

## **OPINION**

about the dissertation and author's abstract entitled

### **Possibilities of transit-time flowmetry for intra-operative blood flow objectification and comparison in coronary surgery on a 'beating heart' and with extracorporeal circulation**

for the acquisition of the educational and scientific degree of 'Doctor' in the field of higher education No 7 'Public health and sports', professional direction No 7.1 'Medicine' and scientific speciality of 'Surgery'

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The dissertation thesis is written on 213 standard typescript pages and is structured correctly, containing all the sections inherent in such kind of scientific work. The list of used literature contains 226 titles, 10 of which are by Bulgarian authors. Most of the papers cited have been published in the last three years.

Coronary artery bypass grafting is the most commonly performed surgical intervention in cardiac surgery patients. Over time, it has proven itself in the treatment of ischemic heart disease, and the implementation of quality control procedures would lead to even better outcomes. Selective coronary angiography is the standard method for intraoperative assessment of blood flow through the performed coronary bypass, however, this requires specific operating theatre equipment and additional skilled personnel, which makes its use in routine surgery limited.

Transit-time flowmetry is an easily feasible method that does not need valuable operative time in quality control of the performed anastomosis. It is widely used in European countries. In our country, there are no published results of the application of transit-time flowmetry in the intraoperative evaluation of coronary artery bypass, which makes Vladimir Borisov Kornovski's thesis extremely relevant. In addition, the author compares the application of transit-time flowmetry between two operative methods for myocardial revascularization, that of the CAB on 'beating heart' and the standard CAB using extracorporeal circulation.

The literature survey is a good analysis of published papers on the topic and is an appropriate basis for substantiating the need for this study.

The aim is clearly stated: "to analyze the possibilities of intraoperative transit-time flowmetry for early objectification and evaluation of coronary blood flow through the performed bypass and the optimization of surgical behavior in ischemic heart disease patients". In order to achieve this, the PhD student has defined five tasks, the performance of which sheds light on the role of transit-time flowmetry in the timely diagnosis of coronary graft dysfunction in CAB on a 'beating heart' and conventional CAB, and the subsequent appropriate surgical behaviour in these cases.

The thesis is completely up to standard in methodical aspect. Three techniques for myocardial revascularization have been applied: conventional CAB and CAB on a 'beating heart' revascularization as well as mini-invasive direct coronary artery revascularization (MIDCAB). The methods section includes a number of original components, too, such as the definition of a protocol for bilateral preparation of internal thoracic arteries in patients undergoing multiple arterial bypass grafts, a protocol for limiting the sternotomy wound infections after bilateral preparation of internal thoracic arteries, as an algorithm for performing the intraoperative flowmetry in order to repeatedly measure blood flow data during the accomplishment of the coronary artery bypass has been approved.

The dissertation analyzes 143 patients who have undergone intraoperative transit-time flowmetry after CAB for a period of 4 years.

Operative parameters such as left ventricular ejection fraction (EF), operative time, time of extracorporeal circulation, etc. were examined. Laboratory parameters such as

the enzymatic release of CK-MB and cardiac troponin-I were analyzed. Clinical cases with the specific benefit of intraoperative transit-time flowmetry have been reported, with subsequent corrections made to the anastomoses and optimal blood flow values achieved through CAB performance.

In the discussion section, the results achieved were compared with those published by other authors on the topic.

Based on the study, six conclusions are drawn that correspond to the presented results. There are four contributions of scientifically applied nature and five contributions of confirmatory nature. Based on the content of this dissertation and the extensive professional practical experience, I accept that the contributions are a personal matter and merit of the PhD student and can actually contribute to the further development of research related to the intraoperative blood flow evaluation through the performed coronary bypass graft.

The abstract of the thesis meets the requirements for volume, structure and content and objectively and adequately reflects the main results and scientific contributions of the dissertation.

The PhD student has published four scientific articles on the topic of the dissertation. He is the sole author of one paper and the first author of the other three. Results of the dissertation have been presented at three scientific forums in Bulgaria and one meeting abroad.

## **Conclusion**

The dissertation submitted to me by Vladimir Borisov Kornovski, MD, entitled: "Possibilities of transit-time flowmetry for intra-operative blood flow objectification and comparison in coronary surgery on a 'beating heart' and with extracorporeal circulation" entirely meets the requirements of the Law for Academic Development in the Republic of Bulgaria. This is an up-to-date, well-planned and realized scientific work.

Because of the above, I fully believe in my positive assessment of the thesis.

I suggest the honoured members of the scientific jury to award the educational and scientific degree “Doctor” to Vladimir Borisov Kornovski, MD.

19.08.2019

Respectfully

Varna

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