandibular torus. Anesthesia after solution injection comes in 5 minutes [11, 13, 22]. Meanwhile, the modified intraoral method of mental anesthesia recommended by S. Malamed [58] is practiced. At the same time the level of injury as there is no need, unlike classical mental anesthesia considerably decreases, there is no need of finding of a mental foramen with a needle and advances on the channel that simplifies anesthesia technology as well as increases its safety. After injection and needle removal from tissues, the pressure in soft tissues is kept within 2 more minutes for prevention of outflow of the entered solution from the foramen. Anesthesia comes in 3 minutes [18].

It should be noted that S.N. Waisblat's method for stem anesthesia at oval foramen is used for a mandibular nerve block. This technique is used when carrying out the traumatic operations demanding anesthesia in the field of all mandible tissues. The research of S.N. Waisblat showed that the simplest and available reference point at blockade of the III branch of a trifacial is the external plate of a pterygoid-shaped process of a wedge-shaped bone. The oval foramen is in one plane with an external plate of a pterygoid-shaped process and is located behind it. It is necessary to use a needle of 7-8 cm long for stem anesthesia. Anesthesia comes in 10–15 minutes. Anesthesia zone: all tissues and organs receiving an innervation from the III trifacial branch. This technique is applied extremely seldom that is connected with the probability of complications. It is possible to get to a nasal cavity or an acoustical pipe during performance of stem anesthesia with a needle, therefore, to bring infection to skull. There can be a diplopia, mechanical damage of third cranial nerves. Anesthetic can lead to temporary loss of sight. Injury of internal maxillary and palatal arteries, average artery of meninx, pterygoid-shaped veniplex is possible [40, 42]. Prevention of complications is careful technology anesthesia [7, 12, 14, 31].

It should be noted that also lingual and buccal nerves are located in pterygoid and maxillary tissue plane, in addition to inferior alveolar nerve

[22, 23]. In this regard most patients feel deactivating of the inferior alveolar nerve together with blockade of lingual, and also buccal nerves. When using torus anesthesia of the inferior alveolar nerve, most of patients, as a rule, do not feel pain [20]. Meanwhile, it is necessary to carry out additionally infiltration anesthesia with vestibular party for a total block of a buccal nerve for pain exception [18].

Thus, methods of the inferior alveolar nerve block in clinical dentistry are widely applied where a set of anatomical-topographical reference points demanding certain experience and skills from the specialist which cause certain difficulties. This situation needs the improvement of mandibular anestesia methods for maximum anesthesia technology simplification with complex clinical, laboratory and functional researches that will promote further safety and analgesic effect.

References

1. Богатов А.И., Малахова М.А., Захарова И.А. Новый способ подглазничной анестезии: сб. тр. 6-й Всерос. науч.-практ. конф. Санкт-Петербург : Человек, 2009: 29-30. [Bogatov AI, Malahova MA, Zaharova IA. A new way of infra-orbital anesthesia: sb. nauch. tr. Saint-Peterburg : Chelovek, 2009: 29-30. (In Russ.).]

2. Богачевская С.А., Капитоненко Н.А., Богачевский А.Н. Медицинская помощь при болезнях системы кровообращения в Дальневосточном федеральном округе с позиций организаторов здравоохранения. *Якутский медицинский журнал.* 2017: №2(58): 25-27. [Bogachevskaya S.A. Kapitonenko N.A. Bogachevsky A.N. A medical care at blood circulatory system diseases in the Far Eastern Federal District from positions of organizers of health care. *Yakut medical journal.* 2017: №2 (58): 25-27. (In Russ.).]

3. Егоров П.М. Анализ внутриротовых способов выключения нижнего луночкового и язычного нервов. *Стоматология.* 1985: № 2 (64): 51-53. [Egorov PM. Analysis of intra oral ways of deprivation of the lower alveolar and lingual nerves. *Stomatologija*. 1985: № 2 (64): 51-53. (In Russ.).]

4. Егоров П.М. Местное обезболивание в стоматологии. Москва: Медицина, 1985: 160. [Egorov PM. Local anesthesia in odontology. Moscow: Medicina, 1985: 160. (In Russ.).]

5. Зеленский В.А., Мухорамов Ф.С. Детская хирургическая стоматология и челюстно-лицевая хирургия : учебник. Москва : ГЭОТАР-Медиа, 2008: 208. [Zelensky VA, Muhoramov FS. Children's surgical odontology and maxillofacial surgery: textbook. Moscow: GEOTAR-Media, 2008: 208. (In Russ.).]

6. Зерзева Е.Д., Абрамян А.А. Метод сравнительной оценки различных видов мандибулярной анестезии (блокада нижнего луночкового нерва). *Вестник Совета молодых ученых и специалистов Челябинской области.* 2016: №4 (15): 128-129. [Zerzeva ED, Abramyan AA. Method of comparative assessment of different types of mandibular anesthesia (block of the lower alveolar nerve). *Vestnik Soveta molodyh huchenyhispecialistov Cheljabinskoj oblasti*. 2016: №4 (15): 128-129. (In Russ.).]

7. Зорян Е.В., Рабинович С.А., Матвеев Е.Г. Ошибки и осложнения при проведении местной анестезии в стоматологии (Проблемы и решения). Часть 1. Москва, 2007: 90. [Zoryan EV, Rabinovich SA, Matveev EG. Mistakes and complications of local anesthesia in odontology (Problems and decisions). Part 1. Moscow, 2007: 90. (In Russ.).]

8. Зорян Е.В., Рабинович С.А., Матвеева Е.Г. Пожилой пациент: критерии выбора местноанестезирующих препаратов. *Институт стоматологии.* 2008: №3 (40): 86-87. [Zoryan EV, Rabinovich SA, Matveeva EG. Elderly patient: criteria of the choice of local anesthesia medicines. *Institut stomatologii.* 2008: №3 (40): 86-87. (In Russ.).]

9. Ибрагимов З.И., Дыдыкин С.С., Семкин В.А. Топографо-анатомическое обоснование проведения методик проводниковой анестезии третьей ветви тройничного нерва: сб. науч. работ. Т.12. Москва, 2006: 29-30. [Ibragimov ZI, Dydykin SS, Semkin VA. Topographic-anatomical justification of conduction anesthesia techniques of the third branch of trigeminal nerve: sb. tr. T.12. Moscow, 2006: 29-30. (In Russ.).]

10. Ибрагимов З.И., Дыдыкин В.А., Семкин С.С. Новый метод мандибулярной анестезии, профилактика и лечение постинъекционной контрактуры нижней челюсти: сб. тр. 6-й Всерос. науч.-практ. конф. Санкт-Петербург : Человек, 2009: 44-46. [Ibragimov ZI, Semkin VA, Dydykin SS. A new method of mandibular anesthesia, prophylaxis and treatment of post-injection contracture of mandible: sb. tr. Saint-Petersburg: Chelovek, 2009: 44-46. (In Russ.).]

11. Ибрагимов З.И., Дыдыкин В.А., Семкин С.С. Анатомо-экспериментальное обоснование развития постинъекционной контрактуры нижней челюсти: сборник статей Всеросс. науч.-практ. конф. Уфа, 2010: 41-42. [Ibragimov ZI, Semkin VA, Dydykin SS. Anatomical-experimental justification of development of post-injection contracture of mandible: sb. tr. Ufa, 2010:.41-42. (In Russ.).]

12. Кононенко Ю.Г., Рожко Н.М., Рузин Г.П. Местное обезболивание в амбулаторной стоматологии. Москва: Книга плюс, 2002: 320. [Kononenko JuG, Rozhko NM, Ruzin GP. A local anesthesia in out-patient odontology. Moscow: Kniga pljus, 2002: 320. (In Russ.).]

13. Кузин А.В. Повышение эффективности местных методов обезболивания зубов нижней челюсти с учетом анатомической вариабельности их иннервации : автореф. дисс. ... канд. мед. наук. Москва, 2014: 23. [Kuzin AV. Increase in effectiveness of local methods of anesthesia of teeth of a mandible taking into account anatomic variability of their innervations : thesis of .... candidate of medical science. Moscow, 2014: 23. (In Russ.).]

14. Кузин А.В., Гурин А.Н., Щербаков А.М. Перелом инъекционной иглы при мандибулярной анестезии: алгоритм профилактики и лечения. *Стоматология.* 2018: №3 (97): 56-59. [Kuzin AV, Gurin AN, Scherbakov AM. A change of a syringe needle at mandibular anesthesia: algorithm of prophylaxis and treatment. *Stomatologija*. 2018: №3 (97): 56-59. (In Russ.).]

15. Кулаков А.А., Гвитадзе Р.Ш., Неробеев А.И. Тезисы VIII научно-практической конференции молодых ученых, посвященной 55-летию Центрального научно-исследовательского института стоматологии и челюстно-лицевой хирургии «Современные научные достижения в стоматологии и челюстно-лицевой хирургии». *Стоматология.* 2017: №3 (96). 57-83. [Kulakov AA, Gvitadze RSh, Nerobeev AI. Theses of the VIII scientific and practical conference of young scientists devoted to the 55 anniversary of Central Research and Development Institute of odontology and maxillofacial surgery "The modern scientific achievements in stomatology and maxillofacial surgery. *Stomatologija*. 2017: №3 (96): 57-83. (In Russ.).]

16. Рабинович С.А., Зорян Е.В., Васильев Ю.Л. и [и др.]. Обеспечение безопасности при проведении местной анестезии в стоматологии. Первая помощь при неотложных состояниях : уч.-метод. Пособие. Москва, 2014: 80. [Rabinovich SA, Zoryan EV, Vasiliev JuL. [et al.]. Safety of local anesthesia in odontology. First aid at medical emergencies: manual. Moscow, 2014: 80. (In Russ.).]

17. Пинелис И.С., Козлова М.В., Писаревский Ю.Л. Болевая дисфункция височно-нижнечелюстного сустава : метод. пособие. Чита, 1997: 27. [Pinelis IS, Kozlova MV, Pisarevsky JuL. Painful dysfunction of temporal and mandibular joint: manual. Chita, 1997: 27. (In Russ.).]

18. Рабинович С.А. Современные технологии местного обезболивания в стоматологии. Москва: ВУНМЦ МЗ РФ, 2000: 144. [Rabinovich SA. Modern technologies of local anesthesia in odontology. Moscow, 2000: 144. (In Russ.).]

19. Рабинович С.А., Московец О.Н. Блокада нижнего луночкового нерва по П. М. Егорову. *Клиническая стоматология*. 2000: № 1: 27-29. [Rabinovich SA, Moskovec ON. [Blockade of the lower alveolar nerve according to P.M. Egorov. *Clinical dentistry.* 2000: №1: 27-29. (In Russ.).]

20. Рабинович С.А., Стош В.И., Ремарк Е.Р. Применение безыгольного шприца нового поколения в стоматологической практике. Москва : АНМИ, 2002: 23. [Rabinovich SA, Stosh VI, Remark ER. Use of jet injector of new generation in dental practice. Moscow, 2002: 23. (In Russ.).]

21. Рабинович С.А., Васильев Ю.Л. Анатомо-топографические и инструментальные аспекты местного обезболивания в стоматологии. Москва: Чебоксары, 2011: 141. [Rabinovich SA, Vasiliev JuL. Anatomical-topographic and instrumental aspects of local anesthesia in odontology. Moscow: Cheboksary, 2011: 141. (In Russ.).]

22. Робустова Т.Г. Хирургическая стоматология: учебник. Москва: Медицина, 2003: 504. [Robustova T.G. Surgical odontology: textbook. Moscow: Medicina, 2003: 504. (In Russ.).]

23. Сохов С.Т., Рабинович С. А. Эффективность альтернативных способов проводникового обезболивания на нижней челюсти: сб. тр. 6-й Всерос. науч.-практ. конф. Санкт-Петербург: Человек, 2009: 97-99. [Sohov ST, Rabinovich SA. Effectiveness of the alternate ways of a conduction anesthesia of mandible: sb. tr. Saint-Petersburg: Chelovek, 2009: 97-99. (In Russ.).]

24. Старобинский И.М. Местное обезболивание: руководство по хирургической стоматологии. Москва: Медицина, 1972: 41-72. [Starobinsky I.M. A local anesthesia: Management on surgical odontology. Moscow: Medicina, 1972: 41-72. (In Russ.).]

25. Столяренко П.Ю. Современные шприцы и инъекционные системы в стоматологии. *Стоматолог-практик.* 2014: №3: 40-44. [Stolyarenko PJu. Modern syringes and injection systems in odontology. *Stomatolog-praktik*. 2014: №3: 40-44. (In Russ.).]

26. Ушницкий И.Д., Зеновский В.П., Вилова Т.В. Стоматологические заболевания и их профилактика у жителей Севера. Москва: Наука, 2008: 172. [Ushnitsky ID, Zenovsky VP, Vilova

TV. [Dental diseases and their prophylaxis among inhabitants of the North. Moscow: Science, 2008: 172. (In Russ.).]
27. Akinosi J. O. A new approach to the mandibular nerve block. *Br. J. Oral Surg.* 1977; 15:83.
28. Brignardello-Petersen R. Uncertainty about the relative effects of upright versus supine positions for inferior alveolar nerve block. *J. Am. Dent. Assoc.* 2018; 5 (149): 83-84.
29. Gow-Gates G. A. E. Mandibular conduction anesthesia a new technique using extraoral landmarks. *Oral Surg.* 1973; 3 (36): 321-328.
30. Malamed S.F. Handbook of Local Anaestesia. 5th ed. St. Louis: CV Mosby; 2004: 400.
31. Malamed S.F. Modern dental pain control. *Dent. Today.* 2008; 11 (27):72-76.
32. Petrosky M, Colaruotolo LA, Billings R J. [et al.] The Integration of Social Work into a Post-graduate Dental Training Program a Fifteen-Year Perspective. *J. Dent. Educ.* 2009; 6 (73): 656–664.

POINT OF VIEW

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VILIUISK ENCEPHALOMYELITIS AS PRIMARY CHRONIC NEURODEGENERATIVE DISORDER

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The paper presents a new concept of the nature of Viliuisk encephalomyelitis – the unique disease of the Sakha ethnic group as primary chronic neurodegenerative disorder. It is based on an analysis of the participation of TNF superfamily members in the pathogenesis of the disease.

The ligands and receptors of TNF superfamily are key players of important biological processes, including the maintenance of tissue cell homeostasis using immunity mechanisms. It is suggested that sTRAIL ligand induce the loss of neurons in the cases of a primary chronic degenerative process. The sTNFα ligand is associated with an inflammatory complication of this disease under conditions of stress and perhaps participates in the neuronal necrosis in the acute stage. Elevated levels of sCD40L, detected in the plasma of patients, may act as a factor of the development of microvascular pathology, the cause of chronic hypoxia, inducing and supporting chronic processes of brain tissue atrophy.

Keywords: Viliuisk encephalomyelitis, Bokhooror, neurodegeneration, TNF superfamily, sTRAIL, sTNFα, sCD40L.

Introduction. "Bokhooror" is the native name for a rare primary chronic degenerative disease of the human central nervous system, observed among the Yakut population in Yakutia and known to medical science for more than 80 years. Phenotypic manifestations of this disease are associated with paresis of the muscles of the laryngeal area and motor functions caused by damage to the pyramidal, extrapyramidal tracts and the cerebellum. Patients experience difficulties in the initiation of movement, show emotional immobility and loss of socially significant features of the relationship in combination with the problems of reproductive memory. The disease is endemic and sporadic. Group cases of the disease is not observed, but can be traced generic ties [9, 14, 17].

One of the main features of the pathology is brain atrophy (in 83% of patients) and significant decrease of a brain mass, which correlates with the duration of the disease [1, 8]. Pathological findings indicate diffuse atrophy, predominantly of the cerebral cortex, cerebellum, and upper spinal cord, associated with loss of neurons. On the other hand, patients may have an inflammatory episode (about 30% of patients experienced acute encephalitis), which clinically manifests itself as neuroinfectious diseases. The clinic of inflammation that gave the name of the disease - Viliuisk encephalomyelitis (VE), is described and studied in detail by P.A. Petrov, A.P. Shapoval, L.G. Goldfarb, R.S. Tazlova and A.I. Vladimirtsev [2, 3, 6, 7, 9]. In the pathological picture of these patients, on the background of neuronal loss, scattered necrosis foci with an inflammatory reaction in the form of infiltrate in the fibrous membrane of small vessels in the brain parenchyma are added [33]. The infectious nature of this inflammation, despite many years of attempts, did not receive its confirmation, which suggests the idea of its aseptic nature associated with congenital abnormalities of the immune system in patients.

The potential possibility of self-limiting the inflammatory process (indicating a controlled process) and the transition to the chronic degenerative form is a characteristic feature of the acute forms of VE. In recent years, with the improvement of social and living conditions, the inflammatory episodes in patients gradually disappear and the primary chronic form of the disease is widespread. This form develops gradually with age and has the character of a neurodegenerative disease of the brain and spinal cord with a clinical picture according definition "Bokhooror". Another feature of the chronic form of this disease is immunosuppression (immune tolerance) of the pathogenic brain. Patients show pronounced and sustained suppression of the immune system [2, 4].

The causes and mechanisms of atrophy of the brain tissue and induction of a controlled inflammatory process (encephalitis) are main issues, which will allow reveal the pathogenesis and develop the treatment of the disease. The article presents a review of clinical, pathological data, as well as our own research on the immunology of Viliuisk encephalomyelitis, on the basis of which the hypothesis of the pathogenesis of the disease is proposed.

The primary chronic brain degeneration is the basis of the VE disease. In this section, we consider a typical clinical picture and pathological changes in the brain tissue in patients with primary chronic disease, which is more consistent with the native definition of the disease "Bokhooror". It is assumed that this state of encephalopathy is the basis of the disease, which may be complicated by an acute inflammatory episode.

The initial symptoms of encephalopathy manifest as stem symptoms. The most frequent complaints are headaches, fatigue and body aches. This state occurs, when the balance of functions of the excitatory and inhibitory neural

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