To
The Chairman of the Academic Jury
appointed by Order No. P-109-273/20.06.2025
of the Rector of the Medical University of Varna

STATEMENT

from
Prof. Dr. Ivelin Takorov, MD, PhD
Head of the First Clinic for Abdominal Surgery
at the Military Medical Academy - Sofia

Regarding: Defense of the doctoral thesis for the acquisition of the educational and scientific degree "DOCTOR" in the scientific specialty "Surgery" on the topic: "Early postoperative complications in open heart surgery - modern approach and risk prediction", developed by Dr. Georgi Stefanov Bachvarov, independent doctoral student at the Department of General and Operative Surgery at Medical University - Varna (MU-Varna), with scientific supervisor prof. Krasimir Ivanov, MD, DSc.

Despite the increasing number of publications on the introduction of a robotic approach in some heart procedures, open heart surgery remains the "gold standard" in the treatment of cardiovascular diseases. The complexity and specificity of these operations naturally and inevitably define a risk of complications. The occurrence of complications can significantly affect patient recovery and overall long-term outcomes, thereby constituting a significant medical and social issue. Their frequency varies from 10% to 30% and depends on several factors. Several models have been developed to predict and stratify the risk of postoperative complications, however, a united, commonly accepted, clinical-practice-adjusted algorithm is missing. Therefore, searching for and implementing models with better and evolving predictive ability benefit the therapeutic process, making the topic of the doctoral thesis highly relevant.

The doctoral thesis is presented on 159 pages, distributed as follows: introduction (2 pgs), literature review (50 pgs), aim and tasks (1 pg), material and methods (12 pgs), results and discussion (52 pgs), conclusions (1 pg), contribution (1 pg), research limitations (1 pg), list of publications related to the thesis (1 pg), appendix (19 pgs), used literature (15 pgs, 320 publications). The doctoral thesis is written in a sophisticated manner and reflects the high level of the doctoral student's professional and general culture. The data is summed up and presented clearly with the help of 39 figures and 55 tables. From a typographical aspect, the work is produced to the highest standard.

A thesis summary of 80 pages in A5 format is also attached to the dissertation. Its content adheres to the regulatory requirements and correctly includes all of the dissertation's chapters, with the

exceptions of the literature review and bibliography. The tables are presented almost in full, but the figures are missing. This significantly detracts from the expressiveness of the summary.

The literature review introduced over 50 pages presents results and analyses from numerous studies by other authors. It logically begins with brief, yet well synthesized historical notes. This is followed by the justification and presentation of the principles of open-heart surgery. The early postoperative complications are then reviewed in detail. Cardiovascular complications (rhythm and conduction, impaired heart pump function, myocardial infarction and graft compromise), postoperative hemorrhage, neurological (stroke and cognitive disorders), and acute kidney deficiency are presented in detail. A section dedicated to risk stratification systems is covered next. Here, Dr. Bachvarov's solid preparation impressed me. He displays the essence of a comprehensive analysis of large data sets, professionally and purposefully examined. All current complication risk prediction models are included and substantiated. The literature review concludes with the formulation of six conclusions guiding the aim of the scientific work.

The aim of the doctoral thesis "To propose optimal models for defining the risk of early postoperative complications such as significant bleeding, delirium, acute kidney damage and death following open heart surgery" is clearly defined, as the six tasks for its implementation are accurate, measured, transparent, and correspond to the topic of the doctoral thesis.

The chapter "Materials and Method," presented over 12 pages, includes the study design, patient collection period, methodology for patient selection and distribution, methods of clinical and image diagnosis. The surgical techniques used are briefly described. The statistical analysis is precise and sufficient - the statistical-mathematical methods used for the analysis of the results obtained are clearly indicated.

The study is based on retrospective data from a large number of patients (n = 504) operated within a relatively short interval – 3 years. The majority underwent aortic coronary bypass, the second largest group underwent valve replacement, and in 18.5% a combined intervention – bypass with valve surgery was carried out at the Cardiac Surgery Clinic of St. Marina University Hospital - Varna. Demographic characteristics, risk factors, clinical, echographic and laboratory characteristics of the patients were thoroughly analyzed. The doctoral student has performed a substantial volume of clinical and surgical work. Arising complications were detailed and analyzed. The created multi-factor logistic predictive models are designed according to Bulgarian patient specifics. I consider this a significant achievement of Dr. Bachvarov.

Dr. Georgi Bachvarov offers an intelligent and competent interpretation of the results. The discussion is in-depth and critically analyzes the data of the doctoral student in comparison with the global literature. I highly value the predictive models created by the author to calculate the probabilities of complication occurrence, adapted to the Bulgarian population.

The seven made conclusions are moderate, meaningful, and fully cover the tasks indicated. I accept the contributions pointed out by the doctoral student, especially 3 and 4, as the work is indeed innovative for Bulgarian medical practice.

Dr. Bachvarov is a promising young head of the Cardiac Surgery Clinic at the St. Marina University Hospital - Varna and presents an original doctoral thesis in the field of his daily surgical practice. He is the author of two publications related to the thesis, one of which he is the lead author.

The bibliography is exhaustive and contemporary – it contains 320 sources in Latin, over 15 % of which were published after 2020. One noteworthy detail is the lack of Bulgarian sources.

The doctoral thesis provides a comprehensive overview of the current state of conventional heart surgery and associated complications. The merit of the dissertation lies in the large number of patients treated for heart ischemia or valve defects over a short period of time. This allows for a precise analysis and the creation of accurate predictive models for potential complications. Dr. Bachvarov has significant clinical experience, enough publications on the subject of the thesis, and participation in scientific forums. I consider that the doctoral thesis of Dr. Georgi Băchvarov completely fulfills and even exceeds the requirements for obtaining the educational and academic degree of doctor.

Summarizing all of the above, and additionally - the future potential, personal and professional qualities of Dr. Georgi Stefanov Bachvarov, I express my opinion "for" the defense of the doctoral thesis "Early postoperative complications in open heart surgery - modern approach and risk prediction," and I take the liberty of inviting the esteemed members of the academic jury to support it for the awarding of the educational and scientific degree "doctor".

September 10, 2025

Sofia

Sincerely,

Заличено на основание чл. 5, §1, б. „В" от Регламент (ЕС) 2016/679

(Prof. Dr. Ivelin Takorov, MD, PhD)