

ACADEMIC ASSESSMENT

by Assoc. Prof. Stoyan Pavlov Pavlov, MD, PhD, Department of Anatomy and Cell Biology,
Faculty of Medicine, Medical University "Prof. Dr. Paraskev Stoyanov" – Varna

regarding a dissertation thesis for the award of the educational and scientific degree 'Doctor'
(PhD)

Professional Field: 7.1. Medicine

Doctoral Program: "Anatomy, Histology, and Cytology"

Author: **Dr. Zlatizara Hristova Todorova**

Mode of Doctoral Studies: **Independent Research (Self-study)**

Department: "**Anatomy, Histology, and Embryology**"

Topic: "**Anthropological Characteristics of the Facial Skeleton and Apertura Piriformis in the Bulgarian Population from Southern Bulgaria – Measurements based on 3D Reconstructions of Computed Tomography Scans**"

Scientific Supervisor: **Assoc. Prof. Ferihan Ahmed-Popova, MD, PhD, Department of Anatomy, Histology, and Embryology, Medical University – Plovdiv**

Scientific Consultant: **Chief Asst. Prof. Irina Angelova-Dechevska, MD, PhD, Department of Diagnostic Imaging, Dental Allergology, and Physiotherapy, Medical University – Plovdiv**

1. General Presentation of the Procedure and the Doctoral Student

The submitted set of materials on electronic media is in compliance with Art. 70 (1) of Section I: Acquisition of the Educational and Scientific Degree 'DOCTOR' (PhD) and the Scientific Degree 'DOCTOR OF SCIENCES' (DSc) at the Medical University – Plovdiv; Regulations of MU-Plovdiv dated January 28, 2021, and includes the following documents:

- Application to the Rector of MU-Plovdiv for the initiation of the dissertation defense procedure;
- Curriculum Vitae (CV) in European format, signed by the doctoral student;
- Notarized copy of the higher education diploma;
- Orders for enrollment in the doctoral program, for interruption of studies (due to maternity leave), for continuation of studies, and for discharge with the right to defense;
- Order for conducting an examination from the individual study plan and the respective protocol for the passed exam or "doctoral minimum" in the specialty;
- Protocol from the Departmental Council regarding the preliminary discussion of the dissertation and the decisions made for the initiation of the procedure and the composition of the Scientific Jury;
- Dissertation thesis;
- Dissertation Abstract (Author's Summary);
- List of scientific publications on the topic of the dissertation;
- Copies of the scientific publications;
- List of participations in scientific forums (conferences);
- List of noticed citations;
- Declaration of originality and authenticity of the attached documents;
- Other documents related to the progress of the procedure.

The doctoral student has submitted 4 publications related to the topic of the dissertation, which are evaluated at a total of 31 points (in accordance with the criteria of the Development of Academic Staff in the Republic of Bulgaria Act – DASRBA).

Dr. Zlatizara Hristova Todorova obtained her Master's degree in Dental Medicine from the Medical University – Plovdiv in 2009. From August 2009 to February 2020, she practiced her specialty at "AGPIPDM – Vtora Poliklinika" Ltd., Haskovo. From February 2020 to December 2021, she worked at "Dr. Zlatizara Todorova – AIPPPPDM" Ltd., Haskovo, as a Doctor of Dental Medicine.

From September 2020 to September 2021, she was appointed as a Part-time Assistant Professor (Honorary Assistant) at the Department of Anatomy, Histology, and Embryology within the Faculty of Medicine at MU-Plovdiv. Since September 2021, Dr. Zlatizara Hristova Todorova has held the position of a Full-time Assistant Professor at the same department.

She possesses excellent written and spoken proficiency in English and French. She demonstrates strong communication and organizational skills, as well as the ability to work effectively in a team. She is a member of the Bulgarian Anatomical Society, the Bulgarian Anthropological Society, the Union of Scientists in Bulgaria, and the Bulgarian Dental Association.

The submitted documents comply with the requirements of the Development of Academic Staff in the Republic of Bulgaria Act (DASRBA) and the Regulations of the Medical University – Plovdiv for admission to a public defense for the acquisition of the educational and scientific degree 'Doctor' (PhD).

2. Relevance of the Topic

The presented dissertation thesis validates and expands the data regarding the metric and spatial characteristics of the facial skeleton and cranial bones within the Bulgarian population. While standardized craniometric instruments were primarily used for this purpose in the past, the advancement of modern technologies, data science, and anthropological science has enabled the implementation of direct anthropometric methods to study these relationships in living individuals using contemporary imaging techniques. This significantly expands the number of subjects studied and allows for the refinement of databases.

The utilization of 3D reconstruction methods and the creation of digital twins of the examined subjects allows for a detailed and accurate quantitative description of sex-related differences in the modern Bulgarian population and an assessment of its position compared to other populations. The data obtained are applicable across a wide range of scientific disciplines: anthropology, forensic medicine, archaeology, etc. They are particularly valuable in solving tasks related to individual identification and the determination of sex, ethnicity, and age of human remains—subjects of study in the aforementioned disciplines. The morphometric indicators of the facial skeleton, and especially the apertura piriformis, which is the central focus of the research in this dissertation, are key in sex determination.

Facial morphology and its natural variability are also applicable and beneficial in numerous medical and dental disciplines, such as neurosurgery, ENT (Otorhinolaryngology), maxillofacial surgery, ophthalmology, prosthetic dentistry, orthodontics, implantology, and others.

Based on the above, I consider the dissertation thesis presented by Dr. Zlatizara Todorova to be of significant relevance, and its results have multidisciplinary applications.

3. Knowledge of the Problem

The in-depth literature review demonstrates the doctoral student's extensive knowledge of the research topic. The specificities of the phylogenetic and ontogenetic development of the skull are examined in a detailed and methodical manner, alongside the influence of various factors on the pre-

natal and postnatal formation of the human cranium. Furthermore, the review covers the methods for investigating the spatial characteristics of the skull and the applicability of craniometric data across a wide range of scientific and practical disciplines. The multi-layered analysis of existing data and methodology, conducted from the perspective of the core scientific hypothesis, allows the author to logically and consistently derive the research objectives and synthesize them into the fulfillment of four scientific tasks.

The doctoral student possesses a profound understanding of the research problem and demonstrates a high level of proficiency in the terminology and methodology required to address the assigned tasks.

4. Research Methodology

The study presented in the dissertation was conducted using a 64-slice spiral computed tomography (CT) scanner. A total of 120 conventional CT scans of individuals of Bulgarian ethnic origin (55 males and 65 females), aged between 20 and 60 years, were examined. The analyzed linear measurements and indices are documented with detail and precision. The evaluation and quantitative analysis methods are in full alignment with the stated aims and objectives, ensuring the production of valid and reliable results.

The selected research methodology enables the achievement of the established goal and provides an adequate response to the tasks addressed within the dissertation thesis.

5. Characteristics and Evaluation of the Dissertation Thesis and Contributions

The thesis submitted for opinion by Dr. Zlatizara Hristova Todorova consists of 146 standard printed pages and maintains the structural volume conventional for a dissertation for the award of the educational and scientific degree 'Doctor' (PhD):

- Introduction: 1 page
- Literature Review: 25 pages
- Aim and Objectives: 1 page
- Material and Methods: 19 pages
- Results: 42 pages
- Summary and Discussion: 28 pages
- Conclusions: 1 page
- Contributions: 2 pages

The results are illustrated with 27 tables and 57 figures. The bibliography includes 269 literary sources (of which more than 35% have been published within the last 10 years).

The Discussion section compares the results of Dr. Todorova's work with existing literature data and emphasizes the relevance, significance, and scope of the conducted research. The presented results hold high scientific value, leading to the derivation of 6 conclusions. These conclusions are in full alignment with the assigned tasks and are formulated with precision and accuracy.

I fully endorse the 6 contributions presented: two of an original nature, two of a theoretical-methodological nature, and two of a scientific-applied nature, which confirm the scientific-theoretical and clinical-applied significance of the dissertation. I would personally highlight the derived discriminant function as an independent contribution; following potential subsequent practical verification, it could supplement existing tools for the quantitative assessment of sexual dimorphism in the skull.

The dissertation adequately presents and analyzes current results and derives significant scientific and scientific-practical contributions.

6. Assessment of Publications and the Doctoral Student's Personal Contribution

Dr. Zlatizara Hristova Todorova has presented **4 publications** on the topic, which, according to the RIDASRBA, earn her **31 points**. This fulfills the requirements of the Development of Academic Staff in the Republic of Bulgaria Act and the Regulations of the Medical University – Plovdiv.

The dissertation is written with high linguistic competence, adhering to formal language norms, and is clear and engaging to read. My sole recommendation regarding the applied statistical analysis is that when calculating the mean values of indices, the use of the **arithmetic mean** should be avoided. Since an index represents a ratio of two variables (linear dimensions), the arithmetic mean in this context tends to underestimate the variance of the numerator and overestimate that of the denominator. Mathematically, it is more accurate to calculate the **mean index** as the ratio of the sums of the individual measurements (index of sums). However, I must emphasize that the use of the arithmetic mean for indices remains a common scientific practice in similar studies; therefore, I do not believe this significantly impacts the overall value of the presented dissertation.

It is evident from the submitted work and the accompanying publications that the research is the doctoral student's own work, and the results obtained, as well as the formulated contributions, are the personal merit of Dr. Zlatizara Todorova.

7. Abstract (Author's Summary)


The Abstract meets all formal requirements and effectively summarizes the primary results described in the dissertation.

Conclusion

The dissertation thesis contains scientific, applied-scientific, and applied results that represent an original contribution to science and meet all the requirements of the **Development of Academic Staff in the Republic of Bulgaria Act (DASRBA)**, the **Regulations for its Implementation**, and the **Internal Regulations of the Medical University – Plovdiv**. The submitted materials and dissertation results fully comply with the specific requirements adopted in connection with the Regulations of MU-Plovdiv for the implementation of the DASRBA.

The dissertation thesis demonstrates that the doctoral candidate, **Dr. Zlatizara Hristova Todorova**, possesses profound theoretical knowledge and professional skills in the scientific specialty of "**Anatomy, Histology, and Cytology**," while showcasing the qualities and skills necessary for the independent conduct of scientific research.

In light of the above, I confidently provide my **positive assessment** of the research presented in the dissertation thesis and abstract reviewed above, as well as the achieved results and contributions. I propose to the honorable **Scientific Jury** to award the educational and scientific degree '**Doctor**' (PhD) to **Dr. Zlatizara Hristova Todorova** in the doctoral program "Anatomy, Histology, and Cytology," Professional Field 7.1. Medicine.



Заличено на основание
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Prepared by: Assoc. Prof. Dr Stoyan Pavlov Pavlov
Dept. „Anatomy and Cell Biology“
Medical University – Varna