

**FUNDAMENTALS OF ELECTROTHERAPY IN PHYSIOTHERAPY,  
GALVANIZATION, ELECTROPHORESIS AND HIGH-FREQUENCY  
THERAPIES**

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**Annotation:** *Currently, in special research institutes, the mechanism of action of natural factors on the human body is studied, the possibilities of extensive use in combination with various methods of treatment, drugs and other means are investigated, and as a result, it is even more proven that it is useful, which relies on specific conclusions, but much cheaper methods of treatment are also found, which These are the benefits of physiotherapy equipment.*

**Keywords:** *galvanization, Vermel, Sherbak, Elekr sleep, Electroson, Darsanvalization, Inductothermy, UVCH, Magnetotherapy.*

**Introduction:**

Electric current, the flow of charged particles, plays a crucial role in various physiological processes within the human body. Electrotherapy harnesses the power of electric currents and fields to elicit therapeutic effects and promote healing. Different types of currents and fields, including direct current (DC), alternating current (AC), pulsed currents, and electromagnetic fields, interact with tissues at the cellular and molecular levels, influencing ion channels, cell membrane permeability, and various biochemical pathways. These interactions can modulate pain, reduce inflammation, stimulate muscle contraction, and promote tissue repair. Several electrotherapy modalities are employed in physiotherapy practice, each with its unique characteristics and therapeutic applications. Some of the commonly used methods include:

1. Galvanization: Utilizes direct current to deliver medication through the skin.
2. Electrophoresis: Employs direct current to introduce ions of medicinal substances into tissues.
3. Darsonvalization: Applies high-frequency alternating current to stimulate local blood circulation and tissue metabolism.

4. Ultra-High Frequency (UHF) Therapy: Utilizes electromagnetic fields within the UHF range to generate deep heating effects in tissues.
5. Electro Sleep Therapy: Induces sleep or relaxation using low-frequency pulsed currents.
6. Ultrasound Therapy: Employs high-frequency sound waves to produce thermal and non-thermal effects within tissues.

### **Methods and Literature Analysis:**

This research involved a comprehensive review of relevant literature on physiotherapy and electrotherapy. Textbooks, including Ahmedov and Sodikova's "Normal Anatomy and Physiology," Ganiev's "Fundamentals of Traumatology and Orthopedics," and Yuldashev's "Physiotherapy," provided foundational knowledge on the principles of physiotherapy, human anatomy, and common musculoskeletal conditions. Ilkhojayeva and Khudoyberganova's "Physiotherapy and Medical Rehabilitation" offered valuable insights into the specific applications of electrotherapy in rehabilitation settings. Furthermore, a thorough search of academic databases, including Google Scholar and PubMed, was conducted using keywords such as "physiotherapy," "electrotherapy," "galvanization," "electrophoresis," and "UHF therapy." Peer-reviewed articles and research studies were analyzed to gain a deeper understanding of the mechanisms of action, therapeutic benefits, and clinical efficacy of various electrotherapy modalities.

### **RESULTS AND DEBATE**

Galvanizing is a continuous direct current of low power and low voltage (up to 30-80V) positively charged ions are fed to the cathode and negatively charged ions to the anode oriented, they are called cations and anions. The effect of this process under the acceleration of blood flow, the permeability of the vascular wall increase, changes take place as the blood vessel expands, work under the influence of current in the field, active biological substances such as serotonin histamine are formed. Mechanism of action Galvanic currents or the impulses generated affect nerve receptors in the skin makes, that is, the central nerve in the form of impulses through the centripetal pathways by affecting its system, it produces a dominant focus where it excels in pain makes. From there, impulses pass through the spinal cord and the descending nerves with the help of pathological impulses reach the focus. Such an effect is that of the neuroreflector effect is called. In addition, the humoral effect is distinguished – various biological active substances by developing, it affects the hypothalamo-hypophysar system. The following electrodes are used in galvanizing: leaded, 0.1 thickness – 0.3 mm; platinum (used in baths for eyes and ears-di); charcoal, mainly. Applicable

to AGVK apparatus (4 chamber bath). 2 different laying of electrodes, depending on the large-small size of the pathological furnace process can, that is, longitudinal and transverse. The longitudinal method places sequentially and affects the surface of the tissue. It is mainly found in diseases of the spine, nerve in their injuries (exit and entrance areas), exposure to segmental zones applied. Transversely, the electrodes are placed in parallel, that is, between two electrodes, the infected organ settles and acts mainly on the thickness. It is used in diseases of the joint and internal organ.

### **Galvanization:**

Several classic methods of galvanization employ specific electrode placements to target different areas of the body:

1. Vermel Method (General Galvanization): One electrode is placed on the upper back (interscapular region), while two electrodes are placed on the anterior thighs.

2. Sherbak Collar Method: One electrode is positioned around the neck like a collar, while the second electrode is placed on the lumbar region.

3. Sherbak-by-Sherbak Method: Two mesh electrodes are placed on the upper back as in the Vermel method, and a third electrode is placed on the lumbar region.

4. Semi-Mask Method (Bergone Method): One electrode is applied to the affected side of the face, covering the distribution of the trigeminal nerve branches (forehead, cheek, and chin), while avoiding the eyes and mouth. The second electrode is placed on the upper chest or contralateral shoulder.

5. Facial and Neck Galvanization (Kellat Method): One electrode is placed on the area of the face or neck requiring treatment, while the second electrode is positioned on the opposite shoulder.

6. Eye Galvanization (Burginon Method): Two small eye electrodes are placed around the eye, and a larger electrode is positioned on the back of the neck on the opposite side.

7. Nasal Mucosa Galvanization (Casselberry Method): Two small electrodes are placed on either side of the nasal bridge, and a larger electrode is placed on the back of the neck.

The current intensity used in galvanization typically ranges from 5 mA to 50 mA, depending on the size of the area being treated, individual patient tolerance, and the desired therapeutic effect. Treatment sessions usually last for 10-20 minutes.

*Electrophoresis* It was proposed by the Italian scientist Rossi in 1801. Electrophoresis refers to the combined or concomitant effect on the body of a constant current and with it a small amount of the drug substance entering the body. Administration of drugs into the body using the electrophoresis method is considered preferable to other methods, namely:



1. Medicinal substances are injected into the surface of the skin without compromising its integrity.

2. Drug substances do not affect the mucous membranes of the gastrointestinal tract.

3. Medicinal substances form a "depot" under the skin, prolonging the strength of the action.

4. In pathological foci, a large accumulation of drug substances enhances the local effect.

5. Drug substances enter the body in ionic form or form, which increases its pharmacological activity.

6. Liquids of two different medicinal substances can be injected into the body at the same time from different poles.

7. It can be widely used in the release of medicinal substances from the body in case of poisoning with medicinal substances. In electrophoresis, there is a "law of Poles" or a "golden" law. The positively charged drug substance is sent to the body from under the positive electrode, the negatively charged drug substance is sent to the body from under the negative electrode. This is due to the fact that the same charged or identical charges escape from each other, based on the fact that drug substances escape from electrodes and enter the body through the skin. If the law of Poles is violated, that is, a drug substance with a positive charge is sent from under the negative electrode, and a drug substance with a negative charge is sent from under the positive electrode, then the drug substances remain on the pad itself and do not enter the body. In the electrophoresis method, a positive electrode, metal ions and positively charged drug substances are injected from the anode into the body's tissues. For example: Ca, magnesium, sodium, novocaine. Vitamin B 12, lidase quinine, dimedrol, etc. From the negative electrode, the cathode, acid radicals and negatively charged drug substances are injected into the body. For example: chlorine, bromine, iodine, penicillin, heparin, caffeine, hydrocortisone, nicotinic acid, etc. The list of negative and positively charged drug substances must be shown in separate tables and must be in the electrophoresis treatment room. At present, filter paper is used in order to save medicinal substances, that is, filter paper soaked in the drug substance is placed under the pad and treated.



*Impulse currents* Electric Sleep is a method of applying Low-Frequency Pulsed currents to induce general braking, directly affecting the central nervous system with the aim of making the patient sleep. In electric sleep, the body is affected by low frequency DC Pulse currents. To influence the body, one electrode (cathode) is placed in the closed eyes and the other (anode) in the area of the sucker-like tumor. Short weak impulses in the cranium, which are returned for a long time and constantly in the same and rhythmic state, increase the braking processes in the cranial cortex and cause a state similar to physiological sleep. Electric sleep trains the strength and mobility of braking processes and creates the restoration of disturbed interactions between the main processes, is considered a mechanism for establishing physiological sleep. Electrodes placed in the eye-area are used to carry out electrical sleep. In this, the vine enters through the natural hole of the skull. Adequate impulse frequencies for sleep are necessary to be selected as early as the beginning of the treatment and to keep it in subsequent treatments, which are only modified by the patient in poor reception. *Darsonvalization* Darsonvalization is a treatment with high voltage (up to 20 kV), small strength (0.015 – 0.02 mA) and high frequency (110 kGs) pulse currents. This is the first time that the vine species has been described by a French scientist, D.Arsonval proposed. D.Arsonval currents act on the skin with tiny sparks falling from the electrode, as well as ions and chemicals (ozone, azotoxide, etc. This causes the patient to experience a needle crunch, at the same time a sensation of heat appears. When conducting procedures, the "Iskra" apparatus is used. This uses glass vacuum electrodes of 7 different shapes, and basically two different methods are used, namely labile and stable. D.Arsonvl toxins have a deleterious effect by lowering the sensitivity of receptors on the skin and losing the spasm of the vessels and sphincters. They affect tissue trophic levels, enhancing substance metabolism in tissues. Indications: heart neurosis, varicose veins, hypertension, climacteric disorders, dry eczema, itchy skin, neuralgia, hair loss, trophic ulcers and injuries, ruptured anus, hemorrhoids, periodontosis,

chronic gingivitis, vasomotor rhinitis, neuritis of the auditory nerve, etc.z.  
Contraindications: inability to raise the vine, poor-quality swelling, tendency to  
bleeding, myocardial infarction, hysteria v h.z.



*Sleep (UVCh)-therapy* For treatment purposes, an ultra-high frequency variable electric field is used. The Ultra-high frequency electric field is applied in continuous and pulsed mode. In the pulsed mode, the strong impulse series of the electric field and the pause between them alternate. The effect of an Ultra-High Frequency Pulsed electric field on the body is manifested by the formation of strong "beats" on the MNS, which temporarily leads to parabiosis. Such a mechanism is aimed at eliminating the processes of dimming in MNS. The physiological effect of a hollow electric field depends on its dosage : weak doses increase the function of tissues and organs, while strong doses, on the contrary, weaken their functions. For example: when weak doses increase the production of bile (bile), strong doses weaken; weak doses accelerate nerve regeneration, strong ones weaken handful cells of vegetative centers in the spinal cord with the effect of an electric field, as well as cells of vegetative nodes in the spinal cord are sensitive. Under the influence of this area, the metabolism in the body is increased and activated, immunological processes are enhanced, it has an anti-inflammatory, analgesic, antispasmodic effect. Increases the number of calcium ions in the furnace of inflammation, slows the absorption of its toxic products from there, reduces the life activity of bacteria. For treatment, the partitive "UVCh-4", "UVCh-30", "UVCh-62", "Uvch - 66" and the stationary "screen-1", "screen-2", "Uvch-300", "Impulse-2", "impulse-3", " UVCh-54 using their apparatus, an electric field is transmitted through an air gap using capacitor plates.

*It is necessary to remember the following conditions when the recommendation of home therapy:*

1. The field density increases as capacitor plates approach, the field density decreases as the distance between them moves away, and the spread increases.
2. If iodine metal objects fall on the field, it focuses an electric field on itself, i.e., a field assembly is observed around the metal object.
3. In the arrangement of capacitor plates at an angle, the electric field will not be in the same norm, and the thermal effect will not be much if it stands very close to each other.



4.If the surface of the capacitor plates is not uniform, then the field density increases on the small surface, and here the biophysical processes and the reaction of the organism are more recent.

5.The uniformity of the field changes when the capacitor is excited from the plate position. With its use in all periods of sleep therapy diseases, it is considered preferable to other methods, Indications: in acute purulent diseases, inflammatory processes, atonias, spasms, neuritis, neuralgia, etc.z. recommended. Monetization: it is not recommended in the presence of a predisposition to bleeding, poor – quality tumor, grade II-III heart failure, aortic aneurysm, hypotonia, myocardial infarction. The treatment is carried out in specially prepared rooms. It is impossible to have metal objects in these rooms, the walls are covered with leaded rubber from the inside.

### **Conclusion:**

Physiotherapy offers a wide range of treatment modalities, and their combined application can often enhance therapeutic outcomes. By utilizing multiple modalities within a single treatment session, clinicians can address various aspects of a patient's condition simultaneously, leading to more comprehensive and efficient care. One example of such a combined approach is the simultaneous use of drug electrophoresis and inductothermy. Inductothermy, which utilizes high-frequency electromagnetic fields, promotes deep tissue heating and improves tissue permeability. This enhanced permeability allows for better penetration of medicinal substances delivered through electrophoresis, maximizing the therapeutic effect of both modalities. During this combined treatment, a pad soaked with the medicinal solution is placed on the targeted area, followed by a lead electrode and an inductothermy coil placed over the pad.

Another valuable combined approach is the inductorbalch method, which incorporates mud or peat wax therapy with inductothermy. In this method, mud or peat wax is applied to the treatment area, followed by the placement of an inductothermy coil. The heat generated by inductothermy enhances the therapeutic properties of the mud or peat wax, allowing for deeper penetration of its beneficial mineral and organic components.

These combined approaches offer several advantages:

- \* Increased treatment efficacy: By targeting multiple therapeutic mechanisms, combined modalities can lead to faster and more effective results.

- \* Reduced need for medication: The enhanced effectiveness of these combined methods may allow for a reduction in the use of oral or injected medications, minimizing potential side effects and drug interactions.

- \* Cost-effectiveness: Combining modalities within a single session can be more efficient and cost-effective for both the patient and the healthcare system.

The ability to effectively combine various physiotherapy modalities is crucial for optimizing patient care and achieving successful outcomes. Therefore, a thorough understanding of these techniques and their potential synergistic effects is essential for physiotherapists and other healthcare professionals.

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