

STATEMENT

By Prof. Dora Konstantinova Zlatareva, MD, PhD
Head of Department of Diagnostic Imaging, Medical Faculty,
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Member of Jury designated by a written order № P-109-268/ 05.08.2024
of the Rector of the Medical University Varna

On dissertation for awarding the educational and scientific degree of **Doctor**

Area 7. Health and Sport

Professional field 7.1. "Medicine"

Mode of PhD student: full-time

Doctoral Programme "Medical Radiology and Radiology (incl. use of radioactive isotopes)"

Author: Dimitrina Nikolova Markova, MD

Department: Diagnostic imaging, interventional radiology and radiotherapy MF, MU-Varna

Topic: CT assessment of abdominal fat tissue, bone density and sarcopenia

Scientific Supervisor: Associate Professor Dr. Chavdar Bachvarov, MD, Medical University – Varna

1. General presentation of the procedure and the PhD student

The set of materials submitted by the candidate on electronic media is in accordance with in accordance with the requirements of the Law of the Development of Academic Staff in the Republic of Bulgaria, Regulations for its implementation and the requirements of the Procedure for Acquisition of the PhD degree at MU - Varna; Regulations of MU - Varna and includes the necessary documents.

The PhD student has submitted 3 scientific articles 3 publications in refereed journals and 2 participations in scientific forums.

Biographical information and career development

Dr. Dimitrina Markova was born on 11.07.1981. In 2000 she graduated from the Technical School of Veterinary Medicine in Sofia. She graduated from Medical College - Pleven in 2003 with a degree in Rehabilitation Medicine. In 2011 he graduated from the College of Rehabilitation Medicine. In 2011 Dr. Markova graduated with honors in medicine from Medical University - Pleven. From November 2011 to May 2015 she worked as a resident doctor in the Imaging Diagnostics Department and in the Emergency Department at the Hospital "Dr. Bratan Shukerov"-AD in Sofia. She was a doctor at the University of Smolyan. From 27.05.2015 to 17.09.2018 he was a doctor at the Clinic of Imaging Diagnostics at the University Hospital "St. She was also a member of the Board of Directors of "Marina" EAD, Sofia. She has been working at the University of Marina in Varna since 17.08.2014. Since 17.09.2018 - until now he is a physician assistant at the Clinic of Imaging Diagnostics of the University Hospital "St. Marina", Sofia. Marina - EAD, Varna. Varna. In 2018 she acquired a specialty in "Diagnostic Imaging".

The PhD student's academic career started on 17.09.2018, when she was appointed as an assistant professor at the Department of Imaging Diagnostics, Interventional Radiology and Radiotherapy. From 02.11.2020 she is enrolled as a full-time PhD student at the Department. She has research interests in breast imaging, abdominal imaging, female pelvic floor imaging and pediatric imaging. The PhD student has participated in various training courses, both in the country and abroad, during which she has become familiar with the world achievements in the researched field. Dr. Markova actively participates in national and international courses, congresses and conferences presenting the results of her research. She also participates in national research projects.

Dr. Markova is fluent in English and Russian.

2. Current relevance

The relevance of the topic is driven by the increasing incidence of obesity, and in particular the accumulation of visceral adipose tissue, and its established role as a risk factor for many types of disease. Sarcopenia, characterised by loss of skeletal muscle mass and function, is a syndrome closely associated with physical disability, poor quality of life and increased risk of mortality. Sarcopenia is often accompanied by an increase in body fat, so that it is possible to have marked frailty despite normal weight - sarcopenic obesity. There are several ways of quantifying abdominal

adipose tissue: by measuring BMI, by anthropometry or by using imaging techniques such as CT and MRI. The use of BMI is not appropriate as it has not been shown to correlate with an increase in visceral fat. On the other hand, various anthropometric measurements are not reliable and often misinterpret visceral fat as subcutaneous fat. Of the available methods, only imaging techniques such as CT or MRI allow the assessment of both compartments: subcutaneous and visceral fat. In developing her thesis, Dr Markova focused on the assessment of abdominal adipose tissue using diagnostic imaging and its relationship to bone density in patients with sarcopenia.

3. Knowledge of the problem

The doctoral candidate is very familiar with the state of the problem and the changes in knowledge in recent years. The **literature review** is written in an excellent scientific style. The existing problems in the assessment of abdominal adipose tissue by imaging techniques, the need to increase knowledge in this area and the scientific potential of future research on the topic of the dissertation are presented.

4. Methodology of the study

Part of the study population was studied retrospectively and the rest prospectively. 96 patients were examined with low-dose abdominal CT who underwent imaging at the University Hospital "St. Marina". The patients were divided into four groups: patients with colorectal cancer - 22 patients; patients with lung cancer - 18 patients; patients with chronic pancreatitis - 20 patients and control group - 36 patients (healthy volunteers).

The first three groups of patients were selected retrospectively and examined on Siemens Spirit, Somatom Definition and Somatom Force CT scanners, and the final control group was examined prospectively on a Siemens Somatom Force CT scanner. The statistical software package IBM SPSS for Windows, v.20.0 was used for data processing. The methods used are described in detail as a condition for future replication of the study and comparison with the results of other teams. The statistical methods and processing software have been carefully chosen to guarantee the reliability of the results obtained. The research methodology chosen by Dr Markova is modern and allows to achieve the set goal and obtain an adequate answer to the tasks of the dissertation.

5. Characteristics and evaluation of theses and contributions

The thesis consists of 203 pages, 82 figures and 4 tables. The dissertation meets the requirements of MU-Varna in terms of structure and content. The bibliography, which is up-to-date and comprehensive, contains 511 references.

The work is structured in the following sections: Introduction, Literature Review, Aim and Objectives, Hypothesis, Material and Methods, Results, Discussion, Conclusion, Conclusions, Contributions, Bibliography. The technical layout of the dissertation meets the requirements.

As a result of the review, a clear objective was logically derived - to evaluate abdominal adipose tissue, bone, density and sarcopenia indices using low-dose abdominal CT and to analyse the relationship between them in patients with colorectal cancer, lung cancer and patients with chronic pancreatitis.

Dr Markova set 6 objectives that were relevant to her aim and scientifically sound. They were met in stages during the study.

The results of the study are presented in 6 sections. The PhD student found differences in the volume of visceral adipose tissue BMT in controls compared to different groups of patients - with lung cancer, chronic appendicitis and colorectal cancer. An interesting finding was that there was an inverse relationship between the volume and density of BMT and subcutaneous adipose tissue. There was a significant difference in the mean values of the HUAC index to assess sarcopenia in the four groups of patients studied.

In the Discussion section, Dr Markova compares her data with the known literature, demonstrating a thorough knowledge of the problem and critical analysis. The differences are outlined and scientifically sound hypotheses for their existence are proposed. The 6 conclusions are based on the literature review, analysis of own results and discussion. They are precisely formulated and reflect the tasks set and the results obtained. In the conclusion, Dr Markova also points out the limitations of the research carried out and emphasises the links between sarcopenia and many socially significant diseases.

The original contributions presented by the doctoral student are two, five of a practical-applied nature and one of a theoretical nature.

I fully accept the contributions mentioned by the PhD student.

6. Assessment of publications and personal contribution of the doctoral candidate

On the topic of the dissertation, Dr Markova has submitted 3 scientific articles in peer-reviewed journals, participated in one scientific project and 2 participations in scientific forums. The doctoral candidate is the first author of two of the articles. Dr Markova's scientific activity meets the minimum scientific requirements for a doctoral degree according to the requirements of the current Law of the Development of Academic Staff in the Republic of Bulgaria and the regulations of MU-Varna.

The personal involvement of Dr Markova is evident from the text of the thesis, the abstract and the publications presented.

I have no critical comments or recommendations about the research and materials presented.

7. The author's abstract

The abstract reflects the essence of the thesis and meets the requirements. It is presented in 74 pages and consists of parts that present the structure and content, main results and contributions of the dissertation.

CONCLUSION

I am of the opinion that the presented dissertation of Dr Dimitrina Nikolova Markova is up to date, has been carried out using the most modern methods of imaging research and has original theoretical-methodological and scientific-applied contributions to modern imaging diagnostics. The structure, content and volume of the thesis meet all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (LADAB), the Regulations on the Implementation of the LADAB and the Regulations of the Varna Medical University. The submitted materials and results fully comply with the specific requirements adopted in connection with the Regulations of MU - Varna for the implementation of the the Law on the Development of Academic Staff in the Republic of Bulgaria.

The dissertation shows that the doctoral candidate Dr Dimitrina Nikolova Markova possesses in-depth theoretical knowledge and professional skills in the scientific field of psychiatry, demonstrating qualities and abilities for independent scientific research.

Based on the above, I confidently give my positive assessment of the research conducted, presented in the above reviewed dissertation, abstract, post-dissertation results and contributions, and propose to the esteemed scientific jury to award the educational and scientific degree of "Doctor" to Dr. Dimitrina Nikolova Markova in the doctoral programme "Medical radiology and radiology (including the use of radioactive isotopes)".

3.10. 2024 г.

Prof. Dora Konstantinova Zlatareva, MD, PhD

Sofia

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