STATEMENT

by Assoc. Prof. **Katya Todorova**, MD, PhD,

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"Dr. G. Dr. Stransky, Department of Endocrinology and Endocrinology, University of Pleven,

On dissertation:

Body composition, biochemical parameters, grip strength and walking speed in women with hyperthyroidism

Dr. Gergana Tosheva Marinova

for the award of the Educational and Scientific Degree **„Doctor„**

Supervisor:

Assoc. Prof. Mira Valentinova Siderova, MD, PhD

Medical University "Prof. Paraskev Stoyanov

Varna,

Medical Faculty

Second Department of Internal Medicine

1.Information about the procedure:

In accordance with the decision of the Faculty Council of the Faculty of Medicine of Medical University of Varna with Protocol No. 33 of 20.01.2025 the procedure for the defense for the acquisition of the Educational and ScientificDegree **„Doctor"**of Dr. Gergana Tosheva Marinova is opened. By Order No. R -109-100/28.01.2025 of the Rector of MU - Varna, Prof. Dr. D. Raikov, D.M.Sc, was appointed the composition of the Scientific Jury (JJ) for the procedure and the decision of the first non-presidential meeting of the JJ was to present an opinion as an external member for MU-Varna.

The required set of documents, submitted on electronic media, was submitted on time and meet all the requirements of the Academic Staff Development Act in the Republic of Bulgaria (ASDA in RB) (http://mon.bg, as of 05.05.2018), the Regulations for its Implementation (RI ASDA) and the Regulations for the Conditions and Procedure for the Acquisition of Scientific Degrees and Academic Positions at MU - Varna.

This Opinion has been prepared in accordance with the requirements of the ASDA in RB Act and Chapter II, Section I of the RI ASDA.

2.Professional data about the applicant:

Dr. Gergana Tosheva Marinova has completed her secondary education at the III Secondary School "Acad. M. Popov with exellent grades. She has a Master's degree in Medicine, graduated from Medical University - MU "Prof. Paraskev Stoyanov" Varna, Faculty of Medicine in 2009 with excellent grades. From 2011 - 2014 she worked as a resident doctor in Dobrich and later as a specialist doctor, and from 2017 until now as a specialist endocrinologist at the Clinic of Endocrinology at the University Hospital "St. Marina". She has been a Assistant Professor in Department of Internal Medicine from 2016-2017 and from 2018-2019 - lecturer in Endocrinology and Metabolic Diseases department at MU- Varna. From 2019 - 2023 she is enrolled as a full-time PhD student at the Second Department of Internal Diseases in the Doctoral Program.

The publication activity of Dr. Gergana Tosheva Marinova is represented by 7 publications on different topics, including 1 scientific article in English and 4 scientific articles in refereed Bulgarian scientific journals. Fourof the publications are on the topic of the dissertation. The scientific activity of Dr. Tosheva includes 13 scientific papers with different topics and communications with printed abstracts, of which 2 on the dissertation topic, presented in English in international scientific forums.

Dr. Gergana Tosheva Marinova has an excellent written and spoken in two foreign languages: English and German.

3.Relevance of the problem developed in the dissertation

The chosen topic for scientific development is aimed at studying the role of the optimal tissue ratio for the health of the individual. This problem is still little studied in the world literature. There are limited and divergent studies on changes in body composition and their relationship certain biochemical parameters indicators in excess of thyroid hormones. Measurements of grip strength and walking speed are indicators that reflect the physical capacity of an individual and are markers of their overall health. They are altered in certain pathological conditions that progress with increased catabolism. The complexity of these studies in hyperthyroidism is unexplored in depth and comprehensiveness in Bulgaria and partly in the world. Therefore, a thorough study of changes in each of these indicators, in women suffering from diseases with increased production of thyroid hormones, is essential.

4.Structure of the dissertation

The present doctoral thesis is structured according to generally accepted criteria and requirements and contains all the necessary sections. The sections are well balanced, following the logic of the exposition. The ratio: review: methodological: result-analysis part is optimal and is 40:10:50 respectively. The thesis contains a total of 150 pages illustrated with 38 tables and 53 figures. The bibliography contains 325 references, 13 in Cyrillic and 312 in Latin.

The dissertation is written in a clear, precise and easily readable professional and grammatically correct Bulgarian language, with a logical sequence of presentation.

The layout of the dissertation as a whole, as well as of the attached abstract, is in full compliance with the requirements of the Regulations of MU-Varna.

5.Nature of the dissertation

The dissertation work of Dr. Gergana Tosheva Marinova is a well-structured scientific study among women suffering from hyperthyroidism. The importance of the problem is shaped by the high

prevalence and the large proportion of undiagnosed women suffering from thyroid hormone excess, as well as the fact that changes in body composition, grip strength and walking speed are identical to sarcopenic ones.

5.1The titleis clearly and accurately worded and emphasizes in summary form the scientific importance of the problem.

5.2 The aim of this dissertation is to evaluate the role of thyroid hormone excess in the female sex on changes in body composition, grip strength and walking speed, and their relationship with some biochemical parameters.

It is consistent with the title and the capabilities of the study, based on an extended set of clinical-laboratory and instrumental methods. By accomplishing the **eight specific tasks** set, the stated aim is fully met.

5.3 Material and Methods: A case/control study was performed comprising a total of 90 women divided into 2 groups: those with hyperthyroidism and those without evidence of thyroid pathology. Additionally, the hyperthyroidism group was divided into 2 subgroups- women with hyperthyroidism, without sarcopenia and women with hyperthyroidism, with sarcopenia.

All ethical requirements were met. Selection of women was based on well-chosen inclusion and exclusion criteria.

The characteristics and methodology of the anthropometric, clinical-laboratory and hormonal examinations performed are described. The assessment of grip strength, physical capacity and body composition is very accurately described.

The reliability of the obtained results was proved by using modern statistical processing methods, and the data were processed using IBM SPSS Statistics Version 26.0 for Windows 10.

5.4 Results and Discussion:

The results characterizing the study population showed that the women of the two groups had similarities in terms of age, body mass index and anthropometric data.

Analysis of hyperthyroidism according to thyroid and immune status confirmed that mean thyroid hormone levels and immunological parameters were significantly higher in hyperthyroid women.

The biochemical indices studied found that hyperthyroid women had nonsignificantly lower creatine phosphokinase values and significantly lower vitamin D levels.

Examination of body composition showed that women with untreated hyperthyroidism had significantly lower bone mass and one-third met the criteria for sarcopenia.

Also, they had a lower mean visceral fat mass and a smaller percentage of whole-body subcutaneous fat. The absolute amount of muscle tissue in each of the body regions examined was significantly less in them.

Grip strength was almost double with lower values in women with hyperthyroidism. Walking speed was significantly slower among women with hyperthyroidism.

The Sarcopenia Scoring Index for Muscle Tissue in the Extremities (ASMI) reported that the mean ASMI in hyperthyroid women was higher than the threshold for the diagnosis of sarcopenia.It is shown that the decrease in bone mass, paralleling the transition from eu- to subclinical and overt

hyperthyroidism, is independent of the thyroid status of women. A negative correlation between age and bone mass was found only among the hyperthyroid group.

A positive association was found between weight, BMI, waist and hip circumferences, and subcutaneous adipose tissue in each of the four limbs, independent of the individuals' thyroid status, and the strength of the associations was significant to strong. As height increased, the amount of muscle tissue in each body region examined rose in parallel. This relationship is particularly strong and is independent of thyroid hormone level, and it persists under conditions of hyperthyroidism.

The enhancing effect of hyperthyroidism on age as a risk factor for sarcopenia is demonstrated.

No association was found between any of the biochemical parameters, 25(OH)D, creatinine, creatin phosphokinase and albumin with body composition and amount of muscle tissue.

There was evidence of an association between hyperthyroid status and a weakening of grip strength, a decrease in ASMI and a slowing in walking speed. Increases in FT3, but not FT4, as well as TPO Ab and TRAb antibodies, were accompanied by decreases in grip strength and ASMI.

Particularly valuable were the results of the data analysis in the sarcopenia subgroup which found significantly lower bone mass. This result correlated with the data from the correlation analysis indicated an association with lower height and weight in the

This result compared with the data from the correlation analysis shows an association with lower height and weight in this subgroup.

In the discussion, the results obtained are commented very thoroughly and competently. The logical and spatial nature of the explanations, the voluminous nature of the studies and their analytical nature give the developed scientific work an outstanding scientific value and originality.

5.5 Thessis's Conclusions.

In accordance with the results obtained as well as the data from the literature review, 21 conclusions were formulated. They are specific and clear.

The significance of the presented results and conclusions is due to the precisely fomed groups and subgroups, as well as to the excellent methodology and precise statistical treatment of the data.

5.6 Contributions and relevance of the development to science and practice:

Dr. Gergana Tosheva Marinova's self-assessment consists in outlining a total of eight contributions. Three of the formulated contributions are original for Bulgaria and are one of the few in the world. The remaining 5 contributions are pioneering for Bulgaria.

6. Publications on the dissertation topic:

A list of 4 publications on the topic of the dissertation published in Bulgarian language journals is presented. Dr. Tosheva has presented parts of her work in five scientific forums, one in Bulgaria with international participation and four foreign.

Conclusion:

The dissertation of Dr. Gergana Tosheva Marinova on **"Body composition, biochemical parameters, grip strength and walking speed in women with hyperthyroidism"** is an extensive, large-scale and complete study, the first of its kind in Bulgaria, which is based on a thorough literature analysis and an original research approach. It develops an understudied scientific and socially significant problem

linking changes in muscle, visceral and subcutaneous adipose tissue, grip strength and walking in women with increased thyroid function. The most important results of the thesis have been published in the Bulgarian scientific journal Endocrinology, published in English, which is a real assessment of its value.

The volume and quality of the scientific work, the original results, the in-depth analyses, the conclusions drawn and the contributions fully meet the requirements for the development of a dissertation for the Educational and Scientific Degree **„Doctor“**.

The dissertation and the abstract thus presented are in compliance with the formal requirements of the Law on the Development of the Academic Staff of the Medical University of Varna, the Regulations on the Development of the Academic Staff of the Medical University of Varna.

In view of this, I confidently give my positive evaluation and vote "YES" the award of the Educational and scientific degree **"Doctor"** in Medicine to **Dr. Gergana Tosheva Marinova** in the professional field of Medicine in the scientific specialty of Endocrinology.

Pleven, 27.02.2025Assoc. Prof. Katya Todorova MD, PhD