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# **ОБРАЗОВАНИЕ И НАУКА В XXI ВЕКЕ**

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**Название публикации:** «ISCHEMIC STROKE AND THE ROLE OF NEUROPEPTIDES IN MOTOR RECOVERY»

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**Abstract.** *Cerebrovascular diseases are one of the most urgent medical and social problems of our time. Violation of blood circulation in the brain leads to the death of many patients and severe disability, which leads to a serious socio-economic deficit. According to official statistics from the Ministry of Health of the Republic of Uzbekistan, the total number of patients with stroke in Uzbekistan in 2018-2020 was 177,935 people (with ischemic stroke - 166,288 people). The introduction of new neurobiomarker assays and proven algorithms into cerebrovascular neurology has been an urgent scientific problem in radiology for many years.*

**Key words:** *circulatory disorders neuropeptide ischemic stroke*

## ИШЕМИЧЕСКИЙ ИНСУЛЬТ И РОЛЬ НЕЙРОПЕПТИДОВ В МОТОРНОМ ВОССТАНОВЛЕНИИ

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**Аннотация:** *Цереброваскулярные заболевания являются одной из наиболее актуальных медико-социальных проблем современности. Нарушение кровообращения в головном мозге приводит к смерти многих пациентов и тяжелой инвалидности, что приводит к серьезному социально-экономическому дефициту. Согласно официальной статистике Министерства здравоохранения Республики Узбекистан, общее количество больных с инсультом в Узбекистане в 2018-2020 годах составило 177 935 человек (с ишемическим инсультом – 166 288 человек). Внедрение новых анализов нейробиомаркеров и апробированных алгоритмов в цереброваскулярную неврологию уже много лет является актуальной научной задачей радиологии.*

**Ключевые слова:** *нарушение кровообращения нейропептид ишемического инсульт*

**Introduction.** *Stroke remains a serious health issue that impacts millions of individuals worldwide, representing the second-most common cause of mortality and the third-most common cause of*

disability . Approximately 60–80% of all strokes are ischemic and result from thrombotic or embolic occlusion of a cerebral artery . The management of acute ischemic stroke has undergone many changes. Regarding recanalization therapies such as thrombolysis and mechanical thrombectomy, the number of patients who may benefit from them is still low. Therefore, different therapeutic strategies have been developed, targeting the pathophysiological cascade that starts with ischemia and leads to irreversible tissue damage

Today, the insufficiently published data on the study of post-stroke neurological disorders, the interaction of neuroplastic mechanisms with neuropeptides. Considering the complexity of the morphological structure of the vessels of the brain and brain tissue, the heterogeneous process does not occur with the activation of one biomarker. Therefore, the purposeful study of a wide circle of molecules, representing neurons, neuroglia and endothelial cells, expressed in different phases of ischemic stroke, with points of observation of their role in the activation of the mechanism of its function. The breakdown of this complex system leads to a change in the concentration of biomarkers in the peripheral blood, reflects the expression of insufficiency of blood circulation in the brain and gives information about the processes of neurogenesis, angiogenesis and angiogenesis.

When choosing neuropeptides, it is important to take into account two main aspects: 1) the involvement of all morphological components of the brain tissue in the secretion of specific neuroproteins; 2) the dynamic nature of the pathophysiological processes occurring in the vessels of the brain in the acute period of ischemic stroke [Del Zoppo, G.J., 2013; A. Lasek-Bal et al., 2015]. Monitoring of brain tissue neurobiomarkers at different stages of stroke can be of great diagnostic and prognostic value. Externally acting neurotrophic factors are able to change the strength of neuronal connections and the number of synaptic connections in the acute phase of a stroke, contributing to post-stroke recovery [M.S. El Tamawi et al., 2014; H. Lan et al., 2014; B.F. Kaniya et al., 2017; M. Toricelli et al., 2021; V. Johnson et al., 2016]. Today, much attention is paid to the optimization of pathophysiological mechanisms and methods of stroke treatment in stroke. One of the effective ways to maintain brain homeostasis in rhythm after a stroke is the use of drugs aimed at stopping the rapid reactions of the glutamate-calcium cascade.

The number of truly effective drugs currently undergoing randomized clinical trials in patients with acute cerebrovascular disease is very small. Calcium channel blockers have a pronounced hypotensive effect and in some cases adversely affect the state of cerebral perfusion. Other drugs that stabilize the glutamate-calcium cascade and have a neuroprotective effect are still in laboratory testing. Recent studies have shown that the mechanism of action of amantadine sulfate, previously considered only an antiparkinsonian agent, not only actively stimulates the release of dopamine from neuronal depots, increasing the sensitivity of dopaminergic receptors to dopamine and normalizing neurophysiological intracerebral processes by blocking glutamatergic receptors, but also stops the release of glutamate and reduces its concentration. in blood.

**The purpose of the work** is to evaluate the role of neuropeptides in the acute phase of ischemic stroke and develop comprehensive diagnostic and therapeutic measures.

1. Evaluation of the dynamics of clinical indicators of rehabilitation potential in patients with acute ischemic stroke and its determinants;

2. To study the relationship of blood serum neuropeptides with rehabilitation potential in the acute period of ischemic stroke;
3. Describe the dynamics of clinical indicators of rehabilitation potential depending on the microstructural parameters of the brain reserve;
4. To determine the efficacy, safety and effect of amantadine sulfate and tricortin on their rehabilitation potential in patients with acute ischemic stroke.

**Material and methods.** The object of the study were 56 patients with first-time acute ischemic stroke in the system of the middle cerebral artery, admitted to the "Tashkent Regional Clinical Hospital" within 24 hours from the moment of occurrence of focal

neurological symptoms and observed after discharge from the hospital for 60 days.

During operation, the following checks are carried out:

- Collection and analysis of somatic and neurological conditions according to the questionnaire; Objective assessment of the degree of clinical symptoms in stroke according to NIHSS (National Stroke Health Scale), assessment of everyday skills (Bartel scale), degree of disability (Rankine scale), hand function (French test).

-Laboratory studies: detection of neuropeptides (BDNF, NGF) in blood serum.

-Instrumental studies: MRI, MSCT.

Statistical analysis.

The diagnosis was verified in accordance with WHO clinical criteria and confirmed by neuroimaging data. The sample was formed based on the inclusion criteria: first-time ischemic stroke in the basin of the middle cerebral artery; voluntary consent of patients or their relatives to participate in the study. Criteria for non-inclusion/exclusion: hemorrhagic stroke; transient ischemic attack, including history; repeated ischemic stroke, including those that occurred within 90 days from the start of enrollment in the study; thrombolysis or thromboextraction.

Patients were divided into groups according to clinical severity, assessed by the National Institutes of Health Stroke Scale (NIHSS) (Kwah L.K., Diong J., 2014). Group A consisted of 12 people (NIHSS = 4 (3; 4) points - mild stroke); group B - of 32 patients (NIHSS = 9 (6; 11) points - moderate stroke); group C included 6 patients (NIHSS = 18 (17; 19) points - stroke between moderate and severe), group D consisted of 5 patients (NIHSS = 23 (22; 25) points - severe stroke). The comparison group Z consisted of 39 volunteers (mean age 64 (58; 71) years) with no history of acute cerebrovascular accident (ACV) and other lesions of the central nervous system (CNS).

**Results and discussion.** Assessment of neurological symptoms in the first 24 hours of acute ischemic stroke according to the NIHSS-I scale revealed contralateral central hemiparesis in 100% of patients in

of the study population, contralateral hemihypesthesia - in 39% of patients, aphasia occurred in 67% of cases. Syndrome "three hemi-" (hemiparesis, hemianesthesia and hemianopsia), associated with occlusion of the proximal part of the main trunk of the middle

cerebral artery, was detected in 2% of patients with a normal level of consciousness according to the GCS-I scale. The absence of impaired consciousness in this case could be associated with functionally effective leptomeningeal collaterals, which made it possible to reduce the size of the infarct and, as a result, swelling of the brain tissue. In 7% of patients, acute cerebral ischemia was accompanied by depression of consciousness to the level of deep stupor and coma according to the GCS-I scale.

In this regard, it was not possible to assess the presence of hemianopsia, hemihypesthesia and aphasia in them. However, given the anatomical features of the blood supply to the middle cerebral artery proximal to the lenticulostriate branches, it is obvious that the anterior and posterior

legs of the internal capsule, as well as cortical centers of speech, explaining the probable presence of the described symptoms, which was taken into account when calculating the total score on the NIHSS-I scale. Among the symptoms of acute cerebral ischemia, paresis of the lower group of muscles of the face occurred in 86% of patients during examination on the first day of a stroke and could be due to both occlusion of the middle cerebral artery distal to the lenticulostriate branches, occlusion of the artery of the central sulcus, and swelling of the brain tissue as a result of ischemic damage.

**Conclusion.** The severity of neurological symptoms and the severity of functional disorders in patients statistically significantly correlate with high concentrations of neuron-specific enolase, protein S100 $\beta$  and antibodies to it ( $p < 0.001$ ), with low concentrations of brain-derived neurotrophic factor ( $p < 0.001$ ) in blood serum in the first 48–72 hours of ischemic cerebral stroke, characterizing processes of neurodestruction in the core of infarction, protective-compensatory humoral reactions and neuronal survival. Independent factors in the prognosis of patient survival in the first 14 days of illness are S100 $\beta$  protein concentrations in the first 48–72 hours and Glasgow Coma Scale score ( $\chi^2 = 67.6$ ;  $p < 0.001$ ; sensitivity 94% and specificity 76%). Disability of patients significantly depends on the number of rehabilitation programs performed from 14 to 90 days of stroke ( $p = 0.025$ ). The high-tech AR-rehabilitation method statistically significantly increases the expression of the brain-derived neurotrophic factor ( $p = 0.012$ ), stimulates synaptic neuroplasticity and motor recovery ( $p < 0.001$ ), reduces the degree of functional impairment ( $p < 0.001$ )

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3. Ko'rgazmalilik vazifasi — boshqa o'qitish vositalaridan farq qilib, axborot texnologiyalari mahsullari bo'lgan animasiyalar o'quvchilarni biologiyaviy jarayonlarni harakat va dinamik tasvirlash imkoniyati mavjudligi sababli, o'qitish jarayonida o'rni beqiyos.

4. Nazorat vazifasi — biologiya ta'limining barcha shakllari: dars, darsdan tashqari ishlar, sinfdan tashqari darslarda, shuningdek, biologiya darsining barcha bosqichlarida o'quvchilarning o'zlashtirgan bilim, ko'nikma va malakalarini nazorat qilish va baholash, nazoratning haqqoniyligi, muntazamliligi, keng qamrovliligi, takrorlanuvchanligini amalga oshiradi.

5. Rivojlantiruvchi vazifasi — o'quvchilarning o'zlashtirgan bilim, ko'nikma va malakalarini nazorat qilish dasturlaridagi o'quv topshiriqlarning qiyinlik darajasiga ko'ra: reproduktiv, produktiv, qisman-izlanishli va ijodiy xarakterda bo'lishi o'quvchilarning topshiriqlarni bilimi, ehtiyoji va qiziqishiga mos holda keyingi bosqich topshiriqlarini bajarishga bo'lgan intilishini orttiradi, fan asoslarini mustahkam o'zlashtirishiga zamin yaratib shaxs sifatida rivojlanish imkoniyatini vujudga keltiradi.

6. Tarbiyaviy vazifasi — o'quvchilar axborot dasturlari bilan ishlashi natijasida o'quv va aqliy mehnat ko'nikmalarini rivojlantiriladi.

7. Ilmiy dunyoqarashni rivojlantirish vazifasi - tabiat va undagi obyektlarni o'rganish 2 olam: makro va mikroolamga ajratilib, biologiya fani o'zining mazmuniga ko'ra, aksar hollarda mikroolam: hujayra, to'qimalarda boradigan jarayon, kimyoviy elementlarning molekula, atomning tuzilishi, masalan, modda va energiya almashinuvi, fotosintez, oqsillar biosintezi, biotexnologiya va gen injeneriyasiga doir o'quv materiallarni animasiyalar orqali o'rganib, abstrakt tafakkuri va ilmiy dunyoqarash rivojlanadi va pirovard natijada kengayadi. Biologiyani o'qitishda axborot texnologiyalarining yuqorida qayd etilgan vazifalarini e'tiborga olgan holda ta'lim-tarbiya jarayonida foydalanish yo'llarini belgilash va amaliyotga joriy etish bugungi kunning dolzarb muammolaridan biri sanaladi.

Axborot texnologiyalari mahsullaridan foydalanilgan darslar axborotlarga boy, ko'rgazmali, interfaol bo'lib, vaqtdan unumli foydalanish, har bir o'quvchining o'z tempi bo'yicha bilim olish, o'qituvchi esa, o'quvchilar bilan tabaqalashtirilgan va individuallashtirilgan ta'limni amalga oshirish imkoniyati vujudga keladi, shu bilan bir qatorda o'qitishda natijalarini nazorat qilish va baholash uchun zamin yaratadi.

Biologiyani o'qitishda axborot texnologiyalarning quyidagi mahsullaridan foydalanish mumkin:

1. Har bir mavzu mazmuniga asosan ko'rgazmalilikni amalga oshirish, ya'ni taqdimot materiallari.
2. Biologik jarayonlarning animasiyasi.
3. Virtual laboratoriya va amaliy ishlar.
4. Ishlab chiqarish korxonalariga virtual ekskursiya.
5. Biologik jarayonlarning modellashtirilgan dasturi.
6. Biologik jarayonlarning ta'limiy dasturlari.
7. O'quvchilarning mavzular bo'yicha o'zlashtirgan bilimlarini nazorat qilish va baholash uchun nazorat dasturlari.
8. O'quvchilarning mustaqil tahsili va ishi uchun o'quv-axborot saytlari.
9. Didaktik o'yinga asoslangan animasiyalar.
10. Qiyinchilik darajasi turlicha bo'lgan ijodiy topshiriqlar dasturi. Biologiyani o'qitishda axborot texnologiyalaridan foydalanish imkoniyatlari juda katta. Barcha tabiiy fanlar kabi biologiyani o'qitishda tabiiy vositalar muhim o'rin tutadi, lekin tasviriy vositalarni kompyuter xotirasiga joylab, ulardan mavzuni o'rganish jarayonida foydalanish mumkin.

O'qituvchi o'rganiladigan mavzu mazmunidan kelib chiqqan holda axborot texnologiyalarining mahsullari bo'lgan elektron darslik, versiya va multimediyalarni o'rganishi va ularni tahlil etish natijasida mavzuning didaktik maqsadlarini amalga

oshirish imkoniyatlari, ta'limiy, modellashtirilgan va nazorat dasturlar, multimediyalardan foydalanish yo'llarini belgilashi zarur. Buning uchun mazkur axborot texnologiyalari mahsullaridan biologiya darslarida foydalanish yo'llarini aniqlash, o'quvchilarning bilish faoliyatini tashkil etish yo'llarini ishlab chiqishi lozim. Uzluksiz ta'lim tizimida tashkil etiladigan ta'lim-tarbiya jarayonida pedagogik texnologiyalar axborot texnologiyalari bilan uyg'unlashtirish dolzarb muammo sanaladi. Shu sababli axborot texnologiyalaridan foydalanish uchun uning didaktik funksiyalarini aniqlash zarurati vujudga keldi.

#### **FOYDALANILGAN ADABIYOTLAR RO'YXATI:**

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**Название публикации:** «ШАРТЛИ БЎЛГАН ШАРТСИЗ РЕФЛЕКС»

Эмиш рефлекси бола туғилиши билан уни янги ҳаёт тарзига мослаштирувчи, асосий она ва оиласи билан мулоқатга кириштирувчи шартсиз рефлексидир. Эмиш процесси болада озугага нисбатан муносабатни, адаптацион, иммунстимулловчи, қарама қарши жинсга нисбатан жинсий майлни шакллантиришда муҳим аҳамият касб этса, онада окситоцин - пролактин механизмини юргизувчи, жинсий йўл билан юқувчи касалликларни олдини олувчи, лактацион аменорея ҳолатини чақирувчи, она ва бола ўртасида тери - тери контактини асосини ташкил этувчи омилдир.

Эмиш ва эмизиш жуда мураккаб физиосоциал акт бўлиб, инсонлар жамияти социумида барча даврларда муқаррар биринчи ўринни эгаллаб келмоқда. Эмиш ва эмизиш жараёнида она ва бола ўртасида жамоада ишлаш хусусиятлари болада шакллантира бошлайди. Соғлом муддати етиб туғилган чақалоқларда эмиш ва қидириш рефлекси нормал физиологик рефлекслардир. Эмиш ва қидириш рефлекси табиий уйқу шаклланишида ҳам ажратиб бўлмайдиган асосий бўғимлардан биридир.

Ичак коликалари, туғруқ жароҳатлари, онада турли юқумли касалликлари мавжудлиги, туғма иллатлар ва бошқа бола ёки онага оид касалликлар пайтида эмиш ёки эмиза олмаслик муаммолари эмиш рефлесини шаклланишига муаммоларни келтириб чиқариши мумкин.

Агарда эмиш рефлекси у ёки бу сабабли пасайса ёки йўқолса уни қайта ривожланишига эришиш учун, дастлаб эмизикли аёлни эмизишга рағбатлантириш ва чақалоқда шу истакни ҳосил қилишга мотивацияловчи физиологик ёки сунъий воситалар керак бўлади.

Энди эмишни имитация қилувчи воситалар болада кўкракни эрта ташлашига олиб келиши мумкинлиги, аммо эмиш рефлекси болада кўкрак қафасини тўғри шаклланиши, танглай равоғини ҳосил қилувчи мускуллар тонусини шакллантирувчи асосий юклама ҳисобланади. Мутахасисларни аниқлашларича эмиш рефлексининг табиий ёки унинг иложи бўлмаган эса, сунъий имитаторлари болаларда оғриққа қарши, тинчлантирувчи, уйқу чақирувчи, она ва бола ўртасида муносабатни шакллантирувчи асосий инстинктлар жараёндир.

Табиатдаги боғланиш занжирларининг шу қадар кўп турлари мавжудки, аммо ҳеч бири индивидумларни бу қадар ўзаро боғлиқлигини вужудга келтира олмайди.

Демакки, агар табиий эмизиш жараёнини иложи бўлмаганда, болада қайта эмиш рефлексини шакллантириш учун турли сўрғич ва эмишни имитаторларидан мутахасислар билан маслаҳатлашган ҳолда, албатта

фойдаланиш мумкин деб ҳисоблаймиз. Акс ҳолда бола ва она психосоциал тараққиётида инқироз ҳолатини ривожланиши, жисмоний, рухий касалликлар ривожланиши мумкин.

Эмиш бола ва она ўртасида мураккаб боғлиқлик риштасини шакллантирибгина қолмай, ҳатто юзаки ва чуқур уйқу босқичларида, касалликларда барвақт тузалишга иштиёқни, истинктларини шу вақт ва маконда даҳлдорлик ҳиссинини шаклланишида ҳам катта ўрин эгаллайди. Ҳурматли ота-оналар болаларни фақат табиий озиклантиришдан зинҳор ба зинҳор чекламанг, чунки келажагимиз ва равнақимиз шу рефлексга боғлиқдир.

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