STATEMENT

by

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regarding
dissertation defense procedure to acquire the
the educational and scientific degree "doctor"
on topic:
„Multimodal Imaging Documentation in Dental Medicine"

by

dr. Konstantin Stoychev Kostadinov

The presented review was prepared in accordance with the RSARB and the Regulations for the implementation of the RSARB

Relevance and importance of the problem

The presented dissertation develops a topic that in recent years has been extremely relevant and in line with the development of digital technologies in dentistry. The use of various methods in the diagnostic and treatment practice in dentistry from the rank of modern digital technologies is incredibly related to the question "How much more accurate and applicable are they compared to the known classical methods?". For the dental practitioner, the accuracy and reproducibility of the finished prosthetic solutions is important for clinical practice. On the other hand, training in the use of new technologies and revealing their weaknesses is a prerequisite for eliminating errors in clinical work.

The use of a multimodal assessment and documentation model in dentistry is particularly useful in clinical practice and from an ergonomic point of view saves a lot of time and inconvenience to the dental practitioner.

Characterization and evaluation of the dissertation work

The dissertation work of dr. Konstantin Stoychev Kostadinov is written on 156 pages, illustrated with 39 tables, 98 figures, 6 graphs and 4 appendices. It is structured as follows:

Introduction - 3 pages. Literature review - 33 pages. Aim, objectives and hypothesis - 1 page. Materials - 2 pages. Methods, results and analyzes - 78 pages. Discussion - 11 pages. Conclusion - 2 pages. Conclusions – 2 pages. References – 16 pages. Appendices – 4 pages. The bibliographic reference includes 259 literary sources. 16 of which are in Cyrillic and 243 are in Latin.

The *literature review* is written in detail and comprehensively. In the first part of the literature review, classic printing materials and their advantages and disadvantages are discussed. In the second part of the literature review, the dissertation student paid considerable attention to the modern development of digital intraoral scanners. He examined the main parameters that need to be taken into account when choosing an intraoral scanner, critically evaluating the advantages and disadvantages. In the third part of the literature review, an evaluation of the images generated by CBCT and the reconstructions of 3D models for the needs of diagnosis and treatment is made. Algorithms described in the literature for creating 3D images from CBCT have been examined in detail

Unsolved problems - due to the rapid development of technologies and the introduction of new digital methods, the question of their reliability and the advantages or disadvantages compared to analog methods arises in dentistry.

The *aim and objectives* - the aim of the dissertation is clearly stated - to study and compare the accuracy of dental reconstruction made on generated 3D models from CBCT and intraoral scanning and on plaster models from conventional impression materials, against the results of intraoral measurement with a digital caliper , with 4 tasks defined and 4 hypotheses postulated.

Material – the material used is described in detail and precisely, and inclusion and exclusion criteria are defined.

Methods – the methods for the individual tasks are described in detail:

1st task. The methods used for the task are clearly and in detail described - placement of composite markers, physical (clinical) measurements, scanning with a comic-ray computed tomograph; converting from .dicom to .stl files from the CBCT scans, taking measurements on the digital models from the CBCT.

The results of task 1 are summarized in a table.

The analysis of the results of task 1 was done professionally by applying appropriate statistical methods.

2nd task. The methods used are: placement of composite markers, physical (clinical) measurements, intraoral scanning, taking measurements on digital models from the intraoral

scan. The preparation of the intraoral scanner for operation and the calibration of the device are described in detail; detailed description of the scanning process. The measurement on the produced digital models is described in depth.

The results of task 2 are presented in a table.

The analysis of task 2 was carried out using appropriate statistical methods.

3rd task. The methods used are: placing composite markers, physical (clinical) measurements, taking a conventional impression (with A- and C-silicone), removing the composite markers, casting plaster models, measuring on plaster models. The method of making impressions with the different classes of impression materials is described in detail.

The results are detailed in a table.

The analysis of the results of task 3 is presented in detail through graphs and charts reflecting the results of statistical processing.

4th task. Detailed and professional use of digital metric tools to conduct measurements. Detailed presentation of results. Presentation in tabular form of a comparative analysis between the modalities used. The latest data are presented comprehensibly and clearly in tabular form.

Discussion. An in-depth discussion of the obtained results was made, and the cited literature was used freely and with ease.

Conclusion. A conclusion is presented that summarizes the obtained results and confirms the achievement of the goal of the dissertation work.

Final conclusions - 16 conclusions were drawn, which present the results of the research in detail.

Contributions. Contributions are divided into 2 categories:

- contributions of a confirmatory nature - 6 contributions, precisely defined, are presented;

- contributions of original character for the country:

1. For the first time in Bulgaria, an in vivo study is being conducted, in which 3-D reconstructions of the dentition of the lower jaw are generated after scanning with a cone-beam computed tomography scanner;

2. For the first time in Bulgaria, the accuracy of 3D reconstructions of mandibular dentition after a cone-beam computed tomography scan is compared with those from an intraoral scan, an impression with A-silicone and an impression with polyether.

The presented contributions correspond to the set goal of the dissertation work and reflect the implementation of individual tasks.

Publications and personal contributions of the PhD student. Dr. Konstantin Stoychev Kostadinov has presented 3 publications on the topic of the dissertation, all of which are in English. The dissertation student is the lead author on all three publications.

The abstract is properly constructed and contains the results of the assigned tasks, conclusions and contributions. Fully corresponds to the dissertation work.

Conclusion. Dr. Konstantin Stoychev Kostadinov presents a dissertation on a current, modern and prospective problem in the diagnosis and registration of the clinical status of patients. The scientific work is properly structured, the goal and tasks are clearly and accurately formulated. Methods are correctly selected and ensure the fulfillment of the set tasks. The dissertation contains original and confirmatory contributions that enrich clinical practice. The written work meets 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 Regulations of MU-Varna.

I confidently give my positive assessment of the conducted clinical research, the dissertation work written in connection with it, the abstract, the achieved results and contributions.

The dissertation work on the topic „Multimodal Imaging Documentation in Dental Medicine" of dr Konstantin Stoychev Kostadinov is fully completed and meets the criteria for awarding the educational and scientific degree "doctor". I confidently give my positive vote and recommendation to the respected members of the scientific jury for awarding the educational and scientific degree "Doctor" to dr Konstantin Stoychev Kostadinov.

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