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OPINION

by Assoc. Prof. Dr. Silvia Bogdanova Tsvetkova-Trichkova, MD, PhD

MEDICAL UNIVERSITY - PLOVDIV

Head of the Department of “Diagnostic Imaging|

Regarding:

Thesis for obtaining the educational and scientific degree "Doctor".

Author: Dr. Sammar Ala Hasun El Shemeri, full-time PhD student at the Department of Imaging Diagnostics, Interventional Radiology and Radiation Therapy, MF, MU - Varna

- **Topic:** "Quantitative measurement of the epicardial adipose tissue and correlation with other markers for increased cardiovascular and metabolic risk in patients with long-term diabetes melitus type 1"

Research supervisor: Prof. Boyan Balev, MD, PhD

Grounds: Order № P-109-107 / 09.03.2022г. of Rector of MU - Varna Prof. Valentin Ignatov, MD, PhD; professional field 7.1. Medicine in the field of higher education 7. Health and sports, Scientific specialty: Medical radiology and roentgenology (including use of radioactive isotopes).

Relevance of the topic and importance of the set goals and objectives: Diabetes mellitus is one of the most common metabolic diseases and is characterized by impaired metabolism of carbohydrates, proteins and lipids. Increased accumulation of visceral adipose tissue is a risk factor for insulin resistance, which may reduce insulin sensitivity, increase the expression and secretion of proinflammatory cytokines in adipose tissue and trigger the development of diabetes and cardiovascular disease. Epicardial adipose tissue can secrete inflammatory factors and a number of hormones that regulate myocardial and coronary artery

function, as well as lipid and energy homeostasis. In an attempt to improve cardiovascular risk assessment, non-invasive imaging methods such as multidetector computed tomography and magnetic resonance imaging are increasingly being used to measure EAT. The problems considered in the dissertation correspond to the modern view on the diagnosis and interpretation of the findings. The presented topic corresponds to the scientific interests. In accordance with the topic, there is a clearly formulated goal and 7 tasks specifically defined in connection with it. There is an actuality of the problem developed in the dissertation in scientific and scientific-applied terms.

Knowledge of the problem: The literature review is extensive and thorough and shows excellent knowledge of the issues discussed in the thesis. The doctoral student makes a thorough review of modern imaging methods for the diagnosis of EAT and its importance as a factor in increased cardiovascular risk.

Research methods: The doctoral student has chosen appropriate modern methods that allow to achieve the goal and obtain an adequate response to the tasks solved in the thesis.

Characteristics and evaluation of the dissertation: The dissertation is written on 119 standard pages and is structured in the accepted way in the relevant sections, illustrated with 17 figures, 29 tables, 27 graphs and 3 appendices. The bibliographic list cites 260 literary sources, of which 5 in Cyrillic and 255 in Latin. The presented dissertation is in accordance with the requirements for structuring and volume content.

The introduction is clearly formulated and reflects the directions of the problem and the need for its development.

The literary review is comprehensive, up-to-date and focuses on the goals and objectives of the dissertation.

The purpose of the dissertation is clearly stated, the tasks are in accordance with it.

The section "Materials and methods" describes in detail the methods used and is presented sequentially. The author uses anthropometric and demographic data, imaging methods - CT, MRI, volumetric measurements with 3D Slicer-segmentation, and DEXA measurements. Computed tomography examinations were performed on a dual source multidetector scanner Somatom Definition 64, Siemens Healthineers, Erlangen, Germany, and MRI examinations - on Magnetom Verio, 3T, Siemens Healthineers, Erlangen, Germany.

Modern statistical methods are applied - statistical package IBM SPSS v.25. Correlation analysis was used - Pearson test (r), Spearman correlation analysis (rho), Spearman coefficient ($p \leq 0.05$), Comparative analysis - parametric and nonparametric, descriptive statistics.

The analysis of the results is thorough and shows the doctoral student's knowledge of collecting, evaluating information and analyzing the data obtained. The results are correctly described and well illustrated by tables and figures.

The section "Discussion" accurately examines and compares the similarities and differences with the publications presented in the scientific literature.

The conclusions are formulated concretely and clearly, reflecting the analysis of the results and meeting the set goals and objectives.

The indicated contributions of the dissertation are objective and derive from the obtained results. For the first time in Bulgaria a study was conducted to assess EAT as a risk factor for the development of cardiovascular and metabolic risk, for the first time in Bulgaria a study was conducted to assess EAT in patients with T1DM with duration more than 15 years and with poor disease control, an algorithm was developed for semi-automatic and manual segmentation of EAT, examined by CT and MRI, a study was performed simultaneously with CT and MRI to measure EAT in patients with an average age of 25 years T1DM. It is proved that a CT scan of the heart can be considered the gold standard for measuring EAT and calcium score (CaScore) at the same time, thus a single imaging study can identify two risk factors for coronary atherosclerotic disease in patients with diabetes.

The topic of the dissertation "**Quantitative measurement of epicardial adipose tissue and correlation with other markers of increased cardiovascular and metabolic risk in patients with long-term diabetes mellitus type 1**" is relevant. It meets the scientific interests and the need for research in this field of imaging.

Publications on the dissertation work: In connection with the dissertation are presented 3 refereed full-text publications, 4 non-refereed full-text publications and 1 refereed non- full-text publication, as well as 1 participation in a project. The number of scientific papers meets the necessary quantitative criteria.

Personal participation of the doctoral student: The doctoral student has personally participated in the research related to the dissertation, summarizing and analysis of the data.

Thesis summary: The thesis summary is written on 68 pages, summarizes the data presented in the thesis and the results achieved. It is sufficient in volume and fully illustrated with tables and figures.

Critical remarks and recommendations: I have no critical remarks on the merits of the thesis. Recommendation - to publish all results related to the dissertation. To maintain good publishing activity in the future.

Conclusion

The presented dissertation of Dr. Sammar Ala Hassun El Shemeri on "Quantitative measurement of epicardial adipose tissue and correlation with other markers of increased cardiovascular and metabolic risk in patients with long-term diabetes mellitus type 1" is an in-depth comprehensive study with clearly formulated goal, tasks and results and with original scientific and applied scientific contributions. It shows the theoretical knowledge and abilities of the doctoral student to collect and analyze scientific information.

The presented materials meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations on the terms and conditions for acquiring scientific degrees and holding academic positions at MU-Varna.

Based on the above, I recommend the members of the esteemed Scientific Jury to vote in favor of the award of the educational and scientific degree "Doctor" of Dr. Sammar Ala Hasun El Shemeri in professional field 7.1. Medicine in the field of higher education 7. Health and sports, Scientific specialty: Medical radiology and roentgenology (including use of radioactive isotopes).

20.04.2022 год.

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Opinion prepared by:

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