

STATEMENT

by Prof. Dr. Anastas Zgurov Batalov, PhD.

Head of the Department of Propaedeutics of Internal Medicine at the Medical University of Plovdiv

Head of Rheumatology Clinic,

UMBAL "Kaspela" - Plovdiv,

of a dissertation for the award of the scientific degree 'Doctor of Science'

professional field 7.1. Medicine

Doctoral Program "Rheumatology"

Author: Dr. Elena Kirilova Kirilova, MD

Department: "Propaedeutics of Internal Medicine"

Topic: "Development of a specific national model for predicting osteoporotic fracture risk and assessment of bone mineral density of axial skeleton with radiofrequency echographic multi spectrometry (REMS)"

The presented set of materials on electronic and paper media is in accordance with the Procedure for Acquisition of the Scientific degree "Doctor of Sciences" in MU - Plovdiv; Rules of MU-Plovdiv from the requirements of ZRASRB and the Rules for its application with the minimum requirements are met, as well as the criteria of the Regulation of MU Plovdiv for acquisition of the Doctoral degree. The author has submitted a total of 19 scientific publications.

1. Brief biographical data about the doctoral student

Dr. Elena Kirilova was born on March 26, 1991 in the city of Plovdiv. She graduated from the MU of the Thrakia University, Stara Zagora in 2016.

During her studies in 2012 she was on a three-month summer internship in the ERASMUS program at the Institute of Imaging and Neuroradiology of the University Hospital of Otto von Guericke University in Magdeburg, Germany.

Dr. Kirilova has conducted one-year pre-graduation internship at the University Hospital at the Medical Faculty of the University "Carl Gustav Carus" in Dresden, Germany in 2016 and subsequently clinical specialization in the Department of Stem Cell Transplantation. At the same University she was enrolled as a doctoral student with successful defense of a dissertation in 2018 with the acquisition of ONS "Doctor" in professional field 7.1. Medicine, Internal Medicine with a grade of "Magna cum laude".

Since 2018 and currently he is an assistant professor of Internal Medicine at the University "Prof. Dr. Asen Zlatarov"-Burgas.

She has completed her training in the Rheumatology program for acquiring a clinical specialty at the University Hospital "Dr Georgi Stranski" and MU - Pleven and is about to take an exam.

Dr. Kirilova has a number of specialized trainings in rheumatology:

2017 basic postgraduate course at EULAR (European League Against Rheumatism) in Belgrade, Serbia;

2018 individual course radiofrequency echographic multi spectrometry (REMS) in Lecce, Italy. In December 2020, the University in Burgas, managed by Dr. Kirilova, was recognized as the World University Reference Center for REMS.

In the same year she has obtained the certificate for work with dual-energy X-ray absorptiometry (DEXA) at the Medical University of Pleven.

Since 2019 he has been leading a biomechanics class at the University "Prof. Dr. Asen Zlatarov"-Burgas with several joint publications with students.

In 2020 she graduated Master of Health Management from the Medical University, Sofia at the Faculty of Public Health and Health Management.

She speaks fluent German and English.

2. Relevance of the topic and expediency of the set goals and objectives

Osteoporosis is a systemic skeletal disease of social and economic importance due to its relationship to fracture risk. Osteoporotic fractures lead to disability, deterioration of quality of life and increased risk of mortality. Currently the most popular is the fracture risk assessment model "FRAX", developed over many years by Kanis and team, and published on the website of the University of Sheffield in 2008. It is available for 66 countries, covering more than 80% of the world's population at risk and is included in over 100 manuals worldwide. The lack of a "FRAX" model for Bulgaria motivates the author of the dissertation to process and present data on hip fractures from Stara Zagora region between 2015-2017, which together with Prof. Kanis and team are used to build the national "FRAX" model for prediction of osteoporotic fracture risk, published on the University of Sheffield website: <https://www.sheffield.ac.uk/FRAX/tool.aspx?country=73>. In addition to creating a specific national model for fracture risk, Dr. Elena Kirilova analyzes the results of osteodensitometry with an innovative method called "Radiofrequency echographic multi spectrometry (REMS)", which is the world's first developed ultrasound method for assessing bone mineral density of axial skeleton. The above shows that the topic of the dissertation is innovative and with a significant contribution to science.

3. Knowledge of the problem

Dr. Kirilova has made an impressive volume of literature review on world scientific publications on the subject as a justification for the goal. Extensive practical mastery of the applied methods and the possibilities for detailed handling in the undertaken scientific researches is demonstrated.

4. Research methodology

The author of the dissertation through the innovative methods-FRAX and REMS manages to achieve the set goal and get an adequate answer to the tasks solved in the dissertation. The specific national model for fracture risk has been created, which is an important tool in the health system of each country in the fight against osteoporosis.

5. Characteristics and evaluation of the dissertation

The dissertation is written on 225 pages and is illustrated with 8 tables, 27 figures and 15 appendices.

The introduction consists of 1 page, is specifically formulated and covers the issues discussed later.

The literature review contains 54 pages and shows the good awareness of the author, who comprehensively summarizes the available studies related to the problem of osteoporosis and fracture risk, as well as the available methods for assessing bone mineral density.

The goal is clearly stated. There are 11 tasks that correspond exactly to the goal.

The section "Clinical material and methods" covers 19 pages. The general characteristics of the women who performed REMS study are described in detail, as well as the methodology of the epidemiological study of femoral fractures among the Bulgarian population for creating a specific national model for predicting osteoporotic fracture risk.

The results are written on 41 pages and are illustrated in tables and graphs. They include an epidemiological fracture risk study (FRAX) for the Bulgarian population based on regional data from Stara Zagora district for incidence and prognosis of femoral fractures, as well as probability of fractures, and results of lumbar spine and femoral neck examinations performed with REMS.

The discussion is written on 23 pages and shows the ability of the author to critically compare the results with the studies published so far.

6. Contributions and significance of development for science and practice

The dissertation contains scientific-theoretical and scientific-applied results, which represent a significant contribution to science and rheumatology. They validate the conducted comprehensive practical-theoretical research in an original way.

I accept the formulated contributions with an original character and I think that they objectively reflect the real results. I consider the following contributions to be more significant:

- For the first time in Bulgaria an epidemiological study on femoral fracture risk was conducted;
- For the first time a specific national model for predicting the osteoporotic fracture risk, valid for the Bulgarian population, is being developed;
- For the first time, the lifelong osteoporosis fracture risk among the Bulgarian population is reported;

-For the first time results are presented through the innovative REMS methodology on a representative sample of women;

-For the first time it is assessed which factors influence the BMD_{US} of the axial skeleton, measured by REMS.

7. Evaluation of the publications on the dissertation

In connection with the dissertation Dr. Kirilova has published her own monograph. She has presented 19 publications on the topic, of which 15 articles in international and Bulgarian peer-reviewed scientific journals and 4 scientific papers from scientific forums abroad.

With 17 publications, Dr. Kirilova's first author, and 2 is the second author, which is evidence of its significant scientific contribution. This fully meets the requirements in the ZRASRB of the Medical University of Plovdiv, which are submitted for a dissertation for Doctoral degree "Doctor of Sciences".

8. Personal participation of the doctoral student

Dr. Kirilova personally carried out the research. The large number of REMS measurements shows the significant volume of practical and applied activity performed by her. She analyzed the complex statistical data according to the model of the world studies done by her and presented the obtained data as a completed dissertation.

9. Abstract

The abstract on content and quality is made according to the requirements of MU Plovdiv and corresponds to the content of the dissertation. It reflects in great detail and accurately the main results. It is written in a total volume of 64 pages with 8 tables and 22 figures. The list of publications is indicated.

10. Critical remarks and recommendations

The dissertation is shaped precisely and I have no significant remarks on the methodology, presentation of the results and their analysis.

CONCLUSION

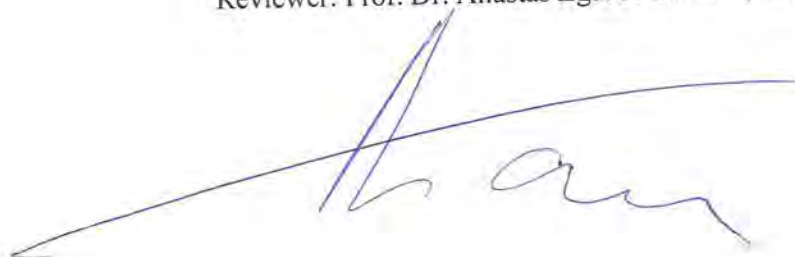
The dissertation contains *scientific, scientific-applied and applied results, which represent an original contribution to science* and **meet all the requirements** of the Law for development of the academic staff in the Republic of Bulgaria (ZRASRB), Regulations for application of ZRASRB and the relevant Regulations of MU - Plovdiv. The presented materials and dissertation results fully comply with the specific requirements of MU - Plovdiv.

The dissertation shows that Dr. Elena Kirilova Kirilova has in-depth theoretical knowledge and professional skills in the scientific specialty Rheumatology by demonstrating qualities and skills for independent research.

Due to the above and given the qualities of the work, I convincingly give my *positive assessment* of the dissertation, abstract, results and contributions, and *I offer the esteemed scientific jury to award the scientific degree of 'Doctor of Science'* to Dr. Elena Kirilova Kirilova, PhD in the doctoral program in Rheumatology.

18.05.2021

Reviewer: Prof. Dr. Anastas Zgurov Batalov, PhD

A handwritten signature in blue ink, appearing to read 'Zgurov', is written over a horizontal line.