

OPINION

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Regarding fulfilling the requirements for achieving a scientific degree "**Doctor of Sciences**"

in area of higher education: 4. Natural Sciences, Mathematics and Informatics; professional field: 4. 3. Biological Sciences (Molecular Biology).

Candidate: assistant professor Tihomir Iliev Vachev, PhD - University of Plovdiv "Paisii Hilendarski"

Dissertation topic: „Comparative genomics, transcriptomics and proteomics research in neurodevelopmental disorders,,

1. General description of the submitted materials in the competition

By order № P33-5262 of 29.10.2020 of the Rector of the University of Plovdiv "Paisii Hilendarski" (PU) I was appointed a member of the scientific jury established for the evaluation of a dissertation titled „Comparative genomics, transcriptomics and proteomics research in neurodevelopmental disorders,, for a scientific degree "Doctor of Sciences" to be awarded in the area of higher education: 4. Natural Sciences, Mathematics and Informatics; professional field: 4. 3. Biological Sciences (Molecular Biology). The author of the dissertation is Tihomir Iliev Vachev, PhD, currently an assistant professor in the Department of Plant Physiology and Molecular Biology, Faculty of Biology, University of Plovdiv "Paisii Hilendarski". Presented paper set of the materials is in accordance with Article 45 (4) of the Regulations for the Development of the Academic staff of Plovdiv University and includes the following documents:

- application to the Rector of the University of Plovdiv for disclosure of the procedure for defense of the dissertation;
- CV in European format;
- a copy of the diploma for the educational and scientific degree "Doctor";
- protocols of department council related to the opening of the procedure and the preliminary discussion of the dissertation;

- dissertation work;
- summary of the dissertation;
- list of scientific publications on the topic of the dissertation;
- copies of scientific publications (a total of 9, 8 of which are indexed in Scopus);
- declaration of originality and authenticity of the attached documents;
- reference for compliance with the minimum national requirements;

Notes on candidate's career profile

T. Vachev acquired bachelor's and master's degrees from the University of Plovdiv “Paisii Hilendarski”. Following is the acquisition of two doctoral degrees, the first of which is at the same university. The second doctoral degree "Genetics" was earned at the Medical University - Plovdiv and is indicative of the candidate's desire to improve his professional level by obtaining new knowledge and skills. Since 2013, he has been affiliated to the University of Plovdiv “Paisii Hilendarski” as an assistant professor in the Department of Plant Physiology and Molecular Biology where his scientific career has been progressing.

2. Current state of research

Mental disorders, including schizophrenia and autism spectrum disorder (ASD), are serious diseases with a negative socio-economic effect. They are associated with reduced ability to work and social adaptability which makes the individual problem socially significant. Mental disorders are difficult to diagnose and require complex, and often costly approaches. In this sense, the early detection and assessment of the development of a specific disease is essential for its successful control. Despite advances in the development of modern medicine, there is a need for specific diagnostic and prognostic biomarkers that can correctly and at an early stage identify diseases. Therefore, the research, presented in the dissertation, responds to the current needs and trends in the treatment of neurodevelopmental disorders.

3. Level of competence

The literature review covers 110 pages and represents almost 1/3 of the dissertation. Presented are the typical characteristics of neurodevelopmental disorders, diagnostic approaches and related challenges that are in the focus of contemporary science. The current molecular

approaches for diagnosing neurodevelopmental disorders are described in detail with a clear indication of not only their advantages but also their limitations. Literature sources, numbering 712, have been used for the preparation of the dissertation. Most of them are from the last 5 years which is indicative of the relevance of the research.

4. Research methodology

The study is extensive and includes genomic, transcriptomic and proteomic analyzes which represent different approaches in the search for opportunities to diagnose neurodevelopmental disorders. The methods are clearly described, although the detailed steps, provided by the kits used in the specific analyzes, could be spared. It is not clear which of the results are generated by the candidate and which are the results of external services.

5. Characteristics and evaluation of the dissertation and contributions

The dissertation is extensive and comprehensive and presents a large number of results. It gives an idea of the potential of different molecular approaches for diagnostics of neurodevelopmental disorders, rather than a specific link between genome, transcripts and proteome. There is no section "Purpose and tasks", which would give greater focus and clarity to the dissertation. The discussion of the results is in a separate section, which makes it difficult to comprehend them, determine their degree of originality and significance against the background of global achievements in this field. The main contribution of the dissertation is the identification of candidate miRNA molecules and protein-encoding genes with potential biomarker characteristics in ASD and schizophrenia. The DNA bank, created by patients diagnosed with PAC and schizophrenia, as well as that of healthy individuals, allows extending and upgrading presented research.

6. Evaluation of the publications and the personal contribution of the candidate

A set of 9 articles is presented which are on the topic of the dissertation. Two of the articles are with quartile Q2, four with Q3 and two with Q4. For a short period of time, some of them have been cited many times, which is indicative of the relevance of the research and the interest in the topic and particular results presented. There are a total of 56 citations, 54 of which are indexed in Scopus and 2 in Web of Science. All articles are in English which contributes to the wide

dissemination of the results and the enhancement of the visibility of both, the candidate and the University of Plovdiv, in the field of molecular research.

7. Summary

The summary is made according to the requirements and reflects the main results achieved in the dissertation.

8. Recommendations for future use of dissertation contributions and results

Various molecular methods and approaches have been mastered and successfully applied, which is a good prerequisite for deepening, expanding and upgrading the conducted research. The obtained results are a good basis for participation in national and international projects and competitions.

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), the Regulations for application of ZRASRB and the respective Regulations of the University of Plovdiv. The presented materials and dissertation results fully comply with the specific requirements of the Faculty of Biology.

Presented materials shows that Tihomir Iliev Vachev has in-depth theoretical knowledge and professional skills in the scientific specialty "Molecular Biology" and has the capacity to conduct research with original and significant scientific contributions.

Due to the above, **I confidently give my positive assessment** of the research presented by the above reviewed dissertation, summary, results and contributions, and I propose to the esteemed scientific jury to award the degree of "Doctor of Science" to Tihomir Iliev Vachev in the area of higher education: 4. Natural Sciences, Mathematics and Informatics; professional field: 4. 3. Biological Sciences (Molecular Biology).

09. 12. 2020 г.

Plovdiv

Opinion prepared by:

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