

REVIEW

by Assoc. Prof. Dr. Iren Stoyanova Tzotcheva, MD, PhD

Department of Health Care

National Sports Academy "Vassil Levski" - Sofia

of a dissertation for the award of the educational and scientific degree 'doctor'
professional field **7.1. Medicine**

doctoral program "**Pathological Physiology**"

Author : Dr. Plamena Stoyanova Lungova

Form of doctoral studies: full-time

Department: "Pathological Physiology", Faculty of Medicine, Medical University - Plovdiv

Topic : "**Anthropometric determinants of resistance (Rrs) and reactance (Xrs), measured by the forced oscillation technique in children aged 2 - 13 years . "**

Scientific supervisor : Prof. Blagoi Marinov, MD, PhD

1. General presentation of the procedure and the doctoral student

The presented set of materials on paper / electronic media is in accordance with Art. 70 (1) of Section I. Acquisition of the educational and scientific degree "DOCTOR" and the scientific degree "DOCTOR OF SCIENCES" at MU-Plovdiv; Regulations of MU-Plovdiv dated 28.01.2021 and includes the following documents:

- Application to the Rector of MU-Plovdiv for disclosure of the procedure for defending a dissertation
- CV in European format with the signature of the doctoral student
- notarized copy of a higher education diploma
- orders for enrollment in doctoral studies, interruption of studies (due to maternity) and for continuation of studies; for dismissal with the right to defense
- order to conduct an exam from the individual plan and a corresponding protocol for a passed exam or a doctoral minimum in the specialty
- minutes of the department council for preliminary discussion of the doctoral thesis and the decisions made to open a procedure and to form a scientific jury
- dissertation
- abstract
- list of scientific publications on the topic of the dissertation
- copies of scientific publications
- list of participations in scientific forums
- list of noted citations
- declaration of originality and authenticity of the attached documents
- other documents related to the course of the procedure

In connection with the dissertation work, the doctoral student has submitted **7 publications** and **10 participations in scientific forums** .

Professional development

Dr. Plamena Stoyanova Lungova graduated medicine in 2020 at the Medical University of Plovdiv, after which she began full-time doctoral studies at the Department of Pathological Physiology at the same university. During her studies, Dr. Lungova followed the set individual curriculum, developing and participating in the necessary modules on time. In 2025, she successfully passed the Pathophysiology exam. During this period, Dr. Lungova was an active lecturer in Bulgarian and English at the Department of Pathological Physiology at the Medical University of Plovdiv and led exercises and seminars for students of medicine, dentistry, pharmacy and nursing, as well as participating in the development of teaching materials. Dr. Lungova's scientific developments are related to, but not limited to, the topic of her doctoral studies. She participates annually in scientific forums in the country and abroad. She is a member of a research team on a project on topic: "Assessment of the degree of pulmonary function impairment in patients after COVID-19 pneumonia". She continues to expand her knowledge through a number of postgraduate courses and trainings.

2. Relevance of the topic

The assessment of respiratory function in children not only with chronic but also with acute lung diseases, as well as in the increasing number of premature patients, is a significant challenge for pediatricians and pediatric pulmonologists. For decades, research methods have been sought that are applicable at a younger age and are not influenced by subjective factors. A number of studies have been proposed, but only a minimal number have reached application in clinical practice. For this to happen, they need to be well standardized, but also to be reference for the studied population. In this regard, the forced oscillation technique (FOT) is making its way as a non-invasive way to assess the small airways, with minimal participation from the patients. Unlike the "golden standard" in pulmonology - spirometry, FOT can be performed at a much younger age. However, the automatic transfer of reference values from other populations carries the risk of systematic bias and inaccuracies in the interpretation of the results, and hence incorrect clinical assessment.

Considering the above, it can be argued that this dissertation examines a current and practically significant problem, of importance for the development of pediatric pulmonology in the country.

3. Knowledge of the problem

The literature review presented by Dr. Lungova is 50 pages (1/3 of the dissertation) and thoroughly presents the specifics of respiratory function in childhood, the methods for its examination and the factors that influence pulmonary functional indicators. The forced oscillation technique (FOT), the possibility of its application in early childhood and its sensitivity as a method for early detection of changes in the peripheral airways are discussed in detail. The need for population-based reference equations for the correct interpretation of the results obtained is logically deduced. Systematically and logically interpreted data from 240 sources, and the Bulgarian scientific contribution in the field is also covered.

4. Research methodology

The research methodology chosen by the doctoral student is adequate and corresponds to the goal and objectives of the dissertation. The study initially included 296 healthy children of Caucasian origin, aged 2–13 years, 63 of whom subsequently dropped out of the analysis. The inclusion and exclusion criteria are clearly defined. The study protocol was approved by the Ethics Committee of

the Medical University of Plovdiv. Subgroups were formed for additional analyses. Modern equipment was used and the data were processed using adequate statistical methods.

5. Characteristic and evaluation of the dissertation work and contributions

The presented dissertation is 143 pages long and has a classic structure, including a literature review, aim and objectives, material and methods, results, discussion, conclusions, contributions and bibliography. Based on the detailed literature review and the conclusions made, Dr. Lungova defines **the goal** of her dissertation: To establish the anthropometric determinants and to develop reference ranges for resistance and reactance in Bulgarian children, studied by the forced oscillation method. To achieve this, **5 specific tasks have been formulated**.

The results obtained are sufficient in volume, are presented clearly in tabular and graphical form, sequentially in the order of the tasks set. Gender differences are clearly documented. Reference equations and cut-off values for the main parameters of FOT - resistance (Rrs) and reactance (Xrs) in school and preschool age have been derived. Valuable from a methodological and practical point of view is the comparison of the results of spirometry and FOT in a subgroup of 35 children, as well as the summary of the interrelationships between the parameters of the two methods. Deviations in FOT indicators in children with bronchial asthma and the capabilities of the method for functional assessment in this clinical group have been systematically analyzed. The limitations due to the small sample are emphasized. The assessment of the validity and reliability of FOT in children up to 8 years of age in the Bulgarian population (task 5) has also been performed comprehensively and methodologically correctly.

The discussion is comprehensive and shows excellent knowledge of the world scientific literature in the field of FOT in childhood. The interpretation of the own results in the context of the available data is logical and convincing. The need for validated reference values for the Bulgarian pediatric population is argued. The weaknesses of FOT as a diagnostic test for distinguishing between clinically stable asthma and healthy children are also substantiated.

Dr. Lungova very precisely and clearly formulates ten **conclusions** of her dissertation work, which correspond to the set goals.

Contributions formulated in Dr. Lungova's dissertation are of an applied and original nature. This is the first independent study of FOT for functional assessment of the respiratory system in clinically healthy and sick children in Bulgaria, and can be used as a basis for future development of the topic, validation of the method and expansion of its clinical application.

6. Assessment of the doctoral student's publications and personal contribution

In connection with the dissertation work, the doctoral student has produced **7 publications and 10 scientific communications**. They show a scientific presentation of the doctoral student's work at all stages of its development. In the majority of publications (5 out of 7) and all scientific communications, Dr. Lungova is the first author, which confirms her active personal participation.

The personal contribution of the doctoral student to the development of the dissertation is undoubted. She actively participated in all stages of the study – design, planning the sequence of work stages, selection of children and conducting the instrumental studies, statistical processing of the data, analysis of the results and their presentation to the broad Bulgarian and international scientific community.

Although it has some limitations, the dissertation work can be a good basis for future scientific developments of the doctoral student. Dynamic follow-up of the included patients, as well as the formation of a group of premature children, would be particularly valuable.

7. Autor's abstract

The presented abstract contains 59 pages. The introduction is short and clear, thanks to which there is an opportunity for a full presentation of the main results in tabular and graphical form. The discussion is clear and consistently interprets the obtained data. The presented abstract is a correct reflection of the dissertation work and meets the requirements.

CONCLUSION

The presented dissertation work of Dr. Plamena Stoyanova Lungova on the topic: "Anthropometric determinants of resistance (Rrs) and reactance (Xrs), measured by the forced oscillation method in the age group of 2-13 years" **contains scientific and applied scientific results** and expands and builds on our knowledge in the field of functional diagnostics of the respiratory system in childhood, which is its main contribution. The dissertation work fully meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the Regulations of the Medical University - Plovdiv. The materials presented and the results achieved in the dissertation are in full compliance with the specific regulatory and academic requirements adopted in connection with the implementation of the ADSRB at the Medical University - Plovdiv.

The dissertation reflects **the in-depth theoretical knowledge and professional skills** of Dr. Plamena Stoyanova Lungova in the scientific specialty "Pathological Physiology". Through her work, the doctoral student **convincing us** of her developed ability to independently derive scientific problems, plan and implement a method for solving them, as well as critical analysis and interpretation of the results. The doctoral student **demonstrates** skills in drawing conclusions with practical value and independently conducting scientific research.

Due to the above, I confidently give my *positive assessment* of the research conducted, presented in the dissertation and abstract, achieved results and contributions, and *I propose to the esteemed scientific jury to award the educational and scientific degree 'doctor' to Dr. Plamena Stoyanova Lungova* in the doctoral program in "Pathological Physiology".

15.03.2026

Prepared the opinion :
Assoc. Prof. Iren Stoyanova Tzotcheva, MD, PhD