**Opinion Statement**

by **Prof. Dr Aneliya Klisarova, MD**

Department of Imaging Diagnostics and Radiotherapy

Medical University-Varna

on the dissertation submitted for academic and scientific degree

**“Doctor”**

in higher education field: 7. Health and Sport,

professional field: 7.1. Medicine,

scientific specialty “Nuclear Medicine”.

**Dr Albena Dimitrova Botushanova,**

 Department of Imaging Diagnostics and Radiotherapy

Faculty of Medicine

Medical University-Varna

Title of the dissertation:

***Nuclear Medicine Methods for Evaluation of Abnormal Parathyroid Glands in Patients with Primary and Secondary Hyperparathyroidism***

Dear members of the Scientific Jury,

By Order of the Rector of Medical University Varna and as Chairman of the Scientific Jury; I have been appointed to give a statement of opinion on Dr Albena Botushanova’s dissertation.

1. **Significance of the topic and formulation of aim and objectives:**

 The relevance and significance of the topic are determined by the difficulties in diagnosing primary and secondary hyperparathyroidism, the asymptomatic course in some patients, the disease being detected only with the changes of serum calcium, phosphorus and PTH levels. In most patients (85-90%) a solitary parathyroid adenoma is visualized and in the rest 10-15% a primary parathyroid gland hyperplasia is present.

The above suggests that the detection of parathyroid adenoma or hyperplasia with nuclear medicine methods is important for the therapeutic behaviour in hyperparathyroidism.

The aim is clearly formulated and it is to study the diagnostic capabilities of the nuclear medicine methods for visualization of abnormal hyperfunctioning parathyroid glands in patients with primary and secondary hyperparathyroidism. The number of the objectives set by the doctoral student is eight. They are properly formulated and are in line with the aim of the study.

**2 Structure of the dissertation**

The dissertation has a traditional structure. It consists of 117 pages and contains the following sections: literature review, aim and objectives, material and methods, results and discussion, conclusions, contributions, references. The dissertation contains 4 tables and is illustrated with 33 figures.

The alignment of the sections meets the requirements. I would like to note that each component of the dissertation follows the logic of the set aim and objectives, and the conclusions naturally derive from the self-obtained results, the statistical data processing and the discussions.

1. **Literature knowledge of the doctoral student:**

The literature review of the dissertation consists of 35 pages, in which the author thoroughly analyzes and proves that very few studies directly compare the subtraction technique with single-isotope dual-phase technique and the results are contradictory. The advantages of the first technique over the other are not fully demonstrated.

**4. Methodological level and design of the research:**

A retrospective comparative study is carried out, covering a range of clinical material of 94 patients which is quite large for the applied modern diagnostic methods. There is a detailed description of the techniques and the radiopharmaceuticals used

99mTc-sestamibi,99mTc-tetrofosmin and 99mTc-pertechnetate

The study methods selected by the author and the clinical material allow the aim to be achieved and the objectives to receive an adequate response.

**5. Conformity between the aim, the results and the conclusions:**

There is logical consistency between the aim, the results, the discussion and the conclusions drawn. The self-obtained results and the discussion consist of 49 pages and are richly illustrated. They follow the course of the objectives and are presented in detail. The importance, advantages and disadvantages of each method used in patients with primary and secondary hyperparathyroidism are noted.

Presented data show the in-depth and detail analysis made by the doctoral student in the retrospective study of the patients which justifies the faithfulness of the conclusions.

**6. Analysis of conclusions and contributions:**

The dissertation ends with 11 conclusions and 9 contributions. I assume the contributions according to the author's own self-assessment and I would like to emphasize that the dissertation presents summarized results of nuclear medicine examinations outlining the advantages and disadvantages of single-isotope dual-phase technique and dual-isotope subtraction with 99mTc-sestamibi and 99mTc-tetrofosmin, as well as the role of SPECT imaging and topic localization of abnormal parathyroid glands to minimize subsequent surgical intervention. An algorithm for parathyroid gland examination is developed.

**7. Critical remarks and recommendations:**

I have no critical remarks to question the methods, the evidence, the discussion of the results obtained and the conclusions drawn.

**8. Publications and scientific events:**

The results from the doctoral student's research on the topic have found place in four publications, one international and two national scientific forums.

**9. Personal impressions from the candidate:**

Dr Albena Botushanova is a well-established specialist respected both by imaging diagnostic specialists and by her colleagues in the clinical practice.

**10. Conclusion:**

**With reference to the scientific merits of the dissertation and its importance in everyday clinical practice, I convincingly recommend to the members of the honorable Scientific Jury to award Dr Albena Botushanova with the scientific degree “Doctor” for her dissertation thesis titled: *"Nuclear Medicine Methods for Evaluation of Abnormal Parathyroid Glands in Patients with Primary and Secondary Hyperparathyroidism”***

13.12.2018 Prof. Dr Aneliya Klisarova, MD