

# History of Ophthalmology

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## Professor Larysa Iukhymivna Cherikchi: a founder of physiotherapy in ophthalmology of Ukraine

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*Larysa Iukhumivna Cherikchi took her career path into the field recommended by Academician V.P. Filatov, and conducted multi-year versatile experimental and clinical studies for the development of effective physiotherapeutic techniques for the treatment of various eye diseases. She proposed the technique called electroelimination (i.e., electrophoretic elimination of inflammation products from the eye) which (1) expanded opportunities for research on the pathochemistry of ocular inflammatory disease of various etiologies and pathochemistry of low-grade ocular inflammation, and (2) has been successfully used in the treatment of eye disorders. Larysa Iukhumivna brilliantly defended her candidate thesis and doctoral dissertation, which enabled her to achieve the rank of Professor. She was Head of the Ukraine Ministry of Health Research and Methodology Center for Physiotherapy in Ophthalmology. In total, these achievements allow us to state that Larysa Iukhumivna was the founder of academic research into and practical applications of physiotherapy in ophthalmology in Ukraine. The areas in physiotherapy in ophthalmology outlined and initially developed by Larysa Iukhumivna Cherikchi were further developed by her numerous pupils and colleagues at the Filatov Institute.*

Larysa Iukhumivna Cherikchi (Fig. 1), the daughter of a dentist and a housewife (Greeks by origin), was born in Odesa on December 14, 1923, and spent her school and student years in her hometown (during some of these years, Odesa was occupied by the German-Romanian forces). After graduating cum laude from the University of Odesa Medical School, she worked several years as a doctor at the sanatorium "Lebedivka", Odesa region.

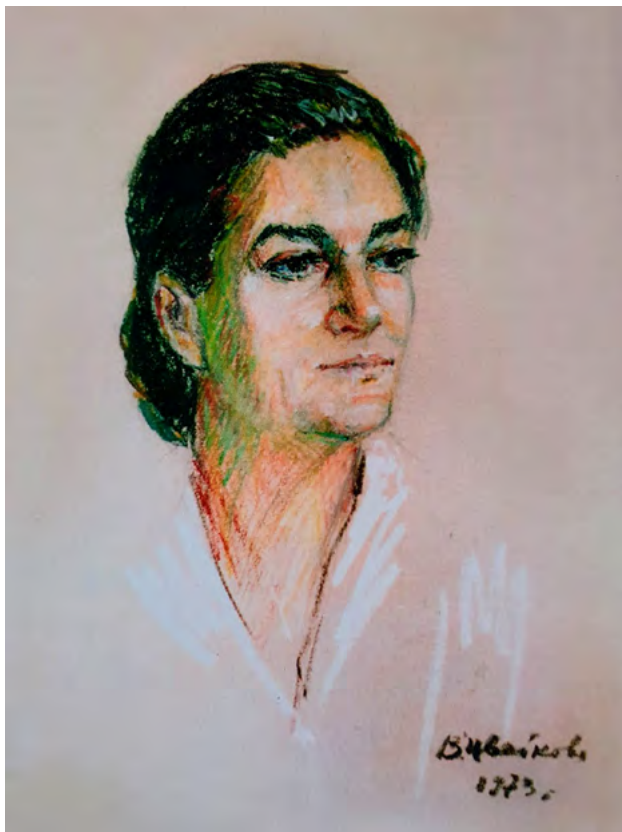
Professor M.S. Bielenkyi, who was a friend of her family and a renowned national expert in health resort science, helped her get an invitation for an interview with Academician V.P. Filatov. Being a young girl, Larysa (Fig. 2) was somewhat afraid of going for an interview with academician V.P. Filatov, because the common attitude toward Greeks was cautious due to the political environment. While preparing for the interview, she was reading a textbook in ophthalmology over and over again. The academician, however, appeared to be interested in art, painting and literature, and did not ask any question regarding medicine. He was very pleased to find that she was fond of verses of the poet he was fond of too. At the end of the interview, she was invited to work at the institute.

Academician V.P. Filatov believed that "the potential of physiotherapy is as valuable as a gold mine" and recommended Larysa Iukhumivna to take the path of physiotherapy in ophthalmology. In 1952, a physiotherapy department in the Institute of Eye Diseases and Tissue Therapy was established by an initiative of the academician, and L. Iu. Cherikchi was appointed head of



**Fig. 1.** Professor Larysa Iukhumivna Cherikchi (1923 - 2011)

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**Fig. 2.** Young Larysa Iukhymivna Cherkchi.  
Painting by V. Tsvitkova

the department. It was also the academician by whom she was assigned her Candidate's thesis topic "Eye disease treatment with aloe extract electrophoresis" [1].

Therefore, the novel method of tissue therapy in ophthalmology was initiated. The choice of the preparation was due to the fact aloe extract had been extensively studied and used clinically for efficacious therapy of various disorders. Experimental studies were started which included the extract separation into two fractions, anode (or acid) fraction and cathode (or alkali) fraction, differing from each other in composition and impact on biological objects. It was decided to use aloe electrophoresis from anode to cathode due to high saturation of anode fraction with organic acids and the nature of exposure. The possibility of the introduction of biologically active substances of aloe extract into the ocular tissue was demonstrated and the methodology was developed (with specifications for electric current polarity and values and procedure duration) in the experimental part of the work.

These studies laid the ground for the clinical application of aloe electrophoresis. In this way, the work for wide application of physiotherapy in the treatment of eye disease has begun. Totally, 60 patients with keratitis of different origin, persistent corneal opacification, myopic chorioretinitis, and optic atrophy underwent clinical observations. Marked therapeutic effect was observed in

82.5% of these patients. Aloe electrophoresis-induced activation of metabolism in the eye was expressed clinically as inflammation relief and stimulation of functions in tissues with poor blood supply. Dr Cherkchi successfully defended her candidate's thesis in 1958. By that time, V.P. Filatov had already passed away, but his prediction of the potential of physiotherapy in ophthalmology came true. Aloe extract electrophoresis is currently widely used for its pro-resolving, anti-inflammatory and metabolic stimulation properties. It has been found very effective in the treatment of corneal dystrophy; corneal opacification due to keratitis, burns and injuries to the eye; congenital and acquired, central and peripheral retinal degeneration; age-related macular degeneration, diabetic retinopathy, and ischemic optic neuropathy [2].

Dr Cherkchi continued developing new areas for the application of direct current effects on ocular tissues, and concluded that it is possible not only to introduce different substances in the eye by electrophoresis, but also to remove pathological substances from the eye by electrophoresis, and called this process electroelimination (i.e., electrophoretic elimination from the eye). Galvanic current is used in both these methods; in addition, both these methods are related to substance transfer across biological membranes, and actually reflect two opposite aspects of one process.

Therefore, the research on the doctoral dissertation "Electrophoresis and electroelimination in experimental and clinical ophthalmology" [3, 4] began. Dr Cherkchi investigated the possibility of using the newly developed techniques for the relief of inflammation in the uvea (uveitis of various etiologies and nature). Of note is an impressive sample size of 802 isolated cadaver rabbit eyes involved in the doctoral dissertation experimental research to lay the ground for the application of medication-mixture electrophoresis and electroelimination in post-burn keratouveitis and ocular siderosis [5, 6]. In addition, clinical studies on the application of medication-mixture electrophoresis and electroelimination involved 464 patients (544 eyes) with uveitis of different etiology. Serum isotopes and thiamine were used along with other methods while investigating the features of electrophoresis in ophthalmology. In an experimental study in rabbits, the topography of medication distribution in the eye in reservoir electrophoresis was established, with the highest medication levels found in the anterior chamber aqueous and different choroidal compartments. After entering the eye through the cornea, a medication passes through the iris, ciliary body and choroid. Lower medication levels were detected in the vitreous, retina and optic nerve. It was found that changes in ocular medication levels in electrophoresis depend on the baseline status of ocular tissues and media and whether the animal eye is in health or disease states. At that time, the effects of radioactive isotopes on the human body had not yet been fully studied, and Larysa Iukhymivna got radiation sickness, from which she suffered the rest of her life.

Medication mixtures were designed (combinations of antibacterial, desensitizing, anti-inflammatory, pro-resolving, and mydriatic agents) in an attempt to obtain greater therapeutic effect. Therefore, the basis was laid for the application of electrophoretic treatment with a mixture of several pharmacological medications in ophthalmology. Clinically, electrophoretic treatment with a mixture of several pharmacological medications was used in 464 patients (mostly with severe uveitis of different origin) and was found to be effective in 86.4% of patients.

Electroelimination (i.e., electrophoretic elimination) processes were investigated in animal studies on chemical and thermal injuries to the cornea. These studies demonstrated that toxic substances can be removed from the eye not only early, but also late after the burn event, thus exerting beneficial effects on the eye. The eliminated matter was found to contain such biologically active substances as histidine and histamine. Therefore, the therapeutic value of electrophoretic elimination in post-burn keratouveitis was determined, and the results of the experimental research allowed them to recommend the clinical application of the method.

Later on, Professor S.A. Iakymenko and T.M. Serebrina used this knowledge and proposed a new modification, so called "flow-through" electrophoretic elimination [7], with a significantly improved efficacy in emergency and diagnosis and treatment of eye burns early and late after the burn event.

In 1971, Dr. Cherikchi brilliantly defended her doctoral dissertation, which enabled her to obtain a doctoral degree in medical science, achieve the rank of Professor and continue heading the physiotherapy laboratory in the institute.

The works by Professor Cherikchi gave the impetus to further development of physiotherapy in ophthalmology over the country. The Ministry of Health issued a decree establishing a research and methodology center for physiotherapy in ophthalmology on the basis of the physiotherapy laboratory in the Institute. The monograph "Physiotherapy in ophthalmology" by L.Iu. Cherikchi [8] was published and became a guide for many ophthalmologists in Ukraine.

The complex development of applications of physiotherapy in the management of various eye diseases was started [9].

Thus, Larysa Iukhymivna proposed a method of treatment of concomitant strabismus by electric stimulation of ocular rectus muscles.

Professors Cherikchi and Kliuka and post-graduate student S.I. Iurov tested the method clinically, and S.I. Iurov defended the candidate's thesis on the subject [10]. The method has been successfully applied in pediatric ophthalmology. Moreover, the method was further developed by Dr Sc (Med) I.M. Boichuk and T.M. Serebrina who proposed differential electrical stimulation of oculomotor muscles with an impact on antagonist

muscles in amblyopia [11] with improved pulsed current modes [12].

Larysa Iukhymivna developed the electric therapy techniques for treating accommodation spasm in progressive myopia [13]. In cooperation with Dr Sc (Med) A.S. Seniakina and junior researcher T.V. Balezina, she used electrophoresis of spasmolytic mixture [13, 14] together with electrical stimulation of the ciliary muscle [9, 15] to improve visual acuity without correction, reduce asthenopia severity, and increase the amount of accommodation kept in reserve.

Larysa Iukhymivna and doctor S.Iu. Gizhitsa developed an electrical therapy technique for the resolution of a pediatric swollen cataract, which demonstrated marked therapeutic effects, with resolution of lens matter and improved visual acuity [16]. This was important at that time because the microsurgical technique and phacoemulsification for safe removal of a traumatic cataract had not yet been developed.

Electrophoretic elimination studies by L.I. Cherikchi expanded opportunities for research on the pathogenesis, pathochemistry and diagnosis of uveitis, including the pathochemistry of sympathetic ophthalmia of the fellow eye, which is very important for determining the risk of the development of sympathetic ophthalmia [17].

Studies on some aspects of the mechanism of electrophoretic elimination were conducted by T.M. Prianishnikova-Serebrina under the guidance of Dr Sc (Med) L.Iu. Cherikchi and Dr Sc (Med) M.F. Leus and became the basis for her thesis [18]. A total of 100 rabbits were used in these studies. The rabbit model of traumatic uveitis was employed, and isotopically labeled glycine was used to establish relationships of the levels of glycine electrophoretically eliminated from the affected and fellow eyes with the (1) levels of glycine accumulated in the anterior chamber aqueous, ciliary body and choroid, and (2) histomorphology of the choroidal tract at different stages of the disease. This made electrophoretic elimination indicators objective and indicated that impaired penetrability of biological membranes and the blood-ocular barrier in both eyes directly depends on the stage of inflammation in the affected eye and underpins increased levels of amine substances in the electrophoretically removed matter. A clinical study involving 177 patients (216 eyes) demonstrated that the change in biochemical characteristics of the electrophoretically removed matter may be used as the basis for the assessment of treatment efficacy, determining the required correction, and predicting late treatment outcomes [18].

In 1988, research in a new important field of therapeutic electrophoresis, electrophoretic elimination in the diabetic eye, was initiated by Professor Cherikchi together with S.E. Gizhitsa, T.M. Prianishnikova and others [19]. Preliminary results were obtained on trends in changes in the levels of sugar and nitrous substances in the eye with progressive diabetes. In addition, in the old-age group, a portion of individuals with a normal glucose curve exhibited an

increased glucose level in the electrophoretically removed matter, which could indicate the diagnostic value of the method for establishing latent diabetes.

In 1970 and 1980, two special issues of the “Ophthalmological journal” were published on physiotherapeutic techniques in eye disease diagnosis and treatment, with contributions from specialists from around the country and foreign authors who called doctor Cherikchi the founder of different types of physiotherapy in ophthalmology.

V.V. Savko, N.V. Konovalova, N.I. Naritsyna and T.M. Serebrina proposed a sequential application of transorbital electrophoresis and endonasal electrophoresis in an attempt to strengthen physiotherapeutic effects in the treatment of severe inflammation (panuveitis). This approach was found to enable increased saturation of the anterior and posterior segments with the medication and contribute to more substantial therapeutic effects [20]. A sequential application of the two physiotherapeutic techniques, microwave therapy and transorbital electrophoresis, improved the treatment effect for inflammation in the anterior and posterior segments [21].

Larysa Iukhymivna used to celebrate her birthday on December 14th together with her laboratory colleagues. We remember a large living room formed after the rearrangement of an ordinary three-room apartment in a five-storey residential building. There was a large dinner table at the side of the room, and a lovely picture, a Crimean landscape (by a well-known Ukrainian painter, Valentina Tsvetkova, the aunt of L.Iu. Cherikchi), on the wall, and the picture appeared to look like a window to a beautiful outside with the sea, mountains and flowers. Larysa Iukhymivna was a good hostess, and the table was full with dishes. There were heartwarming celebrations filled with reminiscences and jokes. But the life of L.Iu. Cherikchi hasn't always had blue skies, and in the nineteen nineties, after she had retired from the institute, it was hard to live only on the professor's pension. She, however, had never lost her spirit and used to say that she had some bread with caviar on for her breakfast, although, actually, she had some black bread with some boiled beetroot on. Her dacha at Chornomorka, a suburb of Odesa, was located almost at the bluff seashore, and she liked it very much. It was a simply arranged one-storey house of just one room with a verandah. There were some grapevine bushes and trees growing close to the house, and a table arranged under a tree, and she used to spend a lot of time reading at the table. But there was so much space, sea and silence.

Larysa Iukhymivna passed away on April 4, 2011, and was buried in Odesa.

She was a highly educated, multifaceted and talented person who devoted many years to the development of a new field in national medical science, physiotherapy ophthalmology (Fig. 3).



**Fig. 3.** Larysa Iukhymivna Cherikchi.  
Painting by V. Tsvitkova.

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#### Disclosures

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