ABSTRACTS

II. REVIEW

1. Lebedev V. P., Sergienko V. I. Development and application in medical practice of the transcranial electrostimulation of the brain defense (antinociceptive) mechanisms based on the principles of the evidence-based medicine (review of the twenty years studies). 1TES Center of the I. P. Pavlov Institute of Physiology, St.-Petersburg, 2Research Institute of the Physical-chemical medicine, Moscow.

Review is presented with description of the consecutive stages of the experimental development of the noninvasive transcranial electrostimulation (TES) method for selective brain defense (antinociceptive) mechanisms activation. The quasiresonance characteristics of these mechanisms were demonstrated for the first time and the selectivity of their activation was proved by immunocytochemistry, RIA, autoradiography and MRI. The main directions of the TES clinical applications were based on the preliminary studies in animal pathological models. The results of TES introduction as a method of treatment into neuropathology, anesthesiology, rescue medicine, combustiology, general therapy, gastroenterology, otolaryngology, obstetrics and gynecology, dermatology, alcoholism and drug addiction are presented. The principles of TES device development and the directions of its further improvement are described. Repeatability of the experimental and clinical data is a result of constant usage of evidence-based medicine principles. Suggestion is made that quasiresonance characteristics of the brain defense (antinociceptive) mechanisms reflect the more common resonance properties of the whole brain.

III. EFFECTS OF THE TRANSCRANIAL ELECTROSTIMULATION ON THE HUMAN PSYCHOPHYSIOLOGICAL STATUS

2. Lebedev V. P., Kovalevski A. V., Gazeeva I. V., Gaisina A. V., Derpogolts S. V., Bord E. I. Noninvasive transcranial electrostimulation of
the brain endorphinergic structures: Effects on human fatigue and related psychophysiological indices. 1I. P. Pavlov Institute of Physiology, 2Psychoneurological Dispensary No.1, St.-Petersburg

A randomized single-blind passive placebo-controlled study using a set of seven subjective and objective psychophysiological tests that evaluated the background state and changes in 26 psychophysiological indices (including physical, cognitive, and affective components of fatigue) has shown that transcranial electrostimulation (TES) of endorphinergic structures of the human brain facilitates normalization of most indices. The positive effects of TES were more pronounced in subjects with strong negative shifts of the initial indices, which suggests a homeostatic character of the effects of activation of the brain endorphin-mediated mechanisms. Special attention was paid to the use of a simple scale for rapid evaluation of fatigue, whose validity, reliability, and applicability were proved experimentally by the method of correlation matrices.

3. Lebedev V. P., Kovalskyi A. V., Gazeva I. V., Derpgol'tse S. V. Effects of rhythmic photostimulation with the parameters coinciding with those of optimal transcranial electrostimulation upon fatigue in humans, and the related psychophysiological events. 1I. P. Pavlov Institute of Physiology, 2St.-Petersburg State University of Cinema and Television, St.-Petersburg.

A randomized blind screening study with active placebo control in humans has revealed that rhythmic photostimulation of 77 Hz frequency and 3.5 msec duration burst does not produce any fatigue or negative psychophysiological events as opposed to 50, 60, 100 Hz frequency and burst durations lower and higher than 3.5 msec. These and other findings are to be considered in designing rational and physiologically substantiated systems of cinema projection and PC monitors.


Description of the visual analog-digital scale for fast estimation of subjective fatigue level is presented. The reliability, validity, and applicability of this scale were verified by cross-correlations with verbal and non-verbal tests commonly used for estimation of the fatigue level in static and dynamic situations.


The efficient transcranial electrostimulation was demonstrated as a part of correction measures of psycho-emotional and somatic disturbances in close relatives of the losses in mass disaster. When applied to rescuers, the transcranial electrostimulation improved their working ability.
6. Sisoev V. N. Transcranial electrostimulation optimizes the professional adaptation of the young army reinforcement. Military Medical Academy, St.-Petersburg.

The efficiency of transcranial electrostimulation (TES) for the process of professional adaptation of called-up men to conditions of military training was examined by means of a comprehensive study of the level of neuropsychological stability (NPS). The results have presented evidence that TES significantly compensates unfavorable changes of physiological, psychological, and behavioral events in soldiers of NPS low level. Psycho-physiological value of the soldiers' professional adaptation decreased with rise of the efficiency of adaptation. It was concluded that application of TES was very useful for psycho-physiological accompaniment of professional military adaptation of young soldiers with unsteady status.

7. Kalinin A. V.¹, Lebedev V. P.², Leikin S. F.¹ Application of the transcranial electrostimulation in the process of training of combat sportsmen. ¹P. F. Lesgaft State Academy of Physical Culture, ²I. P. Pavlov Institute of Physiology, St.-Petersburg

The effect of the transcranial electrostimulation on the sport efficiency and pain sensitivity in wrestling sportsmen of Chinese style during training and competition were estimated. A significant reduction of pain sensitivity and fatigue, and improvement of mood were demonstrated even after one session of stimulation. The number of victories during competitions in the stimulated group were 2.5 times higher in comparison with the matched control group of sportsmen. It was concluded that the transcranial electrostimulation was an effective method to improve results in wrestling sportsmen without any prohibited drugs.

8. Saratov S. Ya.¹, Gerasimova A. S.¹, Grigorieva I. F.¹, Lebedev V. P.², Muratov I. V.¹ Transcranial electrostimulation of speech disorders and accompanied neuro-psychiatric disturbances in children after palatoplasty. ¹St.-Petersburg Research Institute of Ear, Throat, Nose and Speech, ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

Transcranial electrostimulation (TES) increased efficiency of the complex logopedic treatment of speech disorders in children after palatoplasty. Depressive neuro-psychiatric disturbances, such as dysthymia, decreased activity, self-isolation, bradyphrenia accompanying the speech and cosmetic defects were also reduced or abolished. In patients with positive TES effects the coherent index of EEG alpha-spectrum of both hemispheres increased markedly.

9. Chuko L. S.¹, Kropotov Yu. D.¹, Lebedev V. P.², Yakovenko E. A.¹, Grin-Yatsenko V. A.¹, Surushkina S. Yu.¹ Application of transcranial electrostimulation in treatment of attention deficit with hyperactivity disorders and concomitant disturbances in children and adolescents. ¹Institute of Human Brain, ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

Clinical study was carried out to estimate efficiency of treatment of attention deficit with hyperactivity disorders (ADHD) in 102 children and adolescents. Patients were divided onto 3 groups: with prevalent hyperactiv-
ity, with attention deficit, and of the mixed type with equal level of these syndromes. The TES treatment was significantly effective in groups of patients with hyperactivity and mixed type. The concomitant disturbances, such as tics, tension head ache, and anxiety were also significantly reduced. According to the 6-month follow up, the positive TES effects was stable.

10. Chutko L. S.¹, Kropotov Yu. D.¹, Lebedev V. P.², Grin-Yatsenko V. A.¹, Yakovenko E. A.¹, Yur'eva R. G.³, Mnatsakanian E. G.³ Treatment of tic disorders by transcranial electrostimulation in children and adolescents. ¹Institute of Human Brain, ²I. P. Pavlov Institute of Physiology, ³Psycho-Neurological Rehabilitation Center for Children, St.-Petersburg.

The efficiency of tic treatment by transcranial electrostimulation (TES) was estimated. The course treatment by TES was performed in 37 children with different type and severity of tics. The total tic reduction (follow up – 6 months) was revealed in 10 children (32.4%), a sufficient improvement, in 12 patients (32.4%), a mild effect, in 7 children (18.9%). No positive results were found in 8 children (21.6 %). The conclusion was made that the efficiency of the tic treatment by TES is about the same as medication therapy, but without any side effects.

11. Markina L. D., Kratinova E. A. The maintenance of optimal adaptation level in healthy volunteers by transcranial electrostimulation. State Medical University, Vladivostok.

The effect of transcranial electrostimulation (TES) on psychophysiological status of volunteers (medical students) was studied while considering different types of adaptation reaction (training, activation, stress) and level of reactivity. It was shown that TES was the most effective for improvement of the psychophysiological status of volunteers with adaptation reaction of training and activation, and was practically ineffective at adaptation reaction of stress. TES helps improving students' psychophysiological indices and increases their reactivity level.

12. Skorobogatski G. P.¹, Lebedev V. P.² A case of effective treatment of the restless legs syndrome by transcranial electrostimulation. ¹Association of Private Physicians (family medicine), ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

Description of the case of a female patient with progressive restless legs syndrome of about 5-year duration, treated ineffectively, is presented. The syndrome was completely abolished after the course of the transcranial electrostimulation treatment. Full remission was observed during the 7-month follow-up. The mechanisms of curative effect of the transcranial activation of the endorphinergic and serotoninergic brain mechanisms are discussed.

13. Kovalchuk Yu. V.¹, Lebedev V. P.² The preliminary results of treatment of psychogenic sexual disorders by transcranial electrostimulation. ¹International Medical Center «ON CLINIC», Moscow, ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

A high efficiency of treatment of sexual disorders of the psychogenic nature (mainly depressive) with transcranial electrostimulation was demon-
strated in men and women. In 32.4% of patients all psychogenic sexual disorders were abolished and in 62.1%, substantially reduced. The conclusion is made that the transcranial electrostimulation is an effective method especially for treatment of psychogenic sexual disorders.

IV. APPLICATION OF THE TRANSCRANIAL ELECTROSTIMULATION IN NARCOLOGY


Transcranial electrostimulation (TES) was included as a component in treatment of withdrawal in heroin addicts. A significantly faster improvement of the patients' state and reduction of the necessary dosages of neuroleptic and other inhibitory medications were observed. As a result, there were no side effects typical of neuroleptics (extrapyramidal and psychomotor disorders). Typical pain in withdrawal patients was also abolished by TES. In TES-treated patients (all of them — with hepatitis-C immune markers, two — HIV-infected), a significant activation of indicators of specific (T-lymphocytes CD3, CD4, CD8) and non-specific (NK-cells, phagocytosis) immunity were demonstrated. Contrary in medication-treated patients, inhibition of the same indicators was observed. It is suggested that application of TES as a component of treatment of the heroin withdrawal syndrome is very perspective.

15. Krupitski E. M.1.2.4, Burakov A. M.2.4, Grinenko N. I.4, Romanova T. N.4, Vostrikov V. V.4, Slavina T. Yu.4, Lebedev V. P.2, Grinenko A. Yu.2 Treatment of postabstinence disorders (syndrome of anhedonia in heroin addicts by transcranial electrostimulation. 1Regional Research Center of Nарcology and Psychopharmacology of Saint-Petersburg Pavlov State Medical University, 2Saint-Petersburg Medical Academy of Continuing Education, 3I. P. Pavlov Institute of Physiology, St.-Petersburg, 4Leningrad District Narcological Dipensary, Leningrad District, Novo-Deviatkino.

Most of heroin addicts soon after termination of withdrawal syndrome are suffering from syndrome of anhedonia, which includes affective disorders (mostly depression and anxiety), sleep disorders, and craving for heroin. Syndrome of anhedonia is an often reason for destabilization of remission and relapse to heroin. The results of the double-blind placebo-controlled randomized clinical trial showed that ten sessions of transcranial electrostimulation by combination of constant current and pulse current (1:1, 77.5 Hz) statistically significantly reduced symptoms of anhedonia, including the state and trait anxiety, as measured with Spielberger scale, depression measured with Zung scale, craving for heroin assessed with the visual analog scale, and severity of all three components of anhedonia (affective, cognitive, and behavioral). Differences in all psychometrics between the experimental (real electrostimulation) and control (sham electrostimulation) groups were
statistically significant after ten sessions. The rate of relapse in the experimental group was statistically significantly lower than in the control group. Thus, transcranial electrostimulation is an effective method of treatment of the syndrome of anhedonia and relapse prevention in recently detoxified heroin addicts.

16. Kropotov S. P.¹, Litvintsev S. V.¹, Shamrey V. K.¹, Koistrick K. N.¹, Korchagin A. A.¹, Gaisin R. R.¹, Snedkov E. V.¹, Malkhov Yu. K.¹, Lebedev V. P.², Turlakov K. S.¹, Belogortsev D. O.¹ Aplication of transcranial electrostimulation for treatment of heroin and ephedrine addiction. ¹Military Medical Academy, ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

Transcranial electrostimulation (TES) was used in heroin and ephedrine addicts for treatment of withdrawal syndromes, postabstinence disorders, and compulsive behavior. A combination of treatment with TES and medications (clonidine scheme) significantly reduced the severity and duration of the withdrawal syndromes. Postabstinence disorders were also sufficiently improved. Compulsive episodes were abolished even by one TES session. TES treatment significantly increased duration of remission (the 6-month follow up). The home use of TES by motivated patients after in-patient treatment increased the duration of remission (the 1-year follow up)

V. APPLICATION OF THE TRANSCRANIAL ELECTROSTIMULATION FOR PAIN RELIEF

17. Miroshnikova V. V.¹, Rybak V. A.¹, Lebedev V. P.² Transcranial electrostimulation in combined treatment of chronic daily headache. ¹Medical Academy, Volgograd; ²I. P. Pavlov Institute of Physiology, St.-Petersburg.

The efficiency of treatment of daily chronic headache by a combination of non-pharmaceutical method and medication therapy with tizanidine (sirdalud) was estimated. A statistically significant positive effect, including abolishment of any symptoms, was observed in 83.7% of patients with tension headache and in 90.6% of patients with transformed migraine headache. It is suggested that the high efficiency of this combination is based on simultaneous effects upon different neurotransmitter mechanisms (endorphinic, serotoninergic, and adrenergic) of the antinociceptive system.


The therapeutic effect of transcranial electrostimulation (TES) on headache have been studied in neurotic patients with consequences of neuroinfections and autonomic sympatho-adrenal crises. Stable abolishment of headache was observed in 53% and 80% of patients, respectively. The frequency and intensity of autonomic crises were reduced and the «quality of life» in all patients was improved, with an obvious decrease of the levels of
anxiety and asthenia. The more expressive and persistent effect was obtained in neurotic patients with autonomic crises.

19. Gonchar M. A., Amelin A. V., Tumelevich B. Ch., Lebedev V. P., Malygin A. V. The effects of transcranial electrostimulation, antidepressants, and their combination on pain reaction in rats. I. P. Pavlov State Medical University, I. P. Pavlov Institute of Physiology, St.-Petersburg.

In experiments on rats the effect of antidepressants, inhibitors of serotonin re-uptake (amitriptyline and fluoxetine) on analgesia produced by transcranial electrostimulation was studied. The quantitatively estimated integral intensity of the pain vocalization evoked by standard skin electric stimuli was used as a model of the emotional and behavioral pain reaction. It was demonstrated that amitriptyline and fluoxetine injected subchronically enhanced the analgesic effect of transcranial electrostimulation. A suggestion is made that the experimental data obtained provide the basis for clinical trial of the efficacy of this combination.

20. Gonchar M. A., Amelin A. V., Ignatov Yu. V., Lebedev V. P., Tumelevich B. Ch., Skoromets A. A. The combined migraine treatment by transcranial electrostimulation and antidepressants. I. P. Pavlov Saint-Petersburg State Medical University, I. P. Pavlov Institute of Physiology, St.-Petersburg.

The clinical efficiency of a combination of transcranial electrostimulation (TES) with antidepressants in the preventive treatment of migraine was evaluated by measuring frequency, intensity, and duration of attacks in 40 patients with frequent and severe migraine attacks. This combined treatment reduced frequency, intensity, and duration of attacks and produced a statistically significant decrease of doses of simple analgesics as well as of ergotamine. It has been suggested that antidepressants may increase the TES effect by an additional modulation of the opioidergic and serotonergic mechanisms of the brain antinociceptive systems.

21. Shmyrov V. I., Babenkov H. V. Transcranial electrostimulation as a component of complex treatment of the brain venous blood flow disturbances. Medical Center of the RF President’s Administration, Moscow.

Transcranial electrostimulation was used for treatment of 31 patients with dystonic venous encephalopathy. A sufficient clinical improvement and normalization of EEG and conjunctival blood flow was observed.


Transcranial electroanalgesia was used in treatment of 50 patients with mainly chronic spondylogenic pain syndromes produced by osteochondrosis of lumbar or cervical parts of vertebral column. A significant analgesic effect was revealed in 92% of the patients. Analgesia appeared at about the 15th min during even the first 30-min session of treatment, with an aftereffect of about 6—7 hr duration. Maximal effect was demonstrated after 3—4 daily sessions. An increase of plasma endorphin level estimated by a qualitative crystallographic method correlated with the analgesia intensity.

Transcranial electrostimulation (TES) was used as a method for rehabilitation in two groups of oncological patients. The first group included women at the postoperative period after radical and palliative gynecological surgery, the second group consisted of patients with inoperable tumors of the small pelvis area. In 69% of postoperative patients, a significant level of analgesia was achieved by the separate TES application only. During all postoperative periods, nonsteroid analgesics were injected once in 9% of patients, twice in 6%, and three times, in 16%. The process of tissue repair was intensified and no postoperative complications were observed. Pain of moderate intensity (in 77% of inoperable patients) was abolished by TES. No evident analgesic TES effect was observed in patients with the highest level of pain. In this group of patients the severe psycho-physiological disturbances typical of oncological patients were reduced.

24. Dimitrienko A. I.¹, Kovalev M. G.¹, Lebedev V. P.², Leosko V. A.¹, Fan A. B.¹ Transcranial electrostimulation as component of anesthesia during urgent surgery in patients with hypovolemia. ¹Research Institute of Pulmonology of the State Pavlov Medical University, ²Pavlov Institute of Physiology, St.-Petersburg.

Hemodynamic parameters as an indicator of the quality of anesthesia was studied in 60 patients with pronounced initial hypovolemia, urgently operated in case of acute gastrointestinal disease. In contrast to traditional pharmaceutical anesthesia, inclusion of transcranial electrostimulation (TES) as a component of anesthesia stabilized hemodynamic parameters with decrease of the rate and volume of intraoperative infusion therapy. Suggestion is made that anesthesia with TES is preferable in urgent surgery, particularly in cases when hypovolemia can not be properly corrected before intervention.

25. Popov A. S.¹, Petrov V. I.¹, Frolov M. A.¹² Effects of transcranial electrostimulation on the functional state in surgically treated patients with attendant cardiovascular pathology. ¹Medical Academy, ²City Emergency Hospital No. 25, Volgograd.

Considerable changes of autonomic balance towards sympathetic tone as a source of serious complications were found in patients with attendant cardiovascular pathology with operative treatment and general anesthesia. The abnormal sympathetic reactivity during preoperative and perioperative periods in this type of patients was effectively corrected by transcranial electrostimulation.

VI. APPLICATION OF THE TRANSCRANIAL ELECTROSTIMULATION FOR STIMULATION OF THE TISSUE REPAIR

26. Lebedev V. P.¹, Sergienko V. I.² Transcranial electrostimulation activates tissue regeneration: from experimental results to clinical application.
11. P. Pavlov Institute of Physiology, 2Research Institute of the Physical-chemical medicine, Moscow.

A brief review of results of our previous experimental studies is presented, which demonstrate activation effects of transcranial electrostimulation (TES) on regeneration of damaged tissues of different types (skin and gastro-duodenal epithelium, hepatocytes, connective tissue, nerve fibers). These results were used as a basis for recommendations for TES application in clinical practice. The experimental data were completely confirmed by clinical results. Curative TES effects were demonstrated in treatment of thermal burns and wounds, toxic hepatosis, acute myocardial infarction, sensorineural hearing loss. Perspectives of further investigations of the mechanisms of the TES reparative effects are discussed.

27. Lebedev V. P.1, Nechiporenko S. P.2, Melikhova M. V.2, Kolbasov S. E.2, Stroikova G. S.2, Zamuruev O. N.1 Effects of transcranial electrostimulation of brain endorphinergic structures on hepatocyte functional activity. 1I. P. Pavlov Institute of Physiology; 2Institute of Toxicology, St.-Petersburg.

Biochemical events of the rat hepatocyte cytolysis and deterioration of their synthetic activity and detoxification ability, as well as morphological events of lipid degeneration after acute poisoning with dichloethane and CCl4, were significantly reduced by transcranial electrostimulation (TES). Blockade of the TES effects with naloxone revealed its endorphinergic nature. Combined effects of TES and «Essentiale» (a mixed phospholipid preparation) used as a standard hepatoprotector were lower than the separate effects of each of these agents. The TES effects were clinically confirmed in treatment of toxic hepatosis.

28. Lebedev V. P.1, Melikhova M. V.2, Nechiporenko S. P.2, Kolbasov S. E.2, Stroikova G. S.2, Kadryavtsev B. N.3, Ivanov V. A.3, Nilova V. K.3, Bezbordkina N. N.2, Zabehinski M. A.4 Transcranial electrostimulation of brain endorphinergic structures: activation of liver regeneration after partial hepatectomy and oncostatic effect. 1I. P. Pavlov Institute of Physiology, 2Institute of Toxicology, 3Institute of Cytology, 4N. N. Petrov Research Institute of Oncology, St.-Petersburg.

In partially hepatectomized (65—70%) rats, transcranial electrostimulation accelerated the process of liver regeneration. An increase of the rate of the total liver mass recovery was observed. Stimulation of the mitotic process was indicated by an increase of the number of hepatocytes at different mitotic stages and of the number of hepatocyte nuclei labeled by (methyl-3H1)-thymidine. Unlike stimulation of the repair process, transcranial electrostimulation significantly inhibited growth of implanted hepatoma G-27. Possible mechanisms of the transcranial electrostimulation effects observed and some directions of its clinical applications are discussed.

29. Lebedev V. P.1, Bilichenko S. V.1,2, Nechiporenko S. P.2, Kolbasov S. E.2, Melikhova M. V.2 The effect of transcranial electrostimulation on
the glucose level in alloxan-induced diabetes in rats. 1I. P. Pavlov Institute of Physiology, 2Institute of Toxicology, St.-Petersburg.

The effect of transcranial electrostimulation (TES) on the blood glucose level was studied in rats with diabetes of different severity, induced by alloxan at doses of 100 and 150 mg/kg. Three daily TES sessions were performed according to two time schedules. The marked, statistically significant anti-hyperglycemic TES effects were more pronounced than effects of metformin (100 mg/kg). The metformin effects were potentiated by TES. It is suggested that the previously observed anti-hyperglycemic TES effect is to be a subject of further detailed investigations.

30. Rogova N. V., Petrov V. I., Lebedev V. P., Rychkova S. V. Treatment of gastric and duodenal ulcers with transcranial electrostimulation and activation of antihelicobacter therapy. 1Medical Academy, Volgograd; 2I. P. Pavlov Institute of Physiology, 3Medical Academy of Continuing Education, St.-Petersburg.

Introduction of transcranial electrostimulation into the complex of antihelicobacter therapy of gastric and duodenal ulcers significantly decreased the amount of medications needed and the duration of the scar formation process. As a result, the cost of treatment also was reduced.


Treatment with transcranial electrostimulation (TES) of patients with secondary postburn immunodeficiency stimulates the subpopulation lymphocytes CD3+, increases CD4+, the CD4/CD8 ratio, and the absorption ability of phagocytes. The TES stimulation of immunity depends on the initial immunodepression level and is weaker in the most severe cases. Clinical effects peculiar to TES, such as analgesia with long analgesic aftereffect, improvement of sleep, mood, appetite, etc., were observed even in very severely diseased patients.

32. Savchenko A. B., Chefu S. G., Prokofieva V. V., Nozdrachev A. D. The effect of transcranial electrostimulation on the X-ray resistance of mice. 1I. P. Pavlov Institute of Physiology, 2State University, St.-Petersburg.

The experiments were performed on mice after X-ray irradiation at a LD50/30 dose (50% animal death during 30 days). Transcranial electrostimulation (TES) at the regimen optimal for activation of the brain aninociceptive system only performed just before X-ray irradiation prolonged duration of animal life and increased the spleen weight, the number and diameters of stem cell colonies. TES at a non-optimal regimen and 24 hr before or after the X-ray irradiation produced negative effects on the animal life duration and stem cells reproduction.

33. Tsirulinov E. M., Boytsova V. V., Lebedev V. P. Improvement of efficiency of transcranial electrostimulation in treatment of the hearing loss by additional acoustic stimulation of a special type. 1I. M. Sechenov Institute
of Evolutionary Physiology and Biochemistry; 21. P. Pavlov Institute of Physiology; 3 Institute of Medical Rehabilitation, St.-Petersburg.

To increase efficiency of transcranial electrostimulation (TES) in treatment of the sensorineural hearing loss (usual positive effect in 50% of patients in the average range about 10—35 dB) during TES sessions, additional acoustic stimulations (AAS) of monotonal and polytonal types were produced. For monotonal AAS the pure tone with a frequency about 1 kHz (in correlation with frequency of the beginning of the negative audiogram slope in specific patient) was used with an intensity of 40—70 dB in inverse correlation with the level of the hearing loss. An improvement of the hearing ability was observed in 90% of patients with the same 10—35 dB range. A special device “Audiotes” for simultaneous TES and polytonal AAS was developed. In this case, AAS was performed by a set of pure tones of the audiogram frequencies turned on automatically in the ascending and descending consecutive order. The intensity of each tone of polytonal AAS was inversely proportional to the hearing ability for this tone (the “inverted audiogram” regimen). The results of treatment of the sensorineural hearing loss were the same as with monotonal AAS but, additionally, a positive curative effect was observed in patients with otosclerosis. A suggestion is made that subsequent studies of combination of TES and polytonal AAS treatment are perspective for improvement of treatment efficiency of diseases with hearing loss of different etiology.


The efficiency of transcranial (TES), endaural (EnES), and promontorial (PrES) electrostimulation was compared in treatment of the chronic sensorineural hearing loss. An improvement of hearing ability in the range of 10—35 dB was observed in 54% of patients treated with TES, in 40%, with EnES, and in 60%, with PrES. A high level of efficiency of TES (the range of 10—85%) was demonstrated in treatment of 85% patients with the acute sensorineural hearing loss. In 51—65% of the cases the ear noise was reduced or abolished by TES and EnES, and speech legibility also was obviously increased. The positive effects of electrostimulation of different type were in parallel with cerebral blood flow estimated by rhowencephalography.

35. Golovanova L. E., Griason S. G. Transcranial electrostimulation treatment of the chronic sensorineural hearing loss in patients of different age groups. City Surdological Center, St.-Petersburg.

The efficiency of treatment of the chronic sensorineural hearing loss with transcranial electrostimulation was estimated in three age groups (17—30, 31—60, and 60-year old). It was revealed that in the first group the hearing ability was improved in 100% of patients, mainly in the area of middle and high frequencies, while in patients of the second group, in 30% at the lowest frequencies (125—500 Hz). In 78% of patients of the third group the hearing ability also was observed, but it was rather low. In all patients an improvement of speech understanding, self-feeling, and sleep ability were observed. The conclusion was made that the method of transcranial electrostimulation
was useful for treatment of the chronic sensorineural hearing loss in patients of different age groups.

36. Baranova V. M. 1, Abbasov R. Yu. 1, Lebedev V. P. 2, Bort I. G. 1, Vasilits V. M. 1. Treatment of occupational sensorineural hearing loss and other occupational health disturbances with transcranial electrostimulation. 1Research Institute of Industry and Marine Medicine, 2I. P. Pavlov Institute of Physiology, St.-Petersburg.

Workers occupied at the atomic shipbuilding are subjected to high levels of noise, which lead to professional sensorineural hearing loss (PSNHL). PSNHL comprises about 45% of all professional diseases. Usual methods of PSNHL treatment (both pharmaceutical and physical therapy) are rather ineffective. The effects of transcranial electrostimulation (TES-therapy) on the hearing ability and general condition of 125 patients with PSNHL of different stages were estimated. A high efficiency of TES-therapy was revealed after two courses (10 sessions each). Intervals between the courses were 7 months. After the treatment, in 1/3 of the patients who had preclinical stage (signs of noise influence on hearing ability) the hearing improved up to the normal range. All patients with the low level of PSNHL got one stage of hearing improvement to the preclinical level. In 43.5% of the patients with PSNHL of the moderate level the improvement up to the light stage was observed. In the cases of the high PSNHL level, no sufficient improvement was found. Besides, a significant reduction of the number and manifestation of complaints and symptoms typical to profession-related disturbances of health was revealed. In conclusion, the TES-therapy as an effective non-pharmaceutical method of treatment is economically advantageous and should be widely introduced in occupational medicine.

37. Lebedev V. P. On mechanisms of therapeutic effects of the transcranial electrostimulation in treatment of occupational sensorineural hearing loss (short review). TES Center of I. P. Pavlov Institute of Physiology, St.-Petersburg.

Some literature data are reviewed concerning physiopathology of the professional sensorineural hearing loss produced by noise environment of high intensity, including the damage of receptors and microcirculation of the inner ear and neural mechanisms of acoustic signal processing. Possible curative mechanisms of the transcranial electrostimulation are described in connection with activation effect of this type of stimulation of the brain endorphinergic structures on regeneration and functional recovery of inner ear receptors, microcirculation and peripheral and central neural mechanisms of the acoustic signal processing.

VII. TRANSCRANIAL ELECTROSTIMULATION IN OBSTETRICS AND GYNECOLOGY

38. Kustarov V. N. 1, Sedneva S. A. 1,2,3, Lebedev V. P. 3. Transcranial electrostimulation as a new method for treatment of premenstrual syndrome. 1Medical Academy of Continuing Education, 2City Women's Dispensary No 25, 3I. P. Pavlov Institute of Physiology, St.-Petersburg.
It was demonstrated that application of transcranial electrostimulation (TES) — daily sessions from the 16—20th days of cycle up to the 3rd day of the next cycle reduced or abolished the main negative events of premenstrual syndrome (PMS), such as nausea and vomiting, disturbances of sleep, and psycho-emotional tension. These curative effects of TES-therapy also have an important social effect in improvement of working ability and reduction of conflict situations at the working place and in the family life. Pain relief was observed in women with algodysmenorrhea. As a result of the TES-therapy, the cycle regularity usually reappeared. It was especially observed in 14—16-year old girls with cycle disturbances produced by enormous school fatigue or stress. The results obtained demonstrate the efficiency of the non-pharmaceutical TES-therapy of PMS with a high level of medical and social profitability.


The results of treatment of anovulatory infertility in 17 women previously treated with hormones and medications without effect are presented. After 1—2 courses of TES-therapy, in 35% women the appearance of dominant follicles was observed by an ultrasound scanning, with subsequent normal course of gravidity and childbirth. These preliminary data provide a basis for more detailed studies of the TES-therapy as an effective method of treatment of anovulatory infertility.


34 pregnant women (gravidity up to 9 weeks) with emotional disturbances, vomiting and nausea, vasomotor dystonia and neurodermites were treated with TES-therapy. The first TES-therapy effect was a reduction of the psycho-emotional problems, with normalization of the social interrelations and working ability. Vomiting and nausea were abolished in 31 patients after 2—4 TES sessions. Blood pressure instability (especially of the hypotonic type) was reduced even before the vomitting and nausea had stopped. Itch and scratch events also were reduced. During the TES-therapy, no additional medications were used. A suggestion is made that the high efficiency of the TES-therapy is based on an increase of production and release of β-endorphin and serotonin to normalize the psycho-emotional status and vasomotor regulation and to block the nervous vomiting mechanisms.


In 30 pregnant (38—40 weeks) women without any extragenital pathology, transcranial electrostimulation (TES) in addition to ordinary measures
were used in the process of preparation to the childbirth. In matched control
group of 50 pregnant women the ordinary measures were used only. The
status of the stress-limitation system in women was evaluated by determina-
tions of the HRV and components of the lipid peroxide oxidation system.
The clinical characteristics of the process of deliveries and side effects were
also estimated. It was demonstrated that in women of the TES group the
tension of the stress-limitation system was sufficiently reduced. The child-
birth duration in this group was significantly shorter and was accompanied
by an increase of the obstetric mouth of the womb opening velocity and
activated myometrium contractility. The number of side effects in deliveries
also were reduced.

42. Zharkin N. A., Pupishev A. G., Popov A. S. Application of transcranial
electrostimulation for pain relief during delivery. Medical Academy, Vol-
gograd.

It was demonstrated that the intensity of analgesia produced by transcran-
ial electrostimulation (TES) in delivery was equal to the effect of the opioid
type agonist Promedolum (trimiperidine hydrochloride), but without typical
opioid side effects. After TES session the velocities of the ostium of the
uterus opening were increased up to 0.66±0.11 cm/hr in primaparas and 0.42
× 0.12 cm/hr in women with repeated child birth. According to this effect
the duration of deliveries was substantially decreased, with a statistically
significant reduction of the number of anomalies of the uterus contractions,
birth traumas, and neonate hypoxia. The disturbances of the hemodynamic
parameters and heart rate variability after the TES session were abolished or
reduced. In contrast to Promedolum, the TES session produced no EEG
changes. Neonates had a high rating according to the Apgar scale and the
normal adaptation ability during the early perinatal period.

43. Mochalova S. F. TES-therapy in treatment of genital endometriosis.
Medical Center «Gera», Tver, Russia.

Endometriosis occupies the third place in the list of the most frequent
gynecological diseases, reaching of 60% women of reproductive age in some
areas. The traditional methods of treatment (hormones, analgesics, antide-
pressants) are poorly effective and have known contraindications and ex-
pressed side effects. It is revealed that the important role in mechanisms of
endometriosis development plays a deficit endogenous opioid peptides (EOP)
results in persistent pain, inhibition of the nonspecific immunity, some
problems in hypothalamus-pituitary-gonads hormonal regulation. It is known
that the transcranial electrostimulation of the brain defense mechanisms
(TES-therapy, developed in Pavlov Institute of Physiology by V. P. Lebedev,
1992) selectively and noninvasively activates EOP release providing thereby
effective pain relief, stimulation of immunity, in particular of activity of
natural killer cells, normalization of the psychophysiological and hormonal
status. Taking into account these data, the TES-therapy (device «TRAN-
SAIR-01») was used for treatment of 48 patients with genital endometriosis
(adenomyosis)of the 2nd-3rd stages accompanied with heavy pain syn-
dromes. Diagnosis was supported by ultrasonic investigation in 100% of
them. The course of treatment included 10 daily sessions was started at the peak of a pain during the 2 phase of a menstrual cycle. In 58.9% women the pain has sufficiently decreased already after the first session. At the end of treatment course in 82.6% patients pain syndrome was completely abolished, and in 17.4% the obvious decrease of pain was observed. The improvement of self feeling, mood, and quality of life were found in 100% of patients. In 3 months after TES-therapy in 62.5% patients according the ultrasonic investigation the adenomyosis events disappeared. Thus, the TES-therapy based on selective activation of the brain defense endorphinergic mechanisms of the brain, is highly effective nonpharmacological method of adenomyosis treatment without side effects. It was also demonstrated that TES-therapy is effective method of treatment of the other forms of genital endometriosis.


The efficiency of transcranial electrostimulation (TES-therapy) used for treatment of dysfunctional uterus bleeding (DUB) in 40 women of reproductive and premenopausal age was evaluated. Ten daily TES sessions were started immediately after diagnostic ablation. The results of the treatment were estimated by clinical observations, light microscopy of endometrium structure (vacuum aspiration), measurement of the endometrium thickness (US-scanning), and radioimmunoassay of the pituitary gonadotrophic hormones and ovarian sex hormones. It was demonstrated that in 39 women (the one-year follow up) the DUB was not repeated. Obvious reduction of the endometrial hyperplastic processes and normalization of the hormonal status were observed. The data obtained open perspectives of a more comprehensive study of effects of the TES-therapy in the DUB treatment.


The efficiency of treatment of psychosomatic and neuroautonomic climacteric disorders with TES-therapy in 76 patients was evaluated. As a control group, 86 women with normal physiological menopausal events were observed. It was demonstrated that the TES-therapy had certain perspectives for further study owing to its high and fast efficiency, the absence of side effects, and economic advantage.


Transcranial electroanalgesia (TEA) was applied as 6—8 every day sessions in 18 women after abdominal gynecological surgery. Twenty match patients with the same types of surgery were included in control group. It was demonstrated that the amount of medications used for the 100% pain
relief was more than twice lower in the TEA group in comparison with the control group. It was important that in patients of the TEA group at the end of treatment the psycho-emotional status was sufficiently better. The data obtained open perspectives of an effective use of the TEA in postoperative gynecological patients.

VII. TES-THERAPY IN GENERAL MEDICAL PRACTICE

47. Trusov S. V., Barikov A. V., Ivanov M. D. Estimation of TES-therapy efficiency and practicability for treatment of pain syndromes and general psychological status disturbances in patients with vertebral column osteochondrosis in country nurse ambulatory. 1TES Center of I. P. Pavlov Institute of Physiology, St.-Petersburg; 2Medical Center «Medicine – XXI Century», Pskov.

The noninvasive TES-therapy efficiency and practicability were compared with the same properties of invasive methods, such as acupuncture and procaine nerve blockades. The TES-therapy pain relief appeared faster and was significantly more prominent and stable, with a reduction of the enhanced muscle tension and normalization of the psychological status disturbances. Besides, the obvious advantage of the TES-therapy consist of practicability, without a special nurse training for use in the country nurse ambulatory.

48. Evseev E. A., Dimitrienko A. I., Leosko D. A., Lebedev V. P. Transcranial electrostimulation in physician emergency practice: analgesic and hypothermic effects. 1Medical Emergency Home Service of the Petrogradsky District, 2Research Institute of Pulmonology of I. P. Pavlov State Medical University, 3I. P. Pavlov Institute of Physiology, St.-Petersburg.

The transcranial electrostimulation (TES) was used in the cases of medical emergency of 100 patients. There were observed an evident relief of the acute radiculogenic pain and a reduction of hyperthermia typical to acute respiratory tract infections. The intensity of analgesic effect was about the same as that of intravenous injection of the metamizole sodium and diphenhydramine commonly used in the emergency home practice. The TES hypothermic effect was much more pronounced than the effect of injections of these medications. A suggestion is made that TES as a non-pharmaceutical method of treatment could be useful in the emergency service, especially in patients with multi-drug allergy.


A high efficiency of treatment (positive results at about 86—99%) of a combination of transcranial electrostimulation with reflex and manual therapy, and other physiotherapeutic methods was demonstrated in 1193 out-
patient with several types of pathology. The results of special interest are an effective reduction of alcohol and opioid withdrawal syndromes. Thus, transcranal electrostimulation could be used as an ordinary method in general medical practice.


Efficiency of treatment of the surface form of seborrhea (acne papulosa-pustular) with transcranal electrostimulation (TES) and changes of levels of β-endorphin and pituitary-gonadal-suprarenal hormones (PGSH) were evaluated. The effective results of seborrhea treatment were observed after 7—8 daily sessions. At this time the appearance of new pathological seborrhea elements stopped, healing of the papulosa-pustular acne was accelerated, and the patients’ anxiety state was normalized. Further TES sessions for 3 months (2 sessions per month) supported not only the immediate positive clinical effect, but also the relapse for one year in about 95.6% of the patients. It is suggested that the TES curative effect is due to an increase of the blood β-endorphin level in males and females and normalization of most PGSH, e.g. to a significant increase of progesterone and estradiol levels, a decrease of testosterone and cortisol, and a tendency for normalization of FSH and LH levels.