From Prof. Dr. Dimitar Petrov Nikolov, PhD
Head of the Department of Cardiothoracic Surgery,
"Acibadem City Clinic UMHAT Tokuda" JSC

Regarding:

Dissertation title "The Role of Mechanochemical Ablation in the Contemporary Treatment Algorithm for Patients with Chronic Venous Disease" for the acquisition 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.

Dear Members of the Scientific Jury,

1. General presentation of the procedure and the doctoral candidate

By a decision of the Scientific Council of "Acibadem City Clinic UMHAT Tokuda" JSC (Protocol 61/26.11.2025) and by Order No. 15-03-48/23.02.2026 of the Executive Director and the Procurator of the hospital, I was appointed as an internal member of the Scientific Jury in connection with the dissertation of Dr. Nikolay Dimitrov Valchev. At the first non-attendance meeting I was elected Chairman and appointed to present this Opinion. No omissions were found in the documentation submitted by Dr. Valchev for the doctoral period and the public defense. The requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDAS), the Rules for the Implementation of the LDAS, and the Rules for the 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 the Medical University – Sofia in 2015. From 2016, after successfully passing a competitive exam, he was enrolled as a vascular surgery resident at Tokuda Hospital Sofia. After obtaining his specialty in 2021, he was appointed as a physician in the Department of Vascular Surgery at "Acibadem City Clinic UMHAT Tokuda" JSC. Since 11.10.2021 he has been enrolled as a doctoral candidate. 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 for patients with arterial and venous vascular pathology.

2. Relevance of the topic

Chronic venous disease (CVD) is a global health problem affecting a significant percentage of the population and leading to reduced quality of life. Evolution in CVD treatment is directed toward minimally invasive methods. Mechanochemical ablation (MOCA) is a relatively new, non-thermal and non-tumescent method that eliminates risks associated with thermal energy and tumescent anesthesia. The dissertation is highly relevant as it investigates the role of MOCA in the contemporary algorithm and proposes an innovative "modified approach" to optimize the method. The goal is to increase the efficacy and safety of MOCA, making it highly significant for vascular surgery.

3. Understanding of the problem

The doctoral candidate demonstrates excellent understanding of the problem. This is clearly shown by the review, which covers a historical overview, anatomy, pathophysiology, diagnostic methods (CEAP classification), and contemporary therapeutic strategies for CVD. Dr. Valchev critically analyzes existing data on MOCA, identifying the need to improve the long-term anatomical success of the method, which is the main motivation for his research.

4. **Characterization and evaluation of the dissertation and contributions**

Dr. Valchev's dissertation is 157 pages long and is illustrated with 49 figures and 53 tables. It is properly structured and contains all commonly accepted chapters. The bibliography includes 117 sources, of which 2 are in Cyrillic and 115 in Latin script. Introduction: The research problem is well defined and supported by convincing rationale, and the aim of the dissertation is formulated with high precision. Chapter One. Social significance of chronic venous disease and the role of mechanochemical ablation in its treatment (Literature review): The presented literature review has excellent structure and competence, revealing a deep understanding of the multifaceted issues. Chapter Two. Research methodology: The aim of the dissertation is formulated precisely and fully corresponds to the set topic and the preceding literature analysis. All six set tasks are fully adequate and successfully accomplished within the dissertation. This section offers a comprehensive description of the applied research materials and methods, including the clinical cohort (consisting of 220 patients), the applied survey, clinical and statistical methods, as well as details of the operative algorithms (classic and modified approach). The chosen research methodology permits achievement of the aim and provides adequate answers to the tasks addressed in the dissertation. Chapter Three. Results and discussion: The presented results are convincing and transparent, and the analysis of the collected data is comprehensive, including comparison with relevant scientific publications on the topic. The discussion covers key aspects such as individual patient characteristics, comparative analysis of main indicators (anatomical and clinical success, pain intensity, complication profile), and the established correlations between them and various risk factors (e.g., sex, vein diameter). The doctoral candidate demonstrates a high degree of competence and confidently handles the scientific material. Conclusion: In the concluding part of the dissertation the author summarizes the main results of the conducted study, emphasizing the significance of mechanochemical ablation in contemporary treatment of chronic venous disease and the scientific-applied value of the proposed modified therapeutic approach. Chapter Four. Findings and recommendations: Based on the obtained results Dr. Valchev formulates nine conclusions and four recommendations for clinical practice, which logically arise from the study and correspond to the set tasks. The main contributions of the dissertation are four: Original contribution: A modified method for mechanochemical ablation has been created and successfully integrated into clinical practice, demonstrating a significant increase in long-term anatomical success and a reduction in postoperative complications. Scientific-applied contribution: A detailed profile of the "ideal patient" for MOCA has been developed, with clear criteria for optimal selection (e.g., vein diameter <8 mm, absence of thrombophilias). Practical contribution: A detailed, practically oriented working algorithm for effective use of the ClariVein® catheter has been formulated. Appendices: The appendices section contains the full set of used survey instruments (CIVIQ-20, VCSS) and detailed protocols for follow-up examinations, ensuring maximum transparency and reproducibility of the applied methodology.

5. **The abstract** adequately reflects the content of the dissertation. It complies with academic standards and presents the dissertation's content comprehensively and accurately.

6. **Assessment of publications and the doctoral candidate's personal contribution:**
The doctoral candidate presented 4 scientific publications in national journals (one of which is in WoS/SCIE IF), as well as 2 participations in international scientific forums, through which the dissertation results have been made available to the scientific community. Dr. Valchev's personal contribution is indisputable – he personally performed all operative interventions, followed the patients, and analyzed a large volume of data, demonstrating the qualities of a thorough researcher.

7. **Critical remarks and recommendations:**
Although the dissertation is executed at an exceptionally high scientific and practical level, demonstrating in-depth knowledge and skills, I allow myself to make the following constructive remarks and recommendations, which in no way diminish the value of the work:

1. I consider it advisable in future research to examine in greater depth the economic aspect of the two methods (standard and modified MOCA) – for example, analysis of costs for subsequent interventions in case of recanalization or treatment of complications, which would give a fuller picture of their applicability.

2. I recommend active collaboration with other clinics and scientific centers to conduct multicenter randomized controlled trials. This would allow wider validation of the presented modified method and its faster adoption in international clinical practice.

CONCLUSION: The submitted documents and the dissertation "The Role of Mechanochemical Ablation in the Contemporary Treatment Algorithm for Patients with Chronic Venous Disease" fully meet all the requirements set out in the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDAS), the Rules for the Implementation of the LDAS, and the specific internal regulations of "Acibadem City Clinic UMHAT Tokuda" JSC. Dr. Nikolay Dimitrov Valchev's dissertation is a topical and exemplary structured scientific work. The design of the comparative study and the overall concept of the research correspond to the set aim and tasks. The materials and methods used were selected with great precision and executed flawlessly, and the statistical processing of the data is reliable. The drawn conclusions are logically justified and directly arise from the obtained results, providing indisputable scientific-applied value for clinical practice. In view of the above, I hereby express my categorical POSITIVE evaluation of the dissertation and vote "FOR", and I confidently propose to the Esteemed Scientific Jury to award the deserved educational and scientific degree "Doctor" to Dr. Nikolay Dimitrov Valchev in the doctoral program "Cardiovascular Surgery".

15.03.2026 Prepared the opinion:
City of Sofia
Prof. Dr. Dimitar Nikolov, PhD