

TO THE CHAIRMAN OF THE SCIENTIFIC JURY,  
APPOINTED BY ORDER № 15-03-48#2/23.02.2026  
OF THE EXECUTIVE DIRECTOR AND THE PROCURATOR OF  
“ACIBADEM CITY CLINIC UMHAT TOKUDA” JSC

### **Review**

by Prof. Dr. Iliya Petrov Lozev, D.M.Sc Head of the Clinic of General, Abdominal and Vascular Surgery at MI-MVR

**Regarding:** Dissertation for the award of the educational and scientific degree “Doctor” in the field of higher education 7. Healthcare and Sport, professional field 7.1. Medicine, doctoral program “Cardiovascular Surgery.”

*Author:* Dr. Nikolay Dimitrov Valchev Form of doctoral study: Independent preparation *Scientific unit:* Department of Vascular Surgery, “Acibadem City Clinic UMHAT Tokuda” JSC *Title:* “The Role of Mechanochemical Ablation in the Contemporary Treatment Algorithm for Patients with Chronic Venous Disease”

*Scientific supervisor:* Prof. Dr. Vasil Yordanov Chervenkov, M.D.

#### **I. General presentation of the procedure and the doctoral candidate**

The dissertation was discussed and proposed for defense by the extended Scientific Collegium of the Department of Vascular Surgery at “Acibadem City Clinic UMHAT Tokuda” JSC. By a meeting of the Scientific Council of “Acibadem City Clinic UMHAT Tokuda” JSC (Protocol 61/26.11.2025) and by Order № 15-03-48/23.02.2026 of the Executive Director and the Procurator of the hospital, I was appointed as an external member of the Scientific Jury in connection with Dr. Nikolay Dimitrov Valchev’s dissertation. I have been appointed to present this Review. Dr. Nikolay Dimitrov Valchev was enrolled as a doctoral candidate in independent preparation in the scientific specialty “Cardiovascular Surgery” by Order № 523 /11.10.2021 of the Executive Director and Procurator of “Acibadem City Clinic UMHAT Tokuda” JSC, and by Order № 15-05-165+4/04.12.2025 he was discharged with the right to public defense. During his training he strictly followed his individual plan and successfully passed the doctoral minimum exam in the specialty. The completed dissertation was presented and successfully defended before the extended scientific collegium of the Department of Vascular Surgery, after which a decision was made to discharge him with the right to defense. By Order № 15-05-165+4/04.12.2025 of the Executive Director and Procurator of “Acibadem City Clinic UMHAT Tokuda” JSC he was discharged with the right to public defense. No omissions were found in the documentation provided by Dr. Valchev; the requirements of LDAS, the Rules for Implementation of LDAS, and the Rules for Development of Academic Staff at “Acibadem City Clinic UMHAT Tokuda” JSC have been observed. No plagiarism was detected in the submitted materials. I declare that I have no conflict of interest with the author of the dissertation. Dr. Nikolay Valchev obtained the educational-qualification degree “Master” in Medicine from MU – Sofia in 2015. From 2016, after successfully passing a competitive exam, he was enrolled as a vascular surgery resident at Tokuda Hospital Sofia, and in 2021 he obtained his specialty and was appointed as a physician. Dr. Valchev has a strong interest in contemporary methods for diagnosis and surgical treatment of venous vascular diseases. He works actively in the field of endovascular and hybrid treatment of patients with arterial and venous vascular pathology. As part of the required documents for the competition, Dr. Valchev also provided certificates from postgraduate continuing education courses in Bulgaria and abroad. A clear professional focus on venous pathology is evident, particularly endovascular treatment of

varicose veins. Dr. Valchev is a member of the National Society of Vascular and Endovascular Surgery and Angiology.

## **II. Relevance of the topic**

The dissertation topic is very well chosen and highly relevant both medically and socially. Chronic venous disease (CVD) is one of the most widespread conditions worldwide, affecting between 20% and 30% of the population, leading to significant deterioration in quality of life and imposing substantial costs on health systems. In recent decades the paradigm in CVD treatment has undergone a revolutionary change — from classical open surgery (stripping) to endovenous thermal ablations (laser and radiofrequency), which have become established as the “gold standard.” Nevertheless, thermal methods have limitations — the need for tumescent anesthesia, risk of peripheral nerve injury, and postprocedural pain. This has focused modern phlebology on so-called non-thermal non-tumescent methods (NTNT), among which mechanochemical ablation (MOCA) occupies a leading place. Dr. Valchev’s dissertation focuses on optimizing this method. Its relevance is strengthened by the fact that the author does not merely apply an established technique but seeks to address MOCA’s main drawback — lower long-term anatomical success compared with thermal methods. The proposed “modified approach” is a timely response to clinical needs for a method that is both gentle, painless, and highly effective.

## **III. Understanding of the problem**

The doctoral candidate demonstrates in-depth knowledge of the problem based on a detailed and critical analysis of the available literature. The review covers 42 pages and is logically structured, beginning with a historical overview and proceeding through anatomy, physiology, and pathophysiology of the venous system. Special attention is given to contemporary diagnostic methods and the CEAP classification. Dr. Valchev performs a detailed comparative analysis of global and European experience in treating CVD, considering the advantages and disadvantages of various modalities — EVLA, RFA, MOCA, as well as surgical interventions. The in-depth analysis of clinical study data on MOCA (e.g., the MARADONA and LAMA studies) is notable; the author correctly identifies “grey zones” in knowledge — lack of sufficient long-term follow-up data and variations in procedural protocols. This demonstrates the candidate’s ability to synthesize information and formulate scientific hypotheses.

## **IV. Characterization and evaluation of the dissertation and contributions**

Dr. Valchev’s dissertation is 157 pages long and illustrated with 49 figures and 53 tables. It is properly structured and includes: Contents – 1 p., List of abbreviations and symbols – 1 p., Introduction – 2 pp., Chapter One. Social significance of chronic venous disease and the role of mechanochemical ablation in its treatment (Literature review): 34 pp., Chapter Two. Research methodology: 20 pp., Chapter Three. Results and discussion: 67 pp., Conclusion: 3 pp., Chapter Four. Findings and recommendations: 4 pp., Bibliography: 12 pp., Appendices: 5 pp. The bibliography includes 117 sources, of which 2 are in Cyrillic and 115 in Latin script.

The structure is balanced and complies with academic standards. The introduction formulates the problem well and substantiates the dissertation’s objective. Literature review: The review is well structured, competently written, and shows a good understanding of the addressed problem in its various aspects, including historical overview, anatomy, pathophysiology, diagnostic criteria, current treatment methods, and clinical studies on MOCA. The dissertation’s aim is formulated in accordance with the topic and the presented literature review. Dr. Valchev aims to analyze the results of applying the standard and modified approaches to mechanochemical ablation in treating

patients with chronic venous disease in order to create a diagnostic and therapeutic algorithm. To achieve this aim he set the following six tasks:

- 1.To clarify the concepts “modified approach” and “standard/classical approach” in performing mechanochemical ablation.
- 2.To develop and apply an optimal diagnostic and therapeutic algorithm for practical use with the ClariVein® catheter in both methods.
- 3.To follow and compare the results of two homogeneous patient groups with chronic venous disease treated with MOCA by one of the two variants — classical and modified — over a 3-year period, with mandatory ultrasound examinations before minimally invasive treatment, immediately after the procedure (within the first to seventh day), and at 3 months, 1 year, and 3 years.
- 4.To determine risk factors for recanalization after MOCA.
- 5.Using the standardized CIVIQ-20 questionnaire to study quality of life of treated patients depending on the type of treatment applied.
- 6.To create a profile of the patient best suited for MOCA, as well as of the patient for whom MOCA would not lead to optimal results.

In the Materials and Methods section, the collection and processing of materials and the study sequence are described very precisely and expertly by the candidate. The study is prospective and includes a representative sample of 220 patients (220 limbs) treated in 2019–2022. Patients were divided into two homogeneous groups of 110 each: Group 1 (Classical approach): Standard mechanochemical ablation with the ClariVein® catheter and liquid sclerosant. Group 2 (Modified approach): An innovative method introduced by the author, including use of sclerosant in foam form and active aspiration of the foam through a long dilator at the end of the procedure. The study design is solid, including follow-up at day 1, month 1, month 3, month 12 and at year 3. Reliable, validated assessment tools were used: Objective methods: Color-coded duplex Doppler for evaluation of anatomical success (obliteration/recanalization). Subjective methods: Quality of life questionnaire CIVIQ-20 and clinical severity scale VCSS. Pain assessment: Visual analog scale (VAS). The two techniques he used—the classical MOCA approach and his modified MOCA method—are described in detail so that they allow clear understanding of the endovascular maneuvers and reproducibility by other vascular surgeons. For statistical analysis the specialized STATISTICA package was used, contributing to comprehensive and reliable results addressing the candidate’s tasks. It is notable that for quantitative studies the candidate provided appropriate statistical evaluation including reliability analysis, measurement errors and sources of deviation. The chosen research methodology allows achievement of the stated aim and obtaining an adequate answer to the tasks addressed in the dissertation. In the Results and Discussion section, which occupies the main part of the work, the author presents an in-depth comparative analysis between the two groups. The results are impressive and have direct clinical significance: Demographic characteristics: The two groups are statistically comparable by sex, age and disease severity (predominantly C2–C3 by CEAP), making the comparison between methods valid. Success and recurrences: This is the dissertation’s most significant contribution. The author finds that anatomical success (absence of recanalization) at year 3 is statistically significantly higher with the modified approach: Group 1 (Standard): 75.45% Group 2 (Modified): 86.36% ( $p=0.0186$ ) This result brings MOCA’s effectiveness closer to that of thermal methods (typically >90%) while preserving a favorable safety profile. Clinical success (absence of complaints) is high in both groups (>91%) with no statistical difference. Risk factor analysis: Dr. Valchev performs a valuable analysis of

causes of recanalization. Risk factors for failure with the standard method were found to be: Vein diameter over 8 mm (especially over 12 mm). Male sex (35.2% recanalization among men in Group 1). Treatment of the small saphenous vein (SSV). It is important that the modified approach significantly reduces recanalization risk in these subgroups. Safety and complications: Results confirm that MOCA is an extremely gentle method. Pain: Intraprocedural pain levels are minimal. Notably, pain in the first two weeks is statistically lower in Group 2 (modified method), which the author attributes to aspiration of inflammatory mediators and sclerosant. Complications: Deep vein thrombosis (DVT) was observed in only 2 cases in Group 1 (1.8%) and none in Group 2. Hyperpigmentation was also significantly lower with the modified method (2.7% vs. 6.3%), a logical consequence of aspiration of thrombotic masses. Quality of life: Both groups show significant improvement in quality of life (CIVIQ-20) and reduction in disease severity (VCSS). At the end of year 3, however, patients in Group 2 (modified method) show statistically better results, correlating with higher anatomical success. Conclusion: This section summarizes the key findings from the study, emphasizing both MOCA's important role and the significant contribution of the presented modified therapeutic method. Findings and recommendations: Based on the achieved results, Dr. Valchev formulates nine systematic and directly applicable conclusions and four specific recommendations for clinical practice that appropriately address the research tasks and contribute to optimization of the therapeutic approach.

**V. Scientific and applied contributions:** The dissertation's contributions are fourfold and can be summarized as:

1. Original contribution: A modified MOCA method (with foam and aspiration) has been developed and introduced in practice, demonstrably improving long-term success and reducing complications.
2. Scientific-applied contribution: A profile of the "ideal patient" for MOCA has been developed and clear selection criteria defined (vein diameter <8 mm, absence of thrombophilia).
3. Confirmatory contribution: The thesis that MOCA is an effective alternative to thermal methods with better patient comfort (absence of paresthesia and no need for tumescent anesthesia) is confirmed.
4. A practical algorithm for using the ClariVein catheter has been created, which can serve as a guide for vascular surgeons.
5. Abstract The abstract is prepared according to requirements and reflects in concise form the main results and conclusions of the dissertation. Its volume and structure give a clear picture of the scientific activity performed, the methods used, the obtained results and their interpretation. The illustrative material is well selected and informative.

**VI. Assessment of publications and the doctoral candidate's personal contribution** The candidate presented a list of 4 publications in national specialized journals (one of which in WoS with IF), as well as 2 participations in international scientific forums through which the dissertation results were disseminated to the scientific community. The number and quality of publications meet the national minimum requirements for obtaining the educational and scientific degree "Doctor."

### **VII. Recommendations to the candidate**

As recommendations I can note:

- to replace the term "echography" used by the candidate with "ultrasound examination," "duplex Doppler," or "color-coded duplex sonography";

· I strongly recommend performing mini-phlebectomy instead of the sclerosant therapy of saphenous branches currently performed by him;

· To reduce recurrences after MOCA and thermal ablations, detailed preoperative duplex Doppler mapping of the venous system should be mandatory for the vascular surgeon before each procedure.

**VIII CONCLUSION** Dr. Nikolay Dimitrov Valchev's dissertation contains scientific-applied and practical results that represent an original contribution to science and practice. The work expands knowledge in minimally invasive treatment of venous diseases and offers a concrete solution to improve MOCA outcomes. The dissertation is written in a high scientific style, is based on a large clinical material personally collected by the candidate, and is statistically reliable. The dissertation and the "life cycle of the doctoral candidate" procedure comply with all requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDAS), the Rules for Implementation of LDAS, and the Rules of "Acibadem City Clinic UMHAT Tokuda." The submitted documents fully meet the specific requirements. Dr. Nikolay Valchev's professional path is connected with the Department of Vascular Surgery at "Acibadem City Clinic UMHAT Tokuda," where he has gained significant clinical experience. His participation in numerous national and international forums and membership in specialized scientific societies attest to his dedication to the specialty and pursuit of professional advancement. He is established as a vascular specialist with high qualification, innovative thinking and ability for independent scientific work. For the above reasons, I give my **positive evaluation** and confidently recommend that the members of the esteemed Scientific Jury vote "FOR" awarding the educational and scientific degree "Doctor" to Dr. Nikolay Dimitrov Valchev in the field of higher education 7. Healthcare and Sport, professional field 7.1. Medicine, doctoral program "Cardiovascular Surgery."

15.03.2026

City of Sofia

Prepared the review:

Prof. Dr. Iliya Petrov Lozev, D.M.Sc