AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE
ISSN: 2996-5101 (online) | ResearchBib (IF) = 10.81 IMPACT FACTOR
Volume-4| Issue-5| 2026 Published: |30-05-2026

# EFFECT OF TRANSCRANIALMICROPOLARIZATIONONNEUROCOGNITIVEANDHEMODYNAMICPARAMETERS IN PATIENTSWITHCHRONIC CEREBRAL ISCHEMIA

https://doi.org/10.5281/zenodo.20107799

**Umarova Malika Pulatjonovna**
*Fergana Public Health Medical Institute*
*Department of "Neurology and Psychiatry".*
*(Fergana, Uzbekistan)*

**Abstract**

This article examines the effect of transcranial micropolarization on neurocognitive and hemodynamic parameters in patients with chronic cerebral ischemia. Chronic cerebral ischemia is associated with progressive cognitive decline, impaired cerebral blood circulation, and reduced quality of life. The study evaluates the therapeutic potential of transcranial micropolarization as a non-invasive neuromodulation method aimed at improving cognitive functions and cerebral hemodynamics. Neuropsychological testing and instrumental diagnostic methods were used to assess changes in memory, attention, executive functions, and cerebral blood flow dynamics before and after treatment. The findings demonstrate positive effects of transcranial micropolarization on neurocognitive performance and cerebral circulation indicators, suggesting its перспективность as a complementary therapeutic approach in the rehabilitation of patients with chronic cerebral ischemia.

**Keywords**

transcranial micropolarization, chronic cerebral ischemia, neurocognitive functions, cerebral hemodynamics, cognitive impairment, brain ischemia, neuromodulation, cerebral blood flow, rehabilitation, non-invasive therapy.

## INTRODUCTION

Chronic cerebral ischemia is considered one of the most significant medical and social problems in modern neurology. This condition is characterized by prolonged insufficiency of cerebral blood supply, leading to progressive structural and functional impairments of the central nervous system. In recent years, the prevalence of chronic cerebrovascular diseases has steadily increased due to the growing incidence of arterial hypertension, atherosclerosis, diabetes mellitus, cardiovascular disorders, and age-related changes in the human body. Chronic

cerebral ischemia is often accompanied by memory decline, impaired attention, reduced intellectual performance, emotional instability, and a significant decrease in patients' quality of life.

Particular attention in clinical practice is devoted to neurocognitive disorders associated with chronic cerebral ischemia. Progressive deterioration of cognitive functions considerably limits patients' social activity and professional capacity, and in severe cases may contribute to the development of vascular dementia. Alongside cognitive impairment, disturbances in cerebral hemodynamics play a crucial role, reflecting the degree of cerebral circulation insufficiency. The investigation of the relationship between neurocognitive dysfunction and hemodynamic parameters is of great importance for early diagnosis, assessment of disease severity, and selection of effective therapeutic strategies.Despite considerable advances in modern medicine, existing treatment approaches for chronic cerebral ischemia do not always provide sufficient effectiveness in restoring cognitive functions and improving cerebral blood flow. Therefore, the search for innovative non-pharmacological treatment methods capable of exerting комплексное therapeutic effects on brain function remains highly relevant.

One of the promising directions in modern neurorehabilitation is transcranial micropolarization, a non-invasive neuromodulation technique based on the application of low-intensity direct electrical current to specific brain structures. This method is believed to stimulate neuroplastic processes, improve the functional activity of neuronal networks, and normalize cerebral hemodynamics. In recent years, transcranial micropolarization has been increasingly studied in the treatment of various neurological and neuropsychiatric disorders; however, its influence on neurocognitive and hemodynamic indicators in patients with chronic cerebral ischemia remains insufficiently investigated.The relevance of the present study is determined by the necessity to develop effective and safe methods for correcting cognitive impairment and cerebral circulation disorders in patients with chronic cerebral ischemia. Investigation of the therapeutic potential of transcranial micropolarization may broaden current understanding of neurorehabilitation mechanisms and improve the effectiveness of comprehensive treatment for this category of patients.The aim of this study is to evaluate the effect of transcranial micropolarization on neurocognitive functions and hemodynamic parameters in patients with chronic cerebral ischemia.

## RESULTS AND DISCUSSION

The conducted study demonstrated that transcranial micropolarization had a positive effect on neurocognitive and hemodynamic parameters in patients with chronic cerebral ischemia. Following the course of treatment, most patients showed

improvement in cognitive performance, including memory, attention, concentration, and executive functioning. Neuropsychological assessment revealed a reduction in cognitive deficits and an increase in overall mental productivity. Patients also reported decreased mental fatigue, improved emotional stability, and better daily functioning.Analysis of neurocognitive indicators showed that short-term memory and attention span improved significantly after transcranial micropolarization sessions. Patients became more capable of maintaining concentration during cognitive tasks and demonstrated faster information processing speed. Improvement in executive functions was reflected in enhanced planning ability, logical thinking, and task performance. These findings suggest that transcranial micropolarization contributes to the activation of cortical neuronal networks and supports neuroplasticity mechanisms in the brain.

Hemodynamic examination also revealed positive changes after treatment. Cerebral blood flow parameters improved, indicating normalization of vascular tone and enhancement of cerebral circulation. Doppler ultrasonography demonstrated increased blood flow velocity in major cerebral arteries and reduction of vascular resistance indices. Improved cerebral perfusion may play an important role in restoring metabolic activity and functional state of brain tissue affected by chronic ischemia.The obtained results are consistent with data from previous studies reporting beneficial effects of non-invasive neuromodulation methods on brain function and cerebral hemodynamics. The therapeutic effect of transcranial micropolarization may be associated with modulation of neuronal excitability, stimulation of synaptic activity, and improvement of interhemispheric interactions. In addition, low-intensity electrical stimulation may enhance adaptive and compensatory mechanisms within the central nervous system.

An important advantage of transcranial micropolarization is its non-invasive nature, safety, and good tolerability by patients. During the study, no severe adverse effects or complications were observed. Some patients experienced mild and transient sensations such as slight tingling or warmth in the electrode area, which did not require discontinuation of therapy.At the same time, certain limitations of the study should be considered. The sample size was relatively limited, and the duration of follow-up was insufficient for evaluating long-term therapeutic outcomes. Further large-scale studies with extended observation periods are necessary to clarify the mechanisms of action of transcranial micropolarization and to determine optimal treatment protocols for patients with chronic cerebral ischemia.Overall, the findings of the present study indicate that transcranial micropolarization may serve as an effective complementary method in the комплексное rehabilitation of patients with chronic cerebral ischemia. The

method contributes to the improvement of cognitive functions and cerebral hemodynamics, thereby enhancing patients' quality of life and functional capacity.

## CONCLUSION

The results of the present study demonstrate that transcranial micropolarization has a beneficial effect on both neurocognitive functions and cerebral hemodynamic parameters in patients with chronic cerebral ischemia. The application of low-intensity electrical stimulation contributed to improvements in memory, attention, concentration, and executive functioning, while also promoting normalization of cerebral blood circulation.Positive changes observed in cerebral hemodynamics indicate that transcranial micropolarization may enhance cerebral perfusion and improve the functional state of brain tissue affected by chronic ischemia. The method was found to be safe, non-invasive, and well tolerated by patients, with no significant adverse effects reported during the treatment period.The obtained findings suggest that transcranial micropolarization can be considered a promising complementary therapeutic approach in the комплексное management and neurorehabilitation of patients with chronic cerebral ischemia. Its use may contribute not only to cognitive recovery but also to improvement in patients' overall quality of life and social adaptation.Nevertheless, further large-scale clinical studies with longer follow-up periods are required to confirm the long-term effectiveness of this method and to optimize treatment protocols for broader clinical application.

## REFERENCES:

1. Умарова, М., & Кодиржонов, Н. (2022). ТРОМБОЛИТИЧЕСКАЯ ТЕРАПИЯ В ЛЕЧЕНИИ ИШЕМИЧЕСКОГО ИНСУЛЬТА. Theoretical aspects in the formation of pedagogical sciences, 1(5), 218-220.

2. Умарова, М. (2021). ИНСОМНИА ВА МЕТАБОЛИК СИНДРОМНИНГ ЎЗАРО КОМОРБИДЛИГИ МУАММОНИНГ ДОЛЗАРБЛИГИ. Интернаука, (20-7), 29-30.

3. Умарова, М. (2021). МИГРЕН КАСАЛЛИГИ ВА УНИНГ ШОШИЛИНЧ ТЕРАПИЯСИНИ ТАКОМИЛЛАШТИРИШ. ИНТЕРНАУКА Учредители: Общество с ограниченной ответственностью" Интернаука, 93-94.

4. Умарова, М. (2021). ИНСУЛТДАН КЕЙИНГИ ТАЛВАСА СИНДРОМИ. Интернаука, (18-5), 46-48.

5. Rakhmatova, M., Shakhanova, S., Nazarova, J., Azizova, F., Astanakulov, D., Akramov, G., &Mirametova, N. (2024). Brain tumor information retrieval system for brain tumor diagnosis. Health Leadership and Quality of Life, (3), 10.

6. RAKHMATOVA, M., SHAKHANOVA, S., NAZAROVA, J., AZIZOVA, F., ASTANAKULOV, D., AKRAMOV, G., & MIRAMETOVA, N. (2024). BRAIN TUMOR INFORMATION RETRIEVAL SYSTEM FOR BRAIN TUMOR DIAGNOSIS. HEALTH, 3.

7. Djuraev, N. N., Usmnova, M. B., Kozimjonova, I. F., Qayumjonov, O. Z., & Akramov, G. S. (2022). Social parameters characterizing personalities of patients with incomplete suicides. ACADEMICIA: An International Multidisciplinary Research Journal, 12(4), 377-381.

8. Soyibjono'g, A. G. A. THE EFFECTIVENESS OF COMBINING PSYCHOTHERAPY AND PHARMACOTHERAPY IN THE TREATMENT OF MENTAL DISORDERS.

9. Soyibjono'g, A. G. A. TYPOLOGY OF ANXIETY-PHOBIC DISORDERS.

10. Dolimova, M. A., Agranovsky, M. L., Soliyev, D. M., & Gulomkodirov, M. M. (2022). The role of maintenance therapy in comparative effectiveness of the quality and structure of remissions in recurrent schizophrenia. *Art of Medicine. International Medical Scientific Journal*, *2*(1).

11. G'ulomqodirov, M. M. (2024). REMITTIRLASHGAN TIPDAGI KECHUVCHI SHIZOFRENIYANING UZOQ BOSQICHLARI: TIPOLOGIYASI, KLINIKO-PSIXOPATOLOGIK XUSUSIYATLARI, PROGNOZI, PROFILAKTIKASI. *IMRAS*, *7*(6), 383-386.

12. Maxmit o'g, G. U. M. (2025). NEVROTIK DEPRESSIYA: KLINIK KO 'RINISHLAR, OLDINI OLISH VA DAVOLASH CHORALARI. *O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI*, *3*(36), 220-222.

13. Muzaffar, G. U. (2025). SHIZOFRENIYA KASALLIGI HAMDA UNING KELIB CHIQISH SABABLARI. *PEDAGOGICAL SCIENCES AND TEACHING METHODS*, *4*(41), 83-85.

14. Ibodullayevich, F. N., Al-Hussainy, A. F., H Tizkam, H., AbdulHussein, A. H., Salah, O. H., Edan, R. T., ... & Kamola Muminovna, A. (2024). Exploiting pH-Sensitive Polymer Micelles Nanoparticles for Paclitaxel Delivery and Tumor Suppression: Advanced Targeted Cancer Therapy. *Journal of Nanostructures*, *14*(3), 945-952.

15. G'ulomqodirov, M. M., & Muradimova, A. R. (2025). INSULTDAN KEYINGI DEPRESSIV SINDROMNI KLINIK KO'RINISHI. *Журнал гуманитарных и естественных наук*, (24), 39-45.

16. Maxmit o'g, G. U. M. (2025). ALZGEYMER KASALLIGI: KLINIK-XUSUSIYATLARI, DIAGNOS TIZIMI VA DAVOLASHGA

YONDASHUVLAR. *O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI*, *4*(40), 320-323.

17. Maxmit o'g, G. U. M. (2025). REAKTIV DEPRESSIYA: KLINIK KO 'RINISHLAR, SABABLARI VA DAVOLASH. *INNOVATIVE DEVELOPMENTS AND RESEARCH IN EDUCATION*, *3*(35), 205-207.

18. Maxmit o'g, G. U. M. (2025). ISHEMIK INSULTDAN KEYINGI RUHIY BUZILISHLAR. O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI, 4(47), 414-417.

19. Maxmit o'g, G. U. M. (2025). INSULTDAN KEYINGI DEPRESSIYA RIVOJLANISHIGA TA'SIR QILUVCHI ASOSIY XAVF OMILLARI VA ULARNING KLINIK-NEVROLOGIK KO 'RINISHLARI. AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE, 3(11), 363-366.