

## STATEMENT

from

**Assoc. Prof. Dr. Blagovesta Yaneva, PhD, MSc**

**Department of Periodontology and oral mucosa diseases, FDM, MU -  
Plovdiv**

Appointed by order No. P-109-418/03.10.2023 as a member of a scientific jury in the procedure for acquiring the educational and scientific degree "doctor" in the doctoral program "Therapeutic Dentistry", professional direction 7.2. Dental Medicine

Author: KONSTANTIN STOYCHEV KOSTADINOV

Form of doctoral study: regular form of study

Department: Periodontology and Dental Implantology, FDM, MU "Prof. Dr. Paraskev Stoyanov" - Varna

Topic: *MULTIMODAL IMAGING DOCUMENTATION IN DENTAL MEDICINE*

Supervisor: PROF. DR. STEFAN VASILEV PEEV, PhD

### **1. General presentation of the procedure and the PhD student**

The review of the documents shows that the procedure for deducting the doctoral student and the procedure for announcing the defense have been followed, the documents have been prepared in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Application and the Rules for the Terms and Conditions for Acquisition of scientific degrees and occupation of academic positions at Medical University - Varna. The PhD student has attached the required three full-text publications.

### **2. Brief biographical data for the doctoral student**

Dr. KONSTANTIN STOYCHEV KOSTADINOV graduated in 2016 from the Faculty of Medicine at the Medical University - Varna, obtaining a Master's degree in Dental Medicine. Since the same year, he has been working as a dentist in private practice, and since 2018 he has been an assistant at the Department of Periodontology and Dental Implantology, discipline "Imaging Diagnostics" of the Faculty of Medicine at the University of Varna. In the period 2019-2023, Dr. Kostadinov specializes in Dental Imaging at the "Prof. Dr. Paraskev Stoyanov" Medical University, Varna, FDM. In 2020, he was enrolled as a full-time doctoral student at the Department of

Periodontology and Dental Implantology, FDM, MU-Varna. In connection with the dissertation work, the candidate has published 3 full-text articles, of which he is the first author.

### **3. Relevance of the topic and appropriateness of the set goals and tasks**

Undoubtedly, in the modern world, digitization is part of our daily life. With the field of dental medicine, digitization of stages of the work is increasingly applied, with which faster, more accurate and more adequate treatment procedures are achieved. Communication improves, both with dental technicians and patients. The possibility of scanning the prosthetic field, which is provided with modern dental intraoral scanners, ensures not only accurate printing of the patient's prosthetic field, but also allows planning of the treatment process without the need for repeated visits. At the same time, the cone beam tomograph provides an extremely accurate three-dimensional X-ray examination of patients, which does not have the disadvantages of two-dimensional radiographs. By generating 3D models based on CBCT examination, an opportunity is created for even better planning of treatment processes, regardless of whether they are surgical or prosthetic. Bearing in mind the above, I firmly believe that the topic is extremely relevant and the set goals and objectives are of great importance for the information that is generated as a result of the digital examinations of patients.

### **4. Knowing the problem**

The literature review for the dissertation is sufficiently voluminous, informative and up-to-date. It is divided into three parts, with the first part looking at conventional printing materials and techniques with their advantages and disadvantages. The second part of the literature review presents intraoral scanners as part of CAD-CAM technologies. Different scanners enabling intraoral scanning are described and analyzed in detail, and their advantages, both for the dental professional and for the patient, are clearly presented. The third part of the literature review is devoted to imaging of patients with a cone beam computer tomography. In addition to the specifics of this study, the possibility of generating 3D models by using the data from the CBCT study is also discussed in detail. Logically, Dr. Kostadinov ends the literature review with a summary, from which arises the need to carry out clinical studies investigating the application of 3D generated models from CBCT and intraoral scanners.

### **5. Research methodology**

The goal is clearly stated. Four clinical tasks have been formulated, which represent a sufficient volume of clinical research. The methodology was selected in relation to the way of conducting similar type of clinical research.

The studies included 38 patients who participated in all four tasks. In the first task, Dr. Kostadinov places composite markers on certain points in the lower jaw and compares measurements between them taken directly in the mouth with a digital caliper and measurements taken on 3D generated models after CBCT examination. In the second task, the accuracy of digital models obtained after intraoral scanning is investigated by comparing them with direct clinical measurement in the patients' mouths with a digital caliper. The third task compared the accuracy of direct examinations in the patient's mouth with those of plaster casts obtained after impression technique with A-silicone and

elasto-mer. The fourth task repeats the previous studies on selected 21 patients and compares the results between all types of studies that have been applied.

The research methods are described in detail. The statistical methods used to analyze the results ensure the reliability of the conclusions drawn.

## **6. Characterization and evaluation of the dissertation work**

The dissertation is written on 155 standard pages and illustrated with 98 figures, 6 graphs, 39 tables and 4 appendices. The literary reference includes 259 literary sources - 16 in Bulgarian and 243 in Latin.

The literature review for the dissertation is sufficiently voluminous, informative and up-to-date. It examines the possibilities of recreating the dentition of patients through impression materials, intraoral scanning and CBCT examination. The literature review clearly emphasizes the need for research to analyze the accuracy of digital technologies in dental examinations with the "gold standard" - conventional impression techniques.

After formulating the goal and tasks, the doctoral student presents the materials, methods, results and analysis for each of the tasks in sequence.

I believe that during the development of the dissertation, sufficiently significant results have been obtained that enrich the existing knowledge regarding the accuracy of digital prints and 3D models generated by computed tomography. The discussion of the results is well presented and reflects the logical relationship between them. A comparison was made between the data from own research in the dissertation and those from the literature. The formulated conclusions are reliable and largely reflect the contributions of the developed work.

## **7. Contributions and significance of the development for science and practice**

Specific contributions have been formulated for the four tasks, some of which I accept as original for the country and of a confirmatory nature for the world.

For the first time in the world and in Bulgaria, an in vivo study is being conducted, in which 3D reconstructions of the dentition of the lower jaw are generated after scanning with a cone beam computer tomograph. For the first time in Bulgaria, the results of this study are compared with results obtained from analog and digital impressions of the lower jaw.

The derived contributions are a basis for the conduct of future clinical experiments.

## **8. Evaluation of publications on the dissertation work**

Dr. Kostadinov presents 3 full-text publications in connection with his dissertation work. Two of the publications present a review of the literature, one presenting the accuracy of intraoral scanners and the factors that influence it, and the second - the possibility of generating a 3D model from CBCT and its application in dentistry.

The third article presents the PhD student and his supervisor's own clinical research comparing the accuracy and reliability of mandibular reconstructions that were generated from CBCT imaging and intraoral scanning. The articles have been accepted for publication and will be published in 2024.

## **9. Personal participation of the doctoral student**

Dr. Kostadinov personally participated in the conduct of the clinical studies, the formulation of the results and the contributions from them. It should be noted that although Dr. Kostadinov is a specialist in Dental Imaging, he is personally involved in the implementation of the impression techniques using conventional and digital methods. During the studies, the dissertation student learns clinical techniques and methods of working with highly specialized intraoral scanners. These data are proof of the intrinsic interdisciplinary nature of the development.

#### **10. Abstract**

The presented abstract reflects in a synthesized form the structure and content of the dissertation development.

#### **11. Critical remarks and recommendations**

The clinical studies conducted provide meaningful clinical data that would be useful to dental practitioners in the current trends of digitization of research. They recommend that the data be widely disseminated for the information of dental professionals and that Dr. Kostadinov continue his observations on the accuracy of digital impressions obtained by intraoral scanning and the 3D models generated by CBCT.

#### **12. Recommendations for future use of dissertation contributions and results**

I believe that the doctoral student lays the foundations for the assessment of multimodal imaging documentation in dentistry. I recommend conducting more studies, including different types of intraoral scanners, and reporting the results.

#### **CONCLUSION**

The dissertation contains scientific and applied results, which represent a contribution to science and meet all the requirements of the law on the development of the academic staff in the republic of bulgaria, the regulations for its implementation and the corresponding regulations of the MU - Varna. The presented materials and dissertation results fully correspond to the specific requirements of the MU - Varna.

The dissertation shows that the PhD student KONSTANTIN STOYCHEV KOSTADINOV possesses theoretical knowledge and professional skills, demonstrating the qualities of independent conduct of scientific research.

Due to the above I give my positive assessment of the conducted research, presented by the above-reviewed dissertation work, abstract, achieved results and contributions, and I propose to the honorable scientific jury to award the educational and scientific degree "doctor" to KONSTANTIN STOYCHEV KOSTADINOV in the doctoral program "therapeutic dentistry".

18. 12. 2023 г.  
Plovdiv

Reviewer: .....  
Assoc. Prof. Blagovesta Yaneva, PhD