

TO THE MEMBERS OF THE SCIENTIFIC JURY
appointed by Order No. **R 109-208/03.06.2026** of the
Rector of the **Medical University – Varna**, based
on **Minutes No. 1/09.06.2026** of the Faculty Council of the
Faculty of Dental Medicine, Medical University – Varna,
regarding the procedure for the award of the **Educational
and Scientific Degree "Doctor (PhD)"**.

STATMENT

by

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on the dissertation submitted for the award of the **Educational and**

Scientific Degree "Doctor (PhD)"

Doctoral Programme: Prosthetic Dental Medicine

Professional Field: 7.2. Dental Medicine

Field of Higher Education: 7. Health Care and Sports

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**Dissertation Title: "Rehabilitation of Completely Edentulous
Patients with Complete Dentures Fabricated Using a Digital Workflow –
Opportunities, Advantages and Limitations"**

Scientific Supervisor: Assoc. Prof. Desislava Atanasova

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GENERAL ANALYSIS OF THE DISSERTATION

The dissertation submitted by Dr. Yordanka Donkova Shekeroval has been developed within the doctoral programme in Prosthetic Dental Medicine at the Department of Dental Materials Science and Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University "Prof. Dr. Paraskev Stoyanov" – Varna. The research addresses a highly relevant and scientifically significant topic in contemporary prosthetic dentistry—the application of digital technologies in the rehabilitation of completely edentulous patients through the fabrication of complete dentures. The subject is fully aligned with current developments in digital dentistry and reflects the ongoing pursuit of optimizing both clinical and laboratory workflows in everyday prosthodontic practice.

The dissertation comprises **232 standard pages** and is illustrated with **70 tables**, **119 figures**, and **5 appendices**. The bibliography includes **337 references**, of which **13 are in Cyrillic** and **324 are** international publications in Latin script, demonstrating the author's comprehensive knowledge of both the classical foundations and the latest scientific advances in the field under investigation.

The structure of the dissertation fully complies with the established academic standards for doctoral theses. It includes an Introduction, Literature Review, Aim and Objectives, Materials and Methods, Results, Discussion, Conclusions, Scientific Contributions, Publications Related to the Dissertation, and References. The presentation is logical and coherent, with each chapter naturally building upon the previous one to form a comprehensive scientific framework that enables the reader to follow the progression from the

formulation of the research problem to the substantiation of the final conclusions.

Particularly noteworthy is the author's successful integration of fundamental knowledge regarding the anatomical and morphological characteristics of edentulous jaws with the contemporary capabilities of digital modelling, CAD/CAM technologies, and additive manufacturing. In this respect, the dissertation extends beyond the traditional comparison between conventional and digital approaches by proposing a comprehensive strategy for optimizing the entire treatment workflow—from diagnosis and morphometric analysis to denture fabrication and clinical evaluation.

Another important strength of the dissertation is its clear practical orientation. In addition to evaluating currently available digital workflows, the author has developed an original experimental design for an individual impression tray, analysed its structural characteristics, conducted its clinical validation, investigated the microbiological safety of the materials employed, and proposed an optimized algorithm for a partially digital clinical workflow. This comprehensive approach considerably enhances the practical value of the study and demonstrates the author's ability to integrate scientific knowledge, engineering principles, and clinical expertise within a single multidisciplinary research project.

Overall, the dissertation leaves the impression of a carefully designed and methodologically rigorous scientific investigation based on contemporary diagnostic techniques and appropriate statistical methods, with clearly defined objectives and clinically relevant outcomes. The selected topic is highly significant from both scientific and clinical perspectives and is fully consistent with the current directions of development in digital prosthetic dentistry.

RELEVANCE OF THE TOPIC AND EVALUATION OF THE LITERATURE REVIEW

The topic of the dissertation is undoubtedly relevant and addresses one of the most rapidly evolving fields in contemporary prosthetic dentistry—the integration of digital technologies into the diagnosis, treatment planning, and fabrication of complete dentures for completely edentulous patients. Despite the remarkable progress achieved in implant dentistry, conventional complete removable dentures continue to represent a widely used treatment modality for restoring masticatory function, aesthetics, and quality of life in a substantial proportion of patients. In this context, the search for more accurate, predictable, and efficient digital treatment protocols constitutes an important scientific and clinical challenge.

The literature review is comprehensive, well-structured, and systematically presented. The author demonstrates an excellent command of both the classical concepts in prosthetic dentistry and the most recent scientific advances related to the digitalization of prosthodontic treatment. The inclusion of **337 bibliographic references**, the vast majority of which are international publications, provides a solid scientific foundation for the subsequent experimental investigation.

The review presents, in a logical and coherent manner, the anatomical and morphological characteristics of edentulous jaws, the changes occurring in both hard and soft tissues following tooth loss, and the implications of these alterations for the retention, stability, and functional performance of complete dentures. Appropriate emphasis is placed on the considerable individual variability of alveolar ridge resorption and on the necessity of an individualized diagnostic approach, particularly in the planning of digitally designed prosthetic restorations.

Particularly commendable is the analysis of contemporary diagnostic imaging techniques. Rather than merely describing these methods, the author critically evaluates their capabilities and limitations, providing a well-founded justification for the selection of **cone-beam computed tomography (CBCT)** as the principal tool for morphometric analysis and digital treatment planning. This discussion is highly relevant and reflects current trends toward the integration of three-dimensional imaging into digital CAD/CAM workflows.

Considerable attention is devoted to impression materials and impression techniques. Both conventional approaches and contemporary digital methods are critically reviewed, with a balanced discussion of their respective advantages and limitations. The author appropriately concludes that, despite the rapid development of digital technologies, the functional impression remains a critical stage in the rehabilitation of completely edentulous patients. This conclusion logically supports the need for the development of hybrid digital protocols combining the strengths of both conventional and digital techniques.

The literature review concludes with a well-reasoned identification of the unresolved issues in this field, which naturally lead to the formulation of the dissertation's aim and objectives. Thus, the review successfully fulfils its primary purpose—not merely to summarize existing knowledge, but to provide a convincing scientific rationale for the research undertaken.

AIM, OBJECTIVES, MATERIALS AND METHODS

The overall aim of the dissertation is clearly defined, scientifically justified, and fully consistent with the identified research problem. By combining clinical, morphometric, experimental, and statistical approaches, the author seeks to evaluate the potential of digital technologies in the rehabilitation of completely edentulous patients and to propose an improved clinical protocol based on objective scientific evidence.

The **five principal research objectives** are logically formulated and comprehensively address the stated aim. They encompass the entire investigative process—from morphometric analysis and clinical evaluation of digitally fabricated complete dentures to the development of an original technical solution, its legal protection, assessment of its biological safety, and the establishment of an optimized digital clinical workflow. Such a systematic sequence provides the study with coherence and demonstrates careful planning of the research project.

The methodological approach is comprehensive and reflects contemporary scientific standards. The study employs diagnostic imaging, clinical, experimental, microbiological, and statistical methods, which complement one another and ensure a reliable evaluation of all research objectives. Particularly noteworthy is the application of **cone-beam computed tomography (CBCT)** for quantitative morphometric analysis, which enhances the objectivity of the obtained results and facilitates the establishment of standardized reference points for digital treatment planning.

Another important strength of the methodology is its interdisciplinary nature. Beyond the clinical evaluation of the fabricated dentures, the author applies engineering principles in the development of

the experimental "**Occlutray**" custom impression tray, investigates the microbiological properties of the 3D-printed materials employed, and evaluates the time efficiency of different clinical protocols. This multidisciplinary approach substantially broadens the scientific significance and practical relevance of the research.

The statistical analysis is appropriate and fully consistent with the nature of the collected data. The use of descriptive statistics, the **Student's t-test**, **Mann–Whitney U test**, **Kruskal–Wallis test**, **Chi-square (χ^2) analysis**, and **Spearman's rank correlation analysis** ensures a reliable interpretation of the findings and adequately supports the validity of the conclusions. The selected level of statistical significance ($p < 0.05$) conforms to internationally accepted standards for clinical scientific research.

EVALUATION OF THE RESULTS

The results are presented in a logical sequence corresponding to the stated research objectives and are analysed comprehensively. Each section contains a substantial amount of factual data supported by well-organized tables and figures, which facilitate the interpretation of the findings and enhance the overall clarity of the presentation. The conclusions drawn from each stage of the investigation are adequately substantiated by the experimental evidence provided.

Of particular scientific value is the **morphometric analysis of completely edentulous jaws**, which identifies consistent relationships enabling the development of an algorithm for the digital design of custom impression trays and complete dentures. The established correlations between the investigated morphometric parameters provide a valuable basis for the future development of parametric CAD design in complete denture prosthodontics.

The clinical evaluation of the digitally fabricated complete dentures reflects a balanced and objective interpretation of the findings. The author does not overstate the advantages of digital technologies but critically discusses both their strengths—including high patient satisfaction regarding aesthetics, comfort, and phonetics—and their current limitations, particularly with respect to the retention and stability of mandibular complete dentures. This objective assessment substantially enhances the scientific credibility of the dissertation.

Undoubtedly, the most original aspect of the dissertation is the development of the experimental "**Occlutray**" custom impression tray, whose design has been protected as an industrial design. The integration of functional impression making and maxillomandibular relationship registration into a single clinical appointment represents an innovative concept with considerable potential for clinical implementation and further development within contemporary digital prosthodontic workflows.

In my opinion, the presented results are convincing, scientifically well substantiated, and contribute significantly to expanding current knowledge regarding the optimization of digital rehabilitation protocols for completely edentulous patients. The evidence obtained provides a solid basis for accepting the conclusions as reliable and scientifically justified.

ASSESSMENT OF THE SCIENTIFIC CONTRIBUTIONS

One of the major strengths of the dissertation is the presence of clearly defined **scientific, scientific-applied, and practical contributions**, all of which logically arise from the conducted research and are convincingly supported by the obtained results. These contributions are not merely listed but are consistently demonstrated throughout the experimental work and reflected in the conclusions of the dissertation.

I particularly appreciate the development of the original "**Occlutray**" custom impression tray, which has been registered as an industrial design with the **Patent Office of the Republic of Bulgaria**. This achievement demonstrates not only the author's scientific competence but also a clear commitment to developing practical solutions with genuine potential for implementation in routine clinical practice. The industrial design registration further confirms the originality and innovative character of the proposed concept.

Another important contribution is the development of a **CBCT-based morphometric algorithm** that can be applied in the digital design of custom impression trays and complete dentures. The established relationships among the investigated morphometric parameters broaden the possibilities for parametric CAD modelling and provide a valuable foundation for future research in digital prosthetic dentistry.

The optimized **partially digital clinical workflow** proposed by the author also represents a significant practical contribution. By integrating diagnostic imaging, digital treatment planning, functional impression techniques, and CAD/CAM technologies into a unified protocol, the proposed algorithm has the potential to reduce clinical treatment time while preserving the functional accuracy of the final prosthetic outcome. This contribution is of immediate relevance to everyday clinical practice.

Another noteworthy aspect of the dissertation is the author's objective and balanced evaluation of digital technologies. Rather than presenting them as a universal solution, the dissertation critically discusses both their advantages and their current limitations. The obtained results convincingly demonstrate the necessity of adopting a **hybrid clinical approach** in the rehabilitation of completely edentulous patients, a conclusion that is fully consistent with current international scientific evidence and further strengthens the credibility of the study.

Overall, the scientific contributions may be regarded as **scientifically sound, practically significant, and highly relevant**, with clear potential for application in both clinical practice and future scientific research.

CRITICAL REMARKS

Notwithstanding the numerous strengths of the dissertation, several comments and recommendations may be offered. These observations do not diminish the scientific merit of the study but should rather be considered as constructive suggestions for future research.

First, the proposed clinical algorithm and the experimental custom impression tray demonstrate considerable potential for routine clinical application. Therefore, future **multicentre clinical studies** involving larger patient populations would be valuable for confirming the reproducibility and generalizability of the reported results under different clinical conditions.

Second, considering the rapid evolution of digital technologies in dentistry, it would be of particular interest to compare the proposed workflow with **fully digital treatment protocols** based on the latest generation of intraoral scanners, artificial intelligence, and automated parametric design systems. Such investigations would further clarify the future role of hybrid and fully digital workflows in complete denture prosthodontics.

These remarks should not be interpreted as criticism of the quality of the dissertation but rather as recommendations for the continued development and expansion of this promising line of research.

EVALUATION OF THE PUBLICATIONS AND THE DISSERTATION ABSTRACT

The submitted **dissertation abstract** accurately reflects the content of the dissertation. It provides a concise and well-structured presentation of the essential components of the research, including the relevance of the topic, literature review, research aim and objectives, materials and methods, principal findings, conclusions, and scientific contributions. The text is clear, coherent, and enables the reader to obtain a comprehensive understanding of the conducted research.

The scientific publications related to the dissertation demonstrate the systematic dissemination of the research findings and the doctoral candidate's active participation in scientific activities. They provide evidence of a consistent research effort and confirm that the requirements for the award of the **Educational and Scientific Degree "Doctor (PhD)"** have been fulfilled.

CONCLUSION

The dissertation submitted by **Dr. Yordanka Donkova Shekerova** represents an independent, comprehensive, and methodologically rigorous scientific investigation addressing a highly relevant issue in contemporary prosthetic dentistry. The selected research topic is scientifically significant, the study has been conducted using appropriate contemporary research methods, the obtained results have been critically and reliably analysed, and the conclusions and scientific contributions arise logically from the experimental work performed.

The author demonstrates excellent theoretical knowledge, the ability to design and conduct independent scientific research, critical analytical thinking in the interpretation of research findings, and the capacity to develop original solutions with clear practical relevance. I particularly appreciate the author's commitment to integrating modern digital technologies into clinical practice, as well as the development of innovative approaches for optimizing the prosthetic rehabilitation of completely edentulous patients.

Based on the above considerations, I conclude that the dissertation entitled **"Rehabilitation of Completely Edentulous Patients with Complete Dentures Fabricated Using a Digital Workflow – Opportunities, Advantages and Limitations"** fully complies with the requirements of the **Academic Staff Development Act of the Republic of Bulgaria**, the **Regulations for its Implementation**, and the **Regulations for the Academic Staff Development of the Medical University "Prof. Dr. Paraskev Stoyanov" – Varna** governing the award of the **Educational and Scientific Degree "Doctor (PhD)"**.

I express my unequivocally positive evaluation of the submitted dissertation and will vote *in favour* of awarding the Educational and Scientific Degree "Doctor (PhD)" to Dr. Yordanka Donkova Shekerova.

03.08.26

Prepared by:

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/ Assoc. Prof. Georgi Veselinov Iliev, DMD, PhD /