

To:  
The Chairman of the Scientific Jury,  
determined by Order No R-109- 469/09.11.2023  
of the Rector of Medical University “Prof. Paraskev Stoyanov”  
Varna

## ***OPINION***

**From: Prof. Anton Bozhidarov Tonchev, PhD, PhD** – Head of the Department of Anatomy and Cell Biology, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna, Bulgaria

the dissertation work for the award of the educational and scientific degree “**Doctor**” in the field of higher education 7. Health and sport, professional field 7.1. Medicine, **specialty “Anatomy, Histology and Cytology”**.

Author: ***Dr. Martin Nikolaev Ivanov***, Department of Anatomy and Cell Biology of the Medical University “Prof. Paraskev Stoyanov” Varna.

**Subject:** “Proliferation and differentiation of progenitor cells in the subventricular zone of the end-brain of adult primates”

**Scientific Supervisor:** Assoc. Prof. Dr. Stoyan Pavlov, MD

## **1. Review procedure**

By Protocol No 1 of 21 November 2023 of the first meeting of the Scientific Jury, I was appointed to prepare a review of the scientific work prepared by the candidate Dr. Martin Nikolaev Ivanov under the procedure for obtaining an educational and scientific degree “Doctor” at the Medical University of Varna. Martin Nikolaev Ivanov’s “Proliferation and differentiation of progenitor cells in the subventricular zone of the final brain of adult primates” for the award of academic degree “Doctor/PhD” of the doctoral program “Anatomy, Histology and Cytology”. Martin Ivanov is a regular doctoral student at the Department of Anatomy and Cell Biology of MU-Varna. He was enrolled in the same Department as a PhD student on regular training with Order of the Rector of MU-Varna R-109-81/date 01.02.2019.

By Protocol No 11/23.10.2023 of the Faculty of Medicine of MU-Varna, Martin Ivanov was assigned with the right of defence after a positive assessment of his thesis. The procedures for the assignment and assignment of Dr. Ivanov were carried out in accordance with the requirements of the ZRASRB the Rules for the conditions and procedure for obtaining academic degrees and holding academic positions at the Medical University “Prof. Paraskev Stoyanov”- Varna. The materials presented by the applicant on electronic means for the preparation of a review, as well as a paper dissertation and autoreferate are in accordance with the requirements of ZRASRB and the Rules for the conditions and procedure for obtaining academic degrees and holding academic positions at the Medical University “Prof. Paraskev Stoyanov” - Varna.

## **2. Short biographical data of the PhD applicant**

Martin Ivanov was born in 1994 in Sofia and graduated from the Medical University “Prof. Dr. Paraskev Stoyanov” – Varna in 2018. In the period 2019-2023 he specialised in Anatomy, Histology and Cytology at MU-Varna. He acquired a medical specialty in 2023. He held the following positions:

- 2018-2019 — honorary Assistant Professor at the Department of Anatomy and Cell Biology at MU-Varna

- 2019 – Assistant Professor at the Department of Anatomy and Cell Biology at the Medical University “Prof. Paraskev Stoyanov” - Varna

- 2019- to date – Junior researcher (R1) neural stem cells, TRANSTEM project, Medical University “Prof. Paraskev Stoyanov” Varna.

His teaching experience included leading classes in anatomy, histology and cytology of medical and dental students. She also took part in the freely-elected course in neurobiolopathy at the Department of Anatomy and Cell Biology. He is a member of theBulgarian Anatomical Society, Society for Molecular Biology and Evolution, etc.

## **3. Knowledge of the scientific problem of the dissertation**

The introduction clearly motivates the need for research in the field of dissertation. A summary of the main scientific data at the moment on the topic and the availability of blank fields, which deserve the original scientific research and analysis of the author. The literature review, spread over 20 standard pages, shows the dissertant’s good awareness of available literary sources on the topic of the presence of neurogenesis in mammals, how to detect and activate them. A detailed anatomy of the object of the

study is presented in a way it introduces into the presented research methodologies. The purpose and objectives of the study are clearly defined.

#### **4. Methodology of the study**

All the methods used are clearly presented. Statistical methods are described in detail. There is information about a positive ethical evaluation prior to the collection of brain tissues.

**Conclusion: The materials and methods are described in such a way as to allow the experiments to be repeated by other researchers.**

#### **5. Evaluation of results**

The results extend over ~41 standard pages, which contain the main part of a total of 47 figures of the dissertation. The figures are of very good quality and clearly visualise the thesis of the thesis.

The results on each of the tasks formulated in the ***Objective and Tasks*** section of the dissertation work are consistently presented. The dissertant has identified candidate genes for the identification of neural stem squats. A large number of tissue stains were performed in both monkeys and humans. The phenotypic characteristics of the genes selected for study in monkeys are clearly presented, one of which has been studied for the presence and phenotype in human brain tissues. Some of these candidate stem/progenitor cell markers in the largest mammalian neurogenic niche have an exclusive interesting expression in the brain (e.g. APLNR), which promises the development of future developments to investigate in detail the expression and

function of the candidate genes in nocerebraltissue and their role in the development of the nervous system.

**Conclusion: the results presented support the thesis of the dissertation.**

### **6. Contributions and importance of development for science and practice**

The current thesis is of application to a specific biological disciplines – cell biology and histology. The results are mainly of an innovative nature from a fundamental scientific point of view. As the main contributions of the dissertation work, I appreciate the identification of genes of a stem-like character.

**Conclusion: The discovery of different genes with the potential to mark progenitor cells provides a justification for the meaning of the work performed on the dissertation, which is why I assume that the work possesses qualities for acquiring the degree “Doctor”.**

### **7. Evaluation of publications on dissertation**

The list of publications attached to the procedure for acquiring a PhD degree includes 2 publications in Bulgarian and international journals. One of Dr. Martin Ivanov’s publications is in a magazine with an index factor.

1. *Stoyanov, D.S.; **Ivanov, M.N.**; Yamashima, T.; Tonchev, A.B.*

*Expression of transcription factor ZBTB20 in the Dultp rimate neurogenic niche under physiological conditions or after Ischemia. Genes 2022, 13, 1559. <https://doi.org/10.3390/genes13091559>*

2. **Ivanov, M.N.**; Pavlov, S.S. *Distribution and expression of Apelin system in the mammalian body- a review. Biomed Rev 2023, 34, xx-xx*

In addition, the dissertant also presents reports of participation in a scientific conference:

National:

1. VII National Conference with International Participation “Morphological Days”  
June 8-10 2018
2. XXIV National Congress of the Bulgarian Anatomical Society May 31 – June 2 2019
3. XXVI National Congress of the Bulgarian Anatomical Society September 29-October 01 2023

International:

1. X International Symposium on Clinical Anatomy October 6-8 2016
2. Humboldt Kolleg Science without borders: Alexander von Humboldt’s Concepts in Today’s World Varna, September 18-21, 2019
3. Black Sea Neurogenesis 2023, Varna, Bulgaria, 01-03 June 2023, Poster
4. Gene regulatory mechanisms in neural fate decisions 07-10 September 2023
5. Alicante, Spain- Poster, XI International Symposium on Clinical Anatomy October 2-4 2020 meeting)

## 8. Personal involvement of the author

Based on the provided dissertation papers and publications, I believe that the participation of the author in the conducted research is **central**.

## 9. Autoreferate

The anterior reference, presented together with the dissertation, accurately reflects the main results achieved in the dissertation.

## 10. Critical remarks and recommendations

It would be good to carry out an extension of the study by increase in the number of cases studied.

## CONCLUSION

The dissertation work on the award of the educational and scientific degree “Doctor” in the field of higher education 7. Health and sport, professional field 7.1. Medicine, PhD programme “Judicial Medicine and Deontology” **by Dr. Martin Nikolaev Ivanov**, Department of Anatomy and Cell Biology of the Medical University “Prof. Paraskev Stoyanov” Varna **complies with the ZRAS of the Republic of Bulgaria and the Rules for the RAC of MU-Varna for the acquisition of the degree “Doctor”**. I will **therefore vote positively** and allow myself to recommend the same to the other members of the respectable Scientific Jury, as defined by Order No R-109-469/09.11.2023 of the *Rector* of the Medical University “Prof. Dr. Paraskev Stoyanov”, Varna.

A handwritten signature in black ink, reading "Anton Tonchev". The signature is written in a cursive style with a large, sweeping flourish over the 'T'.

Prof. Dr. Anton B. Tonchev, MD  
Department of Anatomy and Cell Biology  
Medical University – Varna

Varna, 19.12.2023