

# STATEMENT

by Assoc. Prof. Armine Vardani Grigoryan, MD, PhD  
Department of Physiology and Pathophysiology  
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regarding a dissertation submitted for the award of the educational and scientific degree  
“Doctor (PhD)”  
professional field 7.1. Medicine  
Doctoral Program "Pathophysiology"

**PhD Candidate:** Gabriela Georgieva Panayotova, MD

**Mode of Doctoral Study:** Full-time

**Department:** Department of Physiology and Pathophysiology, Faculty of Medicine, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna

**Title of the PhD Thesis:** “Evaluation of the Potential Therapeutic Benefits of Biofeedback Training as a Method for Reducing Stress and Improving the Mental Health of International Medical Students”

**Scientific Supervisor:** Prof. Margarita Stefanova Velikova, MD, PhD

## I. DEFENSE PROCEDURE

By Order No. **P-109-283/30.07.2026** of the Rector of Medical University “Prof. Dr. Paraskev Stoyanov” – Varna, I was appointed as a member of the **Scientific Jury** in the procedure for awarding the **Educational and Scientific Degree “Doctor” (PhD)** to **Gabriela Georgieva Panayotova, MD**, in the professional field **7.1. Medicine**, Doctoral Program in **Pathophysiology**.

The procedure for initiating and conducting the defense has been organized in accordance with the requirements of the **Development of Academic Staff in the Republic of Bulgaria Act**, the Regulations for its implementation, and the internal regulations of Medical University – Varna. The submitted set of documents is complete and complies with the regulatory requirements for admission to a public defense. I hereby declare that I have **no joint scientific publications with the PhD candidate** and that there are no circumstances giving rise to a **conflict of interest** in relation to the present procedure.

### **Brief Biographical Information**

**Gabriela Georgieva Panayotova, MD**, graduated in Medicine from Medical University “Prof. Dr. Paraskev Stoyanov” – Varna in 2020. From 2020 to 2022, she completed a Master’s degree in Health Management and Medico-Social Care, followed by a Master’s degree in Artificial

Intelligence in Biomedicine from 2023 to 2025. In 2023–2024, she completed the Global Clinical Scholars Research Training Program at Harvard Medical School, further expanding her expertise in contemporary clinical research methodology.

Her professional career has been closely associated with the Department of Physiology and Pathophysiology at Medical University – Varna. After gaining her initial teaching experience as a part-time lecturer in 2020, she was appointed Assistant Professor in September 2021, combining her teaching responsibilities with continued scientific and professional development. In 2023, she enrolled as a PhD student in Pathophysiology, and in 2025 she obtained a specialty in Physiology.

Her professional training has been further enhanced through clinical and international internships in Bulgaria, Poland, Russia, and Spain, as well as through active participation in national and international scientific forums. Her research interests encompass physiology, pathophysiology, psychophysiology, mechanisms of stress, heart rate variability, biofeedback, and the application of artificial intelligence in biomedicine, reflecting the interdisciplinary focus of her academic and scientific development.

## **II. GENERAL CHARACTERISTICS OF THE DISSERTATION**

The dissertation was developed at the **Department of Physiology and Pathophysiology, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna**, and addresses a current interdisciplinary issue – the psychophysiological manifestations of stress in international medical students and the potential for their modulation through biofeedback training.

The scientific concept of the dissertation is based on a comprehensive investigation of psychological status and psychophysiological stress reactivity, as well as the changes occurring in response to biofeedback training. The combination of psychometric methods with objective physiological parameters and stress-related biomarkers enables precise characterization of the individual stress response and objective assessment of the effects of the applied intervention. Thus, the study integrates the pathophysiological interpretation of the stress response with the practical application of the biofeedback approach, determining its scientific and applied significance.

The dissertation comprises **185 pages**, illustrated with **40 figures and 30 tables**, and includes **7 appendices**. The bibliography contains **645 references**, reflecting the broad scope of the reviewed literature and an in-depth understanding of the research field.

The dissertation is logically structured and encompasses the principal components of a doctoral research study – literature review, aim and objectives, materials and methods, results, discussion, conclusions, and scientific contributions. The individual sections are well balanced and aligned with the overall research concept, while the presentation follows the logic of the stated scientific aim and meets the requirements for a dissertation submitted for the award of the **Educational and Scientific Degree “Doctor” (PhD)**.

## **III. RELEVANCE AND SCIENTIFIC SIGNIFICANCE OF THE TOPIC**

Stress among medical students represents a current psychophysiological challenge associated with an increased risk of anxiety, depressive symptoms, and disturbances in adaptive mechanisms. In international students, academic demands are compounded by linguistic, cultural, and social factors, making this population particularly vulnerable.

In this context, the dissertation is scientifically well-founded and focuses on a comprehensive investigation of the psychological and physiological manifestations of stress. The application of

biofeedback training, combined with the assessment of psychometric parameters, physiological reactivity, and stress-related biomarkers, enables an objective evaluation of its effects and contributes to the scientific and practical significance of the study.

#### IV. AIM, OBJECTIVES AND METHODOLOGY

The aim of the dissertation is clearly formulated and focuses on evaluating the therapeutic potential of biofeedback training for reducing stress and improving mental health among international medical students.

The objectives cover the main areas of the study:

- assessment of the levels of perceived stress, anxiety, and depressive symptoms using standardized psychometric tests;
- implementation of biofeedback training and evaluation of its effects on psychophysiological stress reactivity;
- analysis of heart rate variability and **salivary cortisol and IgA levels**;
- investigation of the relationships between psychological, physiological, and biochemical parameters.

The methodological approach is comprehensive and appropriate to the stated objectives. The study employs a **controlled longitudinal design** and includes **47 international medical students**, allocated to a training group and a control group. Standardized psychometric methods, heart rate variability assessment, and stress-related biomarkers were used, supported by appropriate statistical analysis.

#### V. RESULTS AND DISCUSSION

The results are presented systematically and in a logical sequence consistent with the stated aim and objectives. Psychometric assessment demonstrates a statistically significant reduction in perceived stress, anxiety, and depressive symptoms among participants in the biofeedback program, with the initially pronounced psychological distress reaching levels comparable to those of the control group by the end of the follow-up period.

Heart rate variability analysis reveals heterogeneous individual dynamics of the autonomic response, with MHRR and RMSSD showing a significant increase during the training sessions followed by subsequent stabilization. The laboratory parameters – salivary cortisol and secretory IgA – show no statistically significant changes, supporting the need for an integrated rather than isolated interpretation of individual physiological markers.

Of particular scientific value is the identification of relationships between psychometric measures, HRV parameters, and biochemical markers of the stress response. The findings indicate a higher predictive value of certain HRV parameters, whereas cortisol and secretory IgA do not demonstrate reliable independent predictive value for psycho-emotional improvement.

The discussion is analytical and well substantiated, with the findings critically compared with current scientific literature. The identified relationships support the need for an integrated psychometric, autonomic, and biochemical assessment when investigating stress reactivity and the effects of HRV-based biofeedback training.

## VI. SCIENTIFIC CONTRIBUTIONS

The dissertation contains original and confirmatory scientific contributions of methodological and applied significance. The most important of these can be highlighted as follows:

- ✓ The implementation of a controlled longitudinal study of HRV-based biofeedback training in international medical students, integrating psychological, autonomic, and biochemical indicators of the stress response.
- ✓ The development of a comprehensive model for psychophysiological monitoring of the individual response to biofeedback training, combining psychometric assessment, heart rate variability parameters, salivary cortisol, and secretory IgA.
- ✓ The development and implementation of a structured HRV-based biofeedback protocol, enabling multi-session monitoring of autonomic regulation and the individual dynamics of psychophysiological adaptation.
- ✓ The identification of differences in the predictive value of the physiological parameters studied, with certain HRV parameters demonstrating greater value in predicting changes in perceived stress and anxiety compared with salivary cortisol and secretory IgA.
- ✓ The substantiation of an integrated approach to the assessment of the stress response, in which psychometric, autonomic, and biochemical parameters are interpreted comprehensively rather than as isolated markers.

The findings have clear practical relevance and outline opportunities for the application of HRV-based biofeedback in both university and healthcare settings. Of particular importance is its potential use as a non-pharmacological approach to stress reduction and prevention of burnout syndrome among students, healthcare professionals, and university faculty.

The practical value of the dissertation is further enhanced by the proposed periodic screening of psycho-emotional status using standardized psychometric tools and HRV parameters, as well as by training university faculty and psychologists in the use of biofeedback systems. These recommendations provide a basis for the early identification of at-risk groups and the implementation of structured programs for stress prevention and management.

## VII. PUBLICATIONS AND SCIENTIFIC ACTIVITY

The publication activity related to the dissertation includes **three scientific articles published in peer-reviewed journals**, in all of which **Gabriela Panayotova, MD, is the first author**. The publications address academic stress among international students, factors associated with an increased risk of depression among international medical students, and contemporary aspects of the application of biofeedback training.

The publications are thematically related to the dissertation and reflect the PhD candidate's consistent scientific interest in the psychophysiology of stress, mental health, and the potential applications of biofeedback.

## CONCLUSION AND EVALUATION

The dissertation of **Gabriela Georgieva Panayotova, MD**, represents a complete and independent scientific study addressing a relevant research topic, based on a well-substantiated methodological approach and yielding results of both scientific and practical significance. The comprehensive investigation of the psychophysiological response to stress and the effects of HRV-based biofeedback training contributes to expanding current knowledge regarding the potential for self-regulation and the reduction of psycho-emotional distress among international medical students.

The presented dissertation and the related publication activity meet the requirements for the award of the **Educational and Scientific Degree “Doctor” (PhD)**.

**Based on my overall positive evaluation of the dissertation, I confidently recommend that the esteemed Scientific Jury award Gabriela Georgieva Panayotova, MD, the Educational and Scientific Degree “Doctor” (PhD) in Professional Field 7.1. “Medicine”, Doctoral Program in “Pathophysiology”.**

20.08.2026

Prepared by: ....

Заличено на основание чл. 5,  
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