

REVIEW

By Professor, Doctor of Sciences Dr. Iskra Georgieva Raynova - National Center for Infectious and Parasitic Diseases (NCCP), professional area 7.1. Medicine

Regarding: scientific works for participation in a competition for the academic position of "Associate professor", by professional direction 4.3. Biological Sciences, announced in the State Gazette, no. 54/23.06.2023 with candidate assistant professor, Radoslava Emilova Grozdanova, Ph.D.

I. **Brief biographical details of the applicant**

Assistant professor Radoslava Grozdanova completed her higher education with a master's degree in biology at the Faculty of Biology of Sofia University in 2003. In the same year, she started working as a biologist in the clinical laboratory of St Magdalena Medical Center - Pernik, and from 2005 entered work at a Specialized hospital for active treatment of children's diseases "Professor Ivan Mitev" - Sofia, where she worked consecutively on National screening programs and functional endocrine diagnostics, and in the cytogenetic laboratory. Since 2016, she has been working at the National Reference Laboratory of Immunology at the National Center of Infectious and Parasitic Diseases (NCIPD). Meanwhile, for the period 2010 - 2014, she was a full-time doctoral student at the Faculty of Biology, Department of "Animal and Human Physiology" of the University of St. Kliment Ohridski, Sofia, in the higher education field 4. Natural sciences, mathematics and informatics, professional direction 4.3. Biological Sciences. The topic of the dissertation defended in 2014 is: **Role of perivascular adipose tissue mediators in arterial contraction**. Radoslava Grosdanovae is fluent in written and spoken English, and Russian, and has excellent computer literacy.

II. **Assessment of compliance with the minimum national requirements and the requirements of the NCIPD**

The scientific works, citations, and participation in scientific research projects presented by the candidate meet the minimum scientific requirements for occupying the academic position of Associate professor in the higher education field 4. Natural sciences, mathematics, and informatics professional direction 4.3. Biological sciences, scientific specialty Immunology, according to Art. 26 of the Law on the Development of the Academic Staff in the Republic of Bulgaria, Art. 1a and Appendix to Art. 1a, paragraph 1 of the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of

Bulgaria (Government Gazette, No. 56/2018) and the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria of the NCIPD.

III. Research activity and results

To participate in the competition, Radoslava Emilova Grozdanova submitted the following scientific works according to the NACID indicators for holding the academic position "Associate Professor" in the Department of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Direction 4.3. Biological Sciences:

1. Dissertation for PhD

2. Scientific publications in refereed and indexed world-renowned journals that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus) - 31 of which, with quartiles from Q1 to Q4 are: Q1 - 4; Q2 - 6; Q3 - 4; Q4 - 17.

3. Two chapters of a published collective monograph titled: 'Naturally acquired and post-vaccinal immunity to SARS-CoV-2: when and how to test it', and 'Viral load, dynamics of specific antibodies and levels of major cytokines according to the severity of COVID-19. In COVID-19 in 2020-2021, edited by I. Hristova and N. Yancheva.

The participation of Assistant Professor Radoslava Grozdanova in the monograph is significant (42 pages in total). The emergence of the SARS-CoV-2 pandemic, the peculiarities of the progression of the infection, the immune response against the virus in humans and its specificity in recovered and vaccinated, as well as the applied methods for diagnosing the disease COVID-19, are examined in detail.

4. In addition to the publications indexed in world-famous databases, the candidate has also presented 17 articles in Bulgarian and international journals without the existence of a quartile.

5. A significant part of the scientific results of Assistant Professor Grozdanova have been presented at 173 scientific forums. The total number of participations with reports or posters in international conferences or congresses is 63, with published abstracts in journals with an impact factor of 34 (23 were published in journals with quartile Q1, 6 in Q2, and 5 in journals with Q3). In national forums, the total number of participations is 110.

An overview of Radoslava Emilova's research output shows her varied interests. After obtaining a master's degree in biology from The Faculty of Biology of the St Kliment Ohridski University and in the period 2005-2015 Radoslava Grozdanova participated and significantly contributed to conducting mass neonatal screening programs for congenital hypothyroidism and congenital adrenocortical hyperplasia of all newborns in Bulgaria. In these studies, scientific communications (4 publications with quartile Q4 and 14 published abstracts from scientific

forums in journals with quartiles Q1-Q3) of assistant professor Grozdanova are connected to the development and implementation of methods for determining different hormones and optimizing functional endocrine diagnostics.

After the acquisition of their Ph.D. and starting work at the NCIPD and the National Reference Laboratory of Immunology, her essential theoretical and applied scientific contributions are mainly related to the cellular immune response against viruses and bacteria, as well as cytokine production, small signaling molecules, and intercellular signaling, oxidative stress, and iron homeostasis in various diseases. Working on infectious immunology, important are her studies related to examining the immune response against SARS-COV-2 in recovered and vaccinated individuals, carried out between 2020 and 2023. The emergence of the COVID-19 pandemic in early 2020 necessitated conducting large-scale studies on the levels of specific antibodies as well as their persistence in the human body by identifying virus-specific stem-like memory T lymphocytes as a robust marker of protection. In this regard, the co-authorship of Radoslava Grozdanova in a monograph dedicated to COVID-19 is particularly useful and of great value. In addition to writing two chapters of the monograph, the results of research on the problems of COVID-19 have been presented in 7 more publications (with quartiles Q1-Q4) and six participations in scientific events with the publication of the abstracts in journals with quartiles Q1-Q4, which are proof of the consistent and systematic approach to these problems.

They are of no less importance and scientific value studies of HIV infection. She is actively involved in the analysis of the diversity of HIV-1 subtypes and recombinant forms in Bulgaria, studies on cellular immunity in HIV+ patients on long-term antiretroviral therapy, as well as other indicators, such as intracellular iron and hepcidin, which are important in such patients. Participation in analyses related to HIV infection was reflected in 6 publications with quartiles Q1-Q4 and one journal abstract with quartile Q1.

In addition to studies on the immune response to viruses assistant professor Grozdanova also performs analysis of cellular immunity in patients with active and latent tuberculosis. As a specialist who knows and masters a wide range of modern diagnostic methods (flow cytometry, interferon-gamma-based tests, determination of cytokine levels), she has contributed to a more complete study of tuberculosis infection in persons at risk and in patients with data on various stages of MTB infection. About the infection with *Mycobacterium tuberculosis* the candidate has presented three publications with quartile Q4 and two participation in international forums, of which abstracts have been published in journals with impact factor and quartile Q1.

Together with fellow immunologists assistant professor Grozdanova also participated in the studies of T-cell responses in patients with allergies. In addition, the determination of the

levels of serum pro-inflammatory cytokines in patients with dental implants was performed for the first time in the country. Studies in the field of allergology are reflected in two publications with quartiles Q2-Q4 and two participations in international forums and published abstracts in journals with impact factor and quartiles Q1-Q2.

The interdisciplinary nature of the scientific production of assistant professor Radoslava Grozdanova also stands out in the publications related to the studies of iron homeostasis, as well as oxidative stress and intercellular signaling. In particular, research on hepcidin, which is an important protein in iron control, is of both fundamental and practical importance. Assistant Professor Grozdanova participated in the elaboration of a method for determining serum hepcidin in medical practice in Bulgaria, in the study of the serum levels of this protein in patients with various diseases and in healthy individuals, as well as in the study of the role of hepcidin in iron metabolism. This research activity is reflected in two publications with quartiles Q1 and Q4, in 11 participation in international forums with published abstracts in journals with an impact factor and quartiles Q1 (10) and Q2 (1), as well as in 12 other publications in Bulgarian and international scientific journals without a certain quartile according to SJR.

Regarding oxidative stress and intercellular signaling, Radoslava Grozdanova has developed and implemented flow cytometric and spectrophotometric methods for the determination of reactive oxygen species (ROS) and superoxide dismutase (SOD), which are important for cell function. Determination of intracellular free oxygen radicals is important in patients with viral infections, in aging, and in the use of narcotic substances. The candidate research on these issues is summarized in 4 publications with quartiles Q2-Q4.

In over 40% of scientific works published in peer-reviewed world-renowned databases assistant professor Grozdanova is the first author, which shows her significant participation in their compilation and implementation. The total impact factor of the candidate is also impressive - 34.775, and after defending her doctoral thesis it is 31.688. This shows the activity of Radoslava Grozdanova in terms of sharing the results of the conducted research and the significance of her research work.

Proof of the importance of Radoslava Grozdanova's scientific work is the large number of citations of the publications attached to the documents - 164, of which 74 (45%) are from the last 5 years, which clearly demonstrates the upward development of her research work after the defense of her dissertation.

For the period 2011-2022, Radoslava Grozdanova participated in the development and implementation of 18 scientific research projects, which chronologically reflect her interests,

and the obtained results were applied in practice through the development of various diagnostic methods.

IV. Learning and teaching activity

Assistant Professor Grozdanova is highly involved in teaching activities, having led exercises for students from the Faculty of Biology of SU "St. Kliment Ohridski" since 2012 (totaling 105 hours), and from the Faculty of Biology of the University "Prof. Dr. Asen Zlatarov," Burgas (70 hours for 2022-2023). Since joining the "Immunology" department of the NCIPD in 2016, she has conducted exercises and seminars in post-graduate courses, with a total schedule of 107 hours until 2022. In 2013, she served as the academic supervisor of a graduate who successfully obtained a Master's degree. Her expertise in infectious immunology, molecular genetic methods, and biomarkers is demonstrated in her involvement in training students on topics such as "medical genetics."

As a graduate student in the specialty "Biochemistry" with a training base at the MU-Department of Medicinal Chemistry and Biochemistry, Sofia, Grozdanova completed 15 additional courses related to immunology, flow cytometry, genetics, and molecular-biological diagnostic methods from 2011 to 2023, both abroad and in Bulgaria. Her participation in these training courses shows her eagerness to gain deeper knowledge in her areas of scientific interest.

V. Administrative and public activity

Radoslava Grozdanova carries out active administrative and public activities. She is a member of several professional and public organizations, such as:

- Bulgarian Association of Clinical Immunology (BACI)
- Union of Bulgarian Scientists, Section "Immunology"
- European AIDS Clinical Society (EACS)

Indicator of the qualities of Radoslava Grozdanova is also the inclusion in various administrative activities carried out in the NCIPD.

VI. Personal impressions of the candidate

I am acquainted with Radoslava Grozdanova on a personal level. We worked together in NCIPD (in different departments), and upon reviewing her competition materials, I came away with the impression that she is a highly innovative and diligent scientist, expert, and educator. She is adept at working collaboratively with her team and achieving established objectives.

VII. Opinions, recommendations and notes on the activity and achievements of the candidate

The materials provided by Assistant Professor Grozdanova showcase her extensive research and teaching experience, including practical achievements in her scientific endeavors.

I suggest pursuing further research into the cellular immune response in different pathogens, as well as exploring innovative studies on iron metabolism and oxidative stress through broader interdisciplinary collaboration and sharing of the findings.

Conclusion

I fully endorse Assistant Professor Radoslava Emilova Grozdanova, Ph.D., for the administrative position of "Associate Professor" in the scientific specialty of "Immunology" under scientific direction 4.3 Biological Science. Her impressive qualifications and potential make her an ideal candidate, and I give her a positive assessment as a member of the Scientific Jury for the competition.

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Prof. Dr Iskra Raynova, DsC

